Saiyed Raza Hashim
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Perspectives on Inclusive Policies for Development in India

In Honour of Prof. R. Radhakrishna

Springer

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(1942–2022)

The book is dedicated to the life and achievements of Prof. R. Radhakrishna who sadly passed away before it could be presented to him.

Foreword

This volume in honour of R. Radhakrishna consists of important essays. Most of them are extensively revised versions of previous papers, showing that Radhakrishna is not a fly-by-night operator and his interests are deep-rooted in lifelong cogitation, where genuine advance is incremental. If not, there would be no problems remaining since solutions do not need elaboration after total success, apart from in textbooks. Also, these are difficult times and many authors reflect on the present problems, giving the volume relevance in the '*annus horribilis*' as the Queen of England put it.

C. Rangarajan and Mahendra Dev write on the Rangarajan Committee Poverty Report. It is in a sense the latest in the official reports on Radhakrishna's lifelong interest: namely poverty and malnutrition. In spite of C. Rangarajan's valiant efforts, the report did not interest GoI policy-makers, which is difficult to understand, since from all accounts poverty and malnutrition remain serious problems and in a sense were highlighted in the forced migrations in early 2020. In fact, the cry of free grain is very compelling now (see IIMA Alumnus Webinar, COVID-19, introduction by Y. K. Alagh and also E-Adda, 29 October 2020, Uday Kotak). The chapter adds on social and health security to nutrition security as an objective. It has been suggested that the workforce weights it uses are in fact from the 1978 Poverty Report for rural labour force proportions and that may need re-examination, since such proportions have changed markedly since the seventies of the last century. Female labour participation has been highlighted as a major source of concern in Radhakrishna's work.

Former Governor, Reserve Bank of India, Duvvuri Subbarao mentioned about laments treasury dominance of fiscal and monetary policy. The trend he correctly states is more pronounced in the COVID-19 period. His essay brings out neatly the trilemmas in economic policy as one approaches full employment, and will interest policy-makers. During pandemic period, this author has accepted fiscal profligacy as a fact. Saving lives is important, and the dead will not come back, while those who are alive can be taken care of after the pandemic subsides (see the present author's Inaugural Lecture at the IIM Public Policy Group's Webinar on COVID). There is of course no question that this is a second-best solution: Dr. Subbarao's advice being 'optimal'.

Dilip Nachane and Partha Ray trace the history of the modelling reportedly used in the IMF, beginning with Pollack's Flow of Funds Framework and getting into the later programming models. While the earlier, Pollack models had an accounting framework of integration with National Accounts and were a policy tool of some power in terms of applicability; later general equilibrium policy models gave solutions of a directional kind and Nachane and Ray, bring out the inability of the IMF to go against the interests of the G7, if global stability so required. Models using prices and income distribution variables were a passion of Radhakrishna; with his Complete Demand Systems one of the earliest attempts at modelling income distribution in Demand Theory in India. The policy use of such models, as Nachane and Ray bring out, is another matter, but this essay does move in the direction that Erik Thorbecke visualized when he invited us for the seminar on The Theory of Economic Policy held at Amsterdam and on Income Distribution and Poverty Removal organized when Jan Tinbergen retired, saying that the seminar will continue until 'the problem is solved' by that meaning the intellectual policy problem.

Bhanoji Rao discusses the powerful connection between education and inequality. My favourite example is female education and the demographic dividend. She goes to college, marries late, the first child comes late, the last one early, and we are on the way to another Radhakrishna's objectives; although Rao is concentrating on early girl child education, a more critical and crucial problem.

Hans-Bernd Schäfer makes an interesting categorization of the economic consequences of accidental events and the legal principles underlying compensation for such events. Political and other claims eventually have to give way to such legal structures, which incidentally may or may not jive with welfare economics. Rahul Mukherji goes further using principles of The Theory of Public Policy (wider than the stricter economic laws of Tinbergen's Theory of Economic Policy in which the work is embedded (Radhakrishna being leading example)). In terms of The Theory of Economic Policy of the kind Radhakrishna has modelled, Mukherji's 'Tipping Points' would be open-ended. However, to be fair to Mukherji, modern institutional economics is pushing in the direction of explaining actual events in sociopolitical terms (as can be seen from the Nobel Prizes of last few years in economics). It is a little early to pass judgements on these reflections.

M. V. Nadkarni has discussed the viability crises of Indian agriculture. Nadkarni has a distinct perception of the crises of society in terms of fundamental environmental terms like climate change, which I have analysed separately in an invited Foreword to a festschrift in his honour edited by Ananta Giri; and an interesting question that arises from this kind of work is whether the process of entropy (as defined by the Harvard economist of Romanian origin: Nicholas Georgescu-Roegen) has already begun (A Doomsday Theory as it were).

Atul Sarma has a well-documented piece, with considerable detailed referencing on the abolition of the Planning Commission and the advent of NITI Aayog. With detail, important for researchers and students of economic policy, Sarma establishes that the NITI Aayog does not reform the erstwhile Planning Commission and its mandate is blurred and confusing. Sarma's piece is a solid third decade of the Twenty First Century manuscript on the age old 'Why Planning' debate.

M. Dinesh Kumar has a straightforward quantitative model of water scarcity for the next two decades of this century, using the technique of scenarios, and establishes beyond doubt that if appropriate policies are not followed, India is in trouble in the life-supporting water sector. It can only be hoped that somebody out there in policy implementation reads his model.

Sripad Motiram and V. S. Ranganadham Maddali discuss the classical economic statistics questions of the latest trends in unemployment statistics, with NSS estimates showing many areas of concern with both weekly status and person day measures and the latter on recent trends in India's forte 'official statistics' estimates. The latter, a state-of-the-art chapter, is important, especially after the controversies on The Technical Committee Report chaired by Sudipto Mundle and the resignation of members of the Statistical Commission, of which Radhakrishna once had the distinction of being Chairman. It is important because the sanctity of statistics, with its errors, has to be maintained if policy has to have any factual base.

A. Narayanamoorthy discusses the feasibility of the stated objective of doubling farm income in a short period and the outlines of radical terms of trade and pricing framework to move towards this direction. Parmod Kumar discusses that old favourite palm oil taking on edible oil and its trade aspects as a policy choice, emphasizing that import policy has an impact on domestic decisions and that the needs of the consumer have to be balanced with incentives to the domestic producer. Amita Shah describes fashion khadi.

K. N. Murthy has an interesting chapter using a model he had developed, originally worked on with Radhakrishna. The model has a strong demand side using complete demand systems, rural and urban by income groups, and tracks the economic consequences of government policies. He basically posits recent policy initiatives as external shocks on the economy, beginning with demonetization. He then tracks the effects through time. He concludes that after bearing the consequences in output, income and consumption, the economy returns to its dynamic path. Apart from its policy insights, Murthy's chapter shows the analytical strength of the methods Radhakrishna has worked with and trained generations of scholars in.

All in all, these essays will be a very substantial addition to policy literature in India. They show that the elephant moves slowly. Forced pressures are like waves which dissipate. The moral is that policy has to be structured with an understanding of 'structure' and the relationship of 'outcomes' with 'instruments' working through the 'structure'. Tinbergen still matters and was justifiably the First Economic Nobel. Radhakrishna and his friends and *chelas* are a great example of this policy truth, and I am happy to have read it.

Yoginder K. Alagh

Preface

This Festschrift in honour of Prof. R. Radhakrishna is an occasion to celebrate a life dedicated to scholarship, mentoring and institution building in the service of inclusive growth. He was one of those rare economists who spent considerable effort with his peers and students to promote the view that economics as a discipline should not only be abstract and rigorous but also empirically and socially relevant. It should speak to disciplines such as sociology, politics and law, which form the context within which an economy operates to serve the poor. This volume reflects some of these aspects of Prof. R. Radhakrishna's life in the form of an incisive and wide-ranging account of the challenges facing inclusive growth in India.

Professor Radhakrishna's life as a teacher and mentor is as significant as that of a serious economist engaged with the policy process in the service of India's development process. This is evident from the large number of students and institutions that he had guided in his quest to serve the nation. The Andhra University (Vishakhapatnam), Indira Gandhi Institute of Development Research (Mumbai) and the Centre for Economic and Social Studies (Hyderabad) are only a few examples. Professor Radhakrishna, the institution builder, was involved with the evolution of the Institute for Development Studies, Andhra Pradesh (Visakhapatnam), at the time of his demise. Institution building for the professor involved imparting every kind of support to help a researcher get to the bottom of a social and economic problem without expectation of personal reward. Such teachers and thought leaders rejoice when others succeed. The silent service of such mentors cannot be measured in terms of their contribution to the economic and social growth of a nation.

Professor Radhakrishna's many contributions have manifested itself in a celebration where the leading policy economists of the country have contributed handsomely to this Festschrift. The unique facet of this volume is that it brings together not just economists from the scholarly domain, but also leading policy economists who have engaged with the Indian economy. Together, they provide a coherent rendition of the country's economic challenges and suggest mechanisms to deal with them. Eminent economists such as C. Rangarajan, Yoginder Alagh, S. R. Hashim, Dilip Nachane, Atul Sarma, Y. V. Reddy, Duvvuri Subbarao, Hans-Bernd Schäfer, S. Mahendra Dev, Sripad Motiram, Manoj Panda, M. Govinda Rao, M. V. Nadkarni and S. L. Shetty,

have engaged in scholarly adulation by contributing to six important parts concerning India's inclusive growth. The six parts deal with the instruments of economic policy-making in India; econometric assessment of the development process; governance institutions; poverty and unemployment; and sectoral challenges such as agrarian distress, urbanization and water scarcity.

The detailed introduction by Prof. S. R. Hashim surveys the evolution of India's economic policy-making. It also provides a comprehensive introduction to the chapters and the conceptual frame of this volume. Students of Indian policy-making will find that economic policy-making is both a technical and a political process. It is important to understand what kinds of ideas won support in politics and for which reasons. Such an approach to political economy will tell us why India's Second Five-Year Plan was so different from the first. Why did the green revolution occur in India? How can one understand the transition to the growth-oriented phase in 1991? What were the implications of this growth process?

The contributions combine rigorous economic, legal, political and institutional analysis and sophisticated empirical work. The chapters cover topics as diverse as theoretical debates regarding the relative importance of fiscal dominance in monetary policy, to the International Monetary Fund's (IMF) flawed approach to financial crisis management, to the political and institutional conditions under which the state in India can deliver to the poor. What is the import of the transition from the Planning Commission to National Institution for the Transformation of India (NITI) Aayog after 2014? Policy concerns such as rapid urbanization, water scarcity and agrarian distress are also addressed.

The volume brings together the six above-mentioned interrelated parts. The first part concerns the instruments of public policy with which the developmental activity of inclusive growth can be performed. Three central questions are addressed within this part. First, does the Indian state have effective instruments to deal with the issue of balanced growth among the states? Y. V. Reddy argues that apart from the Finance Commission all other instruments for safeguarding the interests of the poorer states are relatively weak. Second, should economic policy be more concerned with fiscal dominance, which implies prudent management of the fiscal situation for ensuring economic stability? Or does the COVID-19 pandemic provide a good reason for generous public spending, despite falling revenues and a dip in economic growth? The volume presents a healthy debate between Duvvuri Subbarao and M. Govinda Rao on this issue. Third, how should economic losses be compensated in the law of torts? Is it enough to compensate for pure economic losses, or should the law of torts provide provisions beyond that framework? Addressing such legal concerns has important implications for the incentives that individuals and organizations have to take risks in economic life, argues Hans-Bernd Schäfer.

The second part concerns the use of econometric modelling to assess economic management, growth and redistribution. Three central themes characterize this part as well. First, an analysis of the history of the International Monetary Fund's (IMF's) macroeconomic modelling reveals various reasons why the fund often failed in its policy objectives. Dilip Nachane and Partha Ray argue persuasively that the fund is driven more by a coherent hegemonic ideology rather than empirical scepticism.

Second, K. N. Murthy deploys modelling to assess the impact of policies such as devaluation, demonetization and reduction of the corporate tax rate on growth. Manoj Panda and Samraj Sahay deploy modelling to perform the challenging task of assessing the determinants of growth in the Indian states.

The third part of the volume discusses both the political conditions under which the governance can be improved, as well as, how to improve key governance functions of the economy. First, Rahul Mukherji argue that ideas within government evolve in a gradual way, as technocrats puzzle over policy issues. Good governance has much to do with how good policy ideas win political support to tip in favour of policies that serve the purposes of growth and redistribution. Second, the chapter by Atul Sarma argues that the replacement of the Planning Commission by the National Institution for Transforming India (NITI) Aayog did not adequately address India's policy challenges. This was despite the many problems that confronted the functioning of the Planning Commission at that time. It calls for serious evaluation of the institution. In his chapter, M. V. S. Ranganadham argues that the Indian statistical system is in need of regulatory reorganization. Collecting good statistics, after all, is important for ensuring the health of the economy. It is suggested that the National Statistical Commission should be directly responsible to the Parliament. It should be involved more intensively with standard setting and monitoring data collection.

The fourth part concerns a rigorous analysis of the measurement of poverty and unemployment. C. Rangarajan and S. Mahendra Dev argue that no matter how you calculate the poverty ratio, the empirical findings suggest that the figure is quite high. But the poverty ratio has also been declining. Also, a particular measurement of the poverty ratio would have much to do with what are the questions that a scholar or policy-maker wishes to address. Sripad Motiram makes some important observations about unemployment statistics in India. More meaningful ways of collecting the employment data are suggested in this part. Unemployment, especially among the educated youth is a pressing problem. Creating more jobs is a dire need of the hour.

The fifth part considers sectoral issues. S. R. Hashim engages with the issue of urbanization and development. Urbanization poses a serious challenge, especially for migrants. Persons living in census towns that have not become statutory towns cannot take advantage of either urban amenity that come with municipal planning, nor can they take advantage of loans and subsidies that serve the rural population. There is an urgent need to convert the status of census towns into statutory towns. Bhanoji Rao argues that it is important to address inequalities by addressing the issue of quality education for all. The next chapter in this part questions if Khadi, the cloth that inspired India to defy colonial rule, has a developmental basis, despite the adverse opinion of the Planning Commission and the Asian Development Bank? Amita Shah holds that Khadi production should be taken more seriously as an activity that can have a levelling impact on India with some technological advance and funding. M. Dinesh Kumar argues that India can deal with issues connected with water scarcity by largely turning its agricultural practices towards more efficient water utilization.

The final part on agriculture comes with some important policy suggestions. This part addresses the issue of agrarian distress. While India's agriculture sector consti-tutes approximately 15% of the gross domestic product, it feeds a majority of the

citizens. This sector also grows much more slowly than the rest of the economy. The recent farmers' protest is an indication of both the political power of farmers and the threat of distress. M. V. Nadkarni argues that non-viability of small and fragmented agricultural land holdings is a persistent threat to the sector. Moreover, much land has been degraded and it has become easier now to acquire agricultural land for industrial purposes. Non-farm employment is a promising area for improving the conditions of the poor. Possibilities for non-farm employment would improve if the government could expend more resources on skill development in rural areas.

S. L. Shetty points to the dearth of public investment in agriculture. There have been periods when agriculture has not been served with public investment. The pre-green revolution period, for example, was marred by the lack of public investment in agriculture. This was somewhat corrected by the green revolution and its aftermath. There have also been times when agriculture has received subsidies but not public investment. It is stressed that public investment rather than subsidies is the need to rescue the sector from distress.

There is a strong view that production-related incentives will not be as effective as those that are related to the procurement and minimum support price (MSP) given for crop production. A. Narayanamoorthy argues that generous MSP can certainly help the farmer. But this policy instrument is of little use if only 30% of the production is procured for receiving that benefit. The agricultural product marketing committees (APMCs) are very inefficient and lack storage and weighing facilities. Moreover, small farmers cannot often reach these facilities. It is therefore recommended that getting the farmer to access the market is an important reform task.

Finally, Parmod Kumar argues that India can save precious foreign exchange from palm oil imports by promoting import substitution in this area. Palm oil has been tried successfully in twelve Indian states with provisions for subsidizing production. First, this requires fixing a pre-harvest price that protects farmers against exposure to the vagaries of the international market. Second, efficient procurement is required. And, a trained workforce with harvest machinery is required to serve efficient production as well.

Inclusive policies for India are exhaustive in more ways than one. It discusses policy instruments that address interstate inequalities, the importance of fiscal dominance and the role of incentives to deal with compensation for economic loss. Econometric modelling is used to deconstruct the IMF's approach to financial crises as well as to assess the impact of certain measures on economic growth. Governance institutions are addressed in terms of the political conditions under which they are likely to succeed in a democracy. The challenges facing the NITI Aayog and India's statistical system are addressed. The book also engages with the measurement of poverty and unemployment. Finally, the book comprehensively addresses the challenges facing urbanization, water scarcity and small-scale industry. The agricultural sector finds a special status as the one sector to which an entire part is devoted.

In addition, inclusive policies for India are also a methodologically interesting experiment. It combines analysis of the instruments of policy with sophisticated econometric and measurement approaches. It brings together economic, political and legal approaches to appropriately address the challenge of inclusive policies.

The book also presents a variety of sectors and debates within those sectoral issues for the reader to assess their relative strengths. It is for these reasons that inclusive growth in India will guide both policy-makers and students of development policy who wish to deploy technical knowledge in the service of India's development.

New Delhi, India   Saiyed Raza Hashim
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Saiyed Raza Hashim during his long professional career spanning over nearly fifty years, has held high positions in academics as well as in government—planning and economic administration and diplomacy. He held the positions of Professor and Head, Department of Economics, M.S. University of Baroda, Director, Institute of Economic Growth, Delhi, and Director, Institute for Studies in Industrial Development, New Delhi. He served in the Planning Commission of India as Adviser, Principal Adviser, Member and Member-Secretary. He was also Member and Chairman of Union Public Service Commission, Government of India. He has extensively worked and written on issues relating to poverty and inequality, water and agriculture. He Chaired the Working Group on Wholesale Price Indices (1997–1999), and was Chairman of the National Commission on Integrated Water Resources Development Plan (1997–1999). He has chaired the Planning Commission's "Expert Group on Identification of Urban Poor". He produced many Ph.D.s. He is the editor of Quarterly Journal of *Indian Association of social Science Institutions* (IASSI).

Rahul Mukherji joined Heidelberg University in 2016 as Professor and Head of the Department of Political Science, South Asia Institute. He has previously taught at the National University of Singapore, Jawaharlal Nehru University (New Delhi, India), Hunter College of City University, New York, and the University of Vermont (USA). His two most recent books are: *Globalization and Deregulation: Ideas, Interests and Institutional Change in India* (OUP, 2014) and *The Oxford India Short Introduction to the Political Economy of Reforms in India* (2014). Rahul Mukherji serves on the boards of journals such as *Governance*, *Pacific Affairs*, *India Review and Bandung: Journal of the Global South*.

Brajaraja Mishra is a faculty at ICFAI Business School, Hyderabad, India. Prior to this, he served as an assistant professor at Institute for Development Studies Andhra Pradesh, before which he was at Centre for Economic and Social Studies, Hyderabad.

His major areas of research are in the broader areas of inclusive development with specific interest on tribal policy and development, forest ecosystem, poverty/well-being and agrarian economy. His recent publications on tribal policy have wider academic interest.

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Introduction: Inclusiveness in Development Strategies and Policies

Saiyed Raza Hashim

1 A Tribute

I am privileged to be associated with this book brought out in honour of Professor R. Radhakrishna. It is a happy occasion to recall my long association with him going back well over half a century since we were together at Gokhale Institute of Politics and Economies working on our doctoral theses under the inspiring guidance of Professor P. N. Mathur. Radhakrishna was a shining star of the weekly workshops which Professor Mathur used to conduct. Simple, courteous, kind and with a great sense of benign humour, Radhakrishna was enviably popular among teachers and students, all. He has preserved and enriched those qualities through times. This book which brings together the writings of so many of the most eminent economists, social scientists and policy makers, is a gesture of the affectionate regard which people have for him and his intellectual contributions. Starting with his work in applied econometrics ranging from econometrics of consumer behaviour to econometrics of inflation, consumption and welfare, his writings naturally flowed into the issues of poverty and its multidimensional manifestations, nutrition, food security, agriculture, well-being and inequality with strong policy implications. His collected works have been published in five volumes by Academic Foundation. The impact of his contributions goes beyond these publications. Radhakrishna occupied some of the highest positions in academic administration and in Government leaving a mark in every position he occupied. He made contributions of significance as Chair of Commissions and Committees. About one of his early contributions while working at Sardar Patel Institute, Professor Alagh (2020) has recalled that Radhakrishna argued after painstaking field research spread over years that the poverty lay in social structures and not in the evil of drinking. It was a bold conclusion upsetting the conventional wisdom of the times. Among many tributes paid to him by eminent academicians, I would like

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to quote just two. Professor V. N. Pandit of Satya Sai Institute of Higher Education says, 'Prof. Radhakrishna has chosen to pursue an even harder intellectual strategy that is what makes him incomparingly distinct. He chooses to get deeper into problems that face society in all their aspects and follows these till a meaningful solution is found' (Pandit, 2019). Professor Peter Timmer of Harvard University writes, 'In an era where quantitatively-driven analytical insights into the linkages among such policy-relevant variables as food prices, income distribution, and nutrient intake seem to take a back seat to loud populists, who miss academic elites as 'out of touch' with the common folk, Prof. Radhakrishna provides… precisely these very insights and also uses them to identify clear and helpful policy initiatives…' (Timmer, 2019). We look forward to seeing many more products of his creative genius in years to come.

2   The Disconnect Between Theory and Reality

Inclusiveness in development is broadly understood as carrying all the people together in the process of development. Given the conditions of extreme poverty, malnutrition, inequalities, unemployment and social deprivations, a mere trickle-down of the benefits of growth would not help in bringing up all the sections of people to a level of development at which they are able to live a humanely descent life. Extra effort and specific focus in development policies and programmes would be required to achieve this. Evolving a strategy which accelerates growth and also takes care of these dominant issues of underdevelopment has always been a challenge. Growth is important because it generates resources for enhancing capacities for further growth and inclusive development. The historical experience of the actual working of the economic machine shows that in the pursuit of growth, other objectives of development most often fall by the way side, leaving only a slow and inadequate trickle-down to take care of the poor and the left behind. Those in better position in respect of initial resources, i.e. capital, education and skills, social privileges, etc., are able to gain more in the process of economic growth. Similarly, non-agricultural sectors, and people associated with these sectors are able to gain considerably more than the agriculture. But sometime inadequate understanding of the growth machine may also be responsible. For example, the growth theory has always emphasized 'capital formation' as the source of growth. But how to divide resources between 'human capital formation' and physical capital formation does not become clear from the macro-theory. The K in the Harrod-Domar growth model has come to be identified with physical capital. This has also been the approach to development planning in India. The countries which placed more emphasis on human capital formation had both more growth and more inclusive development. Many times, it happens that the general strategy of the model that has been adopted for combining the objectives of growth with inclusiveness remains somewhat fuzzy in unfolding all the implications of its working out in all its multiple dimensions. A model fuzzily demonstrates the final outcome without an assessment of time taken to reach that outcome and without clearly indicating what happens to the people and the economy on the way to that

final outcome, what new problems arise and what sectoral imbalances are created. A corrective to this approach could be 'intervention' from outside the model, i.e. setting aside a fund of resources for direct intervention to bring the development closer to the track of inclusiveness. The poverty alleviation and rural employment generation programmes in India were in the nature of such direct interventions. Even the 'green revolution' was the result of an outside intervention in the model then adopted for development. But the scales of these programmes were perhaps not of the required magnitude to have a decisive impact on the situation. Large scale direct interventions are required in education, healthcare, social security, and in raising the incomes of the farmers. These efforts would result in creation of productive human capital out of the large young population which we celebrate as demographic dividend, impacting growth and inclusive development both significantly.

3   The Historical Context

Indian thinkers on economic development had always been sensitive to the problem of poverty and rural underdevelopment. The National Planning Committee under the Chairmanship of Jawaharlal Nehru had, in 1938, endorsed the objectives of eradication of hunger and poverty, land reforms, modernization of agriculture and industrialization, among others (Mishra, 2014). In the same year the Minister of Industries of the Congress ruled Provinces expressed their opinion through a resolution that the problems of poverty and unemployment, of national defence and of economic regeneration could not be solved without industrialization (Mishra, 2014), thus linking industrialization with inclusive development.

A group of eight prominent industrialists under the auspices of the Federation of Indian Chambers of Commerce, Bombay, proposed in 1944 a plan for development of India, generally known as the Bombay Plan (1945). The principal objective of the plan was to bring about a doubling of the per capita income within a period of fifteen years. They emphasized the production of machines for quickening the pace of industrial development in India and at the same time production of the 'most essential classes of consumption goods', making the fullest possible use of small scale and cottage industries. The Plan, significantly aimed at achieving a minimum standard of living for the people within fifteen years. The Plan worked out in some details the per capita food requirement, anchoring it to per day calorie requirement of 2800. They also recommended a minimum of 30 yards of cloth per person per annum and 100 ft^2. of house room per person. The Bombay Plan was remarkable for defining its objectives and its approach and for defining in details the elements of a minimum standard of living which was much more generous than the 'poverty lines' recommended by the Planning Commission in seventies and later. Amal Sanyal (2010) comments that it is curious that the Plan has faded out of the public memory as completely as it had occupied centre stage when it was brought out. It needs to be mentioned here that in the same year, i.e. 1944 in which the Bombay Plan was prepared, M. N. Roy, under the auspices of Post War Reconstruction Committee

of the Indian Federation of Labour, had drafted a People's Plan which favoured a socialist agenda for the society. People's Plan argued for socialization of agriculture and industry and also emphasized production of goods for the basic needs of the people. Elements of this plan were closer to Nehru's idea of planning. This could be a reason why the Bombay Plan faded out.

Almost all the mainstream of thoughts on reconstruction of India in the post-independence period had emphasized the provision for the fulfilment of the basic needs of the people and the development of agriculture and village and small industries on which depended an overwhelming majority of people for their work and livelihood. The Sarvodaya and Bhoodan Movements in early fifties had emphasized the importance of agriculture and land reforms, small industries and decentralized participatory people's planning.

4 Five-Year Plans—The Gap Between Intentions and Outcomes

The Planning Commission was established in 1950 and the First Five-Year Plan was launched in 1951. The main emphasis of the FFYP was on the construction of irrigation projects and on increasing the productivity of agriculture by spreading improved techniques of farming. An important emphasis of the Plan was increase in food production. Attention was also given to increasing the supply of industrial consumer goods. Land reforms, particularly the abolition of zamindari system was aimed at. Government activity was looked upon as merely supplementary to private activity and was coming in only where private enterprise seemed to have failed (Gadgil, 1972/1952). The First Five-Year Plan is generally described as successful. The food situation improved and the inflation was under control. Agricultural production increased partly as a result of investments in irrigation and partly as a result of good monsoons. However, Professor Gadgil was of the view that the First Plan did not launch a planned economy in the sense that a large part of the achievements of Plan period had not been planned (Gadgil, 1972/1957).

The Second Five-Year Plan (1966–1961) was a radical shift in approach to planning under the newly adopted political philosophy of Socialistic Pattern of Society. Emphasis shifted to rapid industrialization based on basic and heavy machine producing industries and a very large size of investment which could only be realized by sacrificing consumption in the near future. Consumer goods industries were relegated to backstage, and supply of consumer goods was left to small and cottage industries whose productive capacity was limited and productivity low. The idea was that the supply itself would allocate resources between capital formation and consumption. By controlling the supplies of consumer goods, savings would be forced. By producing machines which could only be used as capital goods, capital formation would be enhanced and growth accelerated. This strategy necessitated licensing and control of industries, high tariffs to discourage imports or a complete ban on imports

of certain commodities. Large and very ambitious size of investments (plan outlay) also necessitated heavy deficit financing. Even agriculture was relatively neglected. This was rather a radical departure from the development philosophy which had been conventionally evolved overtime and which had been largely embodied in the Bombay Plan. Could this be a reason why the Bombay Plan was almost blacked out from debates and discussions during the decade of fifties? One can only guess. Gadgil thought two forces might have worked to bring about this radical shift in the approach to planning. 'One was the reported development in communist countries—in particular the reported transformation of the situation in China. The other was the economic situation within the country itself' (Gadgil, 1972/1957, p. 113). Gadgil has further commented that 'the much larger size of the Plan may have been due, again, to persistent unemployment, but most probably owed in a large measure to the reported pace of progress in communist countries' (Gadgil, 1972/1957, p. 115).

The approach to the Second Plan was formalized in a mathematical model by Prof. P. C. Mahalanobis. It came to be known as Mahalanobis model. The model, formulated in the framework of a closed economy with highly simplified assumptions, demonstrated that higher allocation of investments to capital goods sector in preference to the consumer goods sector gave a slower rate of growth in the initial stages, but a much accelerated rate of growth later, thus quickening the transformation of the economy from a primary sector economy to a highly industrialized economy. The method of financing the Plan and its implications in terms of prices and cost of hiring were not a part of the model.

It may not be correct to say that the approach to the Second Plan was inspired by the Mahalanobis model as many of the model enthusiasts would like us to believe. The approach to the Second Plan was a political decision largely influenced by the developments in the communist countries. Mahalanobis only put a mathematical garb on the approach with highly simplified assumptions. The approach to the Second Plan became the approach to planning in India for almost the next three and a half decades, i.e. till 1991 when comprehensive economic reforms were undertaken. The approach necessitated high doses of deficit financing, import controls, licensing of industries, a major role for public sector and rationing of consumer goods. The shortage of consumer goods created extreme hardships for the people, particularly for the poorer sections of the society. Heavy doses of deficit financing created high inflation. Shortages led to rationing and control and in turn to black markets and smuggling. Agricultural production declined due to lack of such investments which could have protected the agriculture to an extent against the vicissitudes of the weather. Droughts had also intensified during the mid-sixties. The implementation of the Second Plan faced considerable road blocks mainly due to resource constraints. There was balance of payment crisis. Foreign exchange was not forthcoming (Datta, 2021). The decade of sixties, immediately following the Second Plan was the worst performing decade in the entire period of development after independence. Agriculture declined and the industry growth did not pick up beyond what it was in the decade of fifties (Table 3.1 in Datta, 2021).

It can be seen in retrospect that, in spite of the best intentions of the planners and policy makers, inclusiveness was a casualty, because perhaps the planners were

in too much of a hurry to contemplate the impact and implications of each of the elements of the Plan in all its dimensions. Some of the things could not be clearly foreseen because of lack of data and lack of prior research into the working of the system. Sometimes assumptions were taken as facts and sometimes imitating other countries (China and the Soviet Union) became a political compulsion.

G. D. Birla, an eminent industrialist and one of the authors of the Bombay Plan, criticized the Second Plan, pointing out that in order to succeed, the Mahalanobis strategy needed to have room for all sorts of industry, small, medium and big even as it emphasized the heavy and the core sectors. He prophetically predicted that massive shortages of consumption goods and jobs would get in the way of public sector investment (Sanyal, 2010).

Quite in contrast to the approach to the Second Five-Year Plan which laid emphasis on the products of capital goods (narrowly interpreted as the production of steel and machines) for accelerating the rate of capital formation, Vakil and Brahmanand (1956) came out with a thesis that it was the supply of wage goods which would raise productivity of the working class and enhance productive employment by eliminating disguised unemployment. It was explained that the root cause of poverty was the shortage of wage goods or 'the wage goods gap'. The wage goods were identified as the items of food, cloth, matches, soap, salt and kerosene. Also included were medicines, health care services, basic education, water electricity roads and recreational services. They called the wage goods as 'liquid capital'. Their prophetic insight which had the imprints of conventional wisdom and the elements emphasized in the Bombay Plan did not find many adherents among the planners and the policy makers of the times.

5 The Green Revolution—A Saviour

The decade of sixties was a decade of acutely difficult economic conditions for India. Apart from the extraneous factors like conflict with China in October 1962 and the war with Pakistan in September 1965 which severely dislocated the Government budget, severe food shortages started appearing from the beginning of the decade culminating in the famine of 1966–67, because of unfavourable weather conditions. Imports of food grain from the USA under easy payment conditions of PL 480 came under strain for political reasons. Inflation was at a very high level. It was under these circumstances that a political decision was taken to intensify production of food grain within the country with the objective of becoming self-sufficient in basic food. Norman Borlaug was invited to India. Despite bureaucratic hurdles imposed by India's grain monopolies, the Ford Foundation and Indian Government collaborated to import wheat seed from the international Maize and wheat Improvement Center (CIMMYT). The state of Punjab was selected by the Indian government to be the first site to try the new crops because of its reliable

water supply and a history of agricultural success. India began its own Green Revolution programme of plant breeding, irrigation development, and financing of agro-chemicals' (en.wikipedia.org/wiki/Green_Revoluation). The green revolution started showing results. The gross food grain output increased from 83 mt in 1961–70 to 103 mt in 1971–75, 120 mt in 1976–8 and 139 mt in 1981–85. Given the high population growth during the period, the per capita availability did not improve so dramatically, but the import dependence was almost done away with. The per capita availability was 159 kg in 1966–70, 156 kg in 1971–75, 161.4 kg in 1976–8 and 166.3 kg in 1981–85 (Figures taken from Table 5.1, p. 110, Radhakrishna, 2019). The pace set by the green revolution has continued and food production has considerably diversified over the years. The green revolution contributed enormously to India's food security and to the alleviation of poverty. This was perhaps the most inclusive policy adopted, though not as a part of the planning model adopted in the Second Plan and followed in substance through the plans till 1990. The green revolution, though, came under severe criticism at that time on the ground that it favoured the better endowed farmers and already agriculturally developed regions thus increasing inequalities. With hindsight, there should be no hesitation in concluding that on balance it had great positive impact on inclusiveness.

6 Economic Reforms and Growth—Not Good News for Inclusiveness

The overall economic condition continued to be critical even in the decade of seventies. The critical economic situation led to more controls, stricter licensing and a spate of nationalization, starting with the nationalization of the scheduled commercial banks in 1969. The price inflation was very high, particularly after the spike in international price for crude oil. Food situation was still critical. There were widespread public agitations. It was realized that the approach to development planning that had been adopted would not deliver on reducing severe poverty and hunger, and hence, some direct action was needed. About 50–60% of the population was at this time extremely poor going even by very modest standards of minimum needs. Poverty alleviation programmes consisting of wage employment programmes and asset building programmes were adopted, almost detached from the rest of the planning process. Of course, once the programmes were formulated, the Planning Commission took over the task of allocating resources for the programmes and monitoring their progress. In one form or the other the programmes still survive.

A mild degree of economic reform was attempted in early eighties. Imports were liberalized to some extent and industrial licensing was broad banded. The growth rate of GDP increased from 3.16% in 1971–80 to 5.40% in 1981–90 (Hashim, 2020; Table 2.2). However, the economic woes persisted through the decade of eighties. By the year 1990, the foreign exchange reserves were almost exhausted, coming down to a level enough to meet only three weeks' imports. The new Narasimha Rao government

with Manmohan Singh as finance minister in mid-1991 undertook radical measures to put the economy back on the rails. The main ingredients of the new economic policy were economic liberalization and privatization of the domestic sector, fiscal reforms and easing of foreign trade, falling in line with increasing globalization. The rate of growth of money supply was controlled and the exchange rate of the rupee was adjusted downwards (Hashim, 2020). These reforms produced quick results. The annual rate of inflation came down from the peak of 17% in the middle of 1991 to 7% by the end of 1992–93. The foreign exchange reserves which had slid to $1 billion, shot up to over $6.4 billion by 1992–93. The rate of economic growth which had dropped to 1.2% in 1991–92 rose to about 4% in 1992–93 (Srivastava, 2011). Reforms produced results. GDP growth rose to 5.7% in 1991–2000, 6.8% in 2001–2005 and remained around this average at least till 2015. The GDP almost trebled in a 10 year period from 1997–98 to 2007–08 (Hashim, 2020).

This turnaround of the economy after the reforms, however was not good news for inclusiveness. The share of wages and profits in net value added in organized manufacturing had remained around 50% each till the year 1988–89. By the year 2010–11, the share of wages had declined to about 30% (IHD, 2014). Reasons for this decline in labour share may be infusion of new technology which raised the productivity of capital, increased globalization and trade openness as well as changes in labour market institutions and policies (Jacobson and Occhino, 2012–13). Declining share of labour in GDP has worked itself out in the form of increasing share of informal employment and increasing open unemployment. Inequalities in income distribution have widened.

Radhakrishna has written comprehensively on post-reform development in Indian economy and its implications for inequality and well-being. His presidential address delivered at the 99th Annual Conference of Indian Economic Association at Tirupati in 2016 (2019/2016) draws upon a number of his earlier writings on the subject. I draw upon his address in what follows. While total employment (UPSS) increased by mere 14.7 million between 2004–05 and 2011–12 registering a growth rate of 0.45% per annum in contrast to the annual GDP growth rate of 7.7%. The implicit employment elasticity during the period tends to zero. The share of profits in net value added in the industries covered by the Annual Survey of Industries increased from about 22.1% in 1990–91 to 55.5% and profits in net value added in organized manufacturing had remained around 50% each till the year 1988–89. By the year 2010–11, it had declined to about 30% (IHD, 2014). Reasons for this decline in labour share may be infusion of networking which raised the productivity of capital, increased globalization and trade openings as well as changes in labour market institutions and policies (Jacobson and Occhino, 2012–13). Declining share of labour in GDP has worked itself out in the form of increasing share of informal employment and increasing open unemployment. Inequalities in income distribution have widened.

Inter-state income disparity widened during the post-reform period. Among the major states, Assam, U.P., J&K, Jharkhand and M.P. lagged far behind the states of Maharashtra, Haryana, Tamil Nadu, Uttarakhand and Gujarat. Growth of Punjab was sluggish. In 2013–14, the GSDP per capita of Gujarat was 4.3 times that of Bihar, and per capita GSDP of Kerala was 3.7 times that of Bihar. One of the root

causes of inequalities is access to quality education. Disparities in access to quality education exist between rural and urban areas, between states and between various sections of population even within the same city. About 4/5th of rural students and 1/3rd of urban students at primary level were attending government schools in 2014. Per person expenditure at primary level incurred during a session in private schools was 10 times that in government schools. Quality of higher and technical education also varies widely (Radhakrishna, 2019/2016).

The rate of reduction in officially estimated poverty is positively associated with the rate of growth of GSDP per capita. Radhakrishna, however points out that even if income poverty is eliminated in India, other forms of poverty, e.g. malnutrition, may persist. Malnutrition in India was higher than that in Sub-Saharan Africa.

Montek Singh Ahluwalia, who, as Finance Secretary under the then Finance minister Manmohan Singh, played a key role in shaping the reforms in the early nineties, has observed that the reforms definitely achieved a significant acceleration in growth and they also succeeded in reducing poverty. However, they had been less successful in generating good quality jobs. There was progress in providing better access to education, health services, and clean drinking water and sanitation, but less than was hoped. The area where performance had been most disappointing was environmental sustainability (Ahluwalia, 2018).

7   The Festschrift

This book presents papers, exploring in depth and in the perspective of post-reform developments in India, issues pertaining to growth and equity. The book brings out how the public policy instruments created to promote growth turn out to be regressive, promoting inequalities, personal and regional, and creating a highly asymmetric federalism in India. The book examines the efficacy of fiscal and monetary reforms and also emphasizes the need for strengthening institutions of governance in order to boost investors' confidence. On the issue of governance and institutions, a way for liberal democracies to fight 'clientalism' and develop the capacity to pursue the goals is explored. Exercises in econometric modelling for explaining factors in growth and for vetting policies are also presented. With changes in the levels of income and pattern of consumption, perceptions on poverty have also changed. An approach to evolving a new poverty line has been explored. It has been pointed out that cities cannot be made inclusive without addressing the plight of migrants and the urban poor. Inequalities in education become root cause of other inequalities. A village industry like Khadi needs to be promoted for its involvement of women and rural poor. It has been pointed out that there is a crisis in agriculture mainly because of persistent decline in public investment in agriculture and the failure of the non-agricultural sectors to absorb the surplus agricultural workers. The book provides insights into the working of an emerging economy and a large democracy, which

has to constantly strive for public acceptability of the tensions of its negotiations between equity and growth.

8 Instruments of Public Policy and Reforms

Exploring the role of institutions and instruments of public policy relevant to inter-state inequalities in levels of development, Y. V. Reddy, in his paper on inter-state inequalities, points out how the institutional and instrumental dispensations to the states have been regressive, to start with, and have become even more regressive over the years. In addition to this, there has been a drain of resources from the poorer regions to the richer regions. One resource is the skill and talent (brain drain). Even more important in the given context is the drain of savings from the poorer to the richer regions through the banking system. The constitution has mandated appointment of a Finance Commission every five years to recommend sharing of Union Taxes between the Union and the States, and also to recommend grants to States which are in need of assistance. Equity considerations can be built into the criteria for tax deduction and also in grants. The Planning Commission was set up as an advisory body on allocation of public investments. It assumed the role of dispensing plan assistance to States. The Planning Commission also approved the Annual Plan of States and approved their market borrowings. Channels of transfers have been normal plan assistance, special plan assistance and centrally sponsored schemes. Y. V. Reddy points out that the tax devolutions and the grants by the Finance Commission have been, on the whole, progressive. Only about 20% of the total transfers were less progressive. Planning Commission's dispensations have been regressive. Per capita plan outlays were invariably higher in respect of the richer states. Poorer states were handicapped by absorptive capacity. Centrally sponsored schemes required matching contributions by the states. Terms and conditions of borrowings would tend to be favourable to the richer states. External borrowings would more particularly favour relatively more developed states. Banks accumulate savings from the poorer states, but find more lending opportunities obviously in richer states. Central tax concessions also tend to be regressive in nature. Thus, except for the Finance Commission, no other public institution focused on the inequalities among the states in pre-reform as well as in post-reform period. Only formula-based tax devolution is progressive. Discretionary transfers from the Centre favoured non-poor states.

Duvvuru Subbarao in his paper on Fiscal Dominance of Monetary Policy makes a strong plea for the independence of monetary policy, and by implication, the independence of the monetary authority (the Central Bank) whose primary responsibility was controlling inflation in the interest of stability and growth. Fiscal dominance of the monetary policy leads to high inflation. The price level in the economy is not dependent only on the money stock but also on the proportion of outstanding debt that is backed by monetary authority. He finds that the share of debt backed by monetary authority, on an average, is higher in developing countries. He points out that the period 1980–91 in India was a period of intensive fiscal dominance. Whittling

down of the fiscal dominance took place after the reforms from 1991 onwards. The Fiscal Responsibility Act of 2003 boosted monetary independence further. However, 2008–09 Global Financial Crisis necessitated a coordinated stimulus package. The impact of the stimulus package in the wake of COVID-19 needs to be watched.

Subbarao's strong plea in favour of price stability has positive implications for inclusiveness since inflation hurts the poor most. But 'fiscal activism' in the shape of stimulus packages in the wake of recessionary economic situation is also needed in order to create jobs which the poor need most.

Govinda Rao writing on the state of Indian economy during the pandemic times, points out that the pandemic struck at a time when the economy was already slowing down. The estimated growth at 4.2% in 2019–20 was the lowest in the last 11 years. There was a declining trend in the period 2015–16 to 2019–20. He further notes that even as the economy gradually recovered from the shock of demonetization in the third quarter of 2016–17, the subsequent quarters showed steady decline. He is of the view that the government would have to come up with substantial additional stimulus to accelerate growth, yet he concedes that in the given circumstances of slowing economy and raging fiscal imbalance, significant fiscal action would be difficult. The government may have to substantially disinvest and spend on infrastructure. The prospect of a 'V' shaped revival in the immediate future does not look possible.

It may be of relevance to mention here that in an interview with Karan Thapar, Montek Singh Ahluwalia (2021) made an interesting observation that the recovery in India was K-shaped. The formal sector could be experiencing a V-shaped recovery, that was not true for the whole economy. The rural and the informal sectors could not be said to be experiencing the same. This was what he preferred to call a K-shaped recovery.

With an objective of facilitating international trade, promoting exchange stability and assisting in the establishment of multilateral system of current payments, the IMF makes resources temporarily available to members. Dilip Nachane and Partha Ray describe in their paper how the theoretical foundations of the functioning of IMF have evolved over the years, ultimately becoming a Global Economy Model. Not denying the brilliance of these exercises, the authors note that the philosophy of research in the IMF is quite monolithic in nature. There are evidences of group think and almost an unquestioning faith in 'new consensus macroeconomics'. Given a host of other limitations of the model, or the philosophical underpinning of the IMF's functioning, the IMF failed to give early warning of the Global Financial Crisis, and the authors think that the disconnect between macro and financial sector in IMF's model was responsible. They conclude that in the ultimate analysis, the IMF is a quota based organization and its functioning reflects this skewed governance structure.

How much institutional, including legal factors can promote (or hamper) economic development is what Hans-Bernd Schafer reflects upon in his paper: Law and Economics of Pure Economic Loss in Tort. The exclusion of pure financial losses from liability in tort is widespread across legal systems. Pure economic losses are losses of wealth which occur without an infringement of an absolute right. The author argues that many pure economic losses deserve compensation under the economic rationale as recent research has shown. Some catastrophic accidents as the Alaska

oil spill and the deep water accident in the Gulf of Mexico revealed that most of the damages were pure economic losses like income loss of fisherman and in the tourist industry, which require compensation for providing sufficient incentives to tortfeasors.

9 Econometric Modelling

Econometric modelling as an instrument of economic analysis, economic forecasting and for providing an empirical basis for economic policies has acquired a strong tradition in India starting with the decade of early sixties. K. L. Krishna, attempts a selective review of econometric practice in India.

K. N. Murty constructs a macro-econometric model for tracing the effect of devaluation, demonetization and demand management in Indian economy. The study is methodological in nature. The data used in the model for estimation covers the period from 1985–86 to 2009–10. More recent data have been used for trend analysis. The model links the real and the financial sectors.

The paper by Manoj Panda and Samraj Sahay attempts to examine some possible determinants of the differences in growth performance across states in India. The determinants are: infrastructure, social sector expenditure, urbanization, financial inclusion and states' fiscal discipline. The period covered is 2004–05 to 2016–17. A fixed effect panel regression model is used to explore the determinants of GSDP and per capita GSDP. The results indicate that infrastructure development, social sector expenditure, urbanization and financial inclusion accelerate state income growth while state fiscal deficit slows down the growth. The limitations of the exercise are that international trade and monetary policies are beyond state jurisdiction and state-wise breakdown of central government expenditure is not available. Private investment data is not available at state level. However, there are quite a number of determinants of growth on which data are available.

10 Governance and Institutions

In the backdrop of a widely held view that India's democracy was a procedural rather than a substantive one and that it was a clientelistic democracy where political parties purchased votes in return for particularistic privileges' rather than seeking benefit to citizens at large, Rahul Mukherjee convincingly argues that the state finds capacity to deliver even in a liberal democracy like India. India follows an evolutionary tipping point model of institutional and economic change. The momentous economic reforms of 1991 and the success of the right to work programmes in Andhra Pradesh each constituted a tipping point. Even the green revolution was a tipping point. India is unique, says Mukherji, in the annals of history to have begun a post-colonial trajectory with such a diversity and a poverty stricken liberal democracy. It takes much greater

effort and longer time to create a consensus within such a large and diverse society, and then the change comes as a tipping point.

The Planning Commission was established in 1950. In January of 2015, the Planning Commission was abolished and replaced by NITI Aayog. Planning Commission had played an important role in the country's economy for over six and half decades from very low initial conditions to a high growth trajectory, says Atul Sarma in his paper on NITI Aayog. NITI Aayog has done considerable work in the four years of its existence. It has moved away from planning and most of its focus has been on policy—but policy without a framework. NITI Aayog does not exercise allocative power—that role has gone to the Finance Ministry. Allocations now are ad hoc and could even be arbitrary. May be NITI Aayog will take some more time to evolve its role so as to be more effective. Sarma suggests that a restructured and reoriented Planning Commission dispensing with its negative features such as micromanagement and excessive bureaucratization but retaining the positive ones in sync with the changed context could have done better.

M. V. S. Ramanadhan writes on Indian Official Statistical System. He expresses the view that official statistics should earn public trust through its production and dissemination methods. There should be a centralized coordination of statistics produced by various departments and agencies. The protocols on quality assurance and data sharing and 'notified guidelines on indices and surveys' should be implemented. There should be a periodical review of statistical products including the data sets used in National Accounts by nodal offices. Regulation of statistics of national importance should be entrusted to a National Statistical Commission constituted as a statutory corporation.

11 Poverty and Unemployment

The concern about poverty in India at social and political level is almost as old as the history of the freedom movement. Attempts at defining a 'minimum' level of living also go back to the Bombay Plan (1944). The Working Group setup by the Planning Commission in 1962 redefined the 'minimum'. With the availability of the NSS data on consumption, attempts have been made to estimate the number of poor in India starting with the work of Dandekar and Rath (1971). Planning Commission took over the task of defining the poverty line and estimating the incidence of poverty in India officially starting with the Task Force estimates of 1979. With the passage of time, the changing perceptions about poverty, the definition of poverty line and the estimates of poverty have come to be questioned, and this explains periodical attempts by the Planning Commission to revise the poverty line and the estimates of poverty. The latest in this line is the work of the Expert Group chaired by C. Rangarajan. The paper by C. Rangarajan and S. Mahendra Dev in this volume discusses the work of Rangarajan Expert Group. They say, the high rate of increase in per capita income and consumption in the first decade of this century and the consequential changes

in the structure of the economy as well as the people's perspectives on poverty was viewed as requiring a fresh look at the poverty line and its composition.

The Rangarajan Group made changes and improvements in the immediately preceding work of the Tendulkar Expert Group whose recommendations are also the basis of official estimates of poverty at present. Instead of anchoring the food requirements just in minimum required calories, the Rangarajan Group added a food component of protein and fat to address the needs for nourishment, and added some normative levels for non-food requirements, i.e. clothing, housing and education and also behaviourally determined other non-food items. They also made some other methodological improvements in the treatment of the basic data. They proposed a 19% increase in the rural poverty line and a 41% increase in the urban poverty line. Accordingly, poverty levels estimated by them for the year 2011–12 were also higher: 30.9% rural as compared to Tendulkar's 25.7 and 26.4% urban as compared to Tendulkar's 13.7%. They found that the bulk of the poor were concentrated between 75 and 100% of the poverty line.

Sripad Motiram, in his paper on unemployment and its measurement, discusses the merits of a distribution sensitive measure of unemployment in the Indian context. There are degrees of intensities of unemployment of different individuals. If unemployment of the more unemployed person has increased, and that of the less unemployed person has decreased (by the same unit of time) the distribution sensitive measure of total unemployment should increase instead of remaining the same. Since a large proportion of Indians work in the informal sector, which are characterized by sporadic employment and voluntary and involuntary withdrawals from the labour force, such a measure is relevant for India. Such a measure can also help in analysing population sub-groups.

12   Sectoral Perspectives

Writing on Inclusive Urbanization in India, S. R. Hashim argues that the inclusiveness of urbanization needs to be considered with reference to the overall impact and implications of the urban process not only for those who live in an urban settlement, but also those in rural areas. Inclusive urbanization has to be considered also with reference to the impact and implications of urbanization for the weaker sections of society, particularly the poor. The paper argues that the growth itself makes urbanization more inclusive and also that a widely spread and even pattern of urbanization is more inclusive. If formally recognized and supported, the 'census towns', i.e. the villages evolving into a township which are statutorily not recognized as 'urban', can play an important role in urban inclusiveness by reaching out to vast rural hinterland deprived of the benefits of urbanization. Urbanization is a driving force in economic development. At higher levels of economic development, there is a tendency for convergence in the regional levels of urbanization. The ranking of states in India in the level of urbanization is broadly aligned with the ranking in per capita net state domestic product. Irrespective of the overall level of urbanization, a few large

cities will always exist. An important constraint that has emerged on the size of the large cities is the cost of land and housing. One of the most important tests of the inclusiveness of a city is how the city treats its migrants. Most of the times migrant workers face discrimination and inequalities in the city to which they migrate. Urban poverty has very different dimensions compared to rural poverty. It is suggested that urban poverty be estimated with reference to residential, occupational and social vulnerabilities of the poor. An approach to quantify these vulnerabilities has to be evolved including the creation of an arrangement to generate periodical data on these vulnerabilities.

The paper by Bhanoji Rao focuses on achieving equality on the educational front, which in many ways affects other inequalities. He is of the view that ensuring equality of educational opportunity calls for the first 12 years of education in the exclusive domain of government schools. In 2015–16, 56% of children were enrolled in government schools. Government schools had higher proportion of girls, probably because people like to spend less on girl's education. The author hopes to see government schools with improved quality of education as the exclusive province of school education.

Amita Shah writes on Khadi under the neoliberal context. Khadi is increasingly being seen as an economic activity thereby missing out its social, cultural and political dimensions. In its present form Khadi does not appear to be a viable activity, as reflected in its continued subsidization year after year. There are significant opportunities for khadi if properly marketed and repositioned as environment friendly, socially conscious, and fair wage activity. Its advantages are: time flexible production, skill flexibility, product flexibility and significant involvement of women, disadvantaged groups and rural people. Khadi is also emerging as a fashion fabric. There is scope of improving technology as well. A new way of understanding the 'Khadi' is needed.

Dinesh Kumar in his paper on water security builds up water demand and supply scenarios for 2040. His broad assumptions are that improved economic conditions would result in increased water demand for sanitation. Water demand has been projected for industrial sector, agricultural sector and for environmental uses on the basis of available work within the Government and outside. The conclusion is that if we are able to keep pace with the ongoing economic development in the country with adequate investment in water resources, we will be able to meet the water and food demands of 2040, even with low levels of improvement in efficiency of water conveyance and with the existing level of wastages in agriculture.

13   Addressing Challenges in Agriculture

Agriculture in India has been almost in a state of crisis for decades. The crisis emanates not so much from the fact that the rate of growth in agriculture is much slower than the rate of growth of all the other sectors of the economy, thus reducing the share of agriculture in GDP from more than 50% at one time to around 15% now.

But the crisis arises from the fact that the dependence of workers for income and work on agriculture still remains around 50%, creating extreme income inequality between those dependent on agriculture and those working in other sectors. This book offers three papers, two dealing with some of the reasons for the crisis, and one dealing with opportunities and challenges of income growth in agriculture.

M. V. Nadkarni contends that one reason for the crisis in agriculture is fast declining number of viable holdings. The root cause of the growing size of the non-viable holdings is the failure of non-agricultural sectors in generating employment adequately enough to absorb the excess population (workers) from agriculture. Small farm holders are also at a disadvantage to benefit from better technology because of constraints on their ability to procure credit and buy costlier inputs. On the whole the crisis in Indian agriculture is not one of decline or stagnation in productivity, nor one of adverse terms of trade any more. Also there is no general crisis of profitability as such. An unviable farmer is not able to invest in agriculture. For drawing workers/farmers out of agriculture, Nadkarni suggests widespread development of small scale agro-processing industries which can also address the problem of seasonal gluts in production of perishables.

S. L. Shetty puts emphasis on public sector investment in agriculture. He contends that the neglect of agricultural investment has persisted for many decades. The green revolution period and before was the best period recording highest public sector gross capital formations. After 1981–82, there was a steady decline in public sector investment in agriculture. After 1998–99, there has been a revival of private investment in agriculture, but public sector investment did not pick up much. Total investment, however, showed an improvement. On the whole, the long term trend shows that increases in private sector investment largely follow the increases in public sector investment. However, in the post-reform period private sector investment shows a lead. While private investment in irrigation and water saving devices did increase, the largest increase was in labour saving mechanization. Subsidies have been increasing and subsidies constitute more than threefold of the size of public investment in agriculture. The author is of the view that the issue of subsidies has to constitute a part of the wider strategy of inclusive development. The recent increases in farmers' investment cannot be sustained for long unless the government steps in and augments its capital formation in agriculture in a variety of ways—extension, heavy infrastructures, education and research.

A. Narayanamurthy, recognizing that inadequate return from crop cultivation is the main reason for present agrarian crisis and farmers' suicides, analyses reasons for low farm incomes and explores ways of raising the same. Post-production activities, namely strengthening of market facilities, infrastructures and procurement by state agencies need to be given due importance. The increased cost of cultivation due to escalating cost of inputs reduces the profit margin of the crops. Procurement in most crops is concentrated only in a few states. This should be expanded across the states. Both the centre and states must make planned effort to improve the agricultural market infrastructure to create ease of agribusiness for farmers. There is need to raise MSPs to enhance the income of farmers. Price support scheme, price deficiency payment scheme and private procurement scheme, under IM-AASHA should be implemented

in full spirit. It has been pointed out that Indian farmers are implicitly taxed through restrictive marketing and trade policies. This needs to be reformed. Measures are also needed to reduce the cost of cultivation. Arrangements should be made to link MGNREGS with farm operations.

14   Concluding Observations

What emerges from the foregoing review is that, in spite of the best of intensions in favour of inclusiveness in economic development, there have always been gaps between intensions and the outcomes. The approaches adopted and the instruments created for development not only failed to produce the desired results, but very often created more miseries for the poor. In earlier days, a reason could be the lack of full understanding of the conditions and of the working of the Indian economic system. India, a vast country, had many autonomous economic enclaves detached from each other, i.e. the formal and the informal economy, the rural and the urban, the agricultural and the non-agricultural. The formal and the informal economy even today work in very different ways. The economic theories and accordingly the instruments of policy and planning guided by these theories are based on formal and organized economic systems. Thus, for example, a drastic action like demonetization and too much emphasis on only bank-based transactions hurts the informal economy the most. The approach to development planning in the decade of fifties was adopted more as an imitation of what was being done in other countries, more particularly in Soviet Union and China. It was not rooted in ground realities of India. It did produce some results—establishment of steel and machine tool industries for example. It facilitated construction of some big irrigation dams and roads and created a large stock of technically trained manpower, but education and skills did not spread widely. The rural and the urban gap could not be bridged, rather it widened. The poor were deprived of a minimum level of living. The paradigm of economic reforms, again, is based on the extension of the experience of successful market economies of the west where the economic system is highly organized, and 'informal' is only understood as 'underworld' system working on the margins of the societies. Economic reforms have proved to be good for the overall growth. The highest beneficiary of that growth, however, has been the organized sector in which product and income growth is accelerating but employment growth is shrinking. We need that growth. But India still depends for more than 90% of its employment and may be nearly half of its GDP on the informal economy. Given the liberal economic environment, a smoothly functioning market system, well-functioning banking system, reasonably good infrastructure etc., the growth under the new paradigm depends on the rate of infusion of new technology and globalization. The new technology, tending towards wide scale digitalization and robotization, is replacing labour at a very fast rate, and the old thoughts about 'the choice of technique based on one's endowment of resources is a myth long forgotten'. There is no choice in technology. There is only one technology which is the best and that has to be adopted in order to keep up in

the competing world. Globalization provides opportunities for participation in the world production chain. However, globalization is also coming under strain mostly from the developed countries who were the champion of globalization at one time, because they see losing their jobs to the emerging economies of the third world. High growth is producing extreme income inequalities. If this trend continues, there will be the problem of shortage of aggregate demand.

What is the way out? It will not be possible to give up the objective of growth. Growth generates resources and with resources many things can be done. What is most needed for a country like India is to slice away through bold fiscal measures a large chunk of the incomes generated by high growth (assuming that high growth is resumed). Invest, first of all, in building human capital—not just a lip service to education but creating real skills and talents taking along the entire population. Then only the country can enjoy the true benefits of demographic dividend. Along with the expenditure on education, the expenditure on health and social security is also to be treated as investment. Subsidized universal provision of these services will go a long way in alleviating the consequences of extremely unequal distribution of good quality jobs and income and also correct the deficiency of aggregate demand. Universal basic income is also being talked about in this context. It is no longer a theory or just an idea. The very big COVID-19 Stimulus Package which the Biden government has got approved by the U.S. Congress recently has a very large component of direct income transfer to about half of the U.S. population in the interest of reviving the economy. In the long run, only inclusive growth can be sustained.

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Instrument of Public Policy and Reforms

Interstate Inequalities—Scope and Limits of Public Policy

Y. V. Reddy

1 Introduction

I have known Radhakrishna Garu since early eighties as a scholar, an institution builder, an administrator and as a person. I worked as a treasurer assisting Radhakrishna, who was Secretary and Director of Centre for Economic and Social Studies (CESS) which was the beginning of our association. It is culminating with this keynote address in his honour.

Radhakrishna's contributions in the area of poverty, inequality and statistical systems in the country have been well recognised both nationally and internationally. Today, I will briefly mention and supplement two of his recent seminal papers. The first one is the paper on Inequality and Poverty published in EPW in 2015, and the second is on India's Development in Post-reform Period: Pathways and Inclusiveness published in 2017.

In the first paper, Radhakrishna analysed whether there has been any systematic relationship between growth and poverty and also between growth and inequality in both rural and urban areas. The paper observed that the growth rate of monthly per capita consumption expenditure for the rural bottom group was very modest as compared with the rural top and urban top groups. Further, it noted that growth in consumption was pro-rich and that urban groups had higher growth in their consumption in both the pre- and post-reform periods. The paper further observed that rural–urban gap widened in the post-reform period. Based on the trends in the coefficient of variation in per capita GSDP, he concluded that on the whole poorer States gained less than the richer States from economic reforms. Though growth was found to reduce poverty, growth elasticity of inequality was positive implying that growth tended to aggravate inequality.

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In the second paper, Radhakrishna's analysis demonstrates that interstate disparities in per capita income widened in the post-reform period. No doubt, the acceleration in the growth in the post-reform period resulted in almost doubling the monthly per capita expenditure in both rural and urban groups. However, the gain was found to be relatively modest in the lowest expenditure group, though growth was found to have had a positive impact on poverty reduction. States which had a lower incidence of poverty in 1993–94 reduced their poverty levels significantly as compared with the other States. The papers suggested a number of measures to promote growth with equity.

These two papers point out the outcomes of public policies in achieving one of the multiple goals, namely reduced inequality along with poverty reduction. Particular reference is made to reduce inequalities across States.

In this address, I will supplement the valuable research done by Professor Radhakrishna by exploring the role of institutions and instruments of public policy relevant to interstate inequalities in levels of development.

2   Framework: Institutions and Instruments

First, the Constitution provides for one mechanism that addresses fiscal needs of the States, and that is the Finance Commission. Second, fiscal transfers have been occurring outside the recommendations of Finance Commission and that was for most part on the recommendations of Planning Commission, and more recently arguably on the advice of NITI Aayog. Third, borrowings by States, external or domestic, from market or from Union government are important resources for accelerated development of States. Fourth, the financial system, in particular banking, has been an important source of extra budgetary resource for public policy. Fifth, the tax concessions, subsidies and other central government's programmes do have differential impact on States and are sometimes intended to subserve the policy goal.

2.1   Finance Commission

The Constitution makers recognised the potential for vertical imbalance between the financial powers and functional responsibilities assigned to the Union and the States, and the horizontal imbalances across the States. Hence, they provided for the institution of Finance Commission to be appointed at an interval of every five years or earlier to recommend sharing of Union taxes between the Union and the States and the *inter se* shares of States. The Finance Commission is also mandated to recommend grants to States which are in need of assistance. Equity considerations can be built into the criteria for tax devolution. Grants may be tied or united, and equity considerations can be built into both tied and united grants.

Empirical evidence points to tax devolution being progressive or inversely related to the per capita State gross domestic product. Grants which account for less than twenty per cent of the total transfers recommended by Finance Commissions (except in case of Fourth and Sixth Finance Commissions) were less progressive. The Finance Commissions have, it can be said, contributed to reduction rather than aggravation of inequalities, though thier scope for contribution is circumscribed as will be explained later.

The generally accepted objective of inter-governmental transfers is to offset the fiscal disabilities arising from low revenue raising capacity and higher unit cost of providing public services. At the same time, there is a case for inter-governmental transfers to ensure that people are provided with minimum standards of basic services irrespective of their State of residence. There are services which should ideally be available at minimum specified standards to all. These generally relate to minimum standards of education, health care, water supply and sanitation. The ultimate objective is to provide comparable levels of public services at comparable tax rates, but the delivery of such services is in the jurisdiction of sub-national governments. In other words, fiscal transfers enable provision of services by providing fiscal support but cannot ensure such provision without undermining the responsibility assigned to the States in the Constitution.

Fiscal equalisation aims at eliminating or minimising fiscal capacity differential across constituent units of federation in order to enable provision of comparable levels of public services at comparable levels of taxation. Equalisation of budget capacity does not automatically ensure elimination of inter-regional income inequality across States.

The Finance Commissions were concerned with distribution of revenues between the centre and States, and determination of grants with a firm belief that capital needs of both centre and States have to be met largely from borrowed funds. The belief has been vindicated, and, in fact, in recent years, a part of revenue expenditure of centre is financed out of the borrowings.

2.2 Planning Commission

There was consensus during the pre-independence days that a planned approach to economic and social development was the most appropriate for Indian conditions. Though there were differences with regard to the relative roles of the government and the market in economic development, the Planning Commission was set up by an executive order in March 1950 primarily as an advisory body on the formulation of medium term and annual plans and on allocation of public investments. But over the years, it assumed the role of dispensing plan assistance to States. It also started approving the Five-Year and Annual Plans of States and in the process approving market borrowings of States. The channels of transfer have been normal plan assistance, special plan assistance and centrally sponsored schemes.

Empirical work shows that the per capita plan outlays were invariably higher in respect of richer States in relation to the poorer States. Though the centralised planning was intended to bring about balanced development across States, it has not succeeded in doing so. There are two explanations for this; namely, the poorer States were less savvy in political bargaining, or they were handicapped in absorption capacity.

The Planning Commission was abolished in 2014, and in its place, National Institution for Transforming India was established in 2015. The dominant mode of transfers since then has been centrally sponsored schemes. They warrant matching contribution by States. Hence, the poorer States have limitations in absorbing them, in view of their fiscal capacity. Overall, transfers from Union to State outside the Finance Commission recommendations have not been in favour of poorer States.

2.3   Access to Domestic Debt

Access to debt is an important instrument in promoting growth. Till the eighties with both the centre and States having surplus on their revenue accounts, borrowings were considered synonymous with capital expenditure. In the beginning of the planned era, allocation of market borrowings largely determined access to debt. With the plan assistance becoming formula based in 1969, grant-loan component of such assistance determined access to debt. With the termination of lending to States on the recommendations of the Twelfth Finance Commission, the loan component of plan assistance was dispensed with, and as a result, States largely depend on market borrowings. Net small saving collections in a State also determined access to debt to some extent. This was an additional window available to States.

With revenue deficit surfacing in the mid-eighties and assuming alarming proportions, fiscal reforms became a part of broad economic reforms introduced in the early nineties. The Government of India enacted Fiscal Responsibility and Budget Management legislation in 2003. With the Twelfth Finance Commission making debt relief recommended by it conditional on States enacting FRBM legislations, all States with the exception of West Bengal and Sikkim enacted such legislation by 2005. Now the net borrowings of a State are capped at 3 per cent of the GSDP of a State. Thus, the poorer States invariably have less access to public debt than the richer States. Furthermore, the terms and conditions under which public borrowings can be raised in the market would tend to be favourable to the richer Sates relative to the poorer States.

Empirical evidence is unmistakable. While the average per capita outstanding liabilities amounted to Rs. 47,054 in the top five per capita income States during the period 2013–16, the corresponding figure for the bottom five per capita income States was Rs. 13,690. To the extent borrowings finance capital expenditure, poorer States are at a disadvantage in raising resources.

2.4 Access to External Debt

Concessional external assistance from multilateral institutions like the World Bank, Asian Development Bank and Japan International Cooperation Agency also seems to shun poorer States. The three States of Tamil Nadu, Andhra Pradesh (including Telangana) and Karnataka accounted for nearly 30% of cumulative additional central assistance (on account of external aid) for the period from 1 April 2002 to June 2018. The per capita cumulative assistance during this period varied between Rs. 2,098 and Rs. 2,546 in the States of Karnataka, Kerala, Andhra Pradesh, Tamil Nadu and Odisha. In contrast, per capita assistance disbursed amounted Rs. 989 in Bihar followed by Rs. 448 in Uttar Pradesh and Rs.403 in Jharkhand.

2.5 Institutional Credit

Among the instruments that have a bearing on growth promotion and reduction of inequalities is access to institutional debt. Besides nationalisation of banks, several other initiatives were taken to improve credit flow to different sectors of the economy.

Among the various sources, bank credit is the most predominant. The dispensation of bank credit remained regressive for various reasons like the concentration of business and industry in the richer States. The average outstanding per capita scheduled bank credit during the years 2013–16 amounted to Rs. 94,001 in the top five per capita income States as compared with a meagre Rs. 14,475 in the bottom five per capita income States. The flow of bank credit seems to favour richer states relative to others.

2.6 Concessions and Subsidies

Fiscal policy instruments to promote development include tax concessions, subsidies and central government expenditure in States. In a study of impact of central tax preferences on States covering 65% of the tax expenditures in direct taxes and 18% of the tax expenditure in excise duties for the year 2008–09, the National Institute of Public Finance and Policy (NIPFP) had brought out the regressive nature of central tax concessions. Excluding area-based tax concessions, there emerged a positive relation between per capita income and per capita tax exemption availed. Within the major states, Karnataka emerged distinctly ahead of the other States with per capita benefits amounting to Rs. 922 followed by Haryana and Gujarat with per capita benefits of Rs. 700 and Rs. 577, respectively. In contrast, per capita tax concessions amounted to Rs.62 in Bihar and Rs.132 in Uttar Pradesh.

In a study by the NIPFP in 2003 on budgetary subsidies, it was found that the per capita subsidies in the economic and social sectors in richer States were significantly higher than those in lower income States. In another study conducted by the NIPFP in 2009, it was found that direct spending (comprising subsidies on food, fertilisers and petroleum products, spending on agriculture marketing and insurance, Central Road Fund and expenditure on school and higher education) by the centre in States was regressive. In 2006–07, while the average per capita central spending in general category States amounted to Rs. 897, the per capita spending in higher income States of Haryana, Punjab, Tamil Nadu and Andhra Pradesh was Rs. 1640, Rs. 1714, Rs. 1274 and Rs. 1182, respectively. In contrast, the per capita expenditure in Bihar, Jharkhand and Uttar Pradesh amounted to Rs. 465, Rs. 762 and Rs. 557, respectively.

In brief, the tax concessions, subsidies and direct spending by Union budgets favoured the richer states, relative to others.

2.7   Constitutional Design: Asymmetrical Federalism

Finally, all States are not equal in the eyes of the Constitution. The makers of the Indian Constitution recognised regional imbalances and provided for special provisions under Part XXI of the Constitution. These provisions include special dispensation to the States of Jammu and Kashmir, Nagaland, Assam, Manipur, Mizoram, Arunachal Pradesh, Sikkim and Goa and separate development boards for Vidarbha and Marathwada regions in Maharashtra, establishment of separate development boards for Hyderabad–Karnataka region and Saurashtra and Kutch regions in the States of Karnataka and Gujarat, respectively. This is a case of de jure asymmetrical federalism. In addition to special provisions in the Constitution, the Government of India had till recently accorded special category status to 11 States so far. Those are cases of de facto asymmetric federalism.

A relevant subject for further research would be the extent to which the relevant States benefitted from the special provisions and categorisation, in terms of flow of funds to reduce inequalities.

3   Conclusion

The empirical evidence seems to indicate that, barring the Finance Commissions, all other public institutions did not focus on the inequalities among the States. This is true of both the pre-reform and post-reform periods. Among the instruments of public policy, the formula-based tax devolution is progressive and the rest did not ensure flow of resources to poorer States. Finally, discretionary transfers from centre seem to favour non-poor States. In brief, to address the very important issues posed by

Professor Radhakrishna, there is need for a review of the functioning of institutions and instruments of public policy based on significant empirical research.

Fiscal Dominance of Monetary Policy: Global and Indian Experience

Duvvuri Subbarao

1 Introduction

Fiscal dominance refers to a phenomenon whereby the government's fiscal profligacy is accommodated by the central bank's monetary policy—that is, the central bank modulates the supply of money in deference to the borrowing plan of the government. Historically, fiscal dominance was an assured recipe for economic imbalances—as countries such as Argentina, Brazil and Italy adopted this path and were soon relegated to the backbenches of economic performance (Watkins, 2016).

During the desperate times of the Global Financial Crisis (GFC), fiscal dominance took on a new avatar—as monetary authorities followed up fiscal stimuli with infusion of liquidity as a matter of course. While these easy monetary conditions have since been only partially rolled, the current COVID-19 crisis has already shown incipient signs of reigniting fiscal dominance. Several countries have announced substantial economic stimulus packages, some hovering close to 40% of GDP (Japan: ~42.2% of GDP as per International Monetary Fund (IMF) data[1]). The announced fiscal measures are now estimated at nearly $11 trillion. Given the sizeable fiscal support and with the steep contraction in economic growth eroding revenues, global public debt is projected to soar to more than 100% of GDP in 2020–21, an all-time high. Overall fiscal deficit is also expected to surge by 10% points to 14% of GDP in 2020 (IMF, 2020).

India announced a ₹20 trillion economic package amounting to 10% of GDP even as its revenues were eroded by the lockdown on account of the pandemic. Furthermore, states have been permitted to expand their fiscal deficits from 3% to 5% of GDP, *albeit* with some conditionalities. The huge increase in public debt on

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[1] Source: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#J accessed last on July 25, 2020.

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account of these factors raises concerns its impact on interest rates and inflation even as it opens up avenues for monetary-fiscal co-ordination. For instance, RBI's efforts to provide liquidity to stressed sectors through Targeted Long-term Repo Operations (TLTROs), have been subsequently complemented by provision of credit guarantee by the government to address risk-averse behaviour of banks and promote credit growth. Thus, as opposed to a widely held belief that fiscal dominance is receding on the economic landscape, it is incontrovertible that the phenomenon will continue to remain germane in the foreseeable future.

2 Theoretical Underpinning

The Great Depression of the 1930s led to Keynesian fiscal policy activism that advocated a stronger role for government expenditure and only a supporting role for monetary policy. By the 1960s, however, monetary policy started gaining ground as the preferred instrumentality for quickly restoring macroeconomic stability in large part because of the delays involved in getting legislative approvals for fiscal stimulus. Moreover, the emergence of a trade-off between inflation and growth as suggested by the Phillips Curve also supported a stronger role for monetary policy.

The natural rate hypothesis proposed by Friedman in 1968 and subsequent evidence in its support during the oil price shocks and stagflation of the 1970s persuaded policy makers and economists that the long-run unemployment rate is determined by structural/natural factors that are beyond the control of monetary policy. Monetary policy can only affect nominal variables in the long run. This led to the emergence of the stabilization function of the central bank. Since a central bank cannot affect the steady-state unemployment, it should only minimize the fluctuation of actual unemployment from the steady-state through price stability.

While price stability was increasingly seen as the primary function of central banks by the 1980s, the 'unpleasant monetarist arithmetic' of Sargent and Wallace (1981) suggested that even under a tight monetary policy regime, fiscal dominance can lead to higher inflation in the future. When the government independently sets its intertemporal path of fiscal deficit, the financing of the deficit would involve higher borrowing (given that the central bank does not immediately accommodate the higher fiscal deficit through money creation). The higher borrowing would push up interest rates and eventually the interest rate on bonds would outpace the growth rate of the economy, imposing an upper limit on bond-financing. Any further increase in fiscal deficit would then have to be financed through money creation, impairing the ability of the central bank to control inflation. The surmise was that fiscal-monetary co-ordination was essential for managing inflation and government debt.

Another constraint on the price stabilization objective of the central bank was suggested by the fiscal theory of price level in the 1990s. Contrary to the monetarist view that inflation is primarily a monetary phenomenon, the fiscal theory of price level (FTPL) postulated that price level is primarily determined by government debt and fiscal policy, and monetary policy plays only an indirect role (Leeper, 1991;

Sims, 1994; Woodford, 1994). According to this theory, the current liabilities of the government must equal the net present value of future stream of government revenues (primary surpluses and revenues from money creation) in real terms.

With an independent and committed central bank, any mismatch in the government's intertemporal budget constraint would require the endogenous adjustment of prices. Consequently, even in the absence of direct monetization of the government's deficit, the price stability mandate of the central bank could be compromised. Accordingly, several countries—including India—have legislated fiscal responsibility rules to rein in excessive fiscal activism that hinders the achievement of stable inflation by monetary authorities (for instance, the Balanced Budget and Emergency Deficit Control Act of 1985 and the Balanced Budget and Emergency Deficit Reaffirmation Act of 1987 in the USA, Maastricht Treaty and the successive Stability and Growth Pact (SGP) in the European Union, Fiscal Responsibility Act (FRA) of 1994 in New Zealand, Federal Spending Control Act 1991 in Canada) (RBI, 2012).

The key insight of the unpleasant monetarist arithmetic concept elaborated by the Sargent and Wallace (1981) model is that when the fiscal authority determines its expenditures over and above its revenues without regard to the stance of the monetary authority, the latter loses its grip over inflation. The veritable constraint on the monetary authority under such a scheme of 'fiscal dominance' is that government bonds are demanded less in the market, so their holders have to be promised a rate of return higher than the economy's rate of growth. The model has some basic features such as: (a) real income and population grow at the same constant rate n; (b) real return on government securities must exceed the rate of growth of real income; (c) a demand schedule for money that exhibits constant income velocity (a modification of this, as described later, would withdraw more control from the monetary authority).

Now, fiscal policy is described as a series of values $D(1), D(2), \ldots, D(t)$, where $D(t)$ is the real expenditure by fiscal authority—except interest payments on government debt—over and above real revenues, i.e. real primary deficit. Similarly, monetary policy is conjectured as the time path $H(1), H(2), \ldots, H(t)$ of stock of high-powered money. For simplicity, it is assumed that entire government debt is one-period debt.

The government budget constraint may now be written as:

$$D(t) = \left\{ \frac{[H(t) - H(t-1)]}{p(t)} \right\} + \{B(t) - B(t-1)[1 + R(t-1)]\} \qquad (1)$$

where $p(t)$ is the price level at time t and $R(t-1)$ is the real rate of interest on one-period government bonds between time t and $t-1$. $B(t-1)[1 + R(t-1)]$ is the real par value of one-period privately held government bonds issued in time $t-1$ and due for redemption in t. So, the essence of the equation is that the deficit must be balanced by a combination of newly created currency and interest bearing debt. Suppose $N(t)$ is the population at time t and we therefore have $N(t+1) = (1+n)N(t)$ for $t = 0, 1, 2, \ldots$ with $N(0) > 0$ being given and n being a constant exceeding -1. Dividing (1) by $N(t)$ and rearranging gives government's budget constraint in per

capita terms, i.e.

$$\frac{B(t)}{N(t)} = \left\{ \frac{[1 + R(t-1)]}{1+n} \right\} \cdot \left[\frac{B(t-1)}{N(t-1)} \right] + \left[\frac{D(t)}{N(t)} \right] - \left\{ \frac{[H(t) - H(t-1)]}{[N(t)p(t)]} \right\}$$

(2)

It is now possible to illustrate the working of the model, in particular how the disregarding of the monetary authority by the fiscal authority leads to higher future inflation if the former independently pursues low inflation target in the short to me run. For this, it is assumed that for $t = 1, 2, \ldots, T$ the monetary base grows at a fixed rate θ (i.e. $H(t) = (1 + \theta)H(t-1)$, with tighter monetary policy being characterized by smaller θ) and for $t > T$, the path of monetary base is chosen so as to keep stock of interest bearing government debt per capita constant at the level attained at $t = T$.

It is also noted that price level is proportional to money stock per capita, $p(t) = \left(\frac{1}{h}\right)[H(t)/N(t)]$, a result that flows directly from assumptions (a) and (c) of the model. Accordingly, inflation may be inferred to be $\frac{1+\theta}{1+n} - 1$. To show that inflation for periods succeeding time period T depends on inflation rate chosen for time periods prior to that, two steps are undertaken: first, to demonstrate that inflation post T depends on $\frac{B(T)}{N(T)} = b_\theta(T)$, and then to show that the latter depends on θ. For this, (2) is rewritten for time periods following T using $\frac{B(t)}{N(t)} = \frac{B(t-1)}{N(t-1)} = b_\theta(T)$ and $H(t) = hN(t)p(t)$, as discussed earlier. This yields

$$1 - \left[\frac{1}{1+n} \right] \left[\frac{p(t-1)}{p(t)} \right] = \frac{\left[\frac{D(t)}{N(t)} \right] + \left\{ \frac{[R(t-1)-n]}{1+n} \right\} b_\theta(T)}{h}$$

(3)

It is clear that (3) makes sense only if the RHS is less than 1, which places an upper bound on $b_\theta(T)$, given that $[R(t-1) - n] > 0$, as per assumption (b) of the model. As such, the RHS is directly proportional to size of $b_\theta(T)$. This implies that for $t > T$ inflation is higher the higher the value of $b_\theta(T)$. To prove that $b_\theta(T)$ is dependent on θ, the entire path of $b(1), b(2), b(3) \ldots b_\theta(T)$ is solved by making use of (2) and recursively solving for higher values of $b(t)$ starting with $t = 1$. The expression so obtained shows that $b_\theta(T)$ encompasses a decreasing function of θ for all values of θ permissible in the model. So, a smaller θ leads to a larger $b_\theta(T)$; or in other words a tighter monetary policy in the short to medium run causes greater inflation in the long run. To summarize, when fiscal authority chooses its policies independently of the monetary authority and has to offer a higher rate of interest on bonds to raise funds to fill its deficit, the monetary authority that attempts to tame inflation in the short run gives up its fetters on inflation in the long run.

Now, if the money-demand equation is slightly modified to de additionally on the expected rate of inflation, then current price level becomes cogent upon anticipated future levels of money supply, not just on the current level. Thus, a fiscally dominated monetary authority that has to concede a higher inflation rate in the future (and therefore higher money supply growth) in order to control inflation unilaterally in

the given time period inexorably has to concede a higher inflation rate even in the short to medium runs.

Another related model is that explored in Resende (2007), showing how price level in an economy not only depends on the money stock but additionally on the proportion of government debt that is backed with money. Briefly, the infinitely lived representative consumer—endowed with perfect foresight—in the model seeks to maximize its utility function of the log linear form which depends on consumption (c_t), money holding (m_t) and leisure ($1 - n_t$), viz. $u(.) = \ln(c_t) + \gamma \ln\left(m_t/p_t\right) + \theta \ln(1 - n_t)$. So, the objective function of the consumer is

$$\max_{\{c_t, n_t, m_t, b_t, k_t\}} \beta^t u(.) \tag{4}$$

where b_t, k_t refer to next period holdings of nominal one-period government debt and capital. Time endowment and population size are both normalized to 1. The intertemporal budget constraint for the consumer may be written as follows:

$$c_t + \frac{m_t}{p_t} + \frac{b_t}{p_t} + k_t = w_t n_t + r_t k_{t-1} + \frac{m_{t-1}}{\pi_t p_{t-1}} + i_{t-1} \frac{b_{t-1}}{\pi_t p_{t-1}} - \tau_t \tag{5}$$

With $\pi_t = p_t/p_{t-1}$ being the level of inflation, τ_t being lump s taxes, r_t being the rate of return on capital and i_{t-1} being the return on government debt. In equilibrium, no arbitrage condition requires that $i_{t-1}/\pi_t = r_t$. The first-order conditions for optimization of the consumer's utility are $\frac{1}{c_t} = \beta \frac{i_t}{\pi_{t+1}} \frac{1}{c_{t+1}}$ and $\frac{m_t}{p_t} = \gamma c_t i_t/i_t - 1$. These conditions hold the key to unlock the model's implications for the aggregate price level.

For the government that spends an exogenous amount of resources G_t, the sources of funds are lump sum taxes, issuance of money (M_t) and increase of public debt (B_t). The government's budget constraint subject to a no-Ponzi game condition is given by

$$G_t + (i_{t-1} - 1)\frac{B_{t-1}}{p_t} = \tau_t + \frac{M_t - M_{t-1}}{p_t} + \frac{B_t - B_{t-1}}{p_t} \tag{6}$$

Which when iterated forward implies a budget constraint

$$i_{t-1}\frac{B_{t-1}}{p_t} = \sum_{j=0}^{\infty} \frac{\tau_{t+j}}{R_t^{(j)}} + \sum_{j=0}^{\infty} \frac{M_{t+j} - M_{t+j-1}}{p_{t+j} R_t^{(j)}} - \sum_{j=0}^{\infty} \frac{G_{t+j}}{R_t^{(j)}} = T_t + S_t - \overline{G}_t \tag{7}$$

With $R_t^{(j)} = \prod_{h=1}^{j} r_{t+h}$ as the j-periods ahead market discount factor and $T_t, S_t, \overline{G}_t$ being the present value of tax receipts, seigniorage revenue and government expenditure, respectively. A fiscal rule is now assumed whereby the government commits credibly to raise large enough primary surpluses to back a constant fraction

of the outstanding debt in any given time period. Say, $T_t - \overline{G}_t = \delta i_{t-1} \frac{B_{t-1}}{p_t}$, where $\delta \varepsilon [0, 1]$. Ipso facto, it means that a fraction $(1 - \delta)$ of the outstanding debt in a given period is backed by present discounted value of current and future seigniorage revenue. It is easily seen that $\delta = 1$ refers to a condition whereby the fiscal authority fully backs all outstanding debt and there is full independence of the monetary authority, whereas $\delta = 0$ refers to a situation where all of the outstanding debt is backed by monetary authority in the form of current and future seigniorage revenue (the case of 'complete fiscal dominance').

Now, the equilibrium price level is determined by the clearing of the money market, in that $M_t = m_t$. The supply of money is contingent upon the fiscal rule followed by the government as well as its intertemporal budget constraint, whereas the demand for money is given by optimization of consumer's utility function. An interaction of the two aspects of the money market leads to the condition that

$$p_t = \frac{(1 - \beta)(M_{t-1} + (1 - \delta)i_{t-1}B_{t-1})}{\gamma c_t} \tag{8}$$

Which casts price level as a function of consumption of beginning of period stocks of money and debt. The simplified form of the numerator $M_{t-1} + (1 - \delta)i_{t-1}B_{t-1} = M_t + (1 - \delta)B_t$ used to rewrite the price level as function of end of period stocks of money and debt:

$$p_t = \frac{(1 - \beta)[M_t + (1 - \delta)B_t]}{\gamma c_t} \tag{9}$$

Equation (9) captures the basic essence of the model. It conveys that price level in the economy is not dependent only on the money stock but also on the proportion of the outstanding debt that is backed by the monetary authority. Thus, the proportion of debt that is backed by monetary authority has the same impact on price level as money itself. The crucial takeaway from this discussion is that for $\delta \varepsilon [0, 1)$, the stock of debt impinges upon the price level of the economy.

Anecdotal evidences have been adduced to point to the presence of fiscal dominance in 'populist governance regimes' of Peru (1985–90), Argentina (2003–17), and Venezuela (2002–present) (Edwards, 2019). This aside, there have been umpteen attempts to capture the phenomenon of fiscal dominance. Sabatéet al. (2019) estimate t following equation:

$$dmb_{it} = \mu_i + \sum_{j=1}^{p} \beta_{1i,j} dmb_{i,t-j} + \sum_{k=0}^{p} \beta_{2i,j} b_{i,t-k} + \varepsilon_{it}$$

where dmb refers to series of variations in monetary base and b refers to budget balance, for a set of 17 countries and the period 1870–1938. Using a pooled mean group (PMG) estimation technique, they discover that a 1% decrease in b (that is, an increase in deficit by 1%) leads to an average increase in dmb of only 0.02%

points during 1870–1938; so there is weak evidence of fiscal dominance for the considered panel of countries. But splitting the countries by their policy on external sector (namely, whether they allowed their currency to freely float or not) yields stronger evidence of fiscal dominance. In fact, such heterogeneity has been commonly discovered by multiple studies: Fischer et al. (2002) examined 94 countries for the period 1960–95 and obtained more robust evidence for fiscal dominance in high inflation countries in the sample; Catão and Terrones (2005), who explored a sample of 107 countries for the period 1960–2001 found similar results for high versus low inflation countries. Heterogeneity of an intertemporal variety is also observed in certain countries: Tanner and Ramos (2002) explore how Brazil showed monetary dominance (such that primary deficit adjusts to changes in liabilities and/or real interest payments) the period from 1995 till 1999, with pendulum swinging towards fiscal dominance gradually since.

Bajo-Rubio et al. (2014) have advocated estimation of equations of the following nature:

$$s_t = \alpha + \beta b_{t-1} + \vartheta_t$$

where s_t refers to primary surplus and b_t refers to level of debt, both as per cent of GDP; or

$$\text{rev}_t = \alpha' + \beta'^{\exp_t} + \varepsilon_t$$

where exp and rev denote ratios of government's total expenditure and revenues to GDP. The discovery of $\beta \leq 0$ or $\beta' \leq 1$ would imply fiscal dominance. They investigate the case of Spain for the period 1850–2000 using variants of the above equation and complement their analysis with Granger causality tests between primary surplus and debt to GDP ratios. They discover fiscal dominance for Spain for the given period.

Ahmed et al. (2020) have adopted another strategy for testing for prevalence of fiscal dominance. They consider the usual form of policy reaction function of monetary authorities, where the nominal interest rate is pegged taking into account output gap and inflation deviation from the targeted rate of inflation, and augment the same with debt-related measures such as public debt/GDP, foreign currency dominated debt/GDP and currency composition of public debt. Specifically, they model the following equation

$$i_{it} = \mu_i + \rho i_{i,t-1} + \alpha \left(y_{i,t} - y*_{i,t} \right) + \beta \pi_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$$

where i is the interest rate set by the monetary authority, $y - y*$ being the output gap, π being the level of inflation and X representing a host of other variables, including the debt-related measures. The analysis is conducted by segregating the set of countries into their development status and their stance on inflation targeting. A host of estimates and concomitant inferences are derived.

Resende (2007) applied his theoretical model—described earlier—for testing incidence of fiscal dominance or otherwise. His empirical strategy consists of estimating the equation given below.

$$M_t = \alpha_0 + \alpha_1 C_t + \alpha_2 B_t + e_t$$

where M, C, B represent money stock, nominal consumption and outstanding public debt respectively. If the variables above are non-stationary variables and there indeed exists an organic relationship between them—as postulated—then the regression would yield meaningful and consistent estimates that could indicate the presence of fiscal dominance. The study considers 18 OECD countries and 20 developing economies for varying time periods, ranging from 1948 to 2005. The co-integrating vector is estimated for those economies that show evidence of co-integration; it is found that the share of debt backed by monetary authority is—on an average—higher in developing economies than in OECD countries.

As a natural corollary, fiscal dominance is more common in developing countries—even though it may be kept in mind that this insight is true in the period considered, i.e. before the GFC whereupon debt levels have sharply risen in advanced countries too. Of course, there are studies that offer contrary evidence to this: for instance, Afolabi and Atolagbe (2018) employ quarterly data from 1986Q1 to 2016Q4 to investigate fiscal dominance and the conduct of monetary policy in Nigeria in a framework of vector error correction mechanism (VECM) and co-integration technique to discover that there is no evidence of fiscal dominance in Nigeria (in that, budget deficit, domestic debt and money supply have no significant influence on the average price level).

The dependence of prevalence of fiscal dominance on nature of incumbent political leadership was explored by Shaheen (2018) who found in the study commissioning structural VAR approach that in the period 1977–2016, fiscal dominance is more notable in the elected regimes and weaker in the presence of military regimes in Pakistan.

3 International Experience with Fiscal Dominance

Whereas Keynesian fiscal policy reigned as the principal instrumentality for stabilizing economies in the post war period, the significant inflationary episodes of the 1970s challenged its efficacy. Informed by the influential thinking of Milton Friedman and the Chicago School, intellectual faith shifted gradually but surely to monetary policy. The prime example of this is the case of the US Federal Reserve which was empowered to control inflation in a credible and sustainable manner, with fiscal restraints brought in to support the anti-inflationary monetary policy framework by way of the Balanced Budget and Emergency Deficit Control Act of 1985 and the Balanced Budget and Emergency Deficit Reaffirmation Act of 1987. Similarly, the UK initiated the Medium-Term Financial Strategy in 1980 with a view to gradually reduce the borrowing requirements of the public sector, which was palpably a major factor in containing money growth and thereby thwarting fiscal dominance. Similar

policies were instituted in place in the European Union, Canada, New Zealand, among others.

The experience of developing countries in this regard is instructive since central banks in emerging market and developing economies (EMDEs) are confronted with a *de facto* lack of independence (from fiscal authorities) and a frequent incidence of fiscal dominance. Lack of sustainable fiscal policy (marked by high levels of budget deficits and public debt) poses a formidable impediment to the autonomous conduct of monetary policy. More emphatically, large public sector borrowing requirements militate against price stability since huge public borrowings fuel inflation expectations. Accordingly, several EMDEs instituted policies that restrain fiscal policy: such as Growth, Employment and Redistribution (GEAR) policy in South Africa; Fiscal Responsibility Law 2000 (that introduced sharp constraints on the financing of the public sector) heralded the all-encompassing fiscal prudence framework for three tiers of governments in Brazil; India's Fiscal Responsibility and Budget Management (FRBM) Act, 2003 provides a bulwark against fiscal dominance in policy matters (RBI, 2012).

4 Post-GFC Developments

The onset of the global financial crisis (2008) led to close co-ordination of fiscal and monetary policies. Apart from using the conventional policy answer to cut policy rates to very low levels, monetary authorities resorted to unconventional policies by expanding their balance sheets (quantitative easing) and changing its composition to influence long-term yields. While the large-scale asset purchases helped stabilize financial markets, they also exposed central banks to interest rate, exchange rate, and credit risks.

Negative interest rates which came into play starting 2014 have an interesting implication for the phenomenon of fiscal dominance. The process was initiated by the European Central Bank (ECB) which slashed its deposit facility rate to (−) 0.1% in June 2014, with a view to address stagnation and deflation in the region. Subsequently, many national central banks, such as those of Denmark, Sweden, Switzerland and Japan, brought down the interest 'paid' on part of the deposits parked with them into negative territory.

Negative rates dis-incentivize the holding of deposits by rendering them not just barren like cash, but going further and penalising those who choose to hold deposits rather than spend their savings. Investors are thus pushed, as a first port of call, to invest in safe assets such as domestic and foreign government bonds that offer positive rates of return. The hunt for bonds intensified to such high levels that bond yields in countries such as Japan, Germany and France forayed into the negative territory, implying that investors were willing to reward their governments for borrowing from them if they hold sovereign bonds to maturity (Chandrasekhar, 2017). This is a new form of fiscal dominance that has manifested in recent times.

5   Relevance for India

Analytically, monetary-fiscal interaction in India can be broken into four main phases (RBI, 2012).

The first phase during the period 1980–91 was marked by intense fiscal dominance as the government's huge and growing fiscal deficit year after year was automatically monetized by the Reserve Bank through *ad hoc* treasury bills. The second-phase came as part of the landmark 1991 reforms. In the period 1991–2003, there was some whittling down of financial repression through the introduction of auctions of government securities, reduction in the cash reserve ratio (CRR) and the statutory liquidity ratio (SLR), and partial de-regulation of interest rates.

Starting 1997, India moved on to *de jure* although not *de facto* monetary independence when the practice of automatic monetization of deficits through the issue of T-Bills was abandoned. During the third phase (2003–08), monetary independence received a further boost with the adoption of fiscal responsibility legislations at both centre and state levels in 2003. The Fiscal Responsibility and Budget Management (FRBM) Act 2003 provided a roadmap for fiscal consolidation for the central government and proscribed RBI from subscribing to primary issuances of government securities. RBI could henceforth operate only in the secondary market through open market operations (OMOs).

For sure, OMOs expand the monetary base, but that becomes monetization only if it is resorted to for the express purpose of aiding government borrowing. Large fiscal deficits can attenuate monetary policy efficacy by compelling it to provide higher liquidity through OMOs (Chart 1). As long as OMOs are conducted in line with the liquidity requirements of the economy rather than to reduce the cost of government borrowing, monetary policy can be considered as independent. Given this thin line
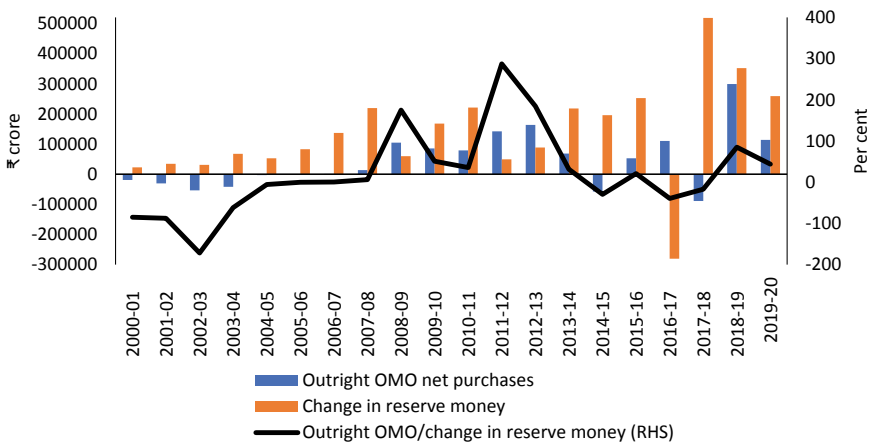
Chart 1 Open market purchases and change in reserve money. *Source* DBIE, RBI

Chart 2 Sources of reserve money. *Source* DBIE, RBI
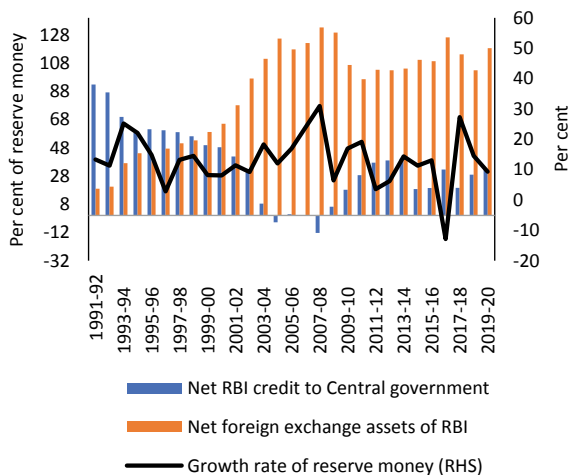
of difference, several authors and economic commentators have held nuanced views on the monetary independence actually panning out in practice.

The final phase in the monetary-fiscal independence (2008–09 onwards) began with coordinated stimulus by both monetary and fiscal authorities in response to the GFC. While the RBI responded with a slew of liquidity measures, the government undertook massive fiscal expansion with net market borrowings rising to ₹2.34 trillion against the budgeted level of ₹1 trillion in 2008–09 (RBI, 2012). This raised a 'paradoxical situation- even as governments and central banks around the world coordinated and cooperated, many of their familiar conflicts got played out once again' (Subbarao, 2009). As a result, the share of net RBI credit to the central government in the outstanding amount of reserve money which was on a declining path till 2007– 08, reversed course in 2008–09 in the wake of the GFC (Chart 2). This trend was mimicked in the sources of broad money with respect to share of bank credit to the government (Chart 3).

India took a decisive step towards an independent monetary regime by adopting the Monetary Policy Committee (MPC) based flexible inflation targeting framework in 2016. Nevertheless, concerns about fiscal dominance have persisted. While the inflation targeting framework puts the onus of inflation control squarely on the central bank, fiscal stability is a 'fundamental necessary condition' for achieving the inflation target. RBI's ability to deliver on the inflation target could be undermined by high fiscal deficits which would raise the aggregate demand and fuel inflationary pressures when the economy is operating above its potential.

This concern of fiscal dominance is buttressed by the fact that India's fiscal deficit is higher than that of many advanced countries and worryingly higher than that of most of its emerging market peers, except Brazil (Chart 4).

The debt to GDP ratio for India is also higher relative to its BRICS peers—South Africa, Russia and China, although it is lower than that of advanced economies (Chart 5).
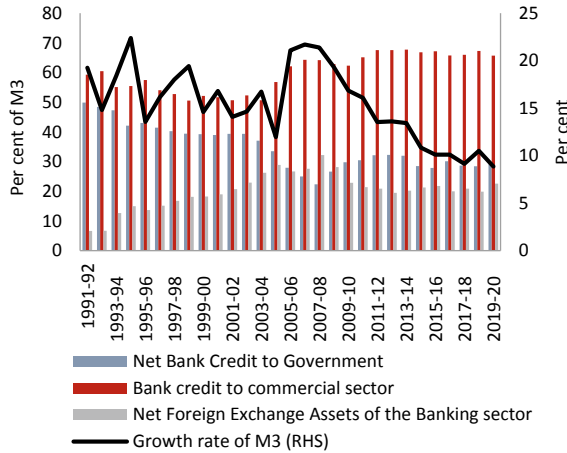
Chart 3 Sources of broad money. *Source* DBIE, RBI
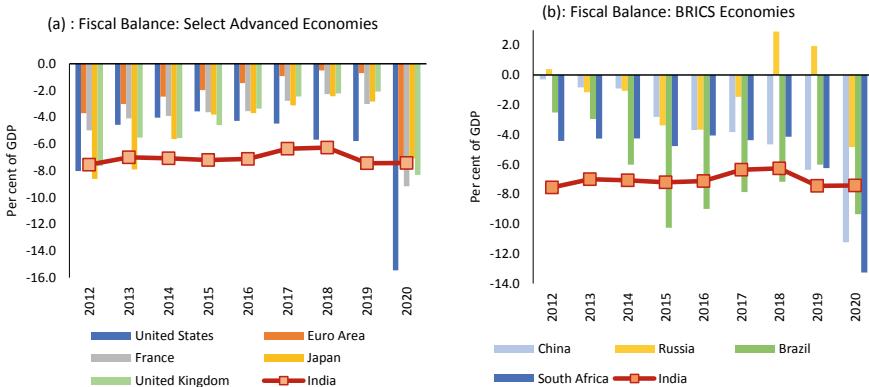
Chart 4 Comparison of fiscal balance position of India *vis-à-vis* other countries. *Source* IMF Fiscal monitor

India's experience with conforming to the FRBM mandate has been mixed. There were periods of declining fiscal deficits but they were rudely interrupted reversals all too frequently by unforeseen circumstances or crises. The combined fiscal deficit (centre plus states) declined during 2001–02 to 2007–08 but that was reversed by the GFC when the combined fiscal deficit (as per cent of GDP) jumped from 2.6% in 2007–08 to 6.1% in 2008–09 (Chart 6). Again, post-GFC, the combined fiscal deficit ratio has been declining in recent years; in fact the centre's fiscal deficit has been on a consistent downward trajectory from 2011–12 until 2018–19. In line with these trends, the share of debt financing in total expenditure, which increased post-GFC, has been coming down since 2011–12 till 2018–19 (Chart 7). The achievement of the centre's fiscal deficit target of 3% of GDP, as envisioned in the FRBM Act, however

(a) : General Government Debt: Select Advanced Economies

(b) : General Government Debt: BRICS Economies
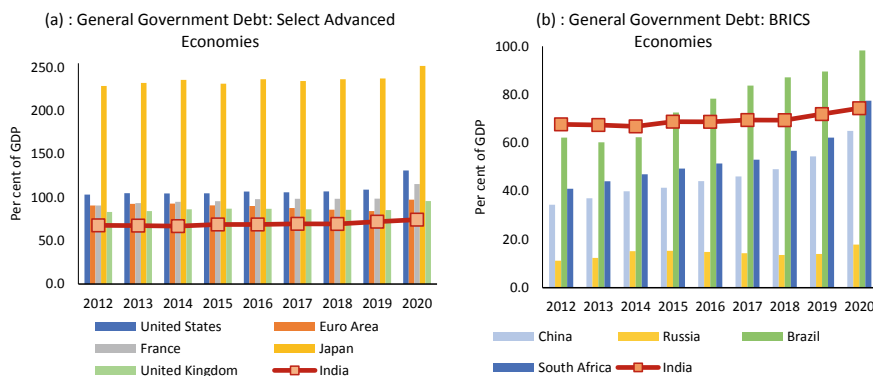
Chart 5 Comparison of debt position of India *vis-à-vis* other countries. *Source* IMF Fiscal monitor

Chart 6 Fiscal deficit in India. *Source* DBIE, RBI
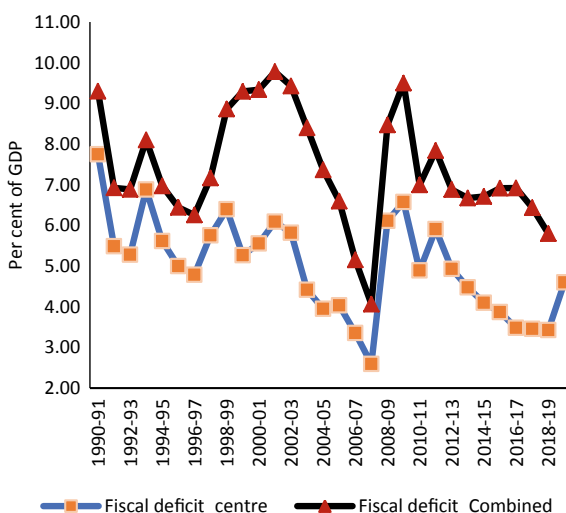
remains elusive. Against this background, we undertake an empirical exercise to check for fiscal dominance in India.

6 Empirical Estimation of Fiscal Dominance in India

The usual approach followed in the literature to check for the existence of fiscal dominance is to test for the impact of fiscal variables on the interest rate setting/response rule of monetary authorities. For example, Ahmed et al. (2020) have postulated that the usual policy reaction function of the central bank may be slightly modified to reflect fiscal variables (such as public debt/GDP, foreign currency-denominated

Chart 7 Financing of centre's public expenditure. *Source* DBIE, RBI
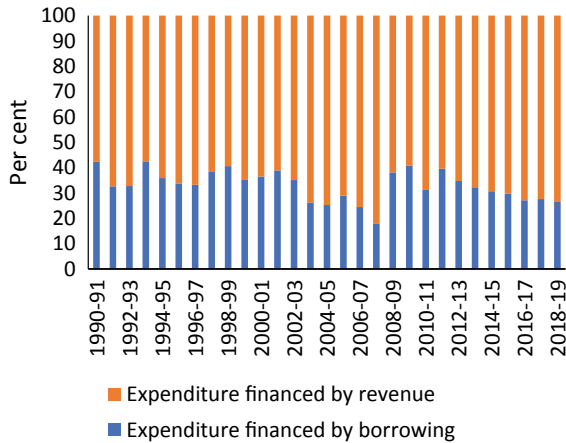
public debt/GDP, and currency composition of public debt) in addition to the standard variables such as output gap and the inflation deviation from the target inflation rate.

We follow a similar approach to test for fiscal/monetary dominance. Accordingly, the policy reaction function of the central bank is specified as follows:

$$i_t = \rho i_{t-1} + a(y_t - y_t^*) + b(\pi_t - \pi^*) + \gamma X_t + \varepsilon_t$$

where i_t is the policy rate, $(y_t - y_t^*)$ represents the output gap, $(\pi_t - \pi^*)$ represents the inflation gap or the deviation of inflation from the target, X_t refers to other variables that may affect the policy rate like the real exchange rate and public debt to GDP ratio.

A real exchange rate depreciation can raise costs of servicing foreign currency-denominated debt. This may induce central banks, particularly those with large foreign currency-denominated external debt, to put higher weight on stabilizing the exchange rate. India's external public debt, however, is low and stands at 3.5% of its total debt and 2.5% of GDP. To capture fiscal/monetary dominance, public debt to GDP ratio is included in the modified Taylor's rule. If higher public debt is found to be associated with lower policy rates, i.e. a negative coefficient of the public debt variable, it implies fiscal dominance (Table 1).

We use annual data from the post liberalization period (1991–2020) for the estimation. The output gap is obtained by applying HP filter to real GDP. Inflation refers to year-on-year change in CPI-Combined linked to CPI-IW for the years prior to 2011–12. The repo rate (available from 2001 onwards) is superimposed on the SBI lending rate to obtain a longer time series for the policy rate. To account for the level difference between the repo rate and the SBI lending rate, an intercept dummy is used in the regression equation. Data description and sources for all variables are

Table 1 Results

Explanatory variables	Dependent variable: repo rate			
	Coefficient	Std. error	*t*-statistic	Prob
Repo rate (−1)	0.5	0.1	4.1	0.00
Inflation gap	0.2	0.1	2.2	0.04
Output gap	0.3	0.2	1.9	0.07
Public debt ratio	0.1	0.0	3.3	0.00
REER	0.0	0.0	−0.7	0.52
Dummy	−4.2	1.2	−3.4	0.00
No. of observations	30 (1991–2020)			
Adjusted R-squared	0.93			

presented in Appendix Table 2. All variables are found to be stationary (Appendix Table 3).

RBI's Policy Reaction Function 1991–2020

The empirical exercise suggests independence of monetary policy and no evidence of fiscal dominance during 1991–2020 (Table 1). The coefficient of public debt ratio is positive and significant suggesting that an increase in public debt to GDP ratio leads to an increase in the policy rate.

The results suggest that the institutional reforms undertaken in fiscal and monetary management have softened direct fiscal pressures on monetary policy. Whereas the policy in the pre-reform period was premised on a predominant role for the public sector with unlimited borrowings from RBI at subsidized rates unmindful of the size of fiscal deficits, the reforms [post-19921—of auctioning of G-Secs at market-determined rates, accompanied by progressive withdrawal of RBI support and eventual abandonment of automatic monetization of government deficit—have effectively ended the erstwhile practice of tangible fiscal dominance over monetary policy (Chidambaram, 2007). Even so, the possibility of fiscal dominance manifesting through other channels like open market operations cannot be ruled out. These are explained in the next section.

7 Extraordinary Situations, Extraordinary Measures

The extraordinary challenge brought on by the COVID-19 pandemic has subjected the economy to a simultaneous demand and supply shocks. Struggling to manage the tension between lives and livelihoods, the government imposed a stringent lockdown which brought economic activity to a grinding halt; government revenues declined steeply as a consequence. At the same time, governments, both at the centre and in states had to ramp up expenditures to expand health and medical care, provide

livelihood support to the vulnerable and support flailing production units. The huge jump in the borrowing requirements of the centre and states has revived the debate about whether the RBI should directly monetize the fiscal deficit.

A couple of ideas are notable here: (1) There have been a number of cases where central banks have assumed the mantle for financing government deficits, as governments announced spending plans against the COVID 19 pandemic. For instance, the US Treasury is issuing commensurate amounts of debt to fund the COVID 19 package even as the Federal Reserve has announced an open ended purchase of government bonds; The UK announced a major fiscal stimulus just a few hours after the Bank of England (BoE) notified a generous reduction in the policy rate, which was subsequently followed by the resumption of quantitative easing programme by the BoE. Across Japan, US and UK, central banks are estimated to take on 52%, 61% and 87% respectively of net issuance of public debt during the ongoing fiscal (Brennan, 2020). (2) The implications of this monetary accommodation of fiscal expansion are ambiguous. One view is that the cost of public debt being issued now is low because not only are current interest rates low but also they will continue to remain low because central banks will be compelled to keep them low as inflation will remain below target. The other point of view that is gaining currency is that central banks ought to allow inflation to be higher than their targeted levels with a view to 'inflating away the public debt'. This, at a time when interest expenses as a share of tax revenues have grown by 2% points, 2.5% points and 15% points for advanced economies, emerging market and middle-income countries and low-income countries in the period 2015–2020 (Tran, 2020).

In India, the government announced an economic stimulus package of ₹20 trillion amounting to 10% of GDP to bolster the economy, create critical health infrastructure, and provide livelihood support to vulnerable sections. At the same time, the pandemic and the consequent lockdown have led to a slump in growth that has eroded government revenues (during April–May 2020, total receipts of the central government contracted by 69% over corresponding period of previous year). This has stretched government finances and the central government has already revised upwards its estimated gross market borrowings in 2020–21 to ₹12 trillion from the budgeted ₹7.8 trillion.

Current estimates are that the fiscal deficit for 2020–21 could be even higher—anywhere between ₹13–16 trillion (Nayar, 2020). In addition, the borrowing limit for state governments has also been raised from 3 to 5% of their Gross State Domestic Product (GSDP) for 2020–21 albeit linked to specific reforms.

The apprehension that the market will not be able to finance borrowings of such a huge order has revived the suggestion that the only alternative in such a situation is for the RBI to step in and finance the deficit directly—an inevitable and in view an unavoidable acquiescence in fiscal dominance. The FRBM Act, as amended in 2018, provides for an exception when RBI may subscribe to the primary issuances of government securities in specific circumstances.

While both monetization and OMOs involve expansion of money supply and can potentially stoke inflation, OMOs are a monetary tool with control vested in the

monetary authority regarding the quantum and timing of intervention. Direct monetization on the other hand involves complete subservience of monetary policy to fiscal policy, as the money supply is determined by government's spending decisions. If RBI is seen as losing control over monetary policy, this may lead to loss of credibility in the inflation targeting framework and fuel self-fulfilling inflation expectations. Moreover, markets may fear that the government is planning to solve its fiscal problems by inflating away its debt, leading to a surge in government bond yields. The remedy thus, may be worse than the disease.

Going a step forward, some economists have suggested that it is time for 'helicopter money', i.e. direct non-repayable funding by the central bank (Gali, 2020). The central bank would print money and credit the government's account, but this credit would not be repayable. On the central bank's balance sheet, it would be captured by a reduction in its capital. Such a transfer would be synonymous with a commensurate purchase of government securities by the central bank, followed by its immediate writing-off or conversion into zero interest perpetuities to be held permanently on the central bank's balance sheet. Thus, government's effective debt liabilities would not be affected. Of course, there's no free lunch and the central bank would book a loss on its balance sheet by cancelling government debt, and collective wealth would be diminished by the same amount.

Another proposed solution is yield-curve control—an instrumentality that has been effectively used by the Bank of Japan (BoJ) since 2016 to bring both short-term and long-term interest rates to zero. The BoJ is the residual buyer of government securities in the secondary market. As long as the private sector is willing to hold government securities at the committed interest rate, the BoJ determines the size of its balance sheet. Beyond that, additional government securities are absorbed by the BoJ (Cecchetti and Schoenholtz, 2020).

These policies involve varying degrees of surrender of monetary policy independence to the fiscal authorities. In a situation where the objectives of fiscal-monetary policy are in sync—growth is contracting and inflation is below target -loose monetary policy that supports fiscal expansion can improve outcomes. However, if fiscal dominance persists even after normalcy is restored, it can fuel inflation and ultimately hurt growth (Chart 8).

The IMF's World Economic Outlook (April 2020) finds that rules-based fiscal stimulus measures can be highly effective in dampening downturns. Going forward, adoption of rules-based fiscal stimulus measures that provide stimulus in response to deteriorating economic conditions based on identified macroeconomic criteria like unemployment or growth shortfall, with automatic unwinding of the stimulus once the situation improves can ensure policy support in times of crisis, without subjugating monetary policy.
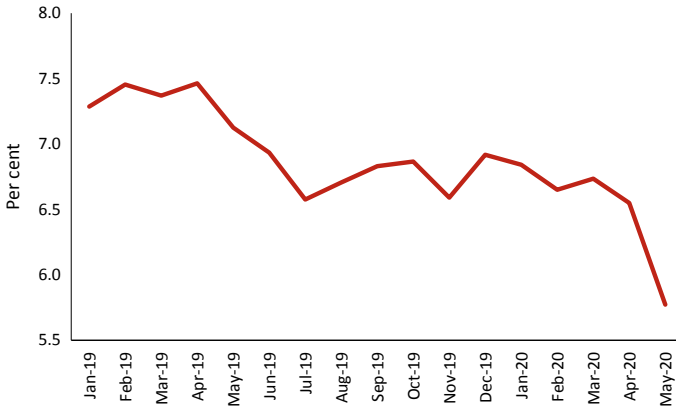
Chart 8 Yield on 10-year government securities. *Source* CEIC

8   Conclusion

The GFC tested the policy force of central banks and pushed them into uncharted territory. When the conventional thinking was that central banks had exhausted their policy arsenal after they brought the interest rate to the zero-lower bound, they proved otherwise by embarking on unprecedented bond buying which came to be termed quantitative easing (QE). Confronted with the economic fallout of COVID 19, central banks went deeper into uncharted territory by showing readiness to be the lender of first resort rather than their conventional role of being the lender of last resort. As discussed above, several central banks are financing their governments' deficits. And there is a growing possibility of 'helicopter money' What is common across all of these unconventional policies is that central banks are willy-nilly wading into the territory of fiscal policy, the traditional preserve of political decisions. With policy lines blurred, central banks are no longer able to assert their case for policy independence; on the contrary, they seem willing to acquiesce in fiscal dominance.

The situation with emerging market central banks is however different. They still have to contend with inflation, rather than disinflation, pressures. They also have to contend with fragile and immature governance institutions. The case for combating fiscal dominance of monetary policy in emerging markets therefore remains strong even as it might be weakening in the rich world. That case is possibly the strongest for India.

Appendix

See Tables 2 and 3.

Table 2 Data description and sources

Variable	Description	Source
Policy rate	Repo rate and SBI lending rate	DBIE, RBI
Inflation	CPI-combined linked to CPI-IW (y-o-y change)	NSO, ministry of statistics and programme implementation and labour bureau
Output gap	HP cycle of real GDP (base 2011–12)	NSO, ministry of statistics and programme implementation
Debt to GDP ratio	Combined debt of centre and states/nominal GDP	DBIE, RBI and NSO
REER	36-country trade-weighted REER	DBIE, RBI

Table 3 Results of unit root tests

Variables	Augmented Dickey Fuller test statistic
Repo rate[#]	-9.6^*
Inflation	-3.5^{**}
Output gap	-5.3^*
Public debt ratio	-2.7^{***}
REER	-5.4^*

Note ***, **, and * indicate 1, 5 and 10% levels of significance respectively; # breakpoint unit root test is applied on the repo rate

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Post-pandemic Revival Strategy for India

M. Govinda Rao

1 Introduction

The impressive growth story of Indian economy was brought to an abrupt break when the COVID-19 pandemic struck in March 2020. The pandemic not only resulted in a sharp contraction in the economy but also caused untold misery to millions and made severe dents on the lives and livelihoods of the people. As the economy moved into the expansionary mode after the second quarter, the second wave struck in May 2021 causing severe setback in the revival and hardship to the people. Unfortunately, the setback to the growth process came on the economy which was already affected by structural problems resulting in the deceleration in both investment and growth. Reviving the economy from the impact of the pandemic and accelerating capital formation and economic growth are priority areas and these call for structural reforms. In fact, the crisis created by the pandemic provides an opportune climate for undertaking the reforms. The present paper attempts to identify the various reforms needed to take the economy back to the high growth scenario.

Indian economy had witnessed a steady acceleration in GDP growth after economic reforms in 1991. From the "Hindu" rate of growth of 3.7% during 1950–81, it accelerated to 4.9% during 1981–88. The steady acceleration after the liberalising reforms were implemented saw the economic growth pivot at 7.8% during the period 2003–18 (Table 1). Although the growth decelerated after 2018 until the pandemic struck in 2020 to 5.8%, it was believed that achieving double digit growth was within the realm of feasibility. Acceleration to the high growth regime was found to be an imperative not only to improve the living standards of the people but also to provide jobs to two million people joining the workforce every year and to lift those unfortunate from the morass poverty. The transition to the high growth regime required

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Table 1 Phases of Indian Economic Growth

Period	Growth in GDP (constant prices)	Growth in per capita GDP (constant prices
Phase I (1950–81)	3.7	1.6
Phase II (1981–88)	4.9	2.8
Phase III (1988–2003)	5.7	3.7
Phase IV (2003–18)	7.8	6.4
Phase V (2017–20)	5.8	4.5

Source Estimated by the author

structural reforms which were explored by a number of economists. However, this not only requires significant increase in the volume of investment, but also enhancing productivity of investments through structural and governance reforms in land and labour markets, agriculture, fiscal reforms to control the deficit and debt and enhance public investment in infrastructure, tariff reforms to enhance export competitiveness, reforms in the financial markets, and the banking system. The crisis created by the pandemic was to be used as an opportunity to undertake these reforms.[1]

2 Aspirational Targets and the Setting for Reforms

Just a few months before the Coronavirus pandemic struck, that the Prime Minister of India set an aspirational goal of transforming into a five trillion-dollar economy target by 2024–25 from the present level of 2.9 trillion dollars. Of course, the target was more aspirational than real as it required sustained growth at over 9% (or nominal growth at 14%) at the prevailing exchange rate. To achieve this, the NITI Aayog had worked out the additional investment required at Rs. 108 trillion and 78% of this was supposed to be made by the Union and State governments equally and the remaining 22% was to be invested by the private sector. This also implied that the capital outlay of the Centre will have to increase from the prevailing 3.5 trillion (2019–20 RE) to Rs. 10 trillion by 2024–25 which required significant additional resource mobilisation through taxes and non-tax revenues and monetisation of assets including disinvestment. and compressing public spending on consumption expenditures, subsidies and transfers to release larger volume of resources for public investment.

[1] 1 Panagariya in his incisive book (2020) devotes as many as eight chapters (out of 13) to discuss specific policy reforms needed to achieve near-double digit growth trajectory.

Although the economy was decelerating since 2016–17, no one had an inkling that there would be an outbreak of pandemic with devastating effects in the economy. The severest lock down declared in response to the outbreak of the pandemic virtually brought complete halt to economic activities and threw the economic agents into terrible uncertainty. It caused enormous economic destruction and claimed more than 460,000 lives until November 22, 2021 according to official estimate and the actual number is estimated to be 5.8 times the official estimate.[2] There has been tremendous economic uncertainty and despite the stimulus measures taken by the government and the Reserve Bank of India. The aftereffects of the pandemic are likely to manifest in terms of a spate of bankruptcies, loss of employment, increased fragility of the financial system and tremendous uncertainty for both lives and livelihoods of the people.

The total lock down in the announced on March 24 initially for a period of 21 days was extended in phases until the end of May and the subsequent period saw selective relaxations. The severest impact of this was on the unorganised sector in urban centres which were the hotspots of the pandemic spread and the loss of employment. The loss of employment and the fear of contacting the virus in these epicentres of the virus caused massive reverse migration of the labourers to their moorings. The labour in the urban agglomerations who had migrated from the rural areas from far and near in search of livelihoods, suddenly were thrown into uncertain future. With little reserves to back them and with no social security, and with no public transport available, they walked back to their native places hundreds and in many cases, thousands of miles away. This turned out to be a humanitarian tragedy perhaps not seen since the partition of the country. The entire episode underlined the ugly underbelly of the economic system and brought out a glaring lacuna of lack of social security to a vast majority of population. With selective relaxations, after June 2020, even as the businesses started reviving, the supply side disruptions on the one hand and lack of labour on the other constrained the process.

It is not surprising that the first quarter estimate of GDP for 2020–21 shows the severest contraction in the economy seen in recent memory. At 23.9%, the contraction was the highest among the G-20 countries. The Gross Value Added (GVA) shrank by an unprecedented 22.8%. The severest contraction was in Construction (-50.3%), and Trade, Hotels, Transport, Storage and Communication (-47%). The manufacturing sector contracted by 39.4%. The only sector with positive growth seen was Agriculture (3.4%). All the engines of growth stuttered. The gross fixed capital formation declined from 32% of GDP in the first quarter of 2019–20 to 22.3% in the first quarter of 2020–21 and private final consumer expenditure declined to 54.5% of GDP from 56.4%. The constrained fiscal space did not permit increased government spending on consumption or investment. With exports too stagnant, all the engines of economic growth stuttered.

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[2] See, The Hindu, September 21, 2021. https://www.thehindu.com/data/excess-deaths-during-the-pandemic-in-india-was-58-times-the-official-covid-19-death-toll/article36405310.ece#:~:text=The%20E2%80%9Cexcess%20deaths%E2%80%9D%20registered%20during,was%20acce ssed%20by%20The%20Hindu.

By end January, it seemed that the pandemic was under control and the economy was well on its way for recovery. The policy makers were self-congratulating for the controlling the virus and the Economic Survey declared, "India has been able to avoid the second wave while ably managing to flatten the epidemiological curve, with its caseload peaking in mid-September". It went on to state, "….The V-shaped economic recovery is supported by the initiation of a mega vaccination drive with hopes of a robust recovery in the services sector. Together, prospects for robust growth in consumption and investment have been rekindled with the estimated real GDP growth for FY 2021–22 at 11%". Addressing the World Economic Forum, the Prime Minister had stated, "…today, India is among countries that have succeeded in saving the maximum lives. The country, which comprises of 18% of the world's population, has saved the world from disaster by bringing the situation under control". Even in end March, we claimed India being a pharmacy of the world with the Foreign Ministry working on a plan to supply 160 million doses of COVID-19 vaccines to 60 countries which included 10 million doses in gifts focused on neighbouring countries in the first round.

However, the revival process was thrown off guard with the raging second wave of the pandemic. The lethal outbreak of the second wave with dramatically fast spread putting a break on the recovery process. The daily cases in the country jumped from 21,666 on March 11 to 424,443 on May 6. The outbreak created a dire situation and the lack of medical supplies including oxygen concentrators and ventilators, and limited human resources exposed the underbelly of poor capacity of the State to deal with the pandemic. It has not taken even a month to see a dramatic change in the mood to one of desperation and despondency. When the first wave of the pandemic broke, we had seen the humanitarian crisis with thousands of migrants with their families walking on in the summer heat from the cities to their villages after the most stringent lockdown for prolonged period. They were faced with severe uncertainties in the cities without jobs and with hardly any reserves to sustain them. The second wave brought out another type of humanitarian crisis with patients and their family members running from pillar to post in search of hospital beds, ventilators and oxygen cylinders. The situation turned to be pathetic with scores of dead bodies lined up in ambulances in front of crematoriums and burial grounds and for many, there was no dignity even in death! The unscrupulous took advantage of scarcity situation and there were instances of black markets for hospital beds, ventilators, oxygen concentrators and even for the ambulance service and cremation. Even after a year, the complacency reined. We had not created the basic health infrastructure needed because we thought we have won the battle when it was just starting. The sad commentary is that we have been moving from one emergency to another, there is hardly any time to put the healthcare system of the country in place.

The adverse economic impact of the pandemic in 2020–21 was the severest in living memory. The estimated contraction in the economy was 7.3%. Except agriculture and allied activities, all other sectors suffered contraction by varying degrees. Expectedly, the contraction was the highest in contact intensive sectors like trade, hotels, transport, storage and communication (18.2%) followed by construction (8.6%), mining (8.5%) and manufacturing (7.2%). All the engines of growth

have been stuttering. The gross fixed capital formation declined from 34.6% of GDP in the first quarter of 2019–20 to 24.4% in the first quarter of 2020–21 and Private final consumer expenditure declined from 56.8 to 55.4% during the same period. The constrained fiscal space did not permit increased government spending on consumption or investment and not surprisingly, public administration and defence and other services showed a negative growth of 4.6% during 2020–21. With exports too stagnant there was no engine to lift the growth of the economy.

After the first quarter of 2021–22, the recovery was well under way, and it was hoped that the country will register double digit growth this year. The official expectation is that the economy will register 10.5% growth in 2021–22 though the RBI has moderated its earlier estimate to 9.5%. Most credit rating agencies as well as and multilateral lenders including the IMF and the ADB have made downward revisions in the growth estimate for the year ranging from 9 to 9.5%. Although the new cases have been on the decline since June, the pandemic is still on the rage in some States, and it will take considerable time before some activities like travel and tourism can resume fully. Now, with the new variant of the virus, "omicron" with more than 30 mutations in spike protein with the possibility of bypassing the protection from the vaccines emerging, there are some concerns and uncertainties though, the impact is not likely to be as large as it was in the first two waves.

As mentioned earlier, the pandemic struck at the time when the economy was already slowing down. Both the investment (Gross Capital Formation) to GDP ratio and the growth rate of GDP have been showing a steady deceleration (Fig. 1). The growth of GDP declined from over 10% in 2020–11 to 4.2% in 2019–20, which was the lowest in the last 11 years. The quarterly growth trend since 2015–16 presented in Fig. 2 shows a steady decline in the growth to reach 3.1% in the fourth quarter of 2019–20 and this was the lowest in 44 quarters. Even as the economy gradually recovered from the shock of demonetisation to record 8% growth in the fourth quarter of 2017–18, the subsequent periods show a steady decline.

The steady decline in the growth of GDP is the reflection of declining saving and investment in the economy. The aggregate investment as measured by Gross Capital Formation (GCF) as a ratio of GDP (current prices) showed a steady decline from
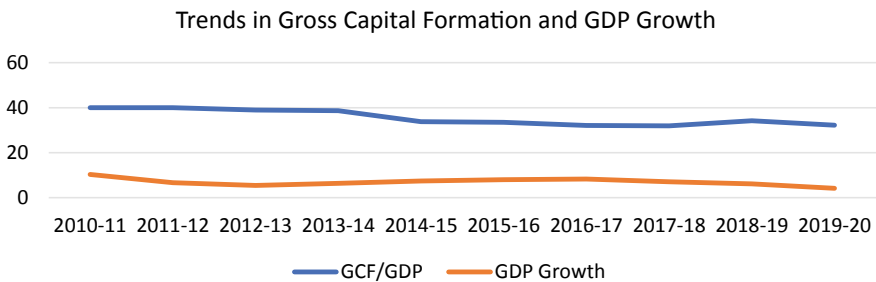
Fig. 1 Trends in gross capital formation and GDP growth. *Source* Ministry of Statistics and Programme Implementation, Government of India
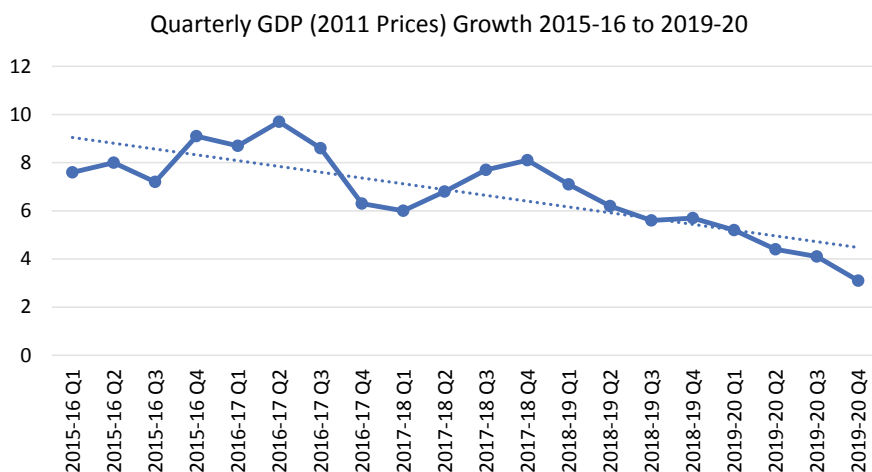
Fig. 2 Quartely GDP (2011 prices) growth 2015–16 to 2019–20 *Source* Ministry of Statistics and Programme Implementation, Government of India

39% in 2011.12 to 32.2% in 2018–19 (Table 2; Fig. 1). Of the 8 points fall in aggregate GCF. 6.2 points (including valuables) were from households, 1.4 points were from corporates 0.3 point was from the public sector. Thus, the decline was witnessed in all the sectors, though a predominant proportion was by the households. Similarly, over the period 2011–12 to 2018–19, the percentage of gross domestic saving to GDP declined by 4.5% points and the entire fall was due to decline in household sector's physical savings.

Table 2 Sectoral investment trends (percent of GDP at market prices)

Years	Households	Valuables	Private corporate	Public	Errors and omissions	Total
2011–12	15.90	2.90	13.26	7.54	−0.64	38.95
2012–13	14.73	2.75	13.63	7.23	0.34	38.69
2013–14	12.61	1.44	12.90	7.08	−0.25	33.78
2014–15	12.14	1.68	13.36	7.09	−0.74	33.52
2015–16	9.57	1.48	13.49	7.58	0.00	32.11
2016–17	10.36	1.09	11.57	7.16	1.78	31.95
2017–18	11.19	1.28	11.48	6.87	3.39	34.21
2018–19	11.50	1.06	11.91	7.24	0.50	32.20
2011–12 minus 2018–19 (% points)	4.41	1.84	1.35	0.30	−1.14	6.75

Source Rangarajan and Srivastava (2020)

In fact, GCF in 2019–20 the ratio of GFCF to GDP showed a sharp decline from 32% in the first quarter of 2019–20 to 28.8% in the last quarter. The private final consumption expenditure was slowing down, and exports were declining. In 2020–21 too, the only engine of growth that kept the growth rate ticking was the Government consumption expenditure, and with significant contraction in revenues and the reluctance of the government to expand fiscal deficit, even that is likely to be a casualty. In the first quarter of 2021–22, while the private consumption expenditures and Gross Fixed Capital Formation and exports showed an upward trend, the Government final consumption expenditure actually declined even in absolute terms as compared to the first quarter of 2020–21.

3   Economic Contraction and Fiscal Impact

The lockdown brought the economy to a grinding halt and the contraction in the economy drained the tax revenues. Even after the relaxations in many restrictions, with continued spread of the pandemic, full-fledged recovery has not been possible because of continued restrictions on many sectors requiring social distancing. The fast spread of the virus has made it imperative to impose restrictions on economic activities by varying degrees by the States. Besides, supply chain disruptions (partly due to restrictions on the imports from China) and unavailability of skilled migrant labour have continued to constrain full scale recovery. The RBI was quick in announcing a slew of measures immediately when the first wave broke out mainly to ease supply side constraints in terms of ensuring liquidity, regulatory forbearance, and moratorium and initiate some additional measures to advance loans and extend regulatory forbearance during the second wave as well. However, the fiscal stimulus by the government has been tepid, less than 1.5% of GDP in the first phase and less than one per cent during the second. The most important measure by the government has been the distribution of free food grains to the vulnerable sections has avoided starvation deaths. The fiscal measures announced include additional allocation to Mahatma Gandhi National Rural Employment Guarantee Rs. 400 billion, front loading the Kisan Samman Nidhi which was already in the budget and providing 2% of GDP additional borrowing space to the State governments.

The ability of the government to provide significant stimulus was constrained by the lack of fiscal space. The budget presented by the finance minister on 1 February 2021 shows that the shortfall in tax revenue to the Centre in the revised estimate from the budget estimate was Rs. 2.91 trillion and from non-tax revenue, Rs. 1.74 trillion. Of the estimated disinvestment proceeds of Rs. 2.1 trillion, only Rs. 320 billion could be realised. Thus, there was a large gap of Rs. 5.43 trillion in revenue and non-debt capital receipts. On the expenditure side, however, although in the initial months, government had been austere, after October, public spending has gathered pace. The revised estimate of expenditure for 2020–21 showed an increase of Rs. 7.64 trillion (28.4%) over the actuals of 2019–20 and Rs. 4.08 trillion (13.4%) over the budget estimate. While the revenue expenditure was estimated to increase by

28.1% over the previous year, the increase in capital expenditure was estimated at 30.8%. Not surprisingly, the fiscal deficit for the year was estimated at 9.5% and the primary deficit at 5.5%. Although a substantial part of the off budget liabilities arising from the NSSF loans to the Food Corporation of India had been included, when the remaining part is added, the fiscal deficit works out to 10.1%.

The 2021–22 budget estimates assume that the economy will register a nominal growth of 14%. Revenues are estimated to increase by 15% over the revised estimate of 2020–21. In addition, the disinvestment proceeds are estimated at Rs. 1.75 trillion. The growth of aggregate expenditure is contained at less than one per cent. While the revenue expenditure is proposed to be compressed by 2.7% while the capital expenditure is budgeted to increase by 26.2%. The fiscal deficit for 2021–22 is estimated at 6.8% and the primary deficit at 3.1%.

The progress in budget implementation in the first seven months of the fiscal shows that the government has exercised restraint in the first quarter limiting the fiscal deficit at 18.2% of the budget estimate. However, by the end of seven months, the revenue collections are 70% of the budget estimate registering 34% growth over the corresponding period last year. Higher revenue collections have helped to increase expenditures in the second quarter and by the end of seven months, it was 53.7% of the budgeted and capital expenditure was 45.7% of the budgeted even as the latter registered 28% increase. The fiscal deficit at the end of October was 36.3% of the budget estimate which is possibly the lowest in recent years. Despite this, with large additional expenditure commitments expected in the remaining part of the fiscal, the government may miss the budget fiscal deficit target of 6.8% though not by a large magnitude. Extension of free food grains distribution to vulnerable sections until end March 2022 would require an additional expenditure of about Rs. 550 billion and overall food subsidy is likely to be higher than the budget by 1.47 trillion. Fertiliser subsidy is also likely to increase by a significant amount. In addition, there is a heavy demand for MGNREGA work and the outlay is likely to increase by Rs. 200 billion. The higher revenue buoyancy is likely to yield an additional Rs. 1.8 trillion and there may be some shortfall in disinvestment receipts. Even if the government exercises restraint on other expenditures, it is likely to miss the fiscal deficit target marginally and may end up with 7% of GDP.

In the case of the States, the aggregate deficit will depend on the permission given to them to borrow. Although their FRBM allows them to borrow up to 3% of their respective GSDP, the aggregate fiscal deficit of the States has been around 2.3–2.5% of GDP in recent years. However, in 2020–21, because of the pandemic, as a part of the stimulus, the Centre allowed the States to borrow an additional 2% of GSDP. Their borrowing from 3% of GDP to 3.5% is without any conditions. However, additional one per cent of GDP borrowing will be permitted only on fulfilling 4 reform conditions, each giving additional quarter per cent. The reforms to be undertaken are: (a) One nation, one ration card which requires linking Aadhar number into ration cards and installing point of sale machines in all fair price shops; (b) improvement in ease of doing business which requires (i) district level assessment of ease of doing business as Department of Promotion for Industry and Internal

Trade norms, (ii) automatic renewal of State industrial, commercial licenses to business and (iii) making randomised inspections with prior notice and full transparency; (c) Power sector reforms which entail reducing aggregate technical and commercial (AT&C) losses, direct benefit transfers to farmers instead of lower tariffs and reducing the gap between average cost and average revenues; and (d) Urban local body reforms requiring the States to notify property tax floor rates according to circle property values and notify water and sewer charges. If at least three of the four reform conditions are satisfied, the States can borrow the remaining half a per cent of GSDP.

There are questions on whether the Centre should have imposed conditions for borrowing at a time the States are faced with severe fiscal distress. Of course, Article 293 (4) states that "A consent under clause (3) may be granted subject to such conditions, if any, as the Government of India may think fit to impose". It must also be admitted that the four reform conditions are important. However, this is for the first time in the history of the country that conditions have been stipulated for the market borrowing by the States. Perhaps, instead of imposing conditions when the States are facing a fiscal distress situation, the Government of India could have had discussions with them and found appropriate ways to implement these reforms. In any case, some States like Punjab and Tamil Nadu have decided not to undertake reforms in sensitive areas like power sector reforms and forgo a part of the borrowing space.

The revised estimate of total gross fiscal deficit of the States in 2020–21 was 4.7% of GDP as against the budget estimate of 3.2% and the revenue deficit for the year turned out to be 3.2% as against no deficit budgeted for the year and the revenue deficit was 2% of GDP as against the zero deficit budgeted for the year. The increase in deficits were mainly due to sharp decline in the revenues estimated at 3.6% of GDP in provisional actuals as compared to the budget estimate. This has resulted in the compression of revenue expenditures from 16.9% of GDP in the budget estimate to 15%, a clear 1.9% point reduction in revenue expenditures and the capital expenditures declined from 3.3 to 2.5%. Thus, the overall reduction in revenues was 3.6% of GDP and decline in expenditures during the year amounted to 2.7%.

The above discussion leads us to make important inferences on the fiscal consequences caused by the COVID-19 Crisis. First, the combined fiscal deficit of the Centre and States is estimated at likely to be about 14.2% of GDP and the corresponding debt is likely to be over 90% of GDP. However, household sector saving is expected to be higher due to the precautionary motive and forced demand compression due to the restrictions. Besides, as the commercial lending by the banks has continued to be subdued, there is no immediate fear of financial crowding out of private investments. However, there has been a surge in foreign portfolio investment requiring the RBI to purchase the and this has added substantially to the liquidity in the economy. This requires careful monitoring of the price situation.

4   Need to Fast Track Reforms

Crisis is good opportunity to initiate reforms and it is important that the opportunity should not be wasted. Structural reforms are needed not only to revive the economy but to take it to the trajectory of higher growth. In the short term, the government will have to substantially increase public spending even in the resource constrained situation prevailing at present. Faced with hard budget constraints, some of the State governments have embarked on an ambitious programme of monetising residential and commercial land in urban centres and selling of leased land to the lessees to shore up their finances. Hopefully, they will start correcting the historical mistake of not spending adequately on public health, particularly on preventative healthcare by strengthening the wellness Centres. A strong system of wellness centres will minimise curative healthcare through hospitalisation. In this connection the special grants to urban local bodies recommended by the 15th Finance Commission is important particularly as it is directed at strengthening the wellness centres and hospital infrastructure.

As mentioned earlier, sharp decline in revenue collection following the GDP contraction is likely to increase the aggregate fiscal deficit to 14.2% of GDP. Nevertheless, with the economy estimated to contract by 7.3% in 2020–21, there was considerable expectation of significant reform signals in the budget not only to revive the economy from the adverse impact of the pandemic but to address the structural problems. The Economic Survey has estimated the GDP growth for 2021–22 at 11% mainly on the back of 7.3% contraction in 2020–21. The Survey estimates that if the economy growth at 6.5% in 2022–23, it will still be only about 90% of the trend level of output in 2023–24. In contrast the RBI has estimated the growth for the 2021.22 at 9.5% and most other agencies which had projected the growth in double digits have revised it downwards after the second wave of the pandemic to 9–9.5%.

The Fifteenth Finance Commission has recommended the roadmap for fiscal consolidation to reduce total outstanding liabilities of the Government should reduce the liabilities from 62.9% of GDP to 56.6% and the States are required to marginally reduce the level from 31.1 to 30.5%. In order to achieve this, the Commission has recommended the road map where the fiscal deficit of the Union government should be reduced from the Commission's estimate of 7.4% in 2020–21 to 4% in 2025–26 and the States are required to reduce the fiscal deficit from 4.2% in 2020–21 to 3% in 2023–24 and maintain that level thereafter. In its Explanatory Memorandum, the government has stated that it accepts the recommendation in principle the recommendations relating to the borrowing ceilings of the States and stated that other recommendations (including those relating to the central roadmap) would be examined separately. In the budget speech, the finance minister has also indicated that fiscal deficit will be reduced to 4.5% by 2025–26 which is in variance with the roadmap set by the Finance Commission.

The demonetisation of Rs. 500 and 1000 currency notes in 2016 had plunged the economy, particularly the cash transacted informal sector into chaos and the implementation of suboptimal GHST has further caused hardships to business and industry.

The problem was compounded by the unprecedented lockdown when the pandemic struck resulting in not only loss of incomes but also loss of employment. The Union government was not able to inject significant fiscal stimulus for want of fiscal space. However fast tracking economic revival requires that the government should generate resources by monetising the assets including disinvestment and privatisation and fast track capital expenditures to augment the much-needed physical infrastructure in the country.

The central government has initiated reforms in a number of areas and that should help to improve the economic environment in the medium and long term. Merging of 24 central labour laws into four codes is an important reform to impart greater flexibility to the labour market and ending the inspector raj. This has been talked about for long without much progress. The Industrial Relations Code allows the manufacturing units up to 300 workers to hire and fire without the Government's approval and for those with more than 300 workers, approval is needed but if the labour department does not respond within the time frame, the approval is deemed to have been received. Unfortunately, the three new legislations enacted in the farm sector have been withdrawn due to the prolonged agitation by the farmers' associations. They could have provided flexibility to the farmers to sell their products anywhere. The amended Essential Commodities Act would have deregulated production, storage, supply and distribution cereals, pulses, potato, onion and oilseeds and enables the private sector to play important role in these activities. The Farmers' (empowerment and protection) Agreement of Price Assurance and Farm Services Act, would have allowed the small farmers to enter into agreement with corporates for contract farming. However, the enactment of the three legislations without properly communicating their benefits to the farmers and their enactment without discussion in the Parliament were contentious and the farmers unions, after agitating for about a year forced the government to withdraw them. Perhaps, a fresh attempt could be made to enable the States to rule by the ruling coalition at the Centre to pass these laws in their respective States and if this brings in demonstrable benefits, it would convince the farmers in the agitating States to come on board.

Two recent books and painted the grim picture of the Indian banking system and chinks in its regulation (Acharya, 2020; Patel, 2020). The problems confronting the financial system in general, and banks in particular are systemic. Acharya (2020) has persuasively argued that fiscal dominance has adversely impacted financial stability in a variety of ways and Patel (2020) has alluded to the constraints in regulation due to government's ownership of banks. The balance sheets of the banks continue to be stressed. In addition, the fear of investigative agencies on lending decisions had turned the public sector bankers to be risk averse. The Non-banking financial company (NBFC) crisis beginning with the failure of IL&FS and followed by DHFL, Reliance Capital and Altico deepened the malice. These developments have adversely impacted on corporates, infrastructure financing and liquidity availability for the small and medium enterprises. The NBFCs crisis worsened the stressed balance sheets of the banks further.

The most important factor the government must address is the issue of governance in public sector banks. Although the Financial Stability Report shows easing

of the NPA situation and many of the public sector banks have turned around in terms of their profitability, the commercial lending is still at a slow pace. We have a peculiar situation where the corporates are deleveraging and moving on a slow lane in borrowing and the banks are unwilling to lend. This shows that new investments are not taking place at the level required. The decision to privatise two public sector banks is important and it is hoped that this will change the culture of banking, but it is important to initiate reforms in the governance in public sector banks on the lines recommended by the Nayak committee.

The Insolvency and Bankruptcy Code (IBC) has been hailed as a landmark reform, but there have been problems of implementation. The two important problems plaguing the system are the enormous delays in resolution and huge haircuts the lenders take. It is important to ensure that the insolvency resolution process timely, effective and reasonable. The delays are caused by the promoters succeeding in gaming the system and acute capacity constraint of the resolution professionals to manage the National Company Law Tribunals. There have been enormous delays in the admission of the application under the resolution process itself. The immediate need is to strengthen the information utility (IU) system under the Insolvency and Bankruptcy Code (IBC) which in fact was conceptualised to ensure faster admission. The delays have also resulted in low recoveries and the lenders taking very high losses.

Another important reform in the budget is the ambitious programme of privatisation and strategic disinvestment. The privatisation of Air India is a high point and will go a long way in assuring that the government is keen to vacate the areas where it has not role. The budget has promised to privatise other companies such as, Container Corporation of India, Shipping Corporation of India, Bharat Earth Movers Limited, Bharat Petroleum and Chemicals Corporation and the IDBI Bank. It has also stated that two more public sector banks will be privatised. Movement in this direction will assure that the government is keen to extricate itself from the shackles of activities which are truly in the domain of the private sector, and the interventions.

An important measure undertaken recently to assure the foreign investors that the government will ensure certainty and stability and tax policies is the withdrawal of the retrospective amendment on the tax on capital gains on companies making transactions outside the country. The amendment done in the wake of the Supreme Court decision striking done the levy of capital gains tax on Vodafone for the transaction between Vodafone and Hutch in Hong Kong 11 years ago had shaken the confidence of the foreign investors and the withdrawal of the retrospective amendment will help to restore their confidence.

Since 2017, the government has slipped into the protectionist mode although the history of this country clearly shows that this would be self-defeating. Right from 2017, the import duties have been increased and differentiation between tariff rates on inputs and outputs has changed the effective rate of protection on various imported commodities in unintended ways. History has shown the futility of pursuing import substitution strategy. Progressively opening the economy since 1191 has helped increase exports and achieve greater competitiveness. Excessive protection will not only hurt trade but also foreign investment as well. The "Atmanirbhar Bharat" will

not help the country to achieve competitiveness but will only add to the protectionist stance. The announcement of reducing the list of exemptions in tariff list in October will only add to protectionism. Myopic view of giving protection and subsidising some sectors through PLIs is like creating scaffolding rather than building walls and it is important to shun such an approach and having seen its devastating impact on competitiveness and economic growth.

5 Concluding Remarks

The government has initiated a number of reforms in earnest, particularly to infuse flexibility to land and labour markets, regulatory systems in education and health-care, and has made additional borrowing to the States conditional on undertaking power sector reforms, property tax reforms and improving the ease of doing busi-ness. However, implementation of these reforms holds the key for their effectiveness. There is considerable urgency in the reform of the banking sector to ensure smoother credit flow to productive sectors. The moratorium and restructuring done during the pandemic is likely to subject them banks to severe stress as revealed by the stress test conducted by the RBI in its financial stability report. It is important to fast track the privatisation programme and use the proceeds to provide the much-needed invest-ment in infrastructure. Also, reforms in sectors like police and judiciary are overdue for the basic incentive for investment decisions is to protect the life and property of people and enforce contracts to improve the ease of doing business in the country.

One of the areas which requires immediate action is to reverse the protectionist stance the government has increasingly been adopting during the last four years. There have been across the board increases in important duties and non-tariff barriers. The decision not to join the Regional Comprehensive economic Partnership (RCEP), a 15-member free-trade block of ASEAN countries along with China, Australia and New Zealand is retrograde. There are signs of the country going back to the import substitution regime that existed prior to 1991 despite bi-partisan efforts to dismantle protection since then. Experience has shown that the policy of important substation hurts the competitive strength of the country.

The most important reform needed in the country today is judicial reforms to ensure that the basic duty of the State, of ensuring property rights and enforcing contracts effectively in a timely manner is accomplished and that is the most important factor in the ease of doing business. The last three years have seen a steady creeping of protectionist stance in the government and the pandemic and the stand-off with China has raised the pitch for more protection. This is self-defeating as the history in this country has shown. Denying the benefit of goods at international prices to the consumers to protect the producers has only helped them not to be competitive and ask for more protection. Hope the government will reverse the trend quickly and make the economy export oriented.

The time is opportune to initiate structural reforms in a number of areas which would help the economy to move towards higher growth potential. The Insolvency

and Bankruptcy Code enacted is a great reform, but the implementation is stuck for several reasons and they need to be removed to hasten the resolution process. It is also important to reverse the protectionist tendency that has crept into the policy regime in the last three years to impart greater competitiveness. There are still large infrastructure gaps that need to be bridged and substantial investments are required to be made. One of the most important and urgent call should be on judicial reforms. Protecting life and property of the people and enforcement of contracts is the basic public good that the government must provide. Long judicial delays result in most people being denied justice and the powerful sections resorting informal and illegal means to secure justice. Incentive to invest and grow depends on ensuring speedy and efficient resolution of the disputes.

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Law and Economics of Pure Economic Loss in Tort

Hans-Bernd Schäfer

1 Introduction

It is a great privilege to be invited to contribute to a Commemorative for late Professor Radhakrishna, whom I came to know in 1983 when I visited the Central University of Hyderabad. I was then involved in development studies and Radhakrishna, who was Head of the department, invited me to give lectures. Later, when I moved to law and economics (but never gave up my interest in developing economies), Radhakrishna then Director of the CESS institute in Hyderabad organized refresher summer courses in "law and economics" for young academic scholars from all over India, which I conducted with Claus Ott, my lawyer colleague in Hamburg. This was a thrilling time and atmosphere. It continued for several years. Today, I take great pleasure in observing that some of my former students in Hyderabad are now academics in India. Later, when Radhakrishna became President of the Indira Gandhi Institute of development research in Mumbai, I was Director of the European Master Programme in Law and Economics (EMLE), and we both arranged a close cooperation, making IGIDRE a third-term university choice within of the programme. This was also a consequence of the insight how much institutional, including legal factors, can promote (or hamper) economic development. I remember countless occasions of cordial hospitality and most interesting talks with him and his wife.

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2   The Compensation of Pure Economic Loss in Tort Law

The exclusion of pure financial losses from liability in tort is widespread across legal systems, even though the exact delimitation differs from country to country. Pure economic losses are losses of wealth which occur without an infringement of an absolute right, such as life, bodily integrity, property or personality rights or interests which the law specifically protects. In the legal literature, this limitation is defended mainly with the floodgate argument.[1] Economic analysis does not deny the validity of this argument but insists that non-compensation is sometimes based on an economic rationale, which has nothing to do with the floodgate argument and which shows that some pure economic losses should be compensated whilst others should not be compensated at all or only under restricted conditions.

In a market economy, pure economic losses of wealth occur all the time as a result of competition, if for instance a new product or production process outcompetes an old one. The losses thus caused are part of the market economy and are not compensated, at least not under the rules of tort law. Most economists agree that such losses should either be borne by the damaged person without compensation or that compensation should be organized by the state via social welfare payments and/or unemployment insurance. This is economically justifiable by the fact that such changes generate larger overall gains than losses and are therefore Kaldor–Hicks improvements. If such pure economic losses would be compensated under tort law rules, the resulting extensive tertiary costs of redistributing wealth would often destroy the societal gains from a market economy. This explains why no tort law system in the world establishes compensation of such pure economic losses.

The legal–economic literature has put forward another related argument to justify the exclusion or restriction of compensation for pure economic loss in tort. Frequently, an act that causes pure economic loss to one person, leads by the same act (uno actu), to a wealth increase for a third person, which might be equal to or below the victim's loss. As a result, the damages suffered by the injured party might be much higher than the damages caused to the society. If the liability rule is based solely on the damage suffered by the injured party, without considering the gains of third parties, such a tort law rule can lead to excessive liability and excessive deterrence.

2.1   The Delimitation of Compensation for Pure Economic Losses

A famous football player who is unable to play for his club due to an injury will commonly be compensated, for the damages suffered. However, in many legal systems, the loss in revenue suffered by a club due to the player's injury will not be

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[1] Schäfer & Ott (2021).

compensated. This limitation of liability exists, albeit in a different form, in common law and in several civil law countries. In US tort law, damages caused by negligent interference with a contract between third parties are not compensated. However, the limits of liability vary internationally. For example, an Italian football club received compensation for loss of income caused by the death of players.[2] Such "liberal" approaches to pure financial losses can be found in France, Italy, Spain, Belgium and Japan, for example. A rather restrictive handling of such damages can be found in Germany, Austria, Portugal, Denmark and Poland. And a less principled than pragmatic approach can be found in the USA, Canada, Israel and the Netherlands.[3]

2.2   Over-Deterrence in the Event of Overcompensation for Pure Economic Losses

From an economic point of view, there exists a significant difference between damage caused by a violation of property which leads to the destruction or uselessness of a resource and pure economic losses. For example, if a house burns down, the value of society's capital stock is reduced by the value of the destroyed house. The social damage in this case is equal to the damage of the injured party, and the amount of compensation for the damage is equal to the private and social damage. If the injured party receives full compensation for its damage suffered, then incentives for socially optimal protection against damage are provided both in the case of strict liability and fault-based liability in tort law.

In the case of pure financial loss, the damage to the injured party and the social damage may differ. There may be cases in which the social damage is lower than the damage incurred by the individual injured party. If this is the case, full compensation may provide incentives for over-optimal prevention efforts.[4]

2.3   Effect of Liability for Pure Financial Losses with Precise and Imprecise Standards of Care

In the case of pure financial losses, the private damage can therefore be higher than the social damage. If, therefore, the damage award exceeds the social damage caused by

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[2] See Corte di Cassazione, 26.01.1971, Foro it. 1971 I 345.

[3] Palmer (2015).

[4] W. Bishop argued that this happens especially in the cases of pure economic losses. See Bishop (1982) Economic Loss in Tort. Oxford Journal of Legal Studies 2:1.

the tortfeasor, this can lead to over-deterrence. The potential tortfeasor may possibly make an excessive and in the worst case strangling effort to avoid the damage.[5]

When analysing possible over-deterrence, a distinction must be made between whether the legal system defines duties of care precisely, i.e. whether the injured party is aware of those standards from the outset or whether it has no reliable information as to which standards of care will ultimately be applied in court.

Example The management of a stock corporation has negligently overlooked the fact that a principal debtor is facing insolvency. The company's shares thus have an inflated value on the stock exchange because shareholders were not informed accordingly. If the information is subsequently corrected, those shareholders who bought their shares after the point of time at which a prudent management had informed the public will suffer a loss. It can be assumed that the damage to these investors will be less than the damage to society, since the private damage will be offset by private profits accruing to those shareholders who sold their shares before the true information about the value of the shares was disclosed. The social damage is then only the loss of efficiency resulting from the delayed release of information. Let us assume that this loss of efficiency is 10 and the damage to those shareholders, who suffered a loss is 100.

Assume that the management and the company are obliged to pay compensation, and an efficient standard of care has been established by the court and was known ex ante. In this case, a compensation for the private damage (overcompensation) will still not lead to excessive damage avoidance costs. The company will not have to pay compensation if it fulfils the established duty of care—regardless of whether the compensation payment corresponds to the social damage (10) or the damage to the injured parties (100).

A fault-based liability regime for negligent acts, which cause losses to some and gains to others is therefore unproblematic from an efficiency point of view and does not lead to excessive deterrence if the tortfeasor has precise ex ante awareness of the due level of care. This is because the tortfeasor is strongly incentivized to meticulously adhere to the standard of care due to of the overcompensation. Excessive deterrence is, however, not to be expected if the compensation is higher than the damage to society at large.

If the purchaser buys shares at an inflated price and still holds them when the bad news reaches the stock exchange with a corresponding price correction, the purchaser makes a loss. However, this loss is offset by an equally high profit for the seller of the share who sold it at the inflated price and would have made a loss if the bad information had reached the stock market earlier. All in all, therefore, the group of shareholders has not suffered any loss. The wrong information damages shareholders and the economy as a whole because it shakes confidence in the financial market. No one can reliably assess this damage.

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[5] For the following considerations, compare Schäfer HB (2002) Liability of Experts and the Boundary between Tort and Contract. In: Klement A (Ed.) Theoretical Inquiries in Law. S. 455–473; Schäfer (2004); *Schäfer*, AcP 202 (2002), 808. Bigus J, Schäfer (2007). Schweizer (2007).

Liability for intent and gross negligence largely prevents excessive care. "Deliberate damage" implies a high degree of precision in terms of the definition. A high degree of precision also applies to gross negligence. Only he who has not made the simplest and most obvious considerations and violates standards of conduct that everyone knows and that are obvious to everyone is liable for gross negligence. Gross negligence for the compensation of such damages is, therefore, compatible with legal and economic considerations for compensation of pure financial losses. It cannot lead to excessive deterrence, for as long as it is certain that a level of due care which is easily recognizable by everyone must have been violated in order to trigger liability. Gross negligence would, therefore, be a general solution for the compensation of such financial losses where the damage suffered by the injured party is likely to be higher than the overall damage caused to society. This rule has a downside if the standard of gross negligence is lower than the efficient standard of care.

One current case is the lawsuit filed by shareholders against Volkswagen AG. As early as May 2014, Volkswagen supposedly had knowledge of impending fines amounting to two digit billions of dollars due to diesel tampering in the USA. However, the ad hoc notification required immediately was not made until 22 September 2014, and all shareholders who acquired the shares during this period and who still held them after 22 September when share prices dropped sharply suffered losses as a result. Liability for this loss may be excessive but does not constitute an excessive deterrent, as liability in Germany depends on gross negligence coupled with a conduct by management of which everyone knows that it is wrong.

In the case of simple negligence, however, it is often difficult for a potential claimant to foresee exactly what level of due care the courts will ultimately use. In this case of ex ante duties of care that are not precisely defined ex ante, over-compensation for pure financial losses can result in excessive loss avoidance costs. This is because, for each chosen level of care, the injuring party must still expect with a certain probability that it will be called upon to assume liability and then pay compensation amounting to a multiple of the social damage caused. Because of this uncertainty, the injuring party is incentivized to increase its damage avoidance expenses to an unreasonably high level to be certain that it will not act negligently and be released from (excessive) liability. From an economic point of view, this would be an inefficient outcome and provide economic reasoning as to why pure financial losses are not reimbursed in many jurisdictions if they are caused by simple negligence. I have shown elsewhere that for every distribution function for the probability of being negligent as a function of the care level, there always exists a level of overcompensation, which under the vaguely defined standards of due care leads to over-deterrence.

The reader should bear in mind that full tortious liability for pure financial losses in such cases is to be rejected not only from an economic policy point of view but also based on the Kaldor–Hicks efficiency considerations. Also, it is not in the interest of the injured party. For at the time the rule is set, both the victim and the tortfeasor are behind the "veil of ignorance" and do not know whether they will be favoured or disadvantaged by the rule. In the shareholder example above, the latter do not know ex ante whether they belong to the group of shareholders who will sell or buy their

shares before the delayed publication of the news, i.e. whether they will gain or lose as a result of the negligent behaviour of the management. They are, therefore, ex ante not interested in excessive due diligence costs being incurred by the company because of liability, which would ultimately reduce the company's profit attributable to them. Therefore, they are only interested in levels of care that minimize overall losses to the stock markets and the reputation of the company in particular. Hence in cases of pure financial losses, liability rules for late reporting of unfavourable management news that result in excessive care levels will be rejected.

The legal system can react in different ways to avoid this undesirable development. Under German law, this is usually done by limiting compensation to cases of intentional and immoral causation of damage, or if a protective law (e.g. criminal law) has been violated (e.g. in cases of fraud). In both cases, the injuring party is fully aware ex ante of its wrong doing. There is, therefore, generally no problem of over-deterrence despite the risk of overcompensation. As already explained, liability for gross negligence does not lead to over-deterrence either, for as long as this term retains its sharp contours and only sanctions such behaviour of which everyone knows that it is obviously wrong.[6]

Literature has instead also suggested that only the amount of social damage should be reimbursed to the injured party.[7] This is consistent, but raises the question whether such netted damages could be estimated in a reasonably non-arbitrary manner and, if so, whether civil courts with their limited capacities of information processing should be burdened with such a task. However, this problem could be solved in the case of auditor liability and the liability of members of the executive bodies of a company. The liability towards injured shareholders could be limited to the amount of the damage caused to the company. This amount is equal to the sum of all damages suffered by the injured parties less the advantages gained by other shareholders, for example through delayed information. However, it does not cover the damage for the stock market as a whole, which is almost impossible to estimate in a legal procedure.

3 Cases Where Liability Should Be Extended

3.1 The Pure Economic Loss is a Resource Loss in Its Entirety

Apart from cases of wilfulness or criminal intent, there exists an important set of cases which many legal orders regard as pure economic loss without liability, and in which the economic rationale described above does not apply. In such cases, there is usually no difference between private and a social damage.

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[6] Vgl. Crasswell and Calfee (1986).

[7] Israel (1997).

In the case of Weller v. Mouth Disease Research Institute, the Institute had negligently allowed a virus to escape, infecting livestock throughout the area. This in turn caused loss of income for a livestock auctioneer. The auctioneer's workforce was completely or partially idle for a period, i.e. the personal, and was identical to the social damage. From an economic point of view, liability can therefore be affirmed, although neither property nor any other absolute right was infringed and therefore the damage was pure economic loss.

Similarly, when an oil company (accidentally) releases oil into the ocean, shoals of fish are destroyed, and coastal fishermen's catches drop. No property infringement is caused, as the fish are not the property of anyone. Nevertheless, a resource has been destroyed, resulting in a loss of income for fishermen. Once again, the damage suffered by the injured party does not have a corresponding gain by someone else. If, in this case, coastal fishermen as well as dealers and manufacturers of fish were not awarded compensation, a valuable resource, which nobody owns, would remain unprotected by tort law.

For the same reason, it does not lead to efficient results that the legal system in many countries, including Germany, generally rejects liability in the so-called cable cases. If a power cable is culpably destroyed during earthworks, the person causing the damage is usually not liable for the production losses caused in a factory because no property of the factory is damaged. Again, there is an indisputable damage to resources, similar to the shoals of fish. The only difference is that only some and not all output capacity has been lost due to the power failure. Employees are unable to work, and production resources cannot be utilized as a consequence of the damage, yet no property or other absolute right has been infringed. It should therefore be considered whether the distinction between "redistribution damage" and "resource damage", which is crucial from an efficiency point of view, can be compared with a legal equivalent. If the injured party can prove that even though a resource which it owned or controlled has not been destroyed or damaged, but that its usability has been irretrievably reduced by fraction of its full utility potential, this should induce liability. The previous distinction between purely financial losses on the one hand and losses caused by damage to property on the other hand does indeed exclude redistribution losses from normal liability, which should clearly be endorsed from an economic point of view. On the other hand, however, it leads to valuable resources not being protected if no property is directly damaged but a private and social damage was caused and if this did not lead to income gains elsewhere in the economy.

An argument by Bishop against compensation for pure financial losses in such cases was rejected in the ensuing discussion because Bishop overstretches the domain of redistributive losses which are to be legally segregated. He argues, as an example, that when a beach is polluted by an oil tanker accident, the adjacent hotels do indeed make losses and suffer damages. However, tourists will simply opt for alternative hotels and induce additional profits elsewhere, such that the total loss to society is equal to or close to zero.[8] The same argument is also used for the cable cases or the loss of sales of an opera house whose singer was injured in an accident. Music

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[8] See Bishop (1982) Economic Loss in Tort. Op. cit., p. 18.

enthusiasts will choose the next best alternative on which to spend their money, i.e. the total damage is only small in relation to the damage suffered by the opera house. However, this argument is flawed. It presupposes overcapacity, in the absence of which the private damage would again be equal to the social damage. But even if overcapacity did exist everywhere, the argument would still be flawed. This is because overcapacities are not exogenously predetermined. They emerge through the market mechanism because of anticipated damages. Overcapacity is comparable to the additional buses that a bus company maintains in anticipation of potential accidents. If, e.g. road traffic accidents did not occur, the capacities of the motor vehicle industry would drop accordingly. The resources freed up could be utilized elsewhere. In 2018, 2.6 million road accidents occurred in Germany. The fact that the associated property damage can be quickly remedied by new vehicles or repairs can only be explained by the fact that the market is generating this reserve capacity for the replacement and repair of damaged vehicles in anticipation of these losses. Without the accidents, these capacities would not exist. Their provision and use generate costs. In relation to Bishop's argument, it follows that when a resource is either destroyed or its overall utility value is impaired, buying from other providers does not amount to "a free lunch". The damage caused is then not offset by the profit of a third party. From a legal policy point of view, this insight results in the demand to extend compensation for pure financial losses if the productive power of a resource is impaired. The argument that damages incurred by one party are the profits gained by another party is thus clearly not true.[9]

In contrast to Germany, various French municipalities received compensation of 250,000 Euro/Francs each because a ship company had dumped dilute acid into the Mediterranean as a result of which the region became less attractive for tourists. In Italy and the Netherlands, one can find similar Supreme Court decisions. They are more compatible with economic considerations than the German rule, which does not trigger any compensation because property was not infringed.

In recent years, catastrophic oil spillings rather than academic opinions have stimulated a change in the international practice of compensation in this category of damages. These accidents have in turn stimulated a change in attitude towards the compensation of pure financial losses among legal scholars. They subsequently demonstrated with the authority of outstanding facts the absurdity of non-compensation in this area. In fact, they cause little damage to life, limb, health and property in relation to the total damage and destroy what belongs to no one, natural resources, fish stocks, marine animals, wildlife, beaches, the environment and, as a result, the income opportunities of employees in entire economic sectors like fishing or tourism. Palmer reports that after the catastrophic "deep water horizon" accident in the Gulf of Mexico in 2010, 99% of all claimed damages were loss of income

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[9] Dari-Mattiacci and Schäfer (2007). Urs Schweizer conducts a microeconomic analysis of the cable cases. With different market structures, under monopoly, perfect competition and imperfect competition with and without capacities for excess demand. He arrives at more complex results but to the similar conclusion that in the cable cases and similar cases the proposition of Bishop is flawed and cannot be used as a starting point for arguments of legal policy or legal doctrinal considerations.

Schweizer (2007) Op. cit.p. 55 ff.

and only 1% resulted from property damage.[10] The Guardian reported that the total damage compensation paid by BP totalled 65 billion dollars.[11] Not having to compensate for such damages would be tantamount to an irresponsible legal subsidization of the oil industry through liability law. (To put the above figures into perspective: total damage compensation paid by liability insurance companies for all motor vehicle accidents in Germany in 2019 was 16.8 billion Euro.[12])

A similar situation had already been observed in connection with the "Great Alaska Oil Spill" (1989) and had led to the adoption of the Oil Pollution Act (OPA) in the USA, which introduced strict liability and also overruled the generally applicable rules of exclusion of liability for pure economic losses in the event of oil pollution. In international law, too, several conventions led to a move away from the ineligibility of pure financial losses, for example in the case of loss of income by fishermen.[13] In the light of these developments, the exclusion rule, often referred to as "conservative" in comparative legal literature, should better be regarded as ultra-obsolete.

3.2 Compensation of Pure Economic Loss if the Injured Party Pays for the Protection Within a Market Relation

In contract law, pure financial losses are compensated, whereas in tort law they are often not. However, there exist cases in which the rationale leading to compensation for pure financial losses in contract law also applies in the context of tort law due to the interplay between markets and prices. This applies, e.g. to value appraisals.[14]

If the buyer of a house orders an expert valuation and the expert negligently arrives at an overvaluation, and the buyer pays too much because the roof truss turns out to be more dilapidated than anticipated, the overvalued price of the property leads to a loss for the buyer. It also leads to a corresponding profit for the seller, who was unaware of the defect and sold the house under exclusion of warranty guarantee and in good faith. The negligent expert is liable under the contract with the buyer. This is the default rule in many countries. The economic rationale of the contractual liability is that the buyer has an interest in a due level of care to be exercised by the expert and in which is willingly remunerated in terms of the price for the expert's report. The buyer wants to avoid a loss and has a corresponding willingness to pay for this loss avoidance. The ensuing liability is derived from the contract. The expected costs of liability and the costs of care are fully internalized in the price of the expertise. The

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[10] Palmer (2011).

[11] The Guardian, Tue 16 January 2018 16.16 GMT.

[12] GDV Statistisches Taschenbuch (statistical pocket book) 2020.

[13] The „International Convention on Civil liability for Oil Pollution Damage" reflects economic considerations on liability for pure economic loss in such cases for „hindrance to marine activities including fishing activities" Art. 1 (4).

[14] Schäfer AcP 202 (2002), 808 und Schäfer HB (2002) Liability of Experts and the Boundary between Tort and Contract. In: Klement A (Hrsg) Theoretical Inquiries in Law. Bd. 3, 2, S. 1565 ff.

buyer gets what he pays for. Essentially, in contract law we have a meeting of minds to pay money for the protection against the consequences of a negligently prepared expertise. Unlike in tort law, it is not for the legal system but for the parties to limit the scope of liability.

Consider that the seller rather than the buyer had commissioned the expert opinion which was subsequently made available to the buyer during the purchase consideration. In this case, the question arises whether the buyer has a claim against the expert under tort law (or a doctrinal construction under contract law which also protects him). From an economic perspective, the answer is affirmative because neither the constellation of interests nor the distribution of costs changes if the seller and not the buyer commissions and pays for the expert opinion. This is because the price of an expert opinion that is valuable for the transaction becomes part of the purchase price of the real estate in a functioning market, and the costs of the expert's diligence are therefore ultimately borne by the buyer regardless of whether the seller or the buyer commissioned the expert opinion. Although there is no contract, the interests and distribution of costs do not in principle change due to the connection between markets and prices because it is not the buyer but the seller who is the contractual partner of the expert. Therefore, liability for pure financial losses is then reasonable from an economic perspective, even if the injuring party and the aggrieved party have not concluded a contract. Such constellations frequently arise in the case of expert valuation.

In Austria, the Supreme Court awarded damages to the seller of a painting, who had commissioned an auction house with the sale thereof. The latter had a contract with an expert who negligently came to the false conclusion that the painting was not genuine. It was therefore auctioned below value, and the expert was ordered to pay the damages.[15] From an economic perspective, this decision is to be welcomed even though the seller had no contract with the expert. In those legal systems, in which the civil code does not explicitly exclude compensation of pure economic loss, courts can take such a decision under tort law. In other civil law countries like Germany, complex doctrinal extensions of contract law are then necessary but also possible. In common law countries, supreme courts set precedents which can make use of economic insights.

3.3   Pure Financial Losses in Tort Law Versus Contract Law, the Goldberg Proposition

Victor Goldberg has presented a theory which explains—at least partially—when and why it can be efficient to protect pure economic losses in contract law but not in tort law, as is the case in many jurisdictions. The starting point for the analysis is the

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[15] Oberster Gerichtshof 20 October 2005, 3 Ob 67/05 g.

Robins Dry Dock v. Flint case, which shall be presented here in a slightly modified version.[16]

A shipowner rents his ship to a hirer at a market rent of 200 per month. The hirer can sublet the vessel to a subtenant as end-user for 300 due to a sudden shortage of tonnage in the market. During the rental period, the owner has a routine inspection of the vessel carried out at a shipyard with which he has a maintenance contract. During the inspection work, the vessel is damaged due to an error on the part of the shipyard and cannot be used for a month. The owner thereby forfeits the right to a rental payment of 200 from the hirer. The owner receives this amount as damage compensation from the shipyard, with which he has a contract. Although the hirer does not have to pay the 200 to the owner, he will lose 300 in subletting because the subtenant cannot use the ship. The hirer does not receive compensation for his pure financial loss of 100 from the shipyard, because he has no contract with the shipyard. He is dependent on a tort claim. But tort law does not include compensation of the pure financial loss, which results from the negligent interference of the tortfeasor in a contract.

If we modify the case in a second version and assume that the owner himself has rented the ship to the end-user and earns a monthly rent of 300, he will then receive compensation of 300 from the shipyard because he can now claim this damage as the shipyard's contractual partner. What is the rationale of treating two cases differently, which differ in their legal construction, whilst from an economic point of view they are identical? In the first version, only a fraction of the damage is compensated by the shipyard, and in the second variant, the entire damage is compensated.

The reason for this—according to *Goldberg*—lies in the fact that the effects of the negligent disruption of a contractual relationship on a third party are undetermined. Suppose that the market had not developed upwards but downwards, which is an equally likely ex ante in this industry. Assume that the market rent at which the vessel was sublet to the end-user had fallen to 100 after the vessel had been rented by the tenant, who pays a rent of 200 to the shipowner. Subletting is therefore only possible at a loss of 100 per month because of the lower freight rates. What would the liability now look like? In the second version of the case, in which the shipowner leases the ship directly to the end-user for 100—the compensation to be paid by the shipyard would be 100 and would therefore again correspond exactly to the total loss. In the original version of the case, on the other hand, the shipyard would have to pay compensation of 200 for the rent lost by the owner, but the tenant would only lose the sub-tenancy rent of 100. Since—as consequence of the damage to the ship—the subtenant does not have to pay the sub-tenancy rent of 100, the tenant has made a profit of 100 as a result of the damage caused by the shipyard. Under normal conditions, the tenant would have made a loss of $200 - 100 = 100$. Now as a consequence of the damage caused by the shipyard, he breaks even.

The tenant realizes an unexpected "windfall profit" caused by the damaging action of the yard. Therefore, if the damages in the first version were fully compensated with

[16] Goldberg (1991) Recovery for Pure Economic Loss in Tort: Another Look at Robins Dry Dock v. Flint. Journal of Legal Studies 20:pp.

a compensation of contractual damages to the owner of 200 and a tortious damage of 100 to the tenant, the compensation payments would rise above the damages—beyond all cases in this damage category. This is because only those injured parties with claims for damages, but not those who made a profit from the damaging act and the resulting interference with a contract, would report to the shipyard. If such pure financial losses were compensated in tort law, this rule would be like a filter that carefully absorbs all pure financial losses caused by damaging acts and lets all pure financial profits also caused fall through. This would regularly result in the tortfeasor having to pay compensation which would be higher than the expected value of the total damage caused. This would provide over-optimal incentives to avert damage if the standards of due care are not precisely defined. In contract law—unlike in tort law—this effect cannot occur. The shipowner who is obliged to pay damages under the maintenance contract would then sometimes either pay more or less than the total damage caused. But this levels out over time, and there exists no systematic overcompensation or excessive deterrence, if this pure economic loss in torts is uncompensated.

The non-compensation of pure financial losses in tort law in cases of negligent interference with a contract takes into account that, as a consequence of damage to a contractual party, pure financial gains and losses can occur to third parties outside the contract. Tort law can compensate for the losses, but, just as importantly, to avoid excessive deterrence, it cannot skim off the profits and pass them on to the tortfeasor.

4   Conclusion

In many legal orders, and especially in common law countries, the law of torts attributes a damage award resulting from negligence only in special cases, if the tortious act infringes a right, for instance property, bodily integrity or a right to privacy, which the holder of this right can protect against everybody or violate specific legally protected interests.[17] Tort law often does not compensate economic losses or loss of income which is not due to the infringement of such a right or interest. In many countries, losses of concert organizers or sports clubs, who lose money because their best performers suffer from an accident and cannot work, are not compensated. By the same token, industrial companies cannot claim damages from a tortfeasor, who destroyed the cable of an electricity company leading to a power cut and resulting losses for the customer of the electricity firm, whose property was not infringed. Many countries do not grant compensation, if a tortious act interferes with a contract between third parties, thus causing damages. Economists have defended the non-compensation or reduced compensation of pure economic loss on the ground that

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[17] In Germany and England, compensation for pure economic loss is generally excluded from compensation. The French civil code does not distinguish between pure economic loss and a damage which occurs as the result of an infringement of an absolute right like property. But in France, courts restricted compensation of some pure economic losses. Zweigert/Kötz, Introduction to Comparative Law–1992–Oxford University Press, USA.

unlike in a case of property infringement, those tortious acts simultaneously cause time losses for victims and gains for others. If only the losses are compensated and the gains are not discharged to the tortfeasor, this would—from a societal point of view—result in overcompensation and possibly over-deterrence. It is shown that this argument is sometimes valid and sometimes wrong. We also show that in international law of the sea, a tendency exists to expand compensation for pure economic losses, especially for hotels, tourist organizations and fishermen, who suffer damages from oil spills, which create huge and sometimes catastrophic pure economic losses without an infringement of property. This is in line with economic reasoning. In other fields however, especially in torts in the market place, the argument of potential over-compensation and over-deterrence applies, and legal solutions must be found, which curb this possibility.

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Econometric Modelling

Macroeconomic Foundation of Functioning of the IMF: An Evolutionary Journey

Dilip Nachane and Partha Ray

1 Introduction

Ever since its birth in 1944, the International Monetary Fund (IMF) has been marred by controversies. Most of these critiques emanated from a political economy viewpoint and were couched into some variant that the IMF, being a quota based organization, had been dictated by the interest of its major shareholders, viz. G7 economies led by the USA. However, parallel to these critiques, there are issues relating to critical assessment of macroeconomic foundation of IMF's functioning or the IMF-supported programmes. Illustratively, when Lawrence Summers is reported to have quipped, "The full form of IMF is 'It's mostly fiscal'", the sentiment perhaps pointed out IMF's obsession of control of fiscal / budget deficit as a panacea of all macroeconomic mismanagement. Two crises brought the deficiencies of IMF's macroeconomic models, viz. the East Asian Crisis of 1998–1999 and the global financial crisis of 2008–2010. In fact, it is now widely believed that there is a gap in the literature in

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terms of presenting this evolutionary journey of IMF's macroeconomics. The perception of such gaps is all the more prominent in the aftermath of the global financial crisis (Grabel, 2011).

A look at the literature on IMF's theoretical foundations allows one to discern the following broad strands:

- The initial foundation of the IMF-supported adjustment programme came from an application of Polak's, 1957 model that attempted an integration of monetary, income and balance of payments analyses.
- Subsequently, this got transformed into "financial programming models", which got refined through IMF's experience of lending to countries (Khan & Montiel, 1989).
- Subsequently, the IMF developed MULTIMOD, as "a modern dynamic multi-country macromodel of the world economy …designed to study the transmission of shocks across countries as well as the short-run and medium-run consequences of alternative monetary and fiscal policies" (Laxton et al., 1998). MULTIMOD had several variants, the current versions of which are referred to as the Mark III generation.
- Later joining the modelling bandwagon, IMF developed a dynamic stochastic general equilibrium (DSGE) model called GEM, which was subsequently modified to include a financial sector after the global financial crisis (one of the variants is known as MAPMOD).

Interestingly, despite the more esoteric foundation of MULTIMOD/GEM /MAPMOD, which is primarily used for IMF's work for its research department's bi-annual publication of *World Economic Outlook,* IMF's dependence on financial programming as a backdrop to any country work relating to IMF continues. It is in this context that the present paper reviews the models that were key to operation of the IMF.

For expository convenience, the rest of the paper is organized as follows. Section 2 reviews the initial macroeconomic thinking in the IMF of the 1940s and early 1950s. Polak (1957)'s model as a foundation of IMF's macroeconomics and the related tool of financial programming as a foundation of country lending are discussed in Sects. 3 and 4, respectively. While Sect. 5 discusses the MULTIMOD model and its variants, Sects. 6 and 7 are devoted to more recent modelling exercises. Concluding observations are presented in Sect. 8.

2   Early Macroeconomic Thinking of the IMF

The IMF was a product of the United Nations Monetary and Financial Conference (popularly known as Bretton Woods Conference) when representatives from 44 nations met from 1 to 22 July 1944, in Bretton Woods, New Hampshire, USA. The agenda was to agree upon a series of new rules for the post-WWII international monetary system. Formally, the IMF came into existence in December 1945, when its

first 29 member countries signed its Articles of Agreement. It began operations on 1 March 1947.[1] The Articles of Agreement between the founding members mentioned the following objectives of the IMF[2]:

i.   "To promote international monetary cooperation through a permanent institution which provides the machinery for consultation and collaboration on international monetary problems".
ii. "To facilitate the expansion and balanced growth of international trade, and to contribute thereby to the promotion and maintenance of high levels of employment and real income and to the development of the productive resources of all members as primary objectives of economic policy".
iii. "To promote exchange stability, to maintain orderly exchange arrangements among members, and to avoid competitive exchange depreciation".
iv. "To assist in the establishment of a multilateral system of payments in respect of current transactions between members and in the elimination of foreign exchange restrictions which hamper the growth of world trade".
v.   "To give confidence to members by making the general resources of the Fund temporarily available to them under adequate safeguards, thus providing them with opportunity to correct maladjustments in their balance of payments without resorting to measures destructive of national or international prosperity".
vi. "In accordance with the above, to shorten the duration and lessen the degree of disequilibrium in the international balances of payments of members".

Thus, from the beginning, one of the fundamental objective of the IMF was to iron out balance of payments disequilibrium. Despite this, there was hardly any coherent framework to handle this role of balance of payments within a broader macroeconomic framework at that time. It has been observed:

> For the first decade following her formal opening in 1946, the IMF functioned without a coherent framework for the analysis of members' balance of payments and macroeconomic challenges. This was particularly problematic in lending arrangements ….Absent a framework for understanding open economy macroeconomic outcomes, how could the Fund discharge her key purposes? What safeguards in lending were there? In any case, what are the basic relations between policy levers—fiscal policy, central bank credit and bank lending—and macroeconomic outcomes and objectives? *Put in simpler terms, what determines nominal (and real) GDP in a monetary economy open to trade and external financial flows*?[3] (emphasis added).

From the vantage point of twenty-first century, a number of reasons may be put forward behind such a negligence in the 1940s and early 1950s.

First, in some sense despite the publication of Keynes's General Theory in 1936, Keynesian macroeconomics was in the process of being formally mainstreamed

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[1] Later in 1947, France became the first country to borrow from the IMF.

[2] Available at https://www.imf.org/external/pubs/ft/aa/pdf/aa.pdf.

[3] The General Theorist: "The Myth of IMF Macroeconomics", https://thegeneraltheorist.com/2020/05/16/the-myth-of-imf-macroeconomics/

in the then prevailing thinking. This is all the more true for the open economy version of Keynesian macroeconomics with an explicit role for exchange rate that came much later in 1960s with the advent of the Mundell–Fleming model. In fact, Chandavarkar (1987) observed, "Keynes was remarkably consistent, whether in the context of Indian discussions or later in the international sphere, in according primacy to domestic price stability as a policy objective and to give exchange stability the second order of importance" (p. 1399).

Second, Keynes' initial idea of the IMF was somewhere between his scheme of a "Supernational Central Bank without any initial capital but with its liabilities guaranteed by adherent central banks" and "an International Clearing Union (ICU)" (Chandavarkar, 1987).

It was not that the IMF itself was unaware of such inadequacies, and during the 1950s Jacques Polak, later Economic Counsellor to the Fund, took the initial steps needed to address the shortcomings and the IMF's financial programming was born, to which we now turn.

3 Polak (1957) Model and Its Variants

Polak (1957) adopted a pragmatic approach in devising a simple model "to bring monetary events, monetary data and monetary problems within the framework of income analysis". Essentially, the model was designed "to study the effects on both income formation and the balance of payments of the two most important exogenous variables …. operating on the economies of the great majority of countries in the early post-war period: autonomous changes in exports and the creation of domestic bank credit; or, in monetary terms, foreign and domestic autonomous additions to a country's money supply" (Polak, 1997).

Following Nowak (2014), a revised version of the original Polak model may be represented in terms of the following basic equations.

$$MS_t = \frac{1}{v} Y_t \tag{1}$$

where MS = Money supply, Y = Nominal income, v = Income velocity of money > 0. Assuming v as an institutional constant, the change in money supply is given by:

$$\Delta MS_t = \frac{1}{v} \Delta Y_t \tag{1b}$$

$$\Delta MS_t = k \Delta Y_t \tag{1c}$$

where $k = 1/v$.

The demand for imports (M) depends on a country's nominal income Y, so that

$$M_t = mY_t \tag{2}$$

where m is the marginal propensity to imports and $0 < m < 1$.

In is interesting to note that the model with Eqs. (1c) and (2) is dynamic in nature as both Y and ΔY are involved here.

Money supply is equal to domestic credit (DC) and foreign exchange reserves (R), so that

$$\Delta MS_t = \Delta R_t + \Delta DC_t \tag{3}$$

Changes in foreign exchange reserves are the outcome of current account balance ($X - M$; X and M being exports and imports, respectively) plus capital inflows (K), so that

$$\Delta R_t = X_t - M_t + K_t \tag{4}$$

Replacing M_t from (2) into (4), we get

$$\Delta R_t = X_t - mY_t + K_t \Rightarrow \Delta R_t = X_t - m(Y_{t-1} + \Delta Y_t) + K_t; \tag{5}$$

so that the balance of payments (BP) equilibrium is given by:

$$BP : \Delta R_t = -m\Delta Y_t - mY_{t-1} + X_t + K_t \tag{6}$$

Note that (6) describes negatively sloped balance of payments relationship between ΔR_t and ΔY_t.

On the other hand, combining (1c) and (3) we get, the money market equilibrium

$$MM : \Delta R_t = \Delta MS_t - \Delta DC_t = \frac{1}{v}\Delta Y_t - \Delta DC_t \tag{7}$$

Equation (7) describes the positively sloped relationship between changes in foreign exchange reserves and domestic credit in the (ΔR_t, ΔY_t) plane.

Equations (6) and (7) can be described by negatively sloped BP and positively sloped MM curve to arrive at the simultaneous equilibrium in the balance of payment and monetary sector of the economy at E (Fig. 1).

Polak (1997) pointed out the following important results from the model that are borne out from the experience of many a country.

- A permanent increase in output (e.g., as a result of a discovery of petroleum) can provide a temporary relief to the balance of payments.
- A lasting increase in exports can produce a lasting increase in reserves but only a transitory improvement in the balance of payments.
- Any once-for-all increase in credit will fully get leaked out through increased imports.

Fig. 1 Equilibrium in the revised polak model. *Source* Nowak (2014)
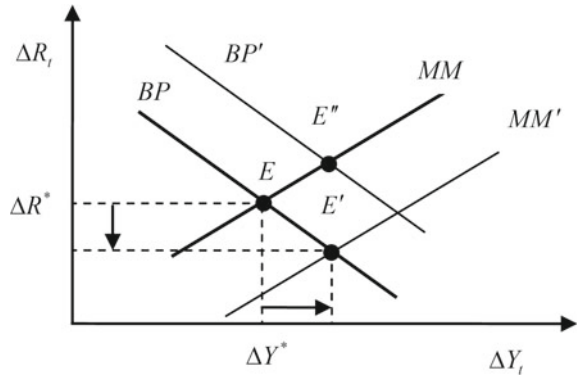
- While control over the expansion of credit can achieve a desired balance of payments result, control over the money supply cannot.

What is the broad policy message from the Polak model? Control over net domestic credit expansion is the key to stabilizing the balance of payments (via forex reserves). In fact, an excess money supply (over domestic credit) could lead to a deterioration of balance of payments (Nowak, 2014). To summarize, the main structure of Polak's model is as follows:

> The principles involved are relatively simple. First, there is a stable relationship between the supply of money and the level of nominal income determined by expenditure – the more money we have, the more we spend. Second, expenditure can either be made on domestically produced goods or on imports. Third, if the latter exceed exports, then there will be a balance of trade deficit, which will have to be covered by an outflow of foreign reserves at the expense of the domestic money supply (and inflow for balance of trade surplus). Fourth, with a new level of money supply established, the whole process can be repeated. One immediate implication is that *increases in the domestic supply of credit will lead to an increase in imports and a corresponding outflow of foreign reserves restoring the overall money supply to its initial level*. (Fine and Hailu, 2000; emphasis added)

4 Financial Programming Models

Polak (1957)'s model or even its later variants have a number of limitations, such as absence of an explicit role for the exchange rate or the fiscal sector—to name a few. Thus by mid 1960s, a fuller framework was put in place that became known as the financial programming model. What is the theoretical foundation of financial programming? Writing from an African perspective, in early 1990s, Tarp (1993) commented:

> Financial programming is based largely on oral tradition. There is little readily accessible written material on the theoretical underpinnings of the IMF model and on the interaction among various policy measures in achieving the ultimate objectives of an adjustment programme. Despite this, there is among some IMF and World Bank staff a tendency to

assume that their approach is well known and overlook that African government officials at large and other outsiders may not quite as easily comprehend what is going on in a particular programming exercise. This does not, of course, exclude the fact that small technocratic elites are becoming increasingly knowledgeable of IMF views and negotiating tactics.

Writing from the vantage point of 2020, in the macroeconomic sense, financial programming is hardly a model, and it more akin to a financial programming exercise that formalizes the structure of the economy in terms of a few identities (Easterly, 2002). The financial programming model/exercise (FPE) builds on the Polak (1957) model. While there are many variants of FPE, we present below a synthesis/slightly improved version of Khan et al., (1990).

4.1 Khan, Motinel and Haque (1990)'s Model

There are four sectors in the model, viz., (i) the private sector, (ii) the government; (iii) the foreign sector; and (iv) the domestic central bank.[4] All variables are measured in nominal currency terms.

Private Sector: The sale of current output leads to nominal income to the private sector (Y) that is used to pay taxes (T), consume (C_p) and invest (ΔK) and accumulation of financial assets. Neglecting any interest received or paid, accumulation of financial assets consists of money (ΔM), foreign assets (ΔF_p) net of borrowing from the banking system (ΔD_p). Thus, the private sector's income identity is given by:

$$Y \equiv C_p + T + \Delta K + \left(\Delta M + \Delta F_p - \Delta D_p\right), \tag{8}$$

i.e.,

$$Y - C_p - T - \Delta K \equiv \left(\Delta M + \Delta F_p - \Delta D_p\right)$$

Government: The government receives taxes (T) and spends on government consumer expenditure (C_G). As it does not have any investment, any surplus is utilized for buying additional foreign assets (ΔF_G) net of borrowing from the central bank (ΔD_G). Thus, the government's budget constraint is given by:

$$T - C_G \equiv \Delta F_G - \Delta D_G \tag{9}$$

Foreign Sector: The foreign sector, with its current account balance (i.e., exports X, net of imports, Z) and capital account balance ($\Delta F_p + \Delta F_G$), gives rise to reserves accumulation by the central bank, so that

$$Z - X \equiv -\left(\Delta F_p + \Delta F_G + \Delta R\right) \tag{10}$$

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[4] There is no explicit banking sector in the model.

Central Bank: The central bank is simply a financial intermediary that supplies money to the private sector (M) backed by international reserves (ΔR) and domestic deposits (of the private sector, ΔD_p and of the government, ΔD_G), so that,

$$\Delta M \equiv \Delta R + \Delta D_p + \Delta D_G \tag{11}$$

Note that, if we add the four sectors, we get,

$$\begin{aligned}
\left[Y - C_p - T - \Delta K \right] &+ [T - C_G] + [Z - X] + \Delta M \\
&\equiv \left(\Delta M + \Delta F_p - \Delta D_p \right) + (\Delta F_G - \Delta D_G) \\
&\quad - \left(\Delta F_p + \Delta F_G + \Delta R \right) + \Delta R + \Delta D_p + \Delta D_G
\end{aligned} \tag{12}$$

Thus,

$$Y - C_p - \Delta K - C_G - X + Z \equiv 0 \tag{13}$$

which is nothing but the familiar national income identity.

IMF's financial programming approach combines the above four-sector structure with Polak (1957)'s model. Khan et al., (1990) formalize the essential building blocks of this approach as follows:

Real GDP is exogenously determined, i.e. nominal GDP (Y) is given by price level (P) multiplied by given real GDP (y), so that:

$$Y = P\overline{y} \tag{14}$$

Change in nominal GDP is, thus, given approximately as:

$$\Delta Y = \Delta P . y_{-1} + P_{-1} \Delta \overline{y} \tag{14a}$$

Money demand is described by a constant velocity (v), so that:

$$\Delta M^D = v \Delta Y \tag{15}$$

Equilibrium is the money market which is described in flow term as,

$$\Delta M^S = \Delta M^D = \Delta M \tag{16}$$

Combine (14a), (15), and (16) along with (11) to arrive at,

$$\Delta R = v \, \Delta P \cdot y_{-1} + v \, P_{-1} \Delta \overline{y} - \left(\Delta D_p + \Delta D_G \right) \tag{17}$$

IMF's approach to balance of payments is captured by Eq. (17).

In (17), ΔD_p and ΔD_G are credit variables controlled by the central bank. Thus, it contains two endogenous variables ΔR and ΔP. In order to close the system, Khan

et al. (1990) introduced an import demand function of the form (and using 14a):

$$Z = aY = a(Y_{-1} + \Delta Y) = aY_{-1} + a(\Delta P . y_{-1} + P_{-1}\Delta \overline{y}) \tag{18}$$

Replace (18) in the identity for the foreign sector (10), i.e., $Z - X \equiv -(\Delta F_p + \Delta F_G + \Delta R)$ to get $\Delta R = X - Z - (\Delta F_p + \Delta F_G) = X - [aY_{-1} + a(\Delta P . y_{-1} + P_{-1}\Delta \overline{y})] - \Delta F$, or

$$\Delta R = (\overline{X} - \Delta \overline{F}) - a(Y_{-1} + P_{-1}\Delta \overline{y}) - ay_{-1}\Delta P \tag{19}$$

where presence of an upper bar denotes a given / policy determined variable.

Equations (17) and (19) captures Polak (1957) model already discussed. Their simultaneous solution will yield the equilibrium values of $(\Delta R^*, \Delta P^*)$ with only one policy variable ΔD. In order to break this indeterminacy and ensuring Tinbergen's principle of equality of targets and instruments, Khan et al (1990) introduced exchange rate as another target.

First, Eq. (19) can be modified as,

$$\Delta P = (1 - \theta)\Delta P_D + \theta \overline{e} \tag{20a}$$

where P, is an index of domestic prices, θ is the share of importables in the overall price index and e is the exchange rate—the domestic currency price of a unit of foreign currency.

Second, (18) can be modified as,

$$Z = Z_{-1} + (Z_{-1} - b)\Delta \overline{e} + b \, \Delta P_D + a\Delta \overline{y} \tag{20b}$$

where b is a positive parameter that measures the responsiveness of the volume of imports to the relative price of importables. According to Eq. (20b), increases in domestic real GDP and domestic prices raise spending on imports; on the contrary, a devaluation will reduce imports, if the volume of imports is sufficiently responsive to relative prices.

Third, we can now modify identity (11), i.e. $\Delta M \equiv \Delta R + \Delta D_p + \Delta D_G$ to include valuation effects to get,

$$\Delta M \equiv \Delta R + \Delta \overline{e} R_{-1}^{f} + \Delta \overline{D}_p + \Delta \overline{D}_G \tag{20c}$$

where R_{-1}^{f} is the foreign currency value of the previously existing stock of foreign exchange reserves and $\Delta R = e\Delta R^f$.

Fourth, the volume of exports (X) is assumed to depend on the relative price of foreign goods in terms of domestic goods (i.e. both e and P_D), while net foreign capital outflows are taken as exogenous in foreign currency terms, so that,

$$X = X_{-1} + (X_{-1} + c)\Delta \overline{e} - c \, \Delta P_D \tag{20d}$$

Table 1 Structure of IMF framework

Target	Endogenous variable	Exogenous variable	Instruments	Parameters
ΔR ΔP_D	ΔY ΔM ΔP Z ΔF $T - C_G$	Δy P_F X_{-1} Z_{-1} ΔF_G	ΔD_P ΔD_G Δe	v: Velocity of money θ: Share of importables in the price index a: Marginal propensity to import b: Coefficient of response of imports to relative prices c: Coefficient of response of exports to relative prices

Source Khan et al. (1990)

$$\Delta F = \overline{\Delta F}(1 + \Delta \overline{e}) \tag{20e}$$

Equations (20a) to (20e) describe the structure of IMF's financial programming model (Table 1).

Thus, in some sense, financial programming is a set of equations and identities aiming at capturing the interrelationship between major macroeconomic accounts (Fig. 2).

Following Tarp (1993), the process of implementing a financial programming exercise can be structured in ten important steps followed through in most of the scenarios.

1. Choose a desired target variable level, generally R, foreign reserves (but inflation or change in private sector credit can also be a target).
2. Projections are generated for the exogenous variables, (viz. real output, exports and change in capital flow).
3. Value of import is assessed.
4. Necessity for any exchange rate adjustments is assessed.
5. Demand for money is estimated and an analysis of the need to influence the interest rate (which would affect money demand) is done.
6. The overall change in domestic credit expansion is set.
7. Consistency of the credit supply (derived from step 6) with credit demand.[5]
8. Exploring options in which gap between credit demand and supply would be closed.
9. Consistency of the measures is tested.
10. Finally, the performance monitoring criteria are set in terms of a letter of intent.

To sum-up, the financial programming exercise is not exactly a model but as Blejer et al., (2001, p. 5) note:

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[5] UK Essays (2018) noted: "This step is one of the most painstaking of all, as in most of the cases domestic credit expansion for the private sector is specifically targeted and any gap at this stage signals that the borrowing required by the government is exceeding the permitted level".
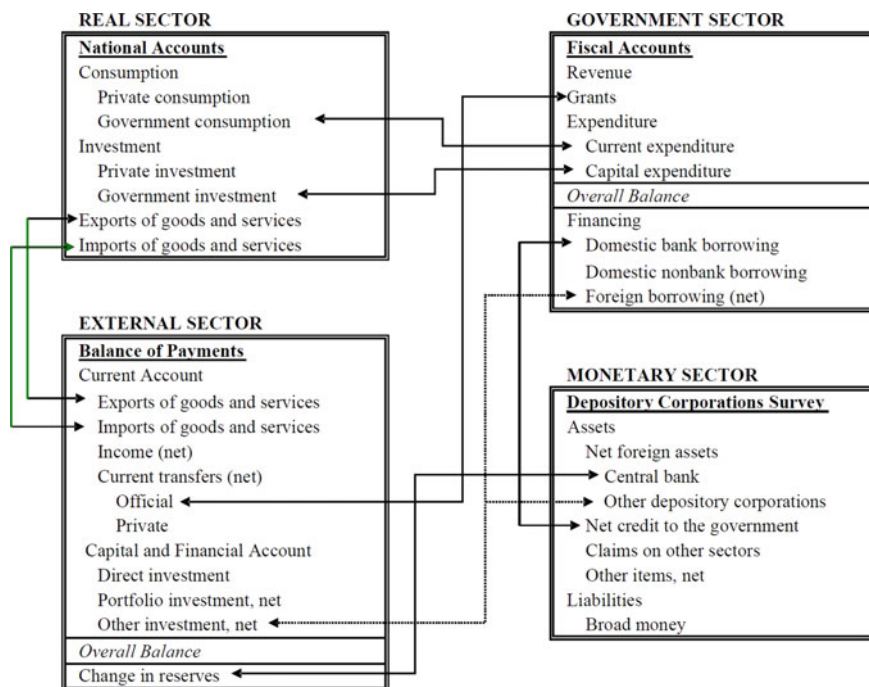
Fig. 2 Interrelations among the macroeconomic accounts. *Source* IMF (2017)

> Quantitative macroeconomic performance criteria in Fund programs do not typically rely on a specific macroeconomic model. They do, however, make use of various balance sheet identities that link monetary and fiscal variables with the balance of payments, to ensure that the Fund program is internally consistent. In general, these performance criteria may best be thought of as signaling devices that flag a possible need for corrective action in case of deviations.

4.2 Some Critiques

The financial programming framework has been criticized on a number of grounds over time. Easterly (2002) was quite candid when he said,

> a model based mainly on identities seems questionable in light of modern macroeconomic theory. A change in policy variables would affect many items in each macroeconomic identity in most modern macroeconomic theories, so the identity provides little guidance as to how policy variables affect target variables.

Easterly's detailed econometric exercise for 109 countries revealed the following limitations of financial programing exercise:

- There are large statistical discrepancies in all the identities.

- Identities fail to yield a strong association between the "policy" variable and the "endogenous" variable.
- Many of the estimated relationship of the behavioural parameters tend to suffer from systematic instability and high variance, which creates serious problems about any forecast that is an outcome of the financial programming exercise.
- This is, in particular, true in particular for velocity of money and the income elasticity of imports.

All these led Easterly to an inescapable conclusion,

> *financial programming does not appear to be a very useful guide to macroeconomic policies in developing countries.* Its shortcomings may be rectified in the field by subjective judgments by the IMF staff, who are technically sophisticated, but there is then a mismatch with the formal presentation of IMF programs and actual practice. There seems to be a mismatch between the formal insistence on benchmark policy criteria and the weak empirical and theoretical underpinnings of an identity-based framework that relies on unstable parameters and fails to take into account the endogeneity of virtually all items in the macroeconomic identities. (p. 21)

Where does financial programming stand now? Notwithstanding the IMF claim that this methodology of the financial programming exercise evolved gradually over the years, taking into account of the major institutional and structural developments in the global as well as programme economies and advancement in macroeconomics, Tarp (1993)'s conclusion that very little has in fact changed in the basic IMF framework over the past thirty years seems to be still valid.

5   IMF's MULTIMOD Model

In a parallel track, work on a MULTI-region econometric MODel (popularly called MULTIMOD) was going on within the IMF since the mid-1980s. The objective of the MULTIMOD model was "to improve analysis of the effects of industrial country policies on major macroeconomic variables, both in the developed and developing worlds" (Masson et al., 1988). Since its development in the late 1980s, MULTIMOD has been actively employed in the IMF's analysis of global and country-specific macroeconomic policy issues. In some sense, the primary purpose of MULTIMOD was generating alternative scenarios for the bi-annual IMF publication *World Economic Outlook* (WEO). Accordingly, it is based on annual data and takes the WEO forecast (produced by combining forecasts for individual countries generated by the IMF's country teams) as an "exogenous" baseline. "The process of putting together the WEO forecast imposes common assumptions about key global variables and involves a certain amount of iteration in pursuit of global consistency" (Isard, 2000).

The first generation MULTIMOD model (Mark 1) was quite aggregative, and it consisted of the following countries.

- Three separate industrial countries viz., the USA, Japan and the Federal Republic of Germany (i.e., West Germany)
- Two blocks of the remaining industrial economies.

  o one for the other G-7 countries, labelled the larger industrial (LI) block (France, the UK, Italy and Canada), and
  o one for the smaller industrial countries.

- The rest of the world has been divided into

  o high-income oil exporters and
  o developing countries.

     There is only one aggregate region, but its industrial structure is disaggregated between production of manufactures, of oil and of primary commodities.

The model developed by Paul Masson, Steven Symansky, Richard Haas and Michael Dooley of IMF's Research Department in 1988 is a dynamic version of the popular open economy macroeconomics workhorse, viz. the Mundell–Fleming model. The main linkages among the regions are modelled through "endogenous determination of prices and volumes of goods trade and the endogenous determination of exchange rates and interest rates" (Masson et al., 1988). The basic features of the model are the flowing:

- Trade plays a major role in the model and it is disaggregated into three different types of goods: oil, primary commodities and manufactures.
- The transmission mechanism of economic policies across the world depends on a number of key parameters, such as the degree of price stickiness, the elasticity of expenditure with respect to interest rates, the degree of openness to trade and the size of trade elasticities.
- The government sector in the model does not include any true behavioural equations—these primarily refer to identities that define the budget balance and total expenditures.
- Monetary policy is specified in terms of the monetary base. This when equilibrating with the demand for base money determines the short-run interest rate, which in turn have an effect on long-term rates and the exchange rate.
- The price of output (i.e., the non-oil GNP deflator) comes from price setting behaviour by firms and wage setting in the context of overlapping contracts. It is assumed to depend on the level of capacity utilization, while wage bargains depend on the degree of slack in labour markets as well as on the expected real wage. Employment and wages are not modelled explicitly here.
- Exchange rates are determined via an open interest parity between short-term interest rates in different countries; that is, the expected appreciation of the dollar exchange rate is set equal to the short-term interest differential in favour of the dollar.

- A key feature of the model is the determination of the net flow of financing from industrial to developing countries; its availability is assumed to depend on the debt-interest-to-exports ratio.

Estimating relationships based on historical data, the MULTIMOD Mark 1 presents a number of simulations.[6]

Subsequently, improved versions of MULTIMOD models were released in 1990 (MULTIMOD MARK II; Masson et al.) and in (1998) (MULTIMOD Mark III, Laxton et al., 1998). The Mark III Version of MULMOD differed considerably from its predecessor. Laxton et al. (1998) summarized these features succinctly and commented:

> New features include a core steady-state analogue model, a new model of the inflation-unemployment nexus, an extended non-Ricardian specification of consumption-saving behaviour, and improved specifications and estimates of investment behaviour and international trade equations. In addition to these changes in model specification, the introduction of a new solution algorithm has greatly increased the robustness, speed of convergence, and accuracy of the simulations and made it easier to develop certain modified versions of MULTIMOD that were difficult to solve with the Mark II algorithm. (p. 1)

The core Mark III model includes explicit country submodels for the following:

- Each of the seven largest industrial countries;
- An aggregate grouping of 14 smaller industrial countries[7];
- Two separate blocks of the remaining economies of the world comprising:
- developing and
- transition economies.

Solution to the steady-state model represents a position of simultaneous stock and flow equilibrium, whose structure is as follows:

- Households determine the steady-state level of wealth.
- Firms determine the stocks of physical capital.
- Governments determine the levels of their debts.
- For each country (or block of countries), the reconciliation of these stock positions comes through the net foreign asset position.

In this context, the reconciliation of stocks and flows in the long-run steady state imposes conditions on the steady-state levels of real exchange rates and interest rates whereby: (a) real exchange rates must be consistent with generating the trade and current account flows that are associated with steady-state stocks of net foreign assets; and (b) interest rates must be consistent with global balance between saving and investment.

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[6] Existence of expectations variables makes certain complications in the estimation of the model. This is avoided by assuming that the expectations are consistent with the model's predictions. This is achieved through a program that implements the Fair-Taylor algorithm, which constrains expectations and model solutions to be the same, to a preset tolerance, by iterating.

[7] Extended versions of MULTIMOD include separate submodels for many of the smaller industrial countries.

The MULTIMOD model generates a number of interesting cross-country simulations. Frenkel et al., (1990) reported the effects of monetary and fiscal policies in each of the three major countries on itself, on the other three major countries, and on the remaining G-7 countries (Table 2). Characterizing the global economy of the late 1980s, a few features of these results need special attention.

First, reflecting the larger size of the US economy, its policy is seen to have much larger spillover than those undertaken in Japan or in then West Germany (i.e., the Federal Republic of Germany).

Second, both monetary and fiscal policies have strong effects on domestic real output over the medium term,

Third, fiscal policy has a much larger own-effect on the current account balance than monetary policy reflecting the fact that the output and relative price effects go in the same direction for a fiscal policy change, whereas they offset each other in the case of monetary policy.[8]

6 More Recent Modelling Exercises at the IMF

By the beginning of the new millennium, large-scale macromodel came under severe attack questioning the lack of microeconomic foundation in these model. The critique emanated from Lucas (1976), who went on to say:

> …Given that the structure of all econometric model consists of optimal decision rules of economic agents, and that optimal decision rules vary systematically with changes in the structure of series relevant to the decision maker, it follows that any change in policy will systematically alter the structure of econometric models. For the question of the short-term forecasting, or tracking ability of econometric models, we have seen that this conclusion is of only occasional significance. For issues involving policy evaluation, in contrast, it is fundamental; for it implies that comparisons of the effects of alternative policy rules using current macroeconometric models are invalid regardless of tile performance of these models over the sample period or in ex ante short-term forecasting. The argument is, in part, destructive: tile ability to forecast the consequences of "arbitrary", unannounced sequences of policy decisions, currently claimed (at least implicitly) by the theory of economic policy, appears to be beyond the capability not only of tile current-generation models, but of conceivable future.

As a result of the Lucas critique, work on macroeconomteric policy modelling proceeded in two distinct directors.

First, a series of papers like Sims (1980) proposed a new atheoretical macroeconomics without imposing too many restrictions from theory. In these models, generically called the vector autoregression (VAR) models, there are three strands of

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[8] "A fiscal expansion, for example, induces an appreciation of the real exchange rate and an increase in domestic demand-both of which lead to a fall in net exports. In contrast, a monetary expansion yields a depreciation of the real exchange rate-which promotes net exports-and an increase in domestic demand-which penalizes them; because the relative-price effect dominates-at least in the case of the United States and Japan-the result is a small improvement in the current account" (Frankel et al., 1990).

Table 2 Spillovers from changes in fiscal and monetary policies in MULTIMOD

After year	Real GDP (Percentage deviation from baseline)				Current A/C Balance (Deviation from baseline, billions of dollars)				Real Effective Exchange Rate (Percentage deviation from baseline)			
	USA	Japan	Germany	Other G-7 countries	US	Japan	Germany	Other G-7 countries	US	Japan	Germany	Other G-7 countries
Impact of Government Spending Increase of 1% of GNP in 1988 (Temporary; each successive year is 70% of previous year's)												
USA 1	1.2	0.5	−0.1	0.2	−13	3	−1	3	1.5	−0.3	−0.1	−0.5
3	0.6	0.6	0.1	0.6	−18	6	–	7	1.8	−0.2	−0.4	−0.6
Japan 1	–	1.5	−0.1	0.1	1	−5	–	2	0.1	0.5	0.1	−0.3
3	0.1	0.6	–	0.3	1	−8	1	4	−0.1	0.9	–	−0.4
Germany 1	0.1	0.1	0.8	0.2	1	1	−6	2	−0.3	−0.2	0.7	−0.2
3	0.1	0.2	0.3	0.2	–	2	−5	3	−0.4	−0.3	0.9	−0.2
Increase in Money Supply Target by 5% Relative to Baseline												
USA 1	1.2	−0.5	−0.3	−0.1	6	5	5	–	−3.8	0.6	10.4	0.6
3	0.8	−0.2	−0.1	−0.1	6	5	6	−1	−2.1	0.3	1.0	0.3
Japan 1	−0.1	1.1	–	–	−1	3	–	−1	0.4	−2.2	0.3	0.6
3	−0.1	1.0	−0.1	−0.3	−1	6	−1	−4.0	0.3	−1.2	–	0.4
Germany 1	−0.1	–	2.1	–	−1	–	–	1	1.2	0.8	−3.5	1.0
3	–	−0.1	1.1	−0.2	–	1	−1	−1.0	0.7	0.5	−1.8	0.5

Source Frenkel et al. (1990)

literature. First, in their original form (e.g., Sims, 1980) VAR models are essentially a theoretical and imposes a Choleski (lower/upper triangular) identification scheme. Second, later VAR models tend to follow an identification structure from economic theories (like Bernanke, 1986; or Blanchard & Quah, 1989). Third, Bayesian priors are also imposed for the identification scheme in Bayesian VARS (Sims & Zha, 1998). Innumerable illustrations of all these strands of model building exist in IMF's research. Just to cite two random examples, illustratively, Cheng (2006) built up a VAR model Keyna's monetary policy transmission, and Choi and Wen (2010) discussed Taylor's rule in the USA in the framework of a structural VAR model.

Second, more recently dynamic stochastic general equilibrium (DSGE) models have tried building up macromodels from explicit microfoundation of optimizing economic agents.[9] Initial applications of DSGE models typically emanated from the Real Business Cycle (RBC) models associated with Kydland and Prescott (1982) and Long and Plosser (1983). Christiano et al., (2017) summarized these RBC-based DSGE models as follows:

> These early RBC models imagined an economy populated by a representative consumer who operates in perfectly competitive goods, factor and asset markets. The one source of uncertainty in these models is a shock to technology. …. These models took the position that fluctuations in aggregate economic activity are an efficient response of the economy to exogenous shocks. The associated policy implications are clear: there was no need for any form of government intervention. In fact, government policies aimed at stabilizing the business cycle are welfare-reducing.

These RBC models faced serious criticism on the following three crucial grounds. First, their key assumptions like perfect credit and insurance market or frictionless labour market were not in consonance with the available microdata cast. Second, these models were at variance with "some key properties of the aggregate data, such as the observed volatility in hours worked, the equity premium, the low comovement of real wages and hours worked" (Christiano et al., 2017). Third, the simple RBC models were conspicuously silent on a number of macroeconomic policy-related issues. Thus, by the 1990s, a class of DSGE models attempted to incorporate Keynesian ideas like real and nominal rigidities as well as market imperfections in an otherwise microfoundation-based models (e.g., Rotemberg and Woodford, 1997).

These models were also adopted in the IMF for various works. Officially, the Global Economy Model (GEM), the IMF's first multi-country DSGE model was developed by early 2000's. Laxton (2008), writing just before the global financial

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[9] Nachane (2018) notes: "New classical theory lays strong claims to being scientific in the sense that its macroeconomic models (the so-called DSGE - dynamic stochastic general equilibrium - models) are securely rooted in micro-economic foundations. It attacks both Keynesian and monetarist theories on the grounds that their macroeconomic relations are ill-defined, since they do not capture the micro-economic behaviour of economic agents …. This viewpoint, that aggregate relations are derivable solely from individual behaviour is termed as "reductionism" by philosophers … Of itself, reductionism does not maintain that all the individuals in the ensemble are homogenous, but typically, new classical economists impose this condition in their theorizing and presume that the typical behaviour of an economic agent is captured by a representative agent, who optimizes an objective function (expected utility in the case of consumers or expected profits in the case of firms).

crisis, summarized the context relating to development of GEM, in an article in IMF Staff Papers as follows:

> The first two-country version of GEM was developed in 2001 and was later published in the Journal of Monetary Economics. Within a few months there was a small team of economists working on the model, which grew in size over time and later became a network of researchers from both inside and outside the IMF. Today, variants of GEM are used extensively at the central bank in Canada, Italy, Japan, and the Norges Bank. Building on the success of the GEM project, the IMF Research Department's Modeling Unit has developed other DSGE models to address issues that require more elaborate theoretical structures. This includes the Global Fiscal Model (GFM), which focuses on medium- and long-term fiscal issues, and the Global Integrated Monetary Fiscal Model (GIMF), which has been designed for issues that involve both monetary and fiscal policy. These two models as well as GEM are now used extensively within the Fund for supporting our surveillance activities.

How is GEM different from MULTIMOD? We turn to Laxton (2008) for a clear exposition of these types of modelling, who has put it as follows:

> The basic philosophy behind GEM and the other DSGE models developed at the IMF is much different than the first generation of large-scale econometric models. These earlier large-scale econometric models focused more on fitting individual equations by connecting variables and then assembling the equations on a computer. The dynamics and forecasts produced by these equations were usually not considered to be very reliable so the modelers would go back to their computers and fiddle with the equations and estimation routines until their models produced more plausible looking results. Following the abandonment of these models and their research program in academia a new research program was developed that focused more attention on dynamic optimization theory and understanding the importance of real and nominal rigidities for macrodynamics. At the same time a similar research program was in place inside a few academic and policymaking institutions trying to build a second generation of forward-looking macromodels for forecasting and policy analysis. This research program was also based on developing models with forward-looking behavior and although these models had a coherent theoretical structure many of the dynamic equations were not derived explicitly from strong choice-theoretic foundations. As the two research programs progressed it became natural to combine the best from both approaches. The end result has been a new generation of models that have stronger choice-thereotic foundations, and with sufficient nominal and real rigidities that can produce plausible macrodynamics. (pp. 226–227)

The GEM model became extremely popular and a number of applications were made such as, exchange rate pass-through, shocks to aggregate demand under different monetary policy responses, or productivity shocks to non-traded goods sector. By the middle of the first decade of the new millennium, it appeared that the state of macroeconomic modelling elsewhere and in the IMF has almost attained a *nirvana*. The sentiment is captured in the following statement of Blanchard (2008), when he went on to say,

> For a long while after the explosion of macroeconomics in the 1970s, the field looked like a battlefield. Over time however, largely because facts do not go away, a largely shared vision both of fluctuations and of methodology has emerged. Not everything is fine. Like all revolutions, this one has come with the destruction of some knowledge, and suffers from extremism and herding. None of this is deadly however. *The state of macro is good*". (emphasis added)

Nevertheless, the onslaught of the global financial crisis has questioned such complacency on the state of macro.

7   Modelling in Post-global Financial Crisis

It seems ironical that when the global financial crisis has savaged the global economy the IMF was in a downsizing mode. Absence of crisis between 2000 through 2007 perhaps made the global economic managers complacent about the state of the economy. Naturally, after the crisis brewed, there were scathing criticism of the IMF. While such criticism aimed at different aspects of functioning of the IMF, in the present paper, we focus our attention only on the modelling efforts of the IMF.

A major critique against the IMF was its failure to anticipate the crisis even to a limited degree. After all, in terms of traditional macrometrics, most of the countries those were severely affected by crisis were doing fine with high growth, low inflation and manageable fiscal and current account deficits. Intellectually, thus, the crisis underlined the limitations of sophisticated DSGE models and their inability to integrate financial sector with the real economy. In terms of modelling efforts, the work in IMF moved forward in two distinct directions. First, research efforts were undertaken to generate what is now known as macrofinancial models. Second, in a parallel track, research was initiated to generate some early warning exercise.

As far as building up macrofinancial models are concerned, attempts were made to incorporate financial sector and financial sector frictions in an otherwise DSGE model. A model named MAPMOD was developed in the IMF to incorporate macro-financial and macroprudential policy analysis "to study vulnerabilities associated with excessive credit expansions and asset price bubbles, and the consequences of different macroprudential policies that attempt to guard against or cope with such vulnerabilities" (Benes et al., 2014). The MAPMOD has an explicit banking sector and considers the implications for excessive credit creation. Banes (2014) simulated scenarios to various shocks such as, productivity growth, riskiness of bank borrowers, deviations of asset prices from their fundamental values, bank equity, and foreign interest rates in the context of MAPMOD. Simulations to changes in increases in minimum capital adequacy ratios and changes in the countercyclicality of bank capital requirements were also considered.

Have these models been successful in capturing the reality of the global financial crisis and its aftermath? We turn to Stiglitz (2018) on this issue, who has commented:

> ….a distinction is often made between the core DSGE model as a benchmark model and the variety of expanded models, which introduces a large number of complexities—more shocks than just technology shocks; and more frictions than just nominal wage and price rigidities. To be sure, as many users of DSGE models have become aware of one or more of the weaknesses of these models, they have 'broadened' the model, typically in an *ad hoc* manner. There has ensued a Ptolemaic attempt to incorporate some feature or another that seems important that had previously been left out of the model. The result is that the models lose whatever elegance they might have had and claims that they are based on solid microfoundations are weakened, as is confidence in the analyses of policies relying on them. The resulting complexity often makes it even more difficult to interpret what is really going on. (pp. 71–72)

The second strand of formal modelling came in terms of early warning exercises (EWE). Since 2009, the IMF and the Financial Stability Board (FSB) have been

undertaking the EWE; its purpose was to "identify developing vulnerabilities within the global financial system". The basic aim of the EWE were three fold (Robinson, 2014):

(a) To identify systemic vulnerabilities sufficiently in advance that corrective policies can be implemented;
(b) To warn of imminent risks that suggest tail risks are about to materialize and suggest mitigating action; and
(c) To prioritize policy recommendations and formulate contingency plans based on probability and impact.

Because of the potential contagion risk, the EWE remains a largely confidential exercise and it is disseminated through a confidential presentation of risks and vulnerabilities to the International Monetary and Financial Committee (IMFC). About one month prior to the IMF Annual and Spring Meetings, the early warning list (EWL) is finalized. The vulnerability exercises are done separately for Advanced (VEA) and Emerging Economies (VEE). Three kinds of sectoral vulnerabilities (viz. external sector, fiscal sector and corporate sector) and two kinds of market risks (viz. asset prices and financial market risk attitudes) have been emphasized (IMF, 2010). Each of these can further be attributed to further details (Table 3).

Admittedly, the EWE suffers from a number of limitations such as issues relating to data quality and coordination between the IMF and the FSB. Nevertheless, it has been aptly pointed out, "The EWE is among the most important innovations introduced after the crisis….. That said, there is room to improve its effectiveness in a number of areas. Many senior policymakers are in practice unaware of the main takeaways from the EWE due to the restricted attendance and rather limited debriefing by the participants …. and it is difficult to find many concrete examples of follow up …." (Robinson, 2014).[10]

8   Concluding Observations

This paper tries to track the philosophical foundation of macroeconomic modelling in the IMF. In doing so we have tracked various major planks in IMF's history—from early years to Polak model to financial programming. In more recent time, IMF's MULTIMOD models (with its three variants) have given way to its DSGE counterparts like GEM, which got revised as MAPMOD model incorporating financial firms after the global financial crisis. IMF has been an employer of some of the finest economists in the world and it is no wonder that such brilliance got reflected in IMF's modelling expertise as well. In fact, it is clear that some of the earlier naivety of Polak

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[10] Initiated in 2011, recent spillover reports of the IMF tried to address some of these limitations. These were initially focused on the external effects of domestic policies in five systemic economies (viz., China, the euro area, Japan, UK and the USA); since 2014, these spillover reports shifted their attention to a more thematic approach.

Table 3 Sectoral and market vulnerabilities in EWE

Source	Vulnerabilities
1. External sector risks and vulnerabilities	• Cross-border capital flows • External financing gaps • External imbalances • Probability of an external crisis • Exchange rate misalignments
2. Fiscal risks and vulnerabilities	• Rollover and financing risks • Sensitivity of public sector debt to adverse shocks • Markets' perceptions of sovereign default risk • Contagion risk from fiscal distress • The required scale of fiscal consolidation • Probability of a fiscal crisis
3. Corporate sector risks and vulnerabilities	• Leverage, liquidity and profitability • Stock valuation and default probabilities
4. Asset prices, market valuation and bubble spotting	• Real estate bubbles • Feedback loops between NPLs and • Equity Market Bubbles • macroeconomic performance
5. Financial market risk attitudes	• Global financial stability map • Asset and market volatility

Source IMF (2010)

model or financial programming exercise indeed got rectified in the later modelling exercise.

But the theme of the paper has less to do with the academic brilliance of the modelling exercise in the IMF, but it primarily focuses on the relevance of these modelling exercise for IMF's functioning. From that angle, to conclude, we venture a few observations.

First, the broad philosophy of research in the IMF is quite monolithic in nature. There are evidence of groupthink and almost an unquestioning faith in what Nachane (2018) has termed as "new consensus macroeconomics". It is interesting to note that IMF's Independent Evaluation Office (IEO) in a report looking into IMF's performance in the run-up to the financial and economic crisis during 2004–07 commented "the IMF's ability to identify the mounting risks was hindered by a number of factors, including a high degree of groupthink; intellectual capture; and a general mindset that a major financial crisis in large advanced economies was unlikely".

Second, the IMF seems to have an almost theological faith on financial globalization. One may remember IMF's spirited (Anjaria, 1998) rebuttal against Bhagwati

([1998](#))'s famous article in *Foreign Affairs* questioning the desirability of free movement of financial flows. In fact, there is quite a swinging door syndrome between the IMF and the Wall Street, where by a Wall Street investment banker could get employed by the IMF and an IMF economist could go out and join one of the investment firms in Wall Street/City of London. Of course, in recent times, the IMF has shed some its extreme position positions about capital control.

Third, there is often a disconnect between an otherwise great research output and IMF's functioning. In fact, when it comes to lending to a crisis-affected country, the typical workhorse of the IMF team could still become the age-old financial programming exercise despite its various limitations. Unless research gets organically linked to IMF's functioning, it will be of limited use from an applied viewpoint.

What is the way ahead? It is important to reiterate what IEO-IMF (2011) commented:

> Researchers should be allowed to explore issues without preconceived conclusions or messages. The Board, Management, and senior staff should actively foster an environment that encourages innovative research and should establish incentives for staff to pursue such research. After a thorough quality review, staff should be able to publish WPs and other academic-style products even when the results of their analysis are not well aligned with messages in surveillance documents. This openness is not simple to implement, given the demands for consistency of the operational work, but it is critical to the credibility of IMF research.

In the ultimate analysis, the IMF is a quota based organization. Its functioning and research output would reflect this skewed governance structure. Till the time this gets addressed in a satisfactory way, the macroeconomic foundation of IMF functioning will be a hostage of the interests of principal shareholders of the IMF.

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Assessing Policy Initiatives to Accelerate Economic Growth: An Illustration Using a Macroeconometric Model for India

K. N. Murty

1 Introduction

In India, there has been a lot of public debate in recent years about the global economic crisis, trade liberalization, their recessionary effects on the Indian economy; measures to overcome further sliding down of the economy; the role and potential of infrastructure sector in accelerating the GDP growth; and the ways and means of raising resources for public investment in infrastructure sector. Further, the role of financial sector development in achieving sustained economic growth is also in focus in India. The history of financial sector development in India is recent and nearly coincided with economic reforms in 1991, including explicit 'devaluation' undertaken in June, 1991. These apart, in an effort to control 'black money' and counterfeit currency in Indian economy, the Central Bank and the GoI have recently (November 2016) undertaken the 'demonetization' exercise, which was believed to have reduced real GDP growth by at least 1% immediately.[1] Also, in an effort to simplify the plethora of indirect taxes, the GoI has introduced the Goods and Services Tax (GST) in June 2018. Some claim both these measures have further accentuated the adverse effects of global economic crisis on the Indian economy. Put together, it is estimated that the real GDP growth in India must have declined from about 8% to 5% during the present decade. Hence, all efforts to reverse the deceleration in the growth momentum in the Indian economy through different policy initiatives are being considered. These include the most recent policy announcement of Rs. 100,000 crore surplus transfer from RBI to GoI. Soon after, the GoI in turn promises to increase public investment substantially in key sectors like infrastructure and announced a host of other 'sops' to private sector to stimulate investment and demand. Most recently on September

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[1] The preliminary estimates of GDP growth in the economy after 'demonetization' seem to conform this.

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20th, the GoI has affected, through an ordinance, a major policy decision to reduce corporate tax and surcharge amounting to nearly 10%, making the effective corporate tax very competitive in Southeast Asia. All the three policies together may be termed as '3Ds'. This paper attempts to address these issues of '3Ds' and seeks quantitative answers in a macroeconomic theoretical framework. The tool of counter-factual policy simulation is used for this purpose. The answers to the above mentioned questions seem affirmative as detailed below.

A macroeconometric model is a system of simultaneous equations, seeking to explain the behavior of key economic variables at the aggregate level, based on the received theories of macroeconomics.[2] Macroeconometric modeling, in general, pursues two objectives: forecasting and policy analysis. The latter objective is the focus of this study. Fiscal and monetary policies are the foremost policies that are virtually analyzed in macroeconometric models from their inception. Economy-wide macroeconometric models can help in understanding the main macroeconomic problems of a country and attempt to obtain quantitative answers for fiscal, monetary, trade and other policy initiatives. There has been relatively less work in linking the financial and real sectors in the Indian economy, which this paper tries to fill-up. The imperative role of financial sector development in accelerating economic growth (and, thereby employment generation and or poverty reduction) needs more attention in India. The flowchart of the estimated macroeconometric model is given below (Appendix 1).

There have been continued efforts over the years by the author and his associates in building and updating an integrated, structural, simultaneous, medium-sized macroeconometric model for India, with both real and financial sectors. The data period was annual time series from 1985–86 to 2009–10 for estimation and 1991–92 to 2009–10 for simulations. Despite numerous difficulties in availability of continuous time series data with common base year, all efforts were made to assemble the series until 2016–17, with some approximations. The recent data after 2009–10 was used only for trend analysis.

2   Data Trends and the Macro-Economy

The period of analysis is 1980–81 to 2016–17 using annual National Accounts Statistics (NAS) data with 2004–05 base year, supplemented by data from other published sources like Reserve Bank of India (RBI), International Financial Statistics (IFS) and National Statistical Survey Organization (NSSO). The financial sector data is

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[2] A comprehensive review of macroeconometric models and policy modeling for India can be found in Klein and Palanivel (1999), Radhakrishna et al. (2001), Krishnamurty (2002), Pandit and Krishnamurty (2004) and Bhattacharya and Kar (2005). A good review of monetary sector models was provided by Jadhav (1990). There has also been some published work by the author earlier (e.g., Murty & Soumya, 2007, 2011) on macroeconometric model for India, with similar methodology. The bibliography given here is somewhat dated and needs more recent references.

available from 1990–91 onward only. The annual average compound growth rate and mean value of important variables in the model are given in Appendix 2.

2.1 Output and Prices

Real gross domestic product at factor cost is an indicator of total economic activity or proxy for real income. Real income rose from Rs. 790.5 thousand crores in 1980–81 to Rs. 7257.1 thousand crores in 2016–17, implying an average growth rate of 6.4% p.a. during the entire study period. The relatively good performance of the Indian economy during post–'80 s, '90's and more so during the decade 2000–09, compared to earlier period, is attributable to the better utilization of industrial capacity and favorable demand conditions. The real output growth has accelerated from 5.2% during 80s to 6.1% during 90s and further to 7.8% during the decade (2000–01 to 2009–10). The real income growth has slowed down by 1% during the recent period 2010–17. Quick estimates show further decline of real GDP to about 5% in 2018–19. Real per capita output (income) also shows similar trends.

The growth rate in the wholesale price index (inflation) fluctuated between 6.6–7.8% during 80s and 90s, which declined to 5.4% during 2000–10 and much further down to 3.0% during the recent period 2010–17. The national income deflator shows similar trends but at 1.6–0.8% higher level during 80s and 90s, and its trends are nearly the same as that of wholesale price index during the decade 2000–09, but it has risen much faster (4.7%) in the recent period.

2.2 Investment and Savings

During 1980-2016, real public investment has increased by 4.9% from Rs. 95.5 thousand crores to Rs. 651.4 thousand crores. These investment trends are consistent with the production trends discussed above. But, the public investment has decelerated from 4.4% during 80s to 1.5% during 90s. In the post-liberalization period, the growth rate is only 1.5%. This is the result of massive disinvestment of public sector units in the country during post-90s. Similar deceleration took place again during the recent period 2010–16. To a certain extent, private investment has substituted for public investment. Private real total investment grew by 10.2% from Rs. 83.74 thousand crores to Rs. 1889.0 thousand crores in the study period. In the post-2000 period, private investment increased faster, but slowed down drastically (4.5%) during the recent period 2010–16. Nominal gross domestic savings in the economy has been growing at an average rate of 15.9% during 1980–2016 from Rs. 26.6 thousand crores to Rs. 4130.5 thousand crores, which is nearly the same as the growth in nominal gross investment (15.8%). However, both gross domestic savings and investment seem to have accelerated by about 2 p.a. and 4% p.a. till 2000–09, but fell very rapidly by 10% and 13% during recent period 2010–16, respectively. This explains,

among other things like slightly delayed global economic crisis, the 1% decline in real income growth in recent period.

2.3 Public Finance

In developing countries, the finances of the government play an important role in the growth of the economy. Govt. total expenditure consists of current and capital expenditures. The nominal total govt. expenditure has decelerated from 17.8% in 80s at Rs. 32.9 thousand crores to 14.4% in 2016–17 at Rs. 5252.6 thousand crores. The govt. final consumption expenditure, however, decelerated from 19.8% (Rs. 11.6 thousand crores) to 14.6% (Rs. 1846.7 thousand crores). Therefore, the deceleration in govt. expenditure can solely be attributed to the deceleration in investment. These trends continued into 2010–16 period as well. Although the nominal govt. direct tax collection has accelerated till 2009–10, the total revenue seems to have decelerated. But, both direct taxes and total revenue decelerated drastically during recent period. Some fiscal prudence has led to deceleration in the fiscal deficit over the years. In fact, gross fiscal deficit decelerated from 18.7% in 80s (Rs. 10.8 thousand crores) to 15.8% in 90s (Rs. 53.6 thousand crores) and further declined to 9.0% in 2000–09 (Rs. 199.8 thousand crores). But, gross fiscal deficit accelerated slightly (10.6%) during recent period to Rs. 979.9 thousand crores in 2016–17. Money supply grew more or less steadily at about 16.9% during the study period. Nominal interest rate (PLR) grew marginally during 80s by 0.7% p.a., but dropped significantly since then and the trend continued, with 1.6% decline during the entire period.

2.4 External Sector

Real export growth from the country has accelerated rapidly from 4.6% in 80s at Rs. 48.9 thousand crores to 10.7% in 90s at Rs. 88.1 thousand crores and continued to grow around 10% p.a. subsequently and reached Rs. 565.1 thousand crores in 2009–10. This increasing trend continued till 2014–15, but real aggregate exports fell during the next two years, possibly due to global crisis and demonetization of the Indian economy in November 2016. In fact, real exports fell by 1.2% during 2010–16 to Rs. 651.2 thousand crores after reaching a peak of Rs. 828.1 thousand crores in 2014–15. The unit value of exports, proxy for export price, has increased slower than export quantity during most of the period except during 80s. The price rise is quite steady around 8.4% through out. Real aggregate imports increased substantially from 5.8% in 80s to 10.8% in 90s and then to 14% in 2000s, but fell sharply at 4.9% during recent period. Real exports of mineral fuel, etc. grew by 12.8% in 80s, declined substantially in 90s (−23.5%) but increased again rapidly (23.6%) during 2000s. This sector is also affected adversely during recent period, with a decline of 10.6% due to global and domestic slow down. Real imports of mineral fuels increased substantially from

1.4% in 80s to 9.8% in 90s and grew slightly slower by 8.4% during 2000s. Imports of this commodity also fell in a similar way as that of exports in recent period. Unit value of imports (import price) accelerated marginally from 5.1% in 80s to 5.2% in 90s, but it rose quite rapidly by 9.8% in 2000s and even faster (10.6%) during the recent period. Unit value of mineral fuel, etc. exports increased substantially from 5.2% in 80s to 14.6% in 90s, respectively. Unit value of mineral fuel imports decreased by −4.3% in 80s but rose by 5.9% in 90s and increased quite rapidly (16.5%) in 2000s, but slowed down a bit (4.7%) in the recent period.

The export competitiveness was facilitated by significant depreciation of Indian rupee (5.8%) against the US$ during the study period, in addition to rise in unit value of exports. Despite rupee depreciation, growth in real imports has accelerated very rapidly from 5.8% in 80s to 10.8% in 90s, mainly due to higher demand. A substantial part of these imports could be POL imports, which have become essential both as inputs and final consumption goods. The import growth accelerated to 14% during 2000–09, but the trend reversed in recent period as already mentioned. The nominal trade balance, as expected, has been negative and highly volatile, particularly during the 90s and thereafter. The opening-up of the economy must have been largely responsible for this. This result is in conformity with the findings of an earlier simulation model developed in Mallick (2005) that currency depreciation did not have a favorable impact on trade balance in the 1990s.

2.5 Poverty

The data on the head count (poverty) ratios, separately for rural and urban India, is taken from Planning Commission source. Head count ratio in rural areas decreased moderately from 47% in 80s to 43.8% in 90s, further decreased to 38.4% in 2000s and to 32.4% in recent period. The head count ratio in urban areas decreased from 39.7% in 80s to 31.9% in 90s, further decreased to 24.5% in 2000s and to 14.2% in recent period.

World Real Income: The growth in world real income was rather slow—only 3.0% during the study period. It was slightly higher (3.4%) during 80s, but lower (2.8%) during 90s and 2000s. It picked-up to 3.4% during recent period.

2.6 Financial Sector

Comparing the real sector growth rates to financial sector, it is observed that financial sector has grown more rapidly. In fact, looking at the BSE Sensex, it has registered a growth of 15.3% in the time span of thirty-six years. The highest growth rate has been recorded in the last decade of 2000–09, when the Sensex grew at 21.7%. Its growth decelerated to 8.8% during the recent period. Moreover, overall market capitalization grew at an average of 25% in past three decades. Loans in the country

grew at a rate of 16.7% in past three and half decades, 21.4% being the highest growth registered in the decade 2000–09. The growth decelerated to 15.4% since 2010. The other financial parameters such as the Foreign Direct Investment (FDI) grew at 29% in the two decades 1991–2010 after implementation of Liberalization, Privatization and Globalization (LPG) reforms. Interestingly, FDI growth accelerated to 26.9% even after global crisis. The growth after 1991 was phenomenal at 60.8%, thanks to the low base value at the beginning of the ninety's decade, after which the growth for the next decade fell to 24.7%. In contrast, FIIs seem to have withdrawn investments during this recent period.

In summary, the above trend analysis shows that the macroeconomy has been under severe stress with high volatility and slowing down of investment and economic growth during the mid-90s and thereafter. However, the infrastructure and services sectors seem to hold some hope. Moreover, it is also evident from the growth rates that the growth in financial sector has clearly outperformed the real sector in the country in the past three and half decades, especially after 1991 reforms.

The model is estimated using 3SLS[3] method[4] in a few economically meaningful blocks and linked together in base simulation.[5] The full model is given in Appendix 3. The model shows significant macroeconomic linkages contemporaneously and over time between real and financial sectors in India. After ascertaining satisfactory ex-post validation of most of the endogenous variables vis-à-vis historical data, three counter-factual simulations relating to three policy initiatives are attempted. These are devaluation, demonetization and demand management through public investment using RBI surplus transfer to GoI.[6]

We start with a very important earlier policy decision, viz., 'devaluation' since it effected both real and financial sectors of the economy.[7] In fact, as many would agree, this unique decision seems to have pulled-out the Indian economy from severe

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[3] In present day research, requirement of stationarity of variables in regression equations is a much debated issue. However, this issue is somewhat side stepped in macroeconometric model estimation, because capturing the structure of the economy in level variables and interpretation of the coefficients are considered more important than correcting for non-stationarity of the underlying variables. Further, despite non-stationarity of variables, in simultaneous equation systems, the 2SLS but not the OLS estimators is shown to produce consistent estimates (see, e.g., Hisio, 1997). Since we use 3SLS method, the parameter estimates will be consistent and asymptotically efficient. The author is grateful to Professor V. N. Pandit for bringing this literature to his notice.

[4] Given the shortness of annual time series data in systems estimation context, estimating regime specific models to address the well-known Lucas critique is somewhat impracticable. For the same reason, testing for stability of coefficients across policy regimes may not be possible either.

[5] Despite the best efforts to get economically meaningful signs for all coefficients and 'good' overall measures of goodness of fit, there are still some worrisome aspects like inappropriate Durbin-Watson statistic for quite some equations. Re-estimation of the model with longer time series may be needed.

[6] In order to assess the symmetry of impacts for each exogenous variable, both an increase and a decrease in that variable have been attempted separately. It is found that the impacts are numerically identical except for the sign change. Further, the simulation impacts due to different exogenous variables are also fully additive.

[7] Although, 'devaluation' was a bygone policy measure, whose effects were already debated and documented, it is being revisited here for comparative analysis with two other policy instruments, 'demonetization' and 'public investment' using a common macro econometric model framework.

balance of payments crisis. With this historical back-drop, we first try to quantify the macroeconomic effects of 'devaluation', visualized as a 30% increase in India-US bilateral nominal exchange rate. 'Demonetization', which is equally, if not more, important recent policy measure is assumed to consist of three components, viz., (i) reduction in broad money due to withdrawal of Rs. 500 and Rs. 1000 denomination currency notes from circulation, (ii) increase in bank deposits for exchange of old currency and (iii) increase in direct taxes when deposited currency exceeded the taxable income. For utilizing RBI surplus transfer to GoI, increase in real public investment is considered as an appropriate tool. A closure look at the estimated macroeconometric model clearly shows that public investment is the **main driver** of economic growth in Indian economy. In this paper, all counter-factual simulations are of 'shock' type. Since the macroeconometric model is 'simultaneous' and 'dynamic' in nature, the impacts are likely to persist for some time, but expected to diminish and eventually become zero over time. However, for some variables, the dynamic effects may stabilize, but not vanish over time. In other words, they may take much longer time to vanish. It is desirable that none of the effects get explosive or widen over time. This should be the case, if the estimated model is stable. To assess this, only a 20 year period, 1991–2010, is chosen for simulations. The impacts and dynamic effects of all the simulations are given in Appendix 4. For some important variables, the time paths are shown in graphs (Appendix 5). Since the impacts are contemporaneous changes of 'policy simulation' from 'base simulation', these changes are not 'growth rates' in a strict sense, particularly for variables in 'level'. However, for 'stylistic' reason, i call them 'growth rates'. This is a common practice. For variables which are rates of changes, like interest rate, exchange rate, indices, the impacts are naturally 'growth rates' without any difficulty.

2.7 *Devaluation*

In Simulation 1, the India-US bilateral nominal exchange rate (EXR) is increased by 30% in 1991–92. This simulation tries to capture the effects of 'devaluation' decision undertaken in June, 1991, to tide over the balance of payments crisis, which severely affected the Indian economy. In empirical economics, the effect of devaluation on trade balance (TB) or balance of payments (BOP) is usually described by the so-called J-curve. This implies that after devaluation, the TB/BOP is expected to decline initially for some time and then start rising thereafter, justifying a 'J-shape' curve. Sometimes, it could be a delayed 'J-curve'. On the contrary, for India, some studies (e.g., Asha, 1995) found an inverse 'J-curve'. In fact, the observed data also does not show any clear 'J-curve' for India. Further, the estimated model could trace the observed data on TB/BOP quite well. This study seems to re-confirm the presence of inverse 'J-curve' as we show below.

Due to a 30% increase in EXR (rupee appreciation), the exchange rate channel will be activated in the foreign trade (of financial sector) module. Specifically, due to rupee appreciation in 1991–92, in the same year, imports become expensive, and hence, the

'import demand' function predicts a decline in real imports ceteris paribus, which is normally expected of devaluation. However, due to the presence of real RBFA in the import demand function, there is a dampening effect on fall in imports due to increase in purchasing power of RBI foreign exchange reserves, which has a positive effect on real imports. Therefore, the net effect prima-face could be either positive or negative. But, in our case, the final net effect is decline in real imports (2.6%). Another concomitant link in this financial sector module is the relationship between BSE Sensex and EXR through trade-openness. The latter variable has a negative effect in the estimated model. The net effect of this relationship seems to be a small decline in BSE Sensex by 6.9 points, which triggers a series of other macroeconomic impacts. These include significant rise in nominal exports (Rs.300 crores) along with Rs. 1925 crore fall in imports which adds to a sizeable increase in trade balance[8] (Rs. 2224 crores); rise in nominal income (1.6%), real income (0.4%) and aggregate demand (0.6%). This is made possible due to increase in public sector savings (14.2%) and real private investment (crowding-in effect) by 1.5%. This amounts to increase in aggregate domestic saving rate and capital formation by 0.6% and 1.9%, respectively. As a result, gross fiscal deficit (GFD) declines by 0.4% and as a share of GDP declines by 0.3%.

Due to increase in nominal income, both direct and indirect taxes will rise substantially, leading to increase in nominal govt. revenue (2.2%) and nominal current expenditure (0.7%). Both private real consumption (0.2%) and nominal govt. consumption (1.5%) will increase. Money supply (4.0%) and inflation (1.2%) will rise, and prime lending rate (PLR) will fall (0.2%). Supply of loans by banks will fall (1.0%). In all, three macro ratios w.r.t GDP, viz., gross fiscal deficit (0.3%), exports (0.1%) and imports (0.6%) will fall. Due to rise in real income, both rural poverty and urban poverty will decline negligibly by 0.03% and 0.01%, respectively. Thus, 30% devaluation of bilateral India-US exchange rate seems to have resulted in moderate benefits to the Indian economy and helps overcome the BOP crisis in 1991 immediately.

Due to simultaneity and dynamic nature of the model, the dampened impacts persist for short-run (1994–95, 3 years) and even medium-run (2000–01, 10 years) for many variables. Only after 20 years, most of the effects vanish, with the exception of a few variables like public sector savings. This variable seems to be too sensitive even to small changes in other variables and takes more time to return to base simulation values.

2.8   Demonetization

On November 8, 2016, Prime Minister Sri Narendra Modi has announced the withdrawal from circulation with immediate effect of all currency notes of Rs. 500 and Rs. 1000 denomination issued by the Central Bank. However, some provision was made to exchange/deposit these currency notes through banking channel for a limited

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[8] Thus, this study seems to re-confirm the presence of inverse 'J-curve' in India.

period to facilitate public transactions. The demonetized currency has also been permitted for specified purposes for some extended period. The proclaimed purpose of this important measure is to curb/unearth large amount of 'black money' (and also 'fake' currency) accumulated over time in the Indian economy. There are widely varying estimates of this 'black money'—one estimate is 30–50% of official money supply, and another estimate is to the tune of 20–25% of GDP and 10% of it is in cash (UN report 2013). The present demonetization of money supply in the economy is a very significant measure by the GoI/RBI. Till recently, despite the best efforts by the Central Bank and the entire banking system to meet the day-to-day currency needs in the country, there has been widespread discontent (and some cautious acclaim as well) from different sections of the population due to the non-availability of replacing currency notes in adequate quantity/value. The Central Bank and the govt. have been assuring the nation that the shortage of currency notes is certainly temporary and the 'demonetization' exercise was very much essential to improve the efficiency of the economic system.[9]

Recent 'demonetization' is visualized for our purpose as a combination of three policy changes, **counter-factual simulations**, as on 1991–92:

- One-period (shock) Rs. 4,975 crore reduction in broad money (5% of base simulation level), symbolizing 'black money', which could not be brought back into circulation after permanent withdrawal of Rs. 500 and Rs. 1000 denomination old notes from circulation,
- One-period Rs. 1,27,530 crores increase in deposits with commercial banks (50% of base simulation level) and
- One-period 30% increase in direct taxes of base simulation level (Rs. 5241 crores approximately).

All the above three changes together is called as 'demonetization' here.[10]

Such 'demonetization' leads to several macroeconomic changes within one year. These include fall in broad money supply (16.0%); fall in inflation (5.6%); and as expected, an immediate decline in nominal GDP growth of 5.3%. But, there will be a 0.3% increase in real GDP due to faster decline in GDP price deflator (5.6%) in Indian economy in the same year. This growth in real GDP is facilitated, among other things, by a small rise in real private investment by 0.2% (public investment is exogenous). Keynesian money market equilibrium will push-up interest rate (PLR) by 0.7%. Public sector (dis) savings will worsen by 8.5%; gross domestic savings

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[9] As per RBI annual report for 2016–17, the Central Bank had issued Rs. 15.44 lakh crores worth of demonetized currency over time. This constituted 87% of total currency in circulation. Post-demonetization, Rs. 15.28 lakh crores, nearly 99% of total demonetized currency has been returned to the Central Bank. It is reported that old notes worth only Rs. 5,000 crores have not been returned back, which probably constitute 'black money' and or 'fake' currency.

[10] There has been lot of debate in India since its implementation on the efficacy and impact of 'demonetization'. In particular, its adverse effect on small-scale industry, petty trade as well as wage earners was much in focus. There were also serious doubts on its modus-operandi, particularly the manipulation made by bankers and big players. Clearly, an aggregate macro model like the present one cannot capture these complex issues.

to GDP will decline by 0.4%. Probably, this is the reason why the Central Bank in successive monetary policy reviews kept policy rates (repo and reverse repo rates) unchanged soon after demonetization, contrary to financial market expectations of interest rate cut. Further, to control inflationary pressure due to heavy inflow of withdrawn currency into commercial bank deposits, the incremental CRR is fixed at 100% by the Central Bank. Of late, to stimulate liquidity and private investment, RBI recently on October 4th cuts repo rate by 25 bps.

Due to a hefty 50% exogenous increase in commercial bank deposits as part of demonetization, there will be a 44.5% increase in disbursed loans, which will generate further effects in the capital market. Despite a 30% counter-factual increase in direct taxes,[11] due to all other interdependent changes in the economy, the net increase in direct taxes will be higher at 31.4%; indirect taxes will, however, decline by 4.2%; non-tax revenue, though small in magnitude, seems to decline very rapidly by 108%; thereby, total govt. revenue will decline by 1.3%. Nominal govt. current consumption will decline by 0.9%; real private consumption will also fall by 0.3%. Govt. current expenditure will decline by 0.4%, and gross fiscal deficit to GDP will rise by 0.4%. Exports to GDP and imports to GDP are expected to rise by 0.2% and 0.7%, respectively. Indian rupee will appreciate against US$ marginally by Rs. 1.18. BSE Sensex index will rise by 1682 points; market capitalization to GDP will rise quite rapidly by 15.5%. Due to demonetization, rural poverty seems to increase negligibly by 0.1%, and much less in urban areas, perhaps because of heavy dependence on cash transactions and loss of employment in the former.

Due to the dynamic nature of the simultaneous macroeconometric model, the effects continue for few years after the demonetization shock. The effects seem to reach maximum amplitudes after 3 years and subsequently get dampened. Most of the effects die down in the medium to long-run. Other policy measures may be needed to stimulate sustained economic growth.[12]

Probably, this is the reason why the Central Bank in successive recent monetary policy reviews kept policy rates (repo and reverse repo rates) unchanged even after demonetization, contrary to financial market expectations of interest rate cut. Further, to control inflationary pressure due to heavy inflow of withdrawn currency into commercial bank deposits, the incremental CRR is fixed at 100% by the Central Bank.

As discussed above, the recent 'demonetization' policy will certainly reduce nominal GDP growth substantially. This prompted us to look at the role of capital markets/financial sector in restoring the real GDP growth to its pre-demonetization level, given the reality of demonetization.

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[11] Post-demonetization, recent estimates show that the direct tax collections have increased by 17.5% in the first quarter of FY2017-18.

[12] Despite some possible economic benefits, critics contend that the short-run costs of demonetization totally outweigh the long-run benefits, if any (among others, e.g., Dr. Raghuram Rajan, former Governor, RBI).

2.9 Other Policy Simulations

Since in reality, both devaluation and demonetization are de facto now operating together, we tried their joint implementation along with increase in public investment and reduction in corporate tax as a 'shock' scenario. A fourth simulation considers increase in real public investment of Rs. 30,000 crore in 1991–'92 in line with recent announcement of GoI, in conjunction with devaluation, demonetization, reduction in corporate tax, and lowering of prime lending rate seems to suggest quite beneficial impacts in Indian economy. For the most comprehensive fourth scenario, the impacts include increases in real GDP (3.1%), real aggregate demand (4.7%) and real private investment (10.9%) implying significant crowding-in effect. There will also be increases in money supply (12.6%), inflation (3.2%) and nominal trade balance (Rs. 1395 crores). Both devaluation and increase in public investment scenarios seem to reduce rural poverty (0.3%) and urban poverty (0.1%) significantly. Due to shock-nature of these policy measures, the dynamic effects are found to dampen and vanish over time, confirming the long-run dynamic stability of the model. Since the financial sector has strong linkages with real sector, the former also contributed to these observed effects. In all, this study suggests that it is possible to stimulate real economic growth to the desired level of 10% with appropriate monetary and fiscal initiatives.

3 Summary and Conclusion

To sum-up, the four policy options fall into two categories—one with all-round beneficiary changes (Simulations 1, 3 and 4) and demonetization per se (Simulation 2) in the other category with negative changes. Category 1 has the desired immediate effect of accelerating the real GDP growth by about 0.4–3.1%. The nominal GDP growth will have a much higher range. The growth in aggregate demand will increase by a little wider range of 0.6–4.7%. However, the impacts under the two categories differ significantly in terms of allocative effects, both qualitatively and in magnitude. Simulations 1, 3 and 4 show significant crowding-in of private investment to the tune of 1.5–10.9%, depending on the choice of policy instruments. Further, there will be sizeable increase in savings rate (as a percent of GDP) of 0.6–3.4%; significant increase in nominal govt. revenue, except in the case of demonetization; increase in real private consumption of 0.2–1.8%; increases in money supply, inflation and external trade; and decline in rural poverty (0.3%) and urban poverty (0.1%). Public investment is catalytic in stimulating private investment, real demand (possibly through higher employment) and accelerating economic growth. It can also reduce nominal fiscal deficit in level (0.4%) and as a share of GDP (0.3%) due to devaluation (Simulation 1). The latter (fiscal deficit) has always been a big concern. Nominal trade balance seems to improve by about Rs. 2224 crores in 1991–92. Since the financial sector has strong linkages with real sector, the former also contributed to these observed

effects. In all, this study suggests that it is possible to stimulate real economic growth to the desired level of 10% with appropriate monetary and fiscal initiatives.

Appendix 1

See Fig. 1.

Appendix 2

See Tables 1 and 2.

Appendix 3

Estimated model: Period: 1985–86 to 2009–10 Method: 3SLS

Real sector:

Production:

Real GDP:

1. YR	−	35.114	+	0.6097 ADD	+	0.0639 KACR$_{-1}$	+	3.9023 MFLIMPTR$_{-1}$
		(2.17)		(18.41)		(4.18)		(8.63)
EL	:			0.65		0.18		0.16
							−	0.1054 AR (1)
								(−0.77)
				$R^2 = 0.999$		DW = 2.34		

Capital formation:

Real gross investment: private.
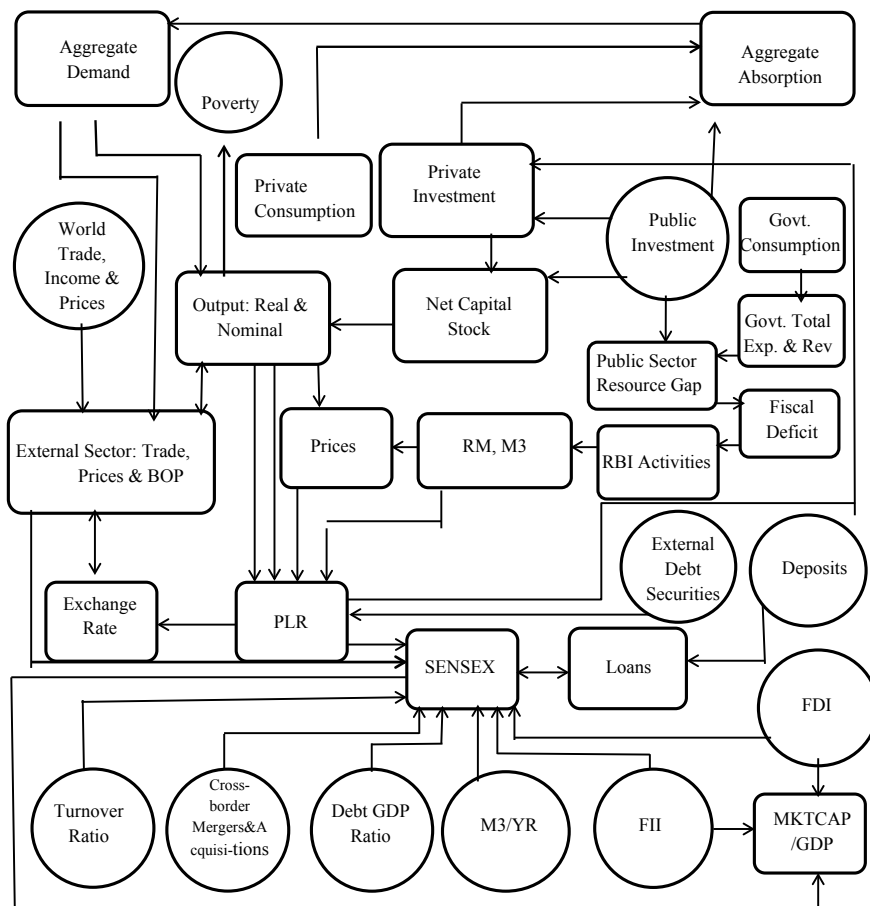
Fig. 1 Model structure flowchart (variables in circles are exogenous)

2. PITOTR	=	−273.506	+	0.3277 YR	+	0.5743 PCFTOTR
		(−10.25)		(16.68)		(3.02)
EL	:			1.52		0.25
	−	0.3685 (RGPUB/PGKE)	−	5.5376 $(PLR_{-1}-INFL_{-1})$	+	0.3699 AR(1)
		(−4.37)		(−5.66)		(2.94)
EL	:	−0.13		−0.07		
		$R^2 = 0.987$		DW = 1.92		

Adjusted total investment: private.

Table 1 Annual average compound growth rate (%) of important variables used in the model

Variable	Annual compound growth rate (%) during				
	(1980–89)	(1990–99)	(2000–09)	(2010–16)	(1980–2016)
Real sector					
Nominal income	13.9	15.2	13.6	11.7	13.9
GDP deflator	8.2	8.6	5.3	4.7	7.0
Real income	5.2	6.1	7.8	6.7	6.4
Real income per capita	3	4.1	6.2	5.1	4.5
Real private consumption	4	4.9	6.7	5.8	5.4
Real personal disposable income	4.8	6.2	6.5	7.2	6.1
Gross domestic savings (N)	16.3	16.7	18.4	8.1	15.9
Gross investment (N)	16.9	16.2	19.8	6.6	15.8
Fiscal sector					
Govt. consumption (N)	19.8	15.9	14.2	14.5	14.6
Govt. total expenditure (N)	17.8	14	15.1	14.7	14.4
Govt. revenue (N)	16.5	14	17.3	13.4	14.9
Direct taxes (N)	13	19.3	23.3	10.0	17.7
Indirect taxes (N)	16.6	12.5	12.8	14.6	13.4
Non-tax revenue (N)	22.7	16.5	25.8	15.3	18.9
Fiscal deficit (N)	18.7	15.8	9	10.6	13.5
Govt. non-market borrowings (N)	22.1	19.5	−0.9	18.1	13.7
Monetary sector					
Money supply	17.3	17.4	17.9	12.0	16.9
Price level	6.6	7.8	5.4	3.0	6.6
Prime lending rate (%)	0.7	−2.4	−5	−1.5	−1.6
External sector					
Real aggregate exports	4.6	10.7	10.1	−1.2	9.4
Real exports of mineral fuel, etc.	12.8	−23.5	23.6	−10.6	11.5
Real aggregate imports	5.8	10.8	14	−4.9	8.7
Real imports of mineral fuel, etc.	1.4	9.8	8.4	−4.9	7.1
Unit value of aggregate exports	9.7	7.5	8.6	8.4	8.4
Unit value of mineral fuel, etc.	5.2	14.6	15.5	11.0	12.2
Unit value of aggregate imports	5.1	5.2	9.8	10.6	8.9

Table 1 (continued)

Variable	Annual compound growth rate (%) during				
	(1980–89)	(1990–99)	(2000–09)	(2010–16)	(1980–2016)
Unit value of mineral fuel, etc.	−4.3	5.9	16.5	4.7	10.9
Exchange rate (N, Rs./$)	7.6	9.1	−0.5	7.1	5.8
Trade balance (N) #	4.2	19.4	44.5	1.5	18.5
Real total investment	6.2	7.2	13.8	NC	NC
Real public investment	4.4	1.5	12.1	6.4	4.9
Real private investment	8.2	10.8	14.5	4.5	10.2
World real income	3.4	2.8	2.8	3.4	3.0
Financial sector					
Sensex	19.4	12.2	21.7	8.8	15.3
Mktcaptgdp	NC	9.2	17.2	−0.4	8.0
DebtSec	NC	−2.5	33.9	−0.8	7.9
MergAcq	NC	37	−23.8	−18.6	−2.4
FDI	NA	60.8	24.7	26.9	25.1
FII	NA	90	40.2	−15.7	27.9
Loans	16.7	14.6	21.4	15.4	16.7
Deposits	18.1	17.8	18.3	17.7	17.7
Debtgdpratio	4.7	−0.7	−1.7	2.3	0.7

Note The annual average compound growth rate is computed using semi-logarithmic regression over time for each variable. #: in absolute value. NA: not available. NC: not computed

3. PIADJR	=	−15.7076	+	1.0633 PITOTR	−	0.3031 AR(1)
		(−2.80)		(110.35)		(−1.71)
EL	:			1.03		
				$R^2 = 0.996$		DW = 1.48

Table 2 Annual average for important variables

Variable/year	Annual average*				
	(1980–89)	(1990–99)	(2000–09)	(2010–16)	(1980–2016)
Real sector					
Nominal income	265.2	1098.2	3541.9	10,634.1	4476.4
GDP deflator	0.2	0.6	1. 1	1.8	1.1
Real income	999.8	1717.3	3252.4	5968.2	3388.5
Real income per capita (000's)	13.3	18.6	29.4	47.8	30.2
Real private consumption	813.5	1236.4	2116.2	3765.8	2218.0
Real personal disposable income	913.1	1554.9	2825.4	5111.0	2947.2
Gross domestic savings (N)	55.7	280.5	1217.4	3342.4	1421.3
Gross investment (N)	61.4	294.6	1270.1	3600.6	1508.2
Fiscal sector					
Govt. consumption (N)	49.1	227.9	832.8	1273.3	511.8
Govt. total expenditure (N)	81.8	328.3	1146	3630.8	1487.9
Govt. revenue (N)	47.7	190.2	739.8	2415.0	970.5
Direct taxes (N)	6.8	35.8	199.8	662.7	258.9
Indirect taxes (N)	37.1	136.4	416.9	1316.5	546.1
Non-tax revenue (N)	3.8	18.1	123.1	435.8	165.5
Fiscal deficit (N)	23.5	91.2	287.6	784.9	343.7
Govt. non-market borrowings (N)	12	55.8	159.8	459.6	198.9
Monetary sector					
Money supply	123.1	612.7	2922.6	9536.6	3781.8
Price level	0.3	0.6	1	1.7	1.0
Prime lending rate (%)	13.7	15.5	9.3	10.1	11.9
External sector					
Real aggregate exports	57.4	145.6	411	717.9	392.3
Real exports of mineral fuel, etc.	7.9	3.9	40.8	109.0	44.8
Real aggregate imports	88	220.7	584.4	864.0	522.2
Real imports of mineral fuel, etc.	33.2	76.7	151.6	243.5	147.7
Unit value of aggregate exports	0.2	0.6	1.1	2.3	1.2
Unit value of mineral fuel, etc.	0.1	0.3	1.2	2.7	1.3

(continued)

Table 2 (continued)

Variable/year	Annual average*				
	(1980–89)	(1990–99)	(2000–09)	(2010–16)	(1980–2016)
Unit value of aggregate imports	0.2	0.5	1.1	2.9	1.3
Unit value of mineral fuel, etc.	0.1	0.3	1.2	3.0	1.3
Exchange rate (N, Rs./$)	11.6	31.7	45.5	56.7	43.3
Trade balance (N)	-6.7	-22.2	-217.8	-801.2	-296.6
Real total investment	248.7	448.3	1123.6	2263.9	1168.8
Real public investment	132.9	165.4	286.9	537.7	306.9
Real private investment	115.8	282.9	836.7	1726.2	861.9
Head count ratio—rural (%)	47	43.8	38.4	32.4	41.1
Head count ratio—urban (%)	39.7	31.9	24.5	14.2	28.7
World real income	91,547.2	123,672.7	165,380.6	208,490.6	161,110.0
Financial sector					
Sensex	0.7	0.5	1.5	3.8	1.8
Mktcaptgdp	NC	28.4	61.6	73.3	54.0
DebtSec	NC	0	0	0.1	0.0
MergAcq	NC	140.6	289.5	45.3	171.0
FDI	NA	5.8	37.9	151.6	55.5
FII	NA	6.4	40.6	97.5	42.7
Loans	86	342.9	1757.8	6708.1	2517.2
Deposits	96.8	498.2	2488.2	9438.1	3553.0
Debtgdpratio	60.7	71.2	78	71.1	73.7

*Rs. '000 crores, except GDP deflator, price level, rate of inflation, rate of interest, unit value of exports, which are indices and exchange rate (Rs./$). NA: not available. NC: not computed

Real consumption: private.

4. PVCR/NTOT	=	0.1338	+	0.3807 (PYDR/NTOT)	+	0.4356 (PVCR$_{-1}$/NTOT$_{-1}$)
		(3.18)		(6.15)		(4.28)
SR EL	:			0.42		
LR EL	:			0.86		
			+	0.0448 D81t04	+	0.447 AR (1)
				(3.82)		(2.94)
				$R^2 = 0.997$		DW = 1.80

Real depreciation:

5. DEPAC	=	−89.5902	+	0.0585 KACR₋₁	−	0.3890 AR(1)
		(−4.91)		(18.09)		(−4.08)
EL	:			1.36		
				$R^2 = 0.741$		DW = 1.09

Price behavior:

Wholesale price index:

6. PGDP	=	0.4136	+	0.7656 (M3 /YR)	+	0.0005 D81t96	+	0.8855 AR(1)
		(5.69)		(13.57)		(0.04)		(25.32)
EL	:			0.53				
				$R^2 = 0.997$		DW = 1.08		

7. P	=	0.0079	+	0.9761 PGDP	+	0.6104 AR(1)
		(0.65)		(67.49)		(6.29)
EL	:			0.99		
				$R^2 = 0.998$		DW = 1.17

Implicit price deflators:

Gross investment: public.

8. PGKE	=	−0.0464	+	0.8475 P	+	0.0072 TREND	+	0.3815 AR(1)
		(−2.57)		(11.58)		(2.27)		(3.00)
EL	:			0.85				
				$R^2 = 0.998$		DW = 1.20		

Gross investment: private.

9. PPIE	=	0.0558	+	0.9364 P	+	0.4180 AR(1)
		(6.48)		(89.49)		(4.29)
EL	:			0.92		
				$R^2 = 0.999$		DW = 1.98

Fiscal sector:

Revenue from direct taxes of (ADORC) (nominal).

10. DT	=	−46.5644	+	(0.0821	+	0.0058 D81t02) (k3T*Y)	+	0.8861 AR(1)
		(−1.36)		(9.30)		(1.40)		(10.55)
EL	:					1.72		
						$R^2 = 0.988$		DW = 1.68

Revenue from indirect taxes (ADORC) (nominal).

11. IDT	=	17.1515	+	0.1004 YM	+	15.8325 D81t02	+	0.1877 AR(1)
		(2.33)		(28.49)		(1.54)		(0.89)
EL	:			0.92				
						$R^2 = 0.988$		DW = 0.87

Non-tax revenue (ADORC) (nominal).

12. NTX	=	−24.6338	+	0.0463 Y	−	14.2886 D81t97
		(−6.58)		(25.35)		(−3.34)
EL	:			1.55		
				$R^2 = 0.968$		DW = 0.38

Govt. final consumption expenditure (ADORC) (nominal).

13. GFCE	=	19.9803	+	0.4726 TR	+	4.5751 D81t00
		(2.12)		(21.73)		(0.38)
EL	:			0.88		
				$R^2 = 0.962$		DW = 0.72

14. GFD	=	0.7893 RGPUB	+	1.1066 AR(1)
		(22.84)		(19.59)
EL	:	0.71		
		$R^2 = 0.981$		

Monetary sector:

Money supply (nominal).

(continued)

15. M_3	=	16.199	+	4.8102 RM	−	15.0075 CRR	−	0.0527 TREND^2	+	0.0251 AR(1)
		(0.22)		(31.65)		(−3.47)		(0.33)		(0.12)
EL	:			1.08		−0.11				
				$R^2 = 0.995$		DW = 1.79				

External sector:

Real exports.

16. EXPTR	=	−221.238	−	69.847 (UVEXP/WPEXP)	+	0.003 WYR	+	0.6993 EXPTR$_{-1}$
		(−4.02)		(−2.70)		(4.03)		(7.99)
SR EL	:			−0.23		1.53		
LR EL	:			−0.76		5.09		
				$R^2 = 0.993$		DW = 2.19		

Unit value of exports.

17. UVEXP	=	1.842	+	0.004 EXPTR	−	0.195 (WPEXP/P)	−	0.000012 WYR
		(2.74)		(4.56)		(−2.70)		(−2.15)
EL	:			1.16		−0.41		−2.27
							+	0.558 AR(1)
								(3.91)
				$R^2 = 0.966$		DW = 1.65		

Real imports.

18. IMPTR	=	0.031 AD	−	0.776 ((UVIMP*(EXR + TARRT)/P)	+	4.619 (RBFA/EXR)
		(2.01)		(−0.93)		(3.28)
SR EL	:	0.24		−0.07		0.10
LR EL	:	1.34		−0.39		0.54
			−	0.817 IMPTR$_{-1}$	−	0.353AR(1)
				(7.25)		(−1.77)
				$R^2 = 0.988$		DW = 2.19

Poverty ratios:

Head count ratio: rural.

19. HCRRUR	=	53.368	−	5.816 (PYDR/NTOT)
		(39.36)		(−8.77)
EL	:			−0.27
		$R^2 = 0.732$		DW = 2.30

Head count ratio: urban.

20. HCRURB	=	−1.747 (PYDR/NTOT)	+	0.982 AR(1)
		(−1.59)		(220.59)
EL	:	−0.11		
		$R^2 = 0.992$		DW = 3.03

Financial sector: Period: 1990–91 to 2009–10 Method: 3SLS.

Prime lending rate.

21. PLR	=	18.0665	−	0.0008 YR	−	0.0045 M3	−	0.1245 INFL
		(4.64)		(−0.35)		(−2.54)		(−1.24)
EL	:			−0.16		−0.64		−0.07
			+	194.8659 DEBTSEC	−	0.3815 81t01	+	0.1107 AR(1)
				(6.29)		(−0.42)		(0.69)
EL	:			0.34				
				$R^2 = 0.764$		DW = 2.2		

22. LOANS	=	−311.3818	+	0.7711 DEPOSITS	+	15.6948 PLR	+	0.7045 AR(1)
		(−3.48)		(34.95)		(3.06)		(3.44)
EL	:			1.1		0.18		
				$R^2 = 0.997$		DW = 1.94		

23. SENSEX	=	3.5948	+	0.0807 PLR$_{-1}$	+	0.0028 LOANS	+	0.0002 MERGACQ$_{-1}$
EL	:	(3.07)		(3.9)		(7.59)		(1.29)
				1.01		2.84		0.04

(continued)

				0.007 FII$_{-1}$	−	0.0433 DEBTGDPRATIO	+	0.7382 (M3/YR)
			+					
				(2.57)		(−5.77)		(1.01)
EL	:			0.16		−3.16		0.43
			+	0.0004 TURNOVERRATIO	−	0.043 FDI	−	12.1055 ((EXPT + IMPT)/Y)
				(0.69)		(−6.02)		(−2.7)
EL	:			0.04		−0.92		−2.91
		−		0.6324 AR(1)				
				(−2.5)				
				$R^2 = 0.78$		DW = 1.57		

24. EXR	=	58.3978	+	0.0271 PLR$_{-1}$	−	0.0207 CAB	−	3.7639 SENSEX
		(6.73)		(0.21)		(−1.7)		(−3.3)
EL	:			0.01		−0.02		−0.10
			+	1.9326 (UVEXP/UVIMP)	−	1.4013 D81t91	+	0.8983 AR(1)
				(0.55)		(−0.9)		(24.94)
EL	:			0.06				
				$R^2 = 0.912$		DW = 1.95		

25. MKTCAPTGDP	=	3.2001	+	53.0598 SENSEX	+	0.0586 FII	−	0.6017 FDI
		(1.52)		(15.31)		(1.35)		(−6.87)
EL	:			1.2		0.03		−0.29
							−	0.5396 AR (1)
								(−2.9)
				$R^2 = 0.908$		DW = 1.89		

The *t*-ratios are given in parenthesis below the respective coefficient. For important variables, the short- and long-run mean partial elasticities also given below the *t*-ratios

Identities:

26. ABSP = PVCR + PIADJR
27. ADD = ABSP + (GFCE/P) + PCFTOTR + EXPTR − IMPTR
28. AD = ADD + IMPTR
29. PYD = YM − TR + SUB + OTP
30. PYDR = PYD/PGDP
31. INFL = (P − P(−1)) * 100/P(−1)

32. $Y = PGDP * YR$
33. $YM = Y + IDT - SUB$
34. $KACR = KACR(-1) + PITOTR + PCFTOTR - DEPAC$
35. $PCFTOT = PCFTOTR * PGKE$
36. $GCFADJ = (PIADJR * PPIE) + PCFTOT + EM2$
37. $GDS = GCFADJ + CAB + EM3$
38. $GCE = GFCE + SUB + OGCE$
39. $GXP = GCE + PCFTOT$
40. $TR = DT + IDT + NTX$
41. $GDSADORC = TR - GCE$
42. $GDSPUB = GDSADORC + GDSRCNDQG$
43. $RGPUB = PCFTOT - GDSPUB$
44. $RM = RCG + RBCS + RBFA + GCL + RBCB - RBNML$
45. $D(RCG) = GFD - D(BCG) - DNB - EB - MISCR$
46. $EXPT = EXPTR * UVEXP$
47. $IMPT = IMPTR * UVIMP$
48. $TB = EXPT - IMPT$
49. $TBBOP = K1T * EXPT - K2T * IMPT$
50. $CAB = TBBOP + INVSB$
51. $RBFA = RBFA(-1) + CAB + NCIF$

Description of variables:

Data source: National Account Statistics (NAS) compiled by Central Statistical Organization, Government of India.

Endogenous variables (Rs. '000 crores):

Data source: Reserve Bank of India (RBI).

Endogenous variables (Rs. '000 crores):

AD: Real aggregate absorption

ADD: Real aggregate demand for domestically produced goods

CAB: Current account balance

EXPT: Exports (merchandise, DGCI&S)

EXPTR: Real exports (DGCI&S)

EXR: Exchange rate of Indian rupee against US (*nominal, Rs. /*)

IMPT: Imports (merchandise, DGCI&S)

IMPTR: Real imports (DGCI&S)

LOANS: Commercial bank loans to private sector

MKTCAPTGDP: Market capitalization to GDP (%)

M3:   Money supply

P: Wholesale price index

INFL: Rate of inflation

PLR: Prime lending rate

RBFA: Net foreign exchange assets of RBI

RCG: Reserve bank credit to the government

RM: Reserve money

SENSEX: BSE Sensex (2004–05 = 1.0)

TB: Trade balance (DGCI & S)

TBBOP: Trade balance (Merchandise)

UVEXP: Unit value of exports

Exogenous variables (Rs. '000 crores):

BCG: Commercial bank credit to government

CRR: Cash reserve ratio

DEBTGDPRATIO: Debt to GDP ratio

DEBTSEC: Debt securities

DEPOSITS: Aggregate deposits with commercial banks

DNB: Non-market borrowings of both central and state governments

EB: External borrowings by the government

FDI: Foreign direct investment in India

FII: Foreign institutional investment in India

GCL: Government's currency liabilities to public

GFD: Gross fiscal deficit of both central and state governments

INVSB: Invisibles in current account balance

K1T: Export share of trade balance in BOP

K2T: Import share of trade balance in BOP

K3T: Share of non-agricultural income in GDP

MERGACQ: Merger and acquisitions

MFLIMPTR: Real imports of mineral fuel and lubricants

MISCR: Other capital receipts of the government

NCIF: Net capital inflows including net capital account in the balance of payments and errors and omissions

RBCB: Reserve bank credit to commercial banks

RBCS: RBI credit to the commercial sector

RBNML: Reserve bank non-monetary liabilities

TARRT: Average tariff rate

TRADE: Extent of total trade (exports + imports)

TURNOVERRATIO: Turnover ratio

UVIMP: Unit value of imports

WPEXP: World export price index (IFS)

WYR: Real world income (IFS)

Data source: generated by the author.
   D81t96: Dummy variable for 1981–96
   D81t97: Dummy variable for 1981–97
   D81t00: Dummy variable for 1981–2000
   D81t02: Dummy variable for 1981–2002
   EM2: Errors and omissions in gross capital formation between adjusted and unadjusted by using sectors
   EM3: Errors and omissions in gross domestic savings
   TREND: Time trend
   Note: Variables which are specified as 'real' are in 2004–05 prices, and all others are nominal, i.e., in current prices. All indices are with 2004–05 value as unity.

Appendix 4

See Figs. 2, 3, 4 and 5.

Appendix 5

Tables 3, 4, 5 and 6.
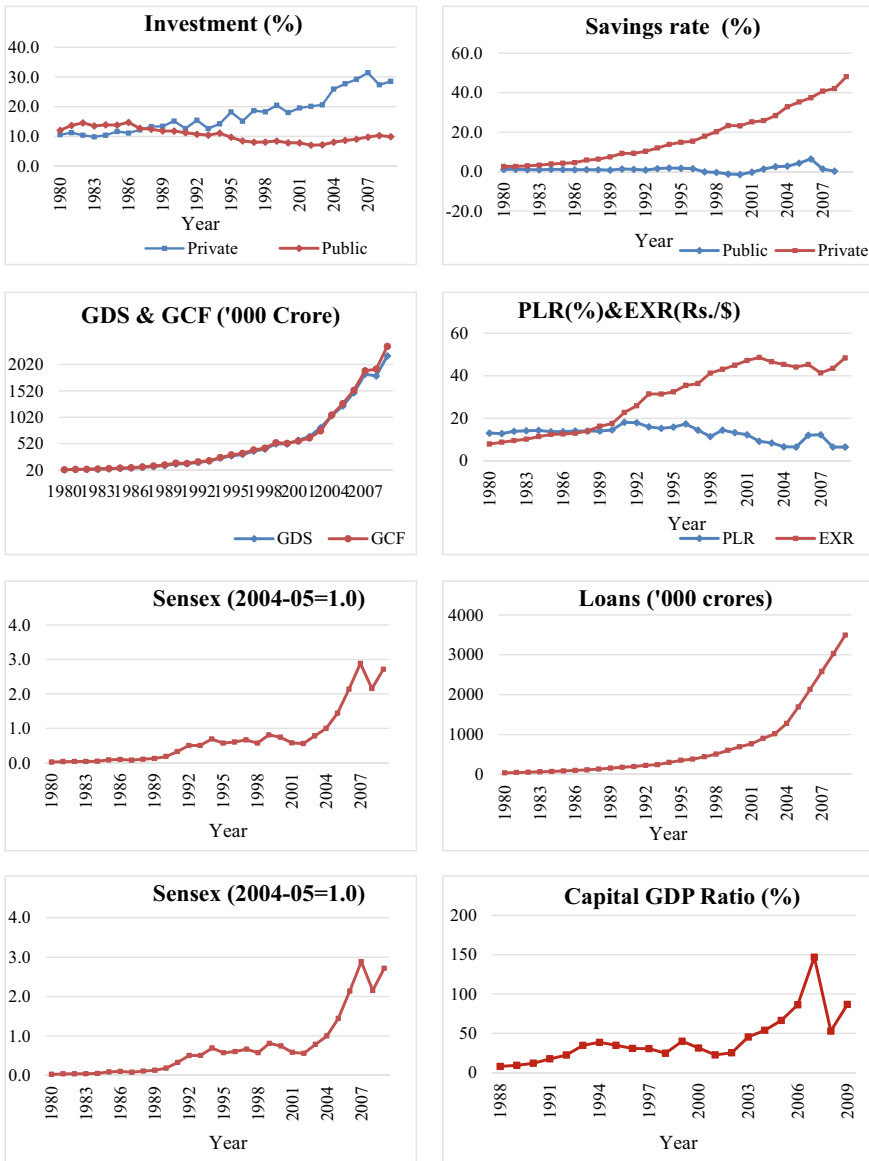
Fig. 2 Trends in selected macroeconomic variables
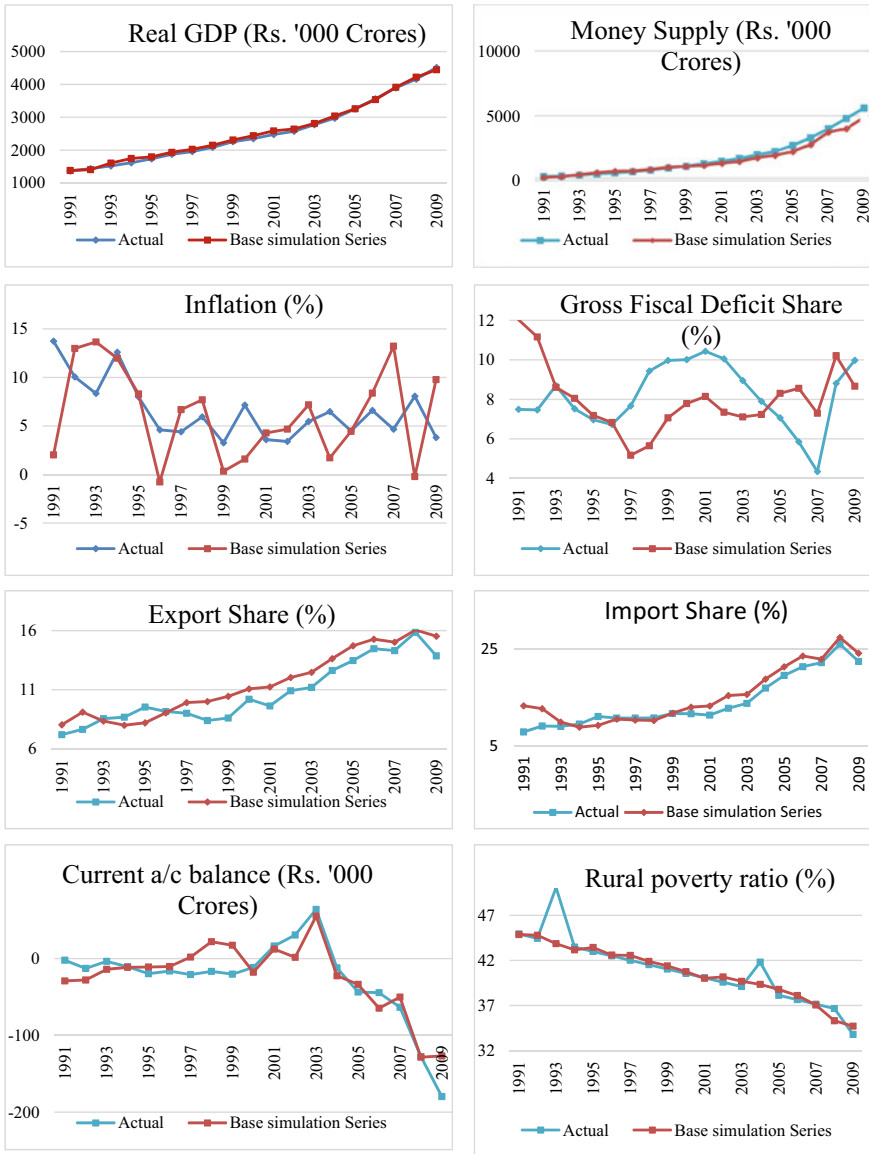
Fig. 3 Actual and base simulation values of selected macroeconomic variables
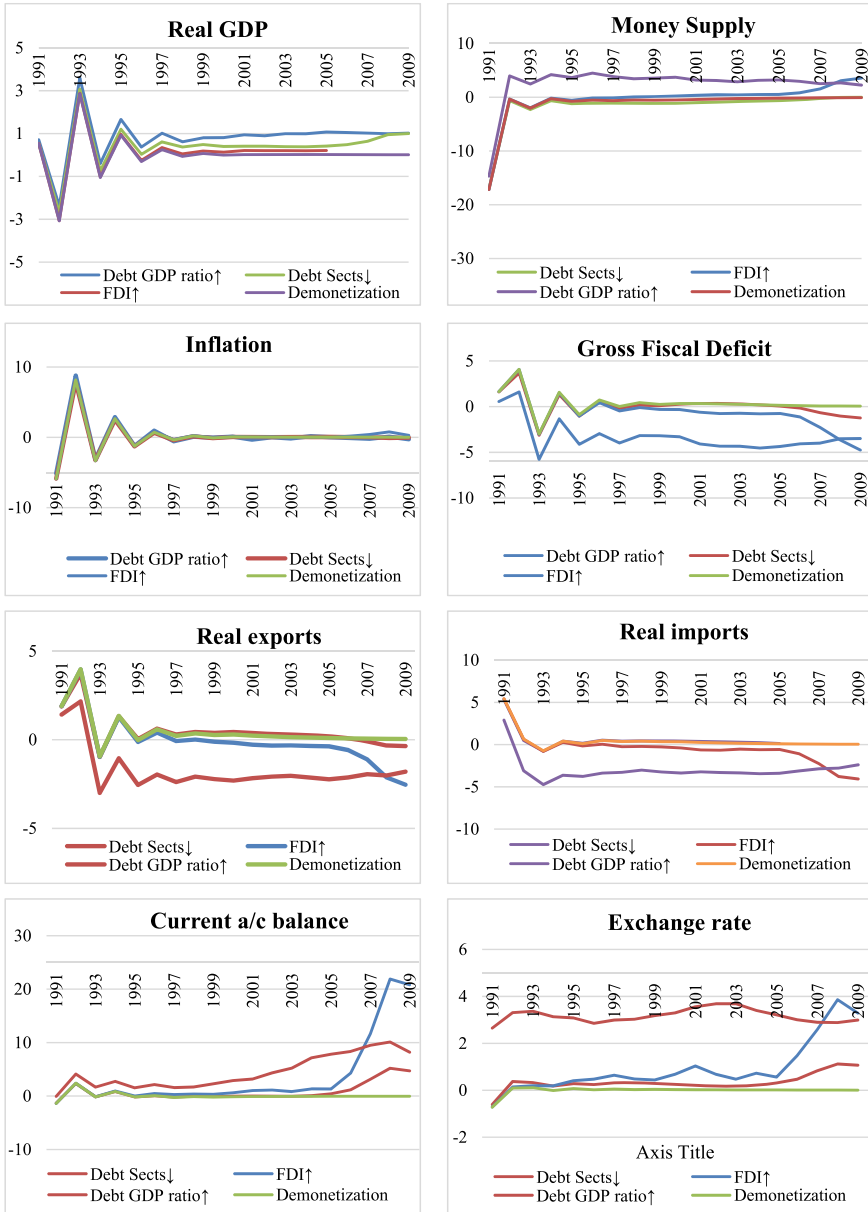
Fig. 4 Impact (%) of alternative policy simulations (relative to base simulation) on selected macroeconomic variables
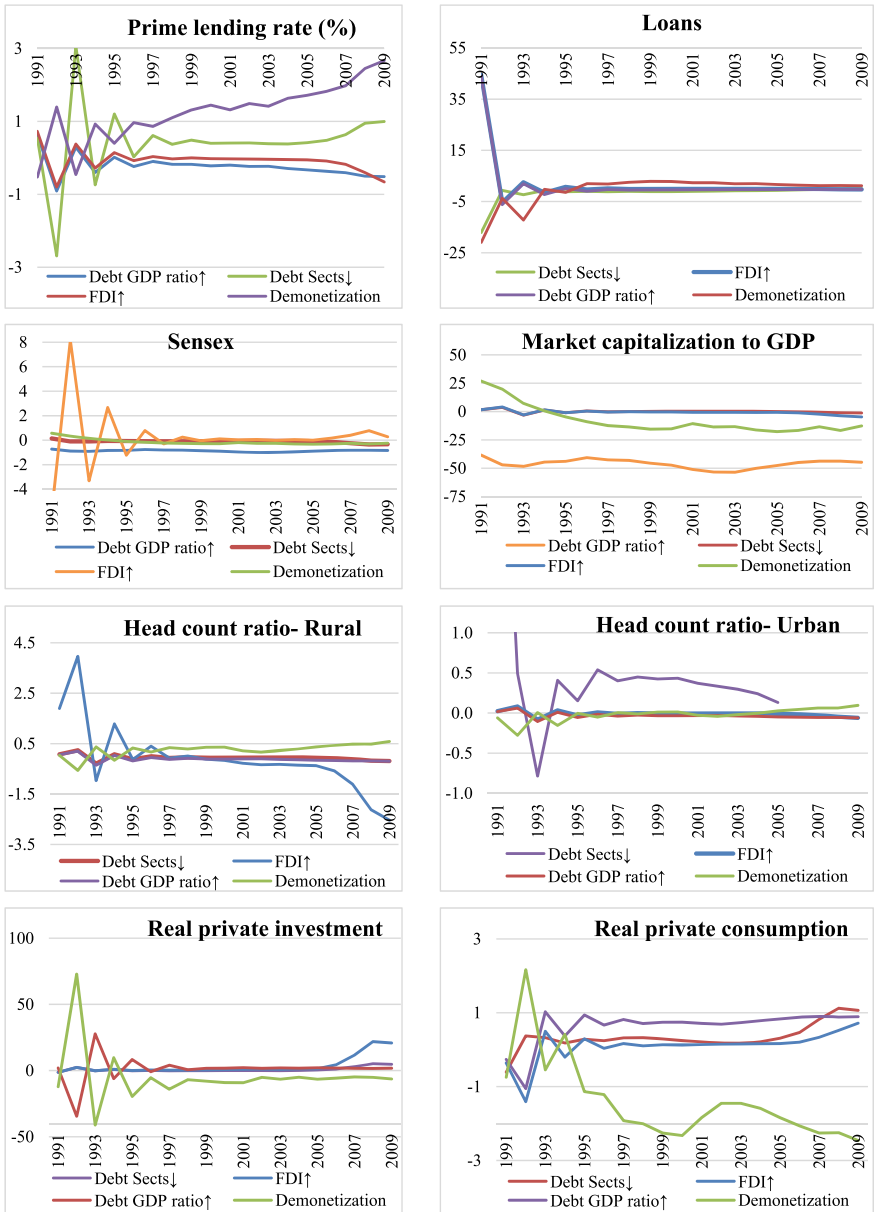
Fig. 5   Impact (%) of alternative policy simulations on selected macroeconomic variables

Table 3 Immediate impacts of alternative policy simulations in India

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Nominal income	Y	559.14	568.35	1.65	529.32	−5.33	594.69	6.36	594.94	6.40
GDP deflator	PGDP	0.40	0.41	1.23	0.38	−5.61	0.41	3.16	0.41	3.19
Real income	YR	1392.56	1398.31	0.41	1396.68	0.30	1435.70	3.10	1435.85	3.11
Real aggregate demand	ADD	1516.24	1525.67	0.62	1522.98	0.44	1586.99	4.67	1587.24	4.68
Real private investment	PITOTR	198.81	201.72	1.46	199.23	0.21	220.45	10.88	220.52	10.92
Public sector saving (N)	GDSPUB	−7.40	−6.35	14.17	−8.03	−8.51	−6.12	17.33	−6.09	17.71
Gross fiscal deficit (N)	GFD	74.00	73.72	−0.38	72.00	−2.70	84.15	13.73	84.15	13.72
Gross domestic saving (%)	SAVRATE	20.99	21.57	0.58	20.60	−0.39	24.41	3.42	24.42	3.43
Gross capital formation (N)	GCFADJ	148.97	151.85	1.93	142.08	−4.62	175.37	17.72	175.45	17.78
Real private consumption	PVCR	1063.52	1065.34	0.17	1060.35	−0.30	1082.69	1.80	1082.74	1.81
Govt. consumption (N)	GFCE	63.20	64.14	1.49	62.64	−0.89	64.35	1.82	64.38	1.86
Govt. current expenditure (N)	GCE	129.48	130.42	0.73	128.91	−0.44	130.63	0.89	130.65	0.91
Govt. revenue (N)	TR	91.45	93.44	2.17	90.26	−1.31	93.89	2.66	93.94	2.72
Direct taxes (N)	DT	11.19	11.73	4.77	14.71	31.40	8.01	−28.43	8.02	−28.30
Indirect taxes (N)	IDT	78.98	80.01	1.30	75.66	−4.21	82.95	5.02	82.97	5.06
Non-tax revenue (N)	NTX	1.28	1.71	33.36	−0.10	−107.93	2.93	128.70	2.94	129.59
Money supply (N)	M3	252.65	262.71	3.98	212.30	−15.97	284.29	12.52	284.56	12.63
Interest rate (%) #	PLR	18.55	18.39	−0.16	19.24	0.69	18.12	−0.43	17.11	−1.44
Inflation rate (%) #	INFL	1.67	2.89	1.22	−3.92	−5.59	4.82	3.15	4.85	3.18
Real exports	EXPTR	106.21	105.89	−0.30	107.76	1.46	105.41	−0.75	105.40	−0.76

(continued)

Table 3 (continued)

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Real imports	IMPTR	170.65	166.25	−2.58	170.41	−0.14	169.31	−0.78	169.20	−0.85
Unit value of exports	UVEXP	0.42	0.42	0.97	0.40	−4.76	0.43	2.46	0.43	2.48
Trade balance (N) #	TB	−30.07	−27.85	2.224	−31.47	−1.40	−28.74	1.338	−28.68	1.395
Head count ratio—rural (%) #	HCRRUR	44.69	44.65	−0.03	44.74	0.06	44.34	−0.34	44.34	−0.34
Head count ratio—urban (%) #	HCRURB	34.74	34.73	−0.01	34.76	0.02	34.64	−0.10	34.64	−0.10
Exchange rate (Rs./$)	EXR	20.69	27.48	32.79	19.51	−5.73	26.45	27.79	26.62	28.65
Loans (N)	LOANS	245.93	243.41	−1.03	355.47	44.54	337.50	37.23	321.51	30.73
BSE Sensex (2004–05 = 1.0)	SENSEX	0.56	0.56	0.00	0.85	0.29	0.84	0.28	0.80	0.24
Market capitalization to GDP (%)	MKTCAPTGDP	33.06	32.99	−0.06	48.52	15.47	48.08	15.02	45.61	12.55
Gross fiscal deficit to GDP (%)	GFDGDP	13.23	12.97	−0.26	13.60	0.37	14.15	0.92	14.14	0.91
Exports to GDP (%)	EXPTGDP	7.97	7.90	−0.08	8.14	0.17	7.62	−0.35	7.62	−0.35
Imports to GDP (%)	IMPTGDP	13.35	12.80	−0.56	14.09	0.73	12.46	−0.90	12.44	−0.91

* Rs. '000 crores, except for GDP deflator, wholesale price index, rate of inflation, interest rate, unit value of exports, trade balance and head count ratio. N: nominal, i.e., in current prices. BS: base simulation; PS: policy simulation; #: (PS−BS) 100/BS 91–92. Simulation 1: 30% shock devaluation of rupee in 1991–92; Simulation 2: shock demonetization in 1991–92; Simulation 3: 10% reduction in corporate tax along with devaluation and demonetization; Simulation 4: 1% decrease in PLR + Simulation 3

Table 4 Short-run (after 3 years) impacts of alternative policy simulations in India

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Nominal income	Y	1084.24	1093.25	0.83	1084.24	0.77	1084.24	1.57	1084.24	1.52
GDP deflator	PGDP	0.66	0.66	0.44	0.66	0.16	0.66	0.61	0.66	0.37
Real income	YR	1645.09	1651.48	0.39	1645.09	−0.93	1645.09	0.95	1645.09	1.14
Real aggregate demand	ADD	161.66	166.90	3.24	1701.10	−1.70	1701.10	0.97	1701.10	1.26
Real private investment	PITOTR	30.68	31.71	3.36	161.66	−16.85	161.66	3.13	161.66	4.99
Public sector saving (N)	GDSPUB	94.46	94.02	−0.46	30.68	−3.12	30.68	6.33	30.68	6.15
Gross fiscal deficit (N)	GFD	20.06	20.28	0.23	94.46	0.94	94.46	−1.07	94.46	−1.24
Gross domestic saving (%)	SAVRATE	228.95	233.56	2.01	20.06	−1.57	20.06	−0.03	20.06	0.12
Gross capital formation (N)	GCFADJ	1234.60	1238.04	0.28	228.95	−8.29	228.95	2.11	228.95	2.83
Real private consumption	PVCR	113.39	114.31	0.81	1234.60	0.11	1234.60	1.00	1234.60	1.11
Govt. consumption (N)	GFCE	215.88	216.80	0.43	113.39	−0.76	113.39	1.54	113.39	1.49
Govt. current expenditure (N)	GCE	197.65	199.60	0.99	215.88	−0.40	215.88	0.81	215.88	0.78
Govt. revenue (N)	TR	34.88	35.41	1.52	197.65	−0.92	197.65	1.86	197.65	1.81
Direct taxes (N)	DT	137.15	138.16	0.73	34.88	−1.41	34.88	2.87	34.88	2.78
Indirect taxes (N)	IDT	25.62	26.03	1.63	137.15	−0.68	137.15	1.38	137.15	1.34
Non-tax revenue (N)	NTX	752.70	761.90	1.22	25.62	−1.51	25.62	3.08	25.62	2.99
Money supply (N)	M3	11.92	11.98	0.06	752.70	−0.63	752.70	2.11	752.70	1.85
Interest rate (%) #	PLR	41.17	40.18	−0.99	11.92	−0.37	11.92	0.15	11.92	0.18
Inflation rate (%) #	INFL	136.01	135.71	−0.22	41.17	3.46	41.17	−2.34	41.17	−2.60
Real exports	EXPTR	197.47	197.72	0.13	136.01	0.29	136.01	−0.48	136.01	−0.43

(continued)

Table 4 (continued)

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Real imports	IMPTR	0.62	0.62	0.00	197.47	0.05	197.47	1.10	197.47	1.13
Unit value of exports	UVEXP	−6.70	−7.00	−0.30	0.62	0.29	0.62	−0.14	0.62	−0.20
Trade balance (N) #	TB	43.79	43.75	−0.04	−6.70	0.44	−6.70	−1.52	−6.70	23.22
Head count ratio—rural (%) #	HCRRUR	32.47	32.46	−0.01	43.79	0.09	43.79	−0.09	43.79	−0.11
Head count ratio—urban (%) #	HCRURB	30.23	30.23	0.03	32.47	0.03	32.47	−0.03	32.47	−0.03
Exchange rate (Rs./$)	EXR	224.76	225.72	0.43	30.23	−0.11	30.23	0.09	30.23	0.11
Loans (N)	LOANS	0.62	0.62	0.00	224.76	−2.61	224.76	1.04	224.76	1.28
BSE Sensex (2004-05 = 1.0)	SENSEX	34.15	34.08	−0.07	0.62	0.01	0.62	0.00	0.62	0.00
Market capitalization to GDP (%)	MKTCAPTGDP	8.71	8.60	−0.11	34.15	0.66	34.15	−0.01	34.15	−0.15
Gross fiscal deficit to GDP (%)	GFDGDP	7.75	7.67	−0.08	8.71	0.15	8.71	−0.23	8.71	−0.24
Exports to GDP (%)	EXPTGDP	8.37	8.31	−0.06	7.75	0.11	7.75	−0.17	7.75	−0.16
Imports to GDP (%)	IMPTGDP	0.00	0.00	0.00	8.37	0.07	8.37	−0.04	8.37	−0.03

* Rs. '000 crores, except for GDP deflator, wholesale price index, rate of inflation, interest rate, unit value of exports, trade balance and head count ratio. N: nominal, i.e., in current prices. BS: base simulation; PS: policy simulation; #: (PS-BS)100/BS 91–92. Simulation 1: 30% shock devaluation of rupee in 1991–92; Simulation 2: shock demonetization in 1991–92; Simulation 3: 10% reduction in corporate tax along with devaluation and demonetization; Simulation 4: 1% decrease in PLR + Simulation 3

Table 5 Medium–term (after 10 years) impacts of alternative policy simulations in India

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Nominal income	Y	1880.38	1876.75	−0.19	1874.73	−0.30	1882.09	0.09	1881.26	0.05
GDP deflator	PGDP	0.71	0.71	−0.15	0.70	−0.53	0.70	−0.35	0.70	−0.43
Real income	YR	2661.69	2660.61	−0.04	2667.81	0.23	2673.49	0.44	2674.32	0.47
Real aggregate demand	ADD	2810.74	2808.77	−0.07	2817.69	0.25	2823.69	0.46	2824.56	0.49
Real private investment	PITOTR	562.99	562.09	−0.16	565.10	0.37	566.83	0.68	567.05	0.72
Public sector saving (N)	GDSPUB	−4.42	−4.84	−9.58	−5.08	−14.92	−4.22	4.51	−4.32	2.33
Gross fiscal deficit (N)	GFD	165.77	165.95	0.11	165.76	0.00	165.26	−0.30	165.26	−0.30
Gross domestic saving (%)	SAVRATE	30.96	30.94	−0.03	31.01	0.04	31.02	0.05	31.02	0.06
Gross capital formation (N)	GCFADJ	568.52	567.07	−0.25	567.44	−0.19	569.64	0.20	569.43	0.16
Real private consumption	PVCR	1832.44	1831.75	−0.04	1836.28	0.21	1839.43	0.38	569.43	0.16
Govt. consumption (N)	GFCE	189.47	189.09	−0.20	1836.28	0.21	1839.43	0.38	1839.98	0.41
Govt. current expenditure (N)	GCE	457.08	456.70	−0.08	188.88	−0.31	189.65	0.09	189.56	0.05
Govt. revenue (N)	TR	348.96	348.15	−0.23	456.48	−0.13	457.25	0.04	457.17	0.02
Direct taxes (N)	DT	79.95	79.72	−0.29	347.71	−0.36	349.33	0.11	349.15	0.06
Indirect taxes (N)	IDT	220.78	220.37	−0.18	79.59	−0.45	80.06	0.14	80.01	0.07
Non-tax revenue (N)	NTX	48.23	48.06	−0.35	220.15	−0.29	220.97	0.09	220.87	0.04
Money supply (N)	M3	1172.06	1167.84	−0.36	47.97	−0.54	48.31	0.16	48.27	0.08
Interest rate (%) #	PLR	12.10	12.12	0.02	1161.73	−0.88	1168.60	−0.29	1167.12	−0.42
Inflation rate (%) #	INFL	8.72	8.75	0.02	12.13	0.03	12.10	0.00	12.11	0.01
Real exports	EXPTR	274.23	274.26	0.01	8.81	0.09	8.72	−0.01	8.73	0.00

(continued)

Table 5 (continued)

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Real imports	IMPTR	364.44	364.67	0.06	274.43	0.07	274.32	0.03	274.35	0.04
Unit value of exports	UVEXP	0.82	0.82	−0.02	364.35	−0.03	363.86	−0.16	363.87	−0.16
Trade balance (N) #	TB	−35.60	−35.78	−0.18	0.82	−0.04	0.82	−0.04	0.82	−0.05
Head count ratio—rural (%) #	HCRRUR	39.74	39.75	0.00	−35.45	0.15	−35.21	0.39	−35.20	0.39
Head count ratio—urban (%) #	HCRURB	26.99	26.99	0.00	39.71	−0.03	39.68	−0.06	39.68	−0.06
Exchange rate (Rs./$)	EXR	43.70	43.70	0.00	26.98	−0.01	26.97	−0.02	26.97	−0.02
Loans (N)	LOANS	847.55	847.82	0.03	43.70	0.00	43.70	0.00	43.70	0.00
BSE Sensex (2004–05 = 1.0)	SENSEX	0.68	0.69	0.00	848.06	0.06	847.61	0.01	847.68	0.02
Market capitalization to GDP (%)	MKTCAPTGDP	26.36	26.42	0.06	0.68	0.00	0.68	0.00	0.68	0.00
Gross fiscal deficit to GDP (%)	GFDGDP	8.82	8.84	0.03	26.34	−0.03	26.22	−0.14	26.22	−0.14
Exports to GDP (%)	EXPTGDP	11.93	11.96	0.02	8.84	0.03	8.78	−0.03	8.78	−0.03
Imports to GDP (%)	IMPTGDP	13.83	13.86	0.04	11.97	0.04	11.92	−0.01	11.93	−0.01

* Rs. '000 crores, except for GDP deflator, wholesale price index, rate of inflation, interest rate, unit value of exports, trade balance and head count ratio. N: nominal, i.e., in current prices. BS: base simulation; PS: policy simulation; #: (PS–BS) 100/BS 91–92. Simulation 1: 30% shock devaluation of rupee in 1991–92; Simulation 2: shock demonetization in 1991–92; Simulation 3: 10% reduction in corporate tax along with devaluation and demonetization; Simulation 4: 1% decrease in PLR + Simulation 3

Table 6 Long-term (after 18 years) impacts of alternative policy simulations in India

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Nominal income	Y	5207.60	5206.21	−0.03	5197.97	−0.18	5197.36	−0.20	5195.80	−0.23
GDP deflator	PGDP	1.12	1.12	−0.02	1.11	−0.27	1.11	−0.41	1.11	−0.45
Real income	YR	4659.29	4659.13	0.00	4663.31	0.09	4669.18	0.21	4669.76	0.22
Real aggregate demand	ADD	4890.86	4890.59	−0.01	4894.38	0.07	4900.64	0.20	4901.12	0.21
Real private investment	PITOTR	1246.38	1246.22	−0.01	1246.97	0.05	4900.64	0.20	4901.12	0.21
Public sector saving (N)	GDSPUB	9.99	9.82	−1.70	8.82	−11.71	8.75	−12.45	8.56	−14.35
Gross fiscal deficit (N)	GFD	520.20	520.25	0.01	520.15	−0.01	519.71	−0.09	519.71	−0.10
Gross domestic saving (%)	SAVRATE	35.12	35.11	0.00	35.10	−0.02	35.10	−0.02	35.09	−0.02
Gross capital formation (N)	GCFADJ	1972.22	1971.62	−0.03	1968.04	−0.21	1967.78	−0.23	1967.10	−0.26
Real private consumption	PVCR	2967.73	2967.63	0.00	2970.09	0.08	2973.53	0.20	2973.86	0.21
Govt. consumption (N)	GFCE	556.29	556.14	−0.03	555.24	−0.19	555.18	−0.20	555.01	−0.23
Govt. current expenditure (N)	GCE	1309.30	1309.15	−0.01	1308.25	−0.08	1308.19	−0.09	1308.02	−0.10
Govt. revenue (N)	TR	1125.14	1124.81	−0.03	1122.92	−0.20	1122.78	−0.21	1122.42	−0.24
Direct taxes (N)	DT	333.22	333.11	−0.03	332.52	−0.21	332.47	−0.22	332.36	−0.26
Indirect taxes (N)	IDT	589.49	589.33	−0.03	588.41	−0.18	588.35	−0.19	588.17	−0.22
Non-tax revenue (N)	NTX	202.43	202.37	−0.03	201.99	−0.22	201.96	−0.23	201.89	−0.27
Money supply (N)	M3	4384.85	4383.11	−0.04	4370.19	−0.22	4366.35	−0.42	4364.01	−0.48
Interest rate (%) #	PLR	6.60	6.61	0.01	6.66	0.06	6.67	0.06	6.68	0.07
Inflation rate (%) #	INFL	−2.41	−2.40	0.00	−2.41	0.00	−2.43	−0.02	−2.43	−0.02
Real exports	EXPTR	576.38	576.39	0.00						

Table 6 (continued)

Variable/year	Abbreviation	Base simulation	Simulation 1		Simulation 2		Simulation 3		Simulation 4	
			PS	% dev	PS	% dev	PS	% dev	PS	% dev
Real imports	IMPTR	963.66	963.66	0.00	576.45	0.01	576.47	0.02	576.49	0.02
Unit value of exports	UVEXP	1.45	1.45	0.00	963.61	0.00	963.48	−0.02	963.47	−0.02
Trade balance (N) #	TB	−482.66	−482.67	−0.01	1.45	−0.03	1.45	−0.05	1.45	−0.06
Head count ratio—rural (%) #	HCRRUR	33.75	33.75	0.00	−482.78	−0.11	−482.72	−0.06	−482.74	−0.08
Head count ratio—urban (%) #	HCRURB	20.94	20.94	0.00	33.73	−0.02	33.71	−0.04	33.70	−0.04
Exchange rate (Rs./$)	EXR	45.52	45.52	−0.01	20.94	0.00	20.93	−0.01	20.93	−0.01
Loans (N)	LOANS	3520.05	3520.18	0.00	45.51	−0.02	45.52	−0.01	45.52	−0.01
BSE Sensex (2004–05 = 1.0)	SENSEX	2.89	2.89	0.00	3520.97	0.03	3521.07	0.03	3521.22	0.03
Market capitalization to GDP (%)	MKTCAPTGDP	115.11	115.15	0.04	2.90	0.00	2.90	0.00	2.90	0.00
Gross fiscal deficit to GDP (%)	GFDGDP	9.99	9.99	0.00	115.28	0.17	115.18	0.07	115.21	0.10
Exports to GDP (%)	EXPTGDP	16.07	16.08	0.00	10.01	0.02	10.00	0.01	10.00	0.01
Imports to GDP (%)	IMPTGDP	25.34	25.35	0.01	16.10	0.03	16.10	0.03	16.10	0.03

* Rs. '000 crores, except for GDP deflator, wholesale price index, rate of inflation, interest rate, unit value of exports, trade balance and head count ratio. N: nominal, i.e., in current prices. BS: base simulation; PS: policy simulation; #: (PS−BS)100/BS 91−92. Simulation 1: 30% shock devaluation of rupee in 1991−92; Simulation 2: shock demonetization in 1991−92; Simulation 3: 10% reduction in corporate tax along with devaluation and demonetization; Simulation 4: 1% decrease in PLR + Simulation 3

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Determinants of Economic Growth Across States in India

Manoj Panda and Samraj Sahay

1 Introduction

In several of his writings, Professor R. Radhakrishna has been deeply concerned with distributional aspects of economic growth. He has examined the issues from multiple dimensions including inequality, poverty, nutrition and regional spread. In this paper, we explore the role played by some factors in explaining observed differences in economic growth across the states in India.

The Indian economy witnessed a fairly reasonable growth rate of about 7% per annum in gross domestic product (GDP) during the last three decades with a high growth of above 8% per year during 2004–2011. But, average level of living of people in various states in the Indian federation has varied widely. States with relatively higher initial per capita income have generally performed better than those with lower average income leading to rising inequality among them on various counts. For example, per capita gross state domestic product (GSDP) of two low-income states like Bihar and Uttar Pradesh, which account for 25% of India's population, is only a third of high income states like Maharashtra and Haryana.

This paper attempts to examine the differences in growth performance across states in India and some determinants of the observed differences. It covers 17 major states accounting for 90 per cent of India's GDP over the period 2004–05 to 2016–17. A fixed effect panel regression model is used to explore the determinants of GSDP and per capita GSDP. The results indicate that infrastructure development, social sector expenditure, urbanization and financial inclusion accelerate state income growth while state fiscal deficit slows down the growth.

Some major limitations may, however, be noted at this stage itself to keep in mind the overall context. First, state level analysis encounters a major data problem due to non-availability of private investment data that prevents consideration of the extent of

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variations in growth that could be attributed to an important variable like investment. Second, international trade and monetary policies are beyond state jurisdiction in the Indian constitution, though they may have differential effects on growth across states. Third, state-wise breakdown of the central government expenditure is not available. Nevertheless, the growth literature in recent decades has focused on several other variables noted above for which time series state level data are available on a comparable basis. We investigate the relationship of these possible factors with GSDP growth.

Section 2 provides a review of the empirical literature on potential determinants of growth. Section 3 relates to a macro overview of the selected states. Section 4 describes the methodology, data and variables used to identify the determinants of growth at the state level. Section 5 discusses the regression results. Finally, Sect. 6 draws some conclusion and indicates scope for further work.

2 Literature on Determinants of Growth

There are a number of studies which have identified determinants of economic growth in a country or across countries. Using the Keynesian framework, the Harrod-Domar model had focused on savings and investment rate and incremental capital-output ratio. On the other hand, the Solow model analysed long-term growth path of an economy considering a neoclassical production function where output depends on capital and labour and technological change leads to productivity gain. We discuss the empirical literature in brief with reference to the determinants considered by us for examining inter-state growth in India. Specifically, we focus on infrastructure development, social sector expenditure, urbanization, financial inclusion and fiscal discipline.

The seminal work by Aschauer (1989) drew attention to the role of public infrastructure in economic growth and added public capital to the conventional production function. Infrastructure expenditure enhances the productivity of private capital, increases its rate of return and stimulates private investment. It marked the beginning of the empirical research on the role of infrastructure on economic growth. Since then, a number of empirical studies have been carried out which point towards a positive effect of infrastructure on growth but with varying extent of the impact (Straub, 2008). The positive role of infrastructure has been found for South Asia as well as for India by Sahoo and Das (2008, 2009). In their study across Indian states for the period 1991–2005, Nauriyal and Sahoo (2010) found positive effect on infrastructure on per capita GSDP; the effect on GSDP growth was positive but not significant.

Human capital has been emphasized as a key driver of growth in literature related to the endogenous growth theory that emphasizes the need for investment in human capital through public expenditures on social sectors like education, health, social security and other welfare measures (Alper & Demiral, 2016; Barro, 1991; Pyo, 1995; Stokey, 1991). The findings of the studies analysing the relationship between government expenditure and economic growth have led to different views with regard

to their relationship. Several studies find that economic growth results in expansion of volume of expenditure by the government. Using econometric time-series tools, these studies have confirm causality running from economic growth to public expenditure, thereby supporting the Wagner's law. It has been empirically demonstrated that the Wagner's law holds true for India (Medhi, 2014; Rastogi et al., 2019; Srinivasan, 2013). On the other hand, there are also many studies that holds the Keynesian view that public expenditure may be treated as an exogenous policy variable and increase in public expenditure helps economic growth in the presence of underutilized resources. The causality in this case runs from public expenditure to growth. In their analysis of some South East Asian economies, Dogan and Tang (2006) found evidence for Granger causality running from public expenditure to GDP for Philippines but did not find the causality either way for Indonesia, Malaysia, Singapore and Thailand.

In view of this debate, public expenditure, total or the social sector component, should be tested for the possible endogeneity in regression exercises. In the context of Indian fiscal federalism, another point relevant for this study is that social sector expenditure mostly falls within the jurisdiction of the state governments in the constitutional division of responsibility between the centre and the states in India and could have a special relevance for inter-state growth analysis.

The role of access to finance in the growth process of an economy has been well recognized long back (e.g. Schumpeter, 1911). It was well displayed that financial services influence growth by enhancing accessibility to financial resources, providing encouragement for innovation and efficiency and promoting investment. There has been a growing volume of literature in the last two decades supporting the Schumpeterian view which includes both theoretical as well as empirical studies. Majority of the studies have provided evidence of positive effect of financial inclusion on growth in developed as well as developing countries (Bakar & Sulong, 2018; Chattopadhyay, 2011; Dixit & Ghosh, 2011). The positive effect is mainly mediated through enhanced accessibility of financial services and products like availability of credit at affordable cost.

As for impact of fiscal management by government on growth, fiscal deficit is one of the most commonly used macroeconomic parameter. Impact of fiscal deficit on growth is one of the most debated issues with practically no consensus (Rangarajan & Srivastav, 2005). The Neoclassical view considers that a rise in fiscal deficit reflects a decrease in government savings and pre-empts private savings available for investment. The increase in government demand to borrow increases interest rate which has an adverse effect on growth. The Keynesian economists argue that increase in government spending or deficit spending has multiplier effect on output and employment during a downturn. It leads to increase in consumption and pushes the aggregate demand thus positively influencing growth. In the Ricardian perspective, if the government spends more than it taxes today, then it must tax more than it spends tomorrow. In other words, it amounts only to postponement of taxes. This would prompt people to spend and save accordingly. As a result, fiscal deficit has no impact on long run growth.

The evidence from the empirical literature further confirms a mixed impact of fiscal deficit on growth. Findings from the studies mostly investigating the impact in

developing and low-income countries confirmed the three views in this regards Bose et al., (2007) reported a positive impact, Mohanty, (2018) reported adverse impact and Tan (2006) confirmed no impact.

Growth is also influenced substantially by urbanization. While urbanization is a natural correlate of growth, literature on urban development show that relationship between them is driven by a complex set of mechanisms and is no way a straightforward one-way relationship (Chen et al., 2014; Turok & McGranahan, 2013). Several studies find a positive impact of urbanization on economic growth (Bertinelli & Black, 2004; Chen et al., 2014; Nguyen & Nguyen, 2018) and provide evidence that it impacts growth through different channels such as promotion of manufacturing activities, entrepreneurship, skill and knowledge spill over, technology transfer and remittances.

However, the positive effect of urbanization on economic growth may not always hold. Turok and McGranahan (2013) argue that the benefits of urbanization are offset by factors which arise as a cost of urbanization such as over congestion, overcrowding, inadequate infrastructure, stressed out urban ecosystem, high cost of living and property prices which are features particularly of developing economies. While some studies have reported negative effect of urbanization on growth (Alam et al., 2010), others have reported an inverted U-shaped relationship between the two (Henderson, 2003).

2.1 Studies Related to India

While the determinants of growth at the national level in India have been widely studied, very few studies have attempted to empirically study the determinants of growth at the state level. Ahluwalia (2000) considers growth pattern of GSDP in states in terms of the variable like level of investment, quality of human resource and growth in infrastructure. In the absence of state level investment data, he uses investment expenditure data from CAPEX database compiled by the Centre for Monitoring the Indian Economy (CMIE) as proxy for investment. Krishna (2004) reviews literature on pattern and determinants of growth among Indian states and notes that agriculture influences growth as it has positive impact on industrial and service sector growth. He draws attention to importance of social infrastructure as a major determinant of investment. The manufacturing sector was found to be a more consistent driver of growth compared to agriculture at state level by Sachs et al. (2002). The study further identifies urbanization as a likely key determinant of growth. Agriculture, infrastructure and human development were found to be important determinants of overall growth in the study conducted by Shand and Bhide (2000).

Infrastructure has been identified as the major reason for the disparity in the growth pattern across Indian states by Cain et al. (2012), Lall, Wang and Deichmann (2010) and Sachs (2009). At the district level in India, Das et al. (2015) identified infrastructure, mainly irrigation and electricity provision along with urbanization as the most important factors responsible for variation in growth. Sahoo and Das

(2008, 2009) found a unidirectional causality running from infrastructure to per capita income at the national level. At the state level, Dutt and Ravallion (1998) found higher growth rates in states with better infrastructure in addition to other factors. In their inter-state analysis of growth, Nauriyal and Sahoo (2010) found education, infrastructure and health as significant determinants.

Financial inclusion has played a major role in improvement of livelihood of farmers and rural enterprises along with generation of employment opportunity. It allows people to deposit their money in formal financial institutions which in turns has a multiplier effect on growth (Dev, 2006; Khan, 2012).

3 An Overview of Selected States

The growth analysis in this paper covers data for 17 major states over the period 2004–05 to 2016–17. Each of the selected states account for at least 1% of India's GDP. Taken together, they account for 90% in the national GDP and 96% of total population in India as per 2011 census. The GSDP data for this period are available with respect to two base years, 2004–05 and 2011–12. We extend the series with 2004–05 base for the period 2012–13 to 2016–17 by using the growth rates implied by the series with base 2011–12 series.

Table 1 provides the average per capita income, GSDP growth rate and contributions of the selected states to national GDP and total population. Maharashtra occupies the top position with an average of Rs. 65,500 per capita GSDP during 2004–2016. Bihar, on the other hand, is at the bottom with average per capita income of Rs. 14,000 during the same period. The average level of living between these two states thus differs by a factor of 4.6:1.

Figure 1 shows per capita GSDP for the first triennium 2004–05 to 2006–07 and the last triennium 2014–15 to 2016–17 of the study period with states arranged in ascending order of per capita GSDP during the first triennium. Haryana, Maharashtra and Gujarat occupied the top three positions among the 17 states during 2004–07 and continue to do so during 2014–17 too, though Gujarat has overtaken the other two to occupy the first position during the last triennium. Kerala, Punjab and Tamil Nadu are the next three high income states during 2004–07, and they too maintain positions in this group during 2014–17, but Tamil Nadu overtakes Kerala and Punjab during this period. The states of Bihar, Uttar Pradesh, Madhya Pradesh, and Assam were at the bottom end during 2004–07 and continue to be among the bottom four during 2014–17, though Madhya Pradesh and Assam have exchanged their third and fourth positions over the period considered. Bihar outperformed all other states in terms of growth rate in per capita income (7.9%) and yet could not overtake any other state in terms of level due to low initial base. On the whole, the high, middle and low-income states continue to remain in their respective categories with some interchange of within group positions.

The average share of agriculture, industries and services sectors in GSDP of the selected states during the study period has been provided in Fig. 2. Services turn

Table 1 Per capita income, GSDP growth, contribution in GDP and population during 2004–05 to 2016–17

States[a]	Average per capita income (Rs. at 2004–05 prices)	GSDP growth rate per year (%)	Share of GSDP in the national GDP (%)	Share in total population of India in 2011 (%)
Maharashtra	65,478	8.56	14.89	9.28
Haryana	64,454	8.13	3.32	2.09
Gujarat	62,616	9.19	7.34	4.99
Tamil Nadu	58,789	8.72	7.96	5.96
Kerala	55,114	7.10	3.93	2.76
Punjab	50,772	6.49	3.1	2.29
Karnataka	45,941	7.50	5.62	5.05
Andhra Pradesh[b]	44,585	7.62	7.74	6.99
West Bengal	35,304	6.70	6.54	7.54
Chhattisgarh	30,982	7.27	1.62	2.11
Rajasthan	30,844	7.30	4.29	5.66
Jharkhand	28,617	7.63	1.8	2.72
Odisha	28,151	5.40	2.55	3.47
Madhya Pradesh	25,993	8.56	3.71	6.00
Assam	24,600	6.05	1.57	2.58
Uttar Pradesh	19,595	6.21	8.26	16.5
Bihar	13,937	9.37	2.63	8.6

[a]States arranged in descending order of average per capita income
[b]Andhra Pradesh refers to the undivided state and includes both Andhra Pradesh and Telangana since 2014
Source Authors' calculation using data from Handbook of Statistics on Indian States—RBI
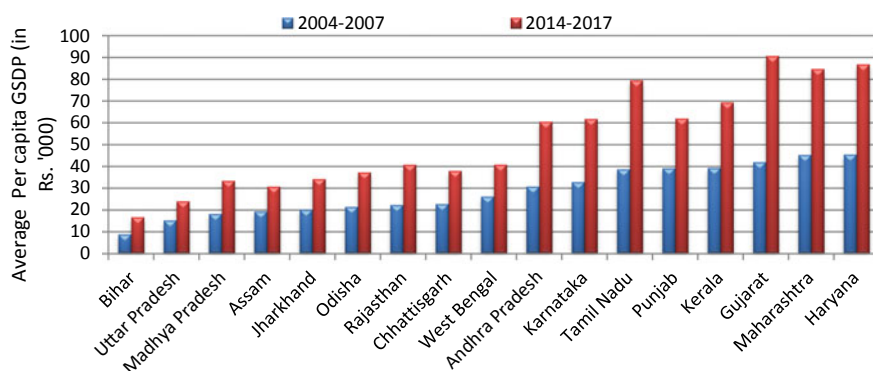
Fig. 1 Average per capita GSDP during initial three years (2004–07) and final three years (2014–17) of study period. *Source* Authors' calculation using data from Handbook of Statistics on Indian States—RBI; *Notes* GSDP at constant price (base: 2004–05). Andhra Pradesh includes Telangana
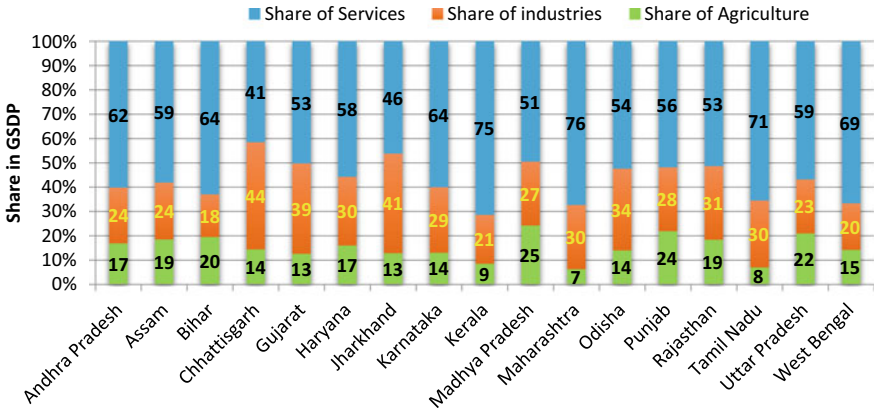
Fig. 2 Average share of agriculture, industries and services in GSDP—(2004–05 to 2016–17). *Source* Authors' calculation using data from Handbook of Statistics on Indian States—RBI

out to be the major contributor to GSDP across the states followed by industries and agriculture. The richest state Maharashtra had the highest average share in services (75.8%), Chhattisgarh in the middle range on per capita income had the highest share in industry (43.8%), and Madhya Pradesh in agriculture (25.2%). The Chhattisgarh recorded the lowest average share in services (41.2%), Bihar in industry (18.1%) and Maharashtra in agriculture (7.1%). The per capita income and the pattern of growth brings out the economic diversity across states in India.

The state-wise growth rates of total GSDPin three broad sectors are shown in Fig. 3. It may be seen that the high growth during 2004–16 is driven by industry and services in Bihar, while it was driven by agriculture in Gujarat and Madhya
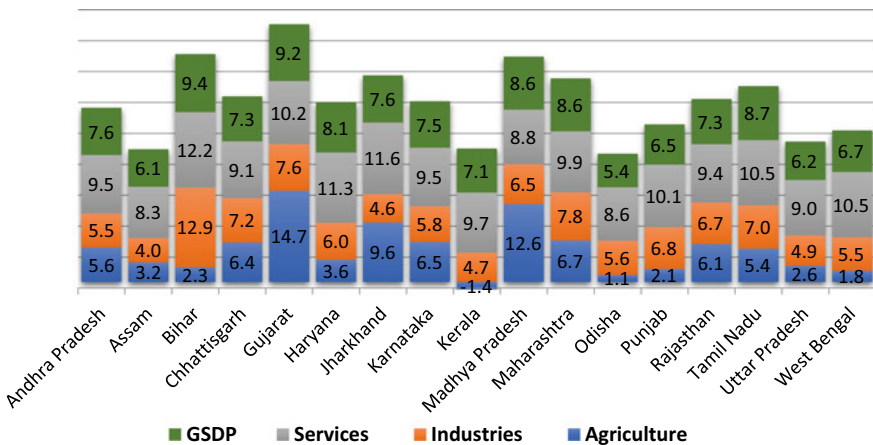
Fig. 3 State-wise average annual percentage growth in GSDP by major sectors (2004–05 to 2016–17). *Source* Authors' calculation using data from Handbook of Statistics on Indian States—RBI

Pradesh. Several states had service growth rate of above 10% a year. Bihar, Gujrat, Haryana, Jharkhand, Punjab, Tamil Nadu and West Bengal belonged to this list. It seems Punjab and Haryana have saturated on agricultural growth and diversifying towards non-agriculture.

4 Methodology and Estimation

4.1 Empirical Model Specification

To identify the key determinants of economic growth (GSDP) at the state level, following functional form has been estimated:

$$\text{GSDP} = f(\text{Social sector expenditure, infrastructure,}$$
$$\text{urbanization, financial inclusion, fiscal discipline})$$

A fixed effect panel regression of the type given below using annual data for the period 2004–05 to 2016–17 for the selected variables for the selected states has been estimated.

$$Y_{it} = \alpha + \beta_{sec} X'_{it} + \sum_{i=1}^{17} \beta_{state} S + \varepsilon_{it} \tag{1}$$

Here, Y_{it} is the gross state domestic product (GSDP), for state i in the year t. It is taken in log scale. x'_{it} is a vector of variables representing determinants considered with the associated parameter β_{sec}, S is the state dummy and the estimated parameter β_{state} indicates state specific effects on growth compared to the reference state. Determinants of GSDP considered by us are: (1) an infrastructure index, (2) social sector expenditure as a percentage of GSDP, (3) share of urban population, (4) financial inclusion measured by number of bank branches of commercial banks per one million adult population and (5) fiscal discipline indicated by fiscal deficit as percentage of GSDP. The state with the median income (West Bengal) is taken as the reference state and its value is taken as 0. The intercept term α represents the state specific effect of the reference state and state effect may be added to obtain intercept for other states. As an alternative specification to check robustness of the estimates, we repeat the estimation of the above model with per capita GSDP as the dependent variable.

In their state level study, Nautiyal and Sahoo (2010) use infrastructure index, development expenditure, urban population, irrigated area, education index and health index as possible determinants. Urbanization rate is common to their study and

this study studies, but as noted below coverage of infrastructure and public expenditure are different. Financial inclusion and fiscal discipline are two new variables considered by us.

4.2 Endogeneity

As hypothesized in the literature discussed above, social expenditure could have a bidirectional relationship with economic growth, e.g. social expenditure influences growth and is also influenced by growth and so existence of possible endogeneity cannot be ruled out. When social sector expenditure is jointly determined with the dependent variable, OLS estimators would suffer from simultaneity bias. Hence a Durbin-Wu-Hausman (DWH) test[1] (augmented regression test) for endogeneity was performed as suggested by Davidson and MacKinnon (1993). The variable for *social sector expenditure as a percentage of GSDP* was regressed on the other explanatory variables of the model and the possible instruments (variables which are strongly related to the potential endogenous regressor but are uncorrelated with the error term). The residual derived from the regression was then used as a regressor in Eq. (1). As the coefficient for the residual term was significantly different from zero, endogeneity of the regressor was confirmed.

To treat endogeneity, a two stage least square using instrument variables (2SLS IV) approach is employed for the estimation of Eq. (1). IV estimators are in fact special case of GMM estimators and are a preferred choice in case the error term is homoskedastic and sample size is small (Baum et al., 2003). The choice of IV method was based on heteroskedasticity test which confirmed homoskedasticity. Both underidentification test (LM test) of whether equation is identified or there is no correlation of the instruments with the error term, and the excluded instruments are relevant and the Sargan–Hansen test for overidentification of the instruments or the validity of the instrument were carried out. Rejection of the null hypothesis for the underidentification (LM test) confirmed that the selected instruments are relevant (correlated with the endogenous regressor and uncorrelated with the error). Failure to reject the null hypothesis for the Sargan–Hansen test for overidentification confirmed that the instruments are valid or they are uncorrelated with the error and are correctly excluded from the estimated equation. Based on the results of the validity tests, first lag of the endogenous regressor *social sector expenditure as a percentage of GSDP*, infant mortality rate *imr* and the gross enrolment ratio in upper primary *ger_upper_primary* were used as instruments for *social sector expenditure as a percentage of GSDP.*

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[1] The DWH test compares the OLS estimator of the suspected endogenous regressor in the IV regression with that of 2SLS and helps deciding use of IV analysis as the estimators are less biased when the suspected endogenous regressor in the IV regression is actually endogenous (Davidson and MacKinnon, 1993).

5   Data and Variables

5.1   Data Sources

For this study, most of the data have been taken from Handbook of Statistics on Indian States published by the Reserve Bank of India (RBI). This includes data on the GSDP (constant price), per capita GSDP, social sector expenditure, infant mortality rate, share of urban population in total population, number of commercial bank branches and variables used for infrastructure index (see below). The population data have been derived from the NSDP and per capita NSDP data. Adult population (age 15 years and above) has been calculated based on percentage of adults in total population as per Census, (2011). Whereas data on gross enrolment ratios were taken from NITI Aayog Database, telecom density per 100 persons and area of the states from Statistical Yearbook 2018 (MoSPI, GoI) and peak demand deficit from India Energy Portal, NITI Aayog.

5.2   Infrastructure Index

Infrastructure refers to several variables and, hence, to avoid multicollinearity, studies generally prefer an infrastructure index to examine the effect on growth (Sahoo & Das, 2009; Mitra et al., 2011) at national level, and Nauriyal and Sahoo (2010) at state level. An infrastructure index has been constructed by us using principal component analysis (PCA) to be used as regressor in our model. PCA is a multivariate technique where a new variable or component is created as a linear combination of the given set of variables and is unobserved or latent. The set of variables used to construct the index are: per capita power availability, installed capacity of power, peak power demand deficit, gross irrigated area as a percentage of gross sown area, telecom density measured by access to telephone per 100 person, road density, and rail density.[2] The variables road density and rail density have been constructed using the data for length of total roads and rail network, both normalized by 1000 km^2.

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[2] Note that we have used proportion of irrigated area as a component of infrastructure index, while Nautiyal and Sahoo use it as a separate independent variable. Further, they do not consider rail density.

Table 2 Eigenvalues and proportion of the variance explained by the extracted components after PCA

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	**2.3471**	**0.2159**	**0.3353**	**0.3353**
Comp2	**2.1311**	**0.9395**	**0.3044**	**0.6397**
Comp3	**1.1917**	**0.6137**	**0.1702**	**0.8100**
Comp4	0.5779	0.1833	0.0826	0.8925
Comp5	0.3946	0.1771	0.0564	0.9489
Comp6	0.2175	0.0774	0.0311	0.9800
Comp7	0.1401		0.0200	1.0000

Using PCA, three components were extracted based on the eigenvalues which provide a measure of the variance of the underlying factors explained by the components (Table 2). Components with eigenvalues greater than 1 were retained as suggested by the Kaiser Criterion. Component 1 explained 33.5%, the maximum variation in the underlying factor, component 2 explained 30.4% and component 3 another 17.0%. The three components extracted thus were able to collectively explain 81% of variation. This was followed by determining the factor loadings or the correlation coefficients between the observed variables and the underlying factors (Table 3). The factor loadings were obtained on rotation using the Varimax criterion. The three components were then combined to construct a single infrastructure index. The factor loadings of variables thus obtained were used as weights of respective variables in constructing the infrastructure index. The index value was normalized and the values ranged between 0 and 1.

Table 3 Factor loadings of the infrastructure variables

Variables	Comp1	Comp2	Comp3
Telecom density (*tele_density*)	0.4621		
Per capita power availability (*per_capita_power*)	0.6100		
Rail density (*rail_1000 m^2*)		0.6184	
Road density (*nh_100 m^2*		0.5674	
Percentage of gross irrigated to gross sown area (*percntg_irrigated*)		0.4702	
Installed capacity of power (*installed_power*)	0.5554		
Peak power demand deficit (*peak_demnd_deficit*)			0.7802

Note Only factor loadings greater than 0.45 are presented above

5.3 Social Sector Expenditure

Most of the total social sector expenditure by states goes to three major services: (a) education, sports, art and culture, (b) medical, public health and family welfare, and (c) social security and welfare. Other social services which are included in the expenditure list are drinking water supply and sanitation, housing, urban development, welfare of labour, SCs, STs, OBCs and natural disaster and calamities (RBI, 2018). Social sector expenditure has increased substantially in all the states during the study period. Figure 4 shows the average share of social sector expenditure in GSDP of various states during the initial three years (2004–07) and final three years (2014–17) of the study period along with the average per capita income during the entire study period.

The average increase in share of social sector expenditure across the states between the two periods was 2.4%. The highest increase was observed in Odisha, where the share increased from just 6.1% during 2004–07 to 10.7% during 2014–17. The increase was the lowest in Maharashtra, where it increased from 4.9% in the initial years to just 5.2% in the final years. As evident from Fig. 4, share of social sector expenditure has remained low in the high income states as compared to middle and low-income states during both the initial and final trienniums.

Even if share of social sector expenditure is low for high income states, their per capita expenditure level may not be low in absolute terms. This aspect is examined in Fig. 5. As this figure reveals, the low-income states lag behind the high income or middle income states on social sector on a per capita basis even after increasing the share in GSDP. However, middle income states such as Andhra, Tamil Nadu and Karnataka along with Chhattisgarh are the highest spenders on social sector on per
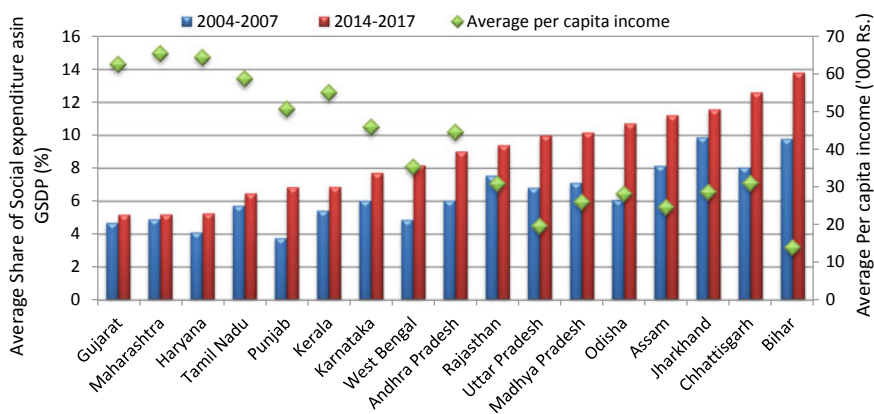
Fig. 4 Average of share of social sector expenditure in GSDP during initial three years (2004–07) and last three years (2014–17) of study period. *Source* Authors' calculation. *Note* The average per capita income refers to the whole of the study period
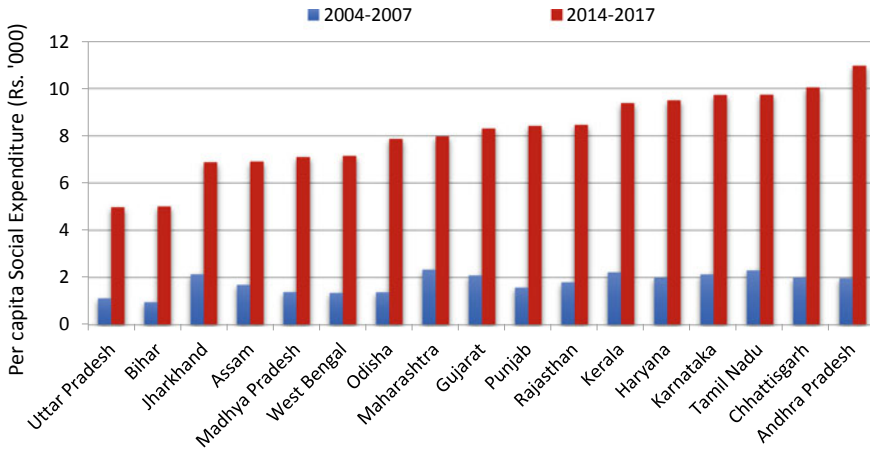
Fig. 5 Average of per capita social sector expenditure during initial three years (2004–07) and final three years (2014–17) of study period. *Source* Authors' calculation

capita basis. High income states like Gujarat, Maharashtra and Punjab do not spend as much on social sector compared to several middle income states.

5.4 Financial Inclusion

In the empirical studies, different indicators for financial inclusion have been used to determine the effect on growth. The number of commercial bank branches normalized by population or area is the most commonly used indicator to determine the effect of financial inclusion on growth (Sethi & Acharyaa, 2018). In this study, we have used number of commercial bank branches per million adult population has been used as an indicator of financial inclusion.

During the study period, there has been a considerable increase in number of bank branches in all the states, but in the extent of increase varies across the states (Fig. 6). The variations indicate that financial inclusion has gained importance at state level but it has not been uniform across the states. On an average, the number of branches increased by 68% across the states. There has been 118% increase in numbers in Haryana between the two periods as compared to 47% in West Bengal. Stronger financial inclusion is mainly observed in the high and middle income states.
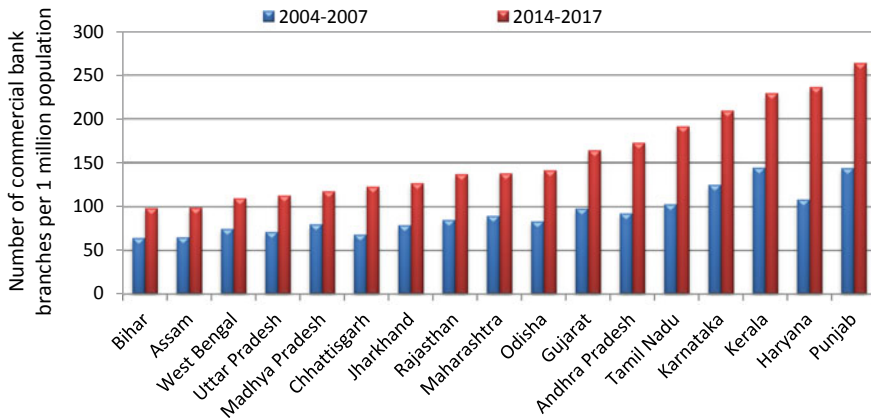
Fig. 6 Average number of bank branches per million adult population during 2004–07 and 2014–17. *Source* Authors' calculation

5.5 *Urbanization*

In this study, urbanization has been represented by percentage of urban population in the total population of the state. During the study period, some of states experienced substantial urbanization. The average share of urban population across the states increased from 28.82% during 2004–07 to 34.37% during 2014–17. Figure 7 show the increase in urbanization between the initial and final trienniums. Kerala has the highest urbanization rate with a rise from 34 to 62% followed by Tamil Nadu which saw an increase from 48 to 57%. The increase in urbanization remained less than 2%
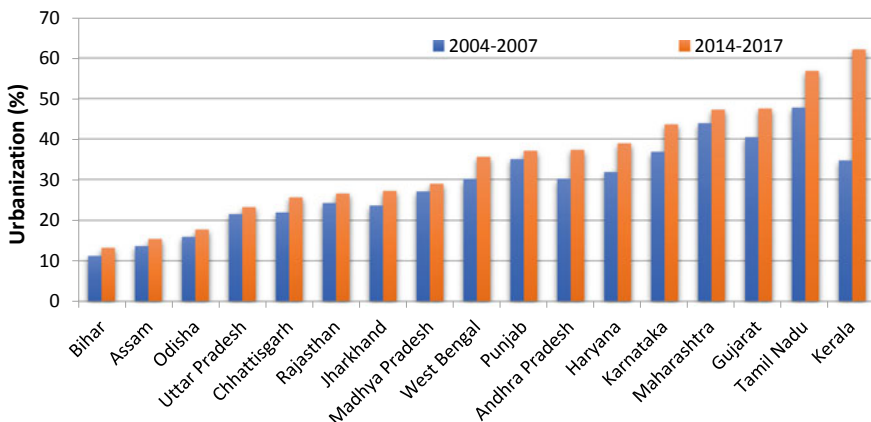
Fig. 7 Percentage point change in urbanization between initial triennium (2004–07) and final triennium (2014–17) of study period. *Source* Authors' calculation
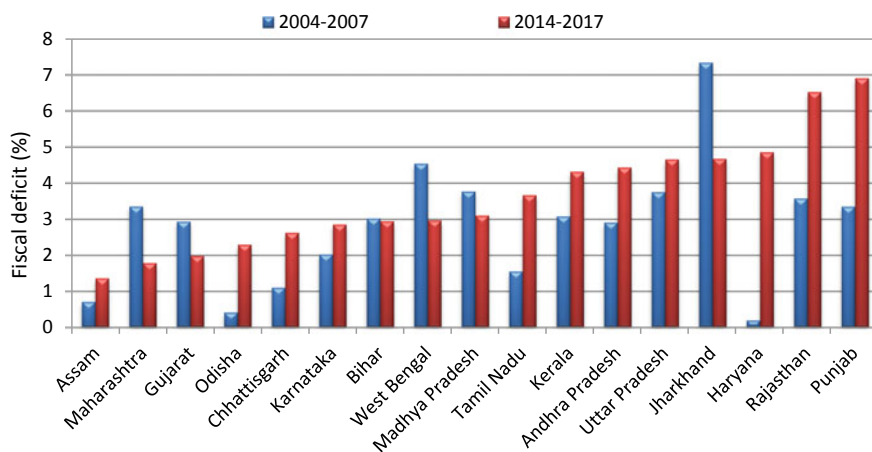
Fig. 8 Fiscal deficit as percentage of GSDP during initial triennium (2004–07) and final triennium (2014–17) of study period. *Source* Authors' calculation

points in the low-income states like Uttar Pradesh, Assam, Odisha, Madhya Pradesh and Bihar.

5.6 Fiscal Discipline

Fiscal deficit is the best single indicator of the government's own income and expenditure management. Fiscal discipline is an integral component of financial stability in the economy. Fiscal deficit as percentage of GSDP is used here to represent fiscal discipline by state governments in this study. During the initial triennium (2004–07), average fiscal deficit across the states was 2.81% which increased to 3.65% in the final triennium (2014–17). Figure 8 shows the change in fiscal deficit in percentage point between the two periods for different states. After adoption of the Fiscal Responsibility and Budget Management (FRBM) Act by them, only about half of the states considered succeeded in containing their deficit within the threshold of 3 per cent of GSDP during 2014–17. But other states were under fiscal stress and could not succeed in maintaining fiscal discipline. The deficit exceeded 6% of GSDP in Punjab and Rajasthan.

6 Regression Results

To empirically test the determinants of growth at the state level in India, two alternative specifications of the model stated in Sect. 4.1 have been estimated. The dependent

variable is GSDP in Eq. 1 and per capita GSDP in Equation 2. Both GSDP and per capita GSDP are on the log scale. The estimated coefficients and standard errors for both the equations are given in Table 4.

Table 4 Regression results on determinants of GSDP

	Equation 1: Dependent Variable = Log (GSDP)		Equation 2: Dependent Variable = Log (per capita GSDP)	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Share of social expenditure in GSDP[a]	0.0870***	0.0132	0.0651***	0.0106
Infrastructure index	0.1455***	0.0150	0.1278***	0.0120
Urbanization rate (*log of urban share*)	0.3503***	0.1489	0.4323***	0.1189
Financial inclusion (*number of offices of commercial banks per million adult population*)	0.0023**	0.0005	0.0015***	0.0004
State government fiscal deficit (% of GSDP)	−0.0325***	0.0066	−0.0255***	0.0052
State dummies				
Andhra Pradesh	−0.2561***	0.0416	−0.1158***	0.0332
Assam	−1.2126***	0.1513	−0.0259	0.1208
Bihar	−0.8580***	0.1864	−0.7693***	0.1488
Chhattisgarh	−1.6429***	0.0961	−0.2297***	0.0768
Gujarat	−0.2415***	0.0626	0.2007***	0.0500
Haryana	−0.9515***	0.0518	0.3672***	0.0414
Jharkhand	−1.4214***	0.0880	−0.2703***	0.0703
Karnataka	−0.5593***	0.0439	−0.0711**	0.0351
Kerala	−0.7303***	0.0689	0.2473***	0.0550
Madhya Pradesh	−0.7582***	0.0579	−0.4628***	0.0463
Maharashtra	0.4772***	0.0667	0.2566***	0.0533
Odisha	−0.9246***	0.1264	−0.0423	0.1010
Punjab	−1.1630***	0.0653	0.0363	0.0522
Rajasthan	−0.5692***	0.0625	−0.2072***	0.0500
Tamil Nadu	−0.3257***	0.0696	−0.0007	0.0556
Uttar Pradesh	0.1415*	0.0789	−0.5794***	0.0630
Constant	15.4593***	0.4856	8.5544***	0.3878
Reference state[b]	West Bengal		West Bengal	
Underidentification test[c] (Anderson canon. corr. LM statistic)	58.822***		49.921***	
Sargan–Hansen test statistic[d, e] (over identification test of all instruments)	0.306		1.347	

(continued)

Table 4 (continued)

	Equation 1: Dependent Variable = Log (GSDP)		Equation 2: Dependent Variable = Log (per capita GSDP)	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Endogeneity test[f] (Chi2 value)	23.457***		18.085***	

Note ***, ** and * indicates 1%, 5% and 10% level of significance respectively

[a]Social expenditure as share of GSDP is the endogenous regressor

[b]Reference state with median income

[c]Rejection of the null for the underidentification or excluded instruments is not correlated with the endogenous regressors confirms the relevance of the instruments

[d]Failure to reject the null for the Sargan–Hansen test that the instruments are valid or uncorrelated to the error terms confirm that the instruments selected are valid instruments

[e]Excluded instruments used in each of the model are first lag of social expenditure as share of GSDP, gross enrolment ratio in upper primary and infant mortality rate

[f]Endogeneity test—tests that endogenous regressor can be treated as exogenous. Rejection of the null confirms endogeneity

Let us consider Equation 1 first. The results reveal the following:

- Social sector public expenditure has positive and significant impact on GSDP indicating that a rise in social sector expenditure as a percentage of GSDP results in an increase in GSDP. A 1% rise in social sector expenditure relative to GSDP has an average effect of 0.0870 on log of GSDP.
- Infrastructure index too has a significant positive impact on log of GSDP with a coefficient of 0.1455.
- Financial inclusion, measured by number of bank branches per million adult population, also has a significant positive impact on log of GSDP with a coefficient of 0.0023.
- Urbanization rate has positive and significant impact on log of state GSDP with a coefficient of 0.3503.
- State government's fiscal deficit as percentage GSDP has a detrimental effect on GSDP with a negative and significant coefficient of 0.0325.
- State dummies reveal a negative impact on the intercept term which corresponds to the reference state, i.e. West Bengal. All the state dummies are negative and significant except for two states, e.g. Maharashtra and Uttar Pradesh. A negative coefficient implies that the state specific factors lower the intercept terms as compared to West Bengal and positive values raise it.

Next, we have tried to explore determinants of per capita GSDP rather than GSDP as such. The results given in the last two columns of Table 4 under the heading Eq. 2 are very similar to those described above. The effects of infrastructure, social sector expenditure, urbanization, financial inclusion are positive while fiscal is negative per capita GSDP. All these effects pass the significance test as well.

Overall, the results suggest that infrastructure, social sector expenditure, urbanization financial inclusion and fiscal discipline are the major drivers of growth in

GSDP and per capita GSDP at the state level.[3] They reinforce some the conclusions in cross country studies. To our knowledge, the only study on determinants of GSDP across states in India by Nauriyal and Sahoo (2010) does not reflect the experiences beyond 2005–06, the last year of their dataset. Infrastructure index as constructed by them had a significant positive effect on per capita GSDP, but not on growth of GSDP. Further, our coverage of public expenditure are different, and we have included new independent variables like financial inclusion and fiscal discipline in this study.

7   Conclusions

Analysis of determinants of inter-state GSDP growth has been an under researched area in India. Given the economic diversity across states, our understanding of the drivers of growth across states needs to be improved for better policy decisions. The present study is an attempt to econometrically explore determinants of GSDP growth across 17 major states in India during the period 2004–5 to 2016–17 using a fixed effect panel regression model. Social sector expenditure, infrastructure, urbanization, financial inclusion, and fiscal discipline have been considered as determinants in this study. Social expenditure by the government has a bidirectional relationship with economic growth, i.e. it influences growth as well as it is influenced by growth. To treat endogeneity issue, we have used a two stage least square approach using instrument variables. For considering a number of components of infrastructure, we have constructed an infrastructure index using principal component analysis.

The results indicate that infrastructure, social sector expenditure, urbanization and financial inclusion have positive effects on growth of both GSDP and per capita GSDP and seem to be important drivers of growth across states in India. Fiscal deficit comes out to be having a detrimental effect on growth emphasizing the need for better management of finances by the state governments.

We would like to draw attention to a basic data problem. Inter-state growth analysis is severely constrained by absence of data on some crucial variables like investment. Attention must be given to estimate total investment by the states on a comparable basis following standard national income conventions. When several state governments are adopting a competitive spirit for achieving higher growth rates, absence of a basic dataset severely constrains analysis and design of their growth strategies.

We may note at the end that more research needs to be done on explaining state level growth in India. This is a fruitful future line of work to understand the diversity of the Indian development process from various perspectives by experimenting with alternative model specifications, new variables and institutional factors.

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[3] We did try estimating the model including a variable for public investment indicated by capital expenditure in government budget as a percentage of GSDP. No significant impact on growth was observed. As noted earlier, total investment data for state level are not available.

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Progress in Applied Econometrics in India: A Selective Review

K. L. Krishna

1 Introduction

Since the founding of the (World) Econometric Society and the establishment of the Society's journal Econometrica in the 1930s, the aims of Econometrics have been to give empirical content to economic relations, for testing economic theories, forecasting and policy evaluation. Many textbooks, several monographs and handbooks depict in varying detail the evolution and advances in econometrics. The crucial role of econometrics in economics has grown over time. The Nobel Prize in Economics has recognized this contribution with many awards to econometricians, including the first which was given to Frisch and Tinbergen in 1969.

The two broad divisions of econometrics are Econometric Theory and Applied Econometrics. A large proportion of econometric research in India is in Applied Econometrics including Quantitative Economics. Pandit and Shanmugam (2008) provide a detailed account of the activities of the Indian Econometric Society (TIES) since its formal inception in 1971. The Introduction chapter in Pandit and Shanmugam classifies 17 presidential addresses under three broad areas: (a) Theory and Methodology (seven addresses), (b) Policy Modelling (five), and (c) Development Issues (five) and review each one. The first address in the volume is Prof C R Rao's Inaugural Address at the 43rd annual conference in IIT Mumbai in 2007. In Krishna (2019), Sect. 8: Progress of econometrics teaching and applied practices in India, may be a useful introduction to what is covered in this essay.

The objective of this essay is to review the literature mainly in Applied Econometrics and partially in Quantitative Economics, in India, for the post-independence period. The literature is vast, but the review will be short and selective. The plan

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of the essay is as follows: Sect. 2 is a short guide to modern econometric methods based on four books; Sect. 3 gives reference to some important literature of the 1950s, 1960s, and 1970s; Sect. 4 refers to some important literature of the 1980s and 1990s; references to literature reviewed by Pandit and Shanmugam (2008) plus review of models included in Parikh (2009) is given in Sect. 5. The other sections of the paper are Bayesian VARs, debt and deficit modelling, and DSGE modelling (Sect. 6); economic well-being and deprivations in India (Sect. 7); studies in econometrics of diets and child undernutrition (Sect. 8); studies on firm-level productivity, exports, FDI, and competitiveness (Sect. 9); and contributions on urban slums, rural labour market and chronic Poverty (Sect. 10). Section 11 gives concluding remark of the paper.

2 Guide to Modern Econometric Methods Based on Four Books

The books are:

- Peter Kennedy (2008): A Guide to Econometrics, Sixth Edition, Blackwell Publishing.
- Stock and Watson (2018): Introduction to Econometrics, Third Edition, Pearson.
- Greene (2018): Econometric Analysis, Eighth Edition, Pearson.
- Nachane (2006): Econometrics: Theoretical Foundations and Empirical Perspectives, Oxford Textbooks.

Each of the four books has its own strengths and usefulness in the context of this Essay.

P. KENNEDY:

As the author claims in the preface to the book, this book supplements econometrics text books at all levels by providing an overview of the subject, its concepts and techniques without too much notation and technical detail. The topic coverage is comprehensive: in addition to conventional topics, it introduces the reader to the Bayesian Approach (Chap. 14) Forecasting (Chap. 20), Robust Estimation (Chap. 21), Applied Econometrics (Chap. 22), and Computational Considerations (Chap. 23). Chapter 19—Time Series Econometrics covers Wavelet Analysis under Technical Notes at the end of the chapter.

JH STOCK and MW WATSON:

This is a very good introduction to the subject, including reviews of Probability and Statistics in Part One. Econometric Theory of Regression Analysis is covered in Part Five (Chapters 17 and 18). Matrices are used only in Chap. 18, where OLS, GLS IV, and GMM are developed using Matrix Algebra.

The specific chapters/sections of special interest in the book are given below:

- Section 1.2: Causal effects and idealized experiments,
- Section 1.3: Data Types: Experimental vis-à-vis Observational Data Cross-sectional, time series, and panel data,
- Section 7.5: Model Specification for Multiple regression,
- Appendix 7.2: Conditional Mean Independence,
- Chapter 9: Assessing Studies based on multiple regression:,
- Chapter 12: Instrumental Variables Regression,
- Chapter 13: Experiments and Quasi-Experiments,
- Chapter 18: The theory of multiple regression.

W. H. GREENE (2018):

This is the most comprehensive and advanced of the four books. Only a few sections from the 21 chapters in the book need be consulted.

- Preface and Chapter 1: Econometrics
- Section 5.8: Model Building—General to Simple Strategy
- Section 5.8.3: Classical Model Selection
- Section 5.8.4: Bayesian Model Averaging
- Section 6.3: Difference in Differences Regression
- Section 6.4: Using Regression Kinks and Discontinuities to Analyse Social Policy
- Chapter 10: Systems of Regression Equations
- Chapter 11: Models for Panel Data
- Chapter 14: Maximum Likelihood Estimation
- Chapter 16: Bayesian Estimation and Inference
- Chapter 17: Binary Outcomes Discrete Choices
- Chapter 18: Multinomial Choices and Event Counts
- Chapter 19: Limited Dependent Variables–Truncation, Censoring, and Sample Selection
- Chapter 20: Serial Correlation
- Chapter 21: Nonstationary Data.

D. M. NACHANE (2006):

The book uses Indian Data sets for illustrative purposes. It has many exercises. The discussion of the concepts and methods is rigorous and authoritative. However, some modern themes, like Treatment Evaluation, are not covered.

   The following Chapters will be found particularly useful.

- Chapter 1: Introduction
- The section on Econometric Modelling, in particular
- Chapter 17: Multivariate Time Series Modelling, especially VARs
- Chapter 19: Causality and Exogeneity
- Chapter 22: A Methodological Epilogue.

3   Some Important Literature of the 1950s and 1960s

In connection with the formulation of the Indian Second Five-Year Plan (1956–61), some statistical and econometric work was done at ISI, Kolkata. Of the three research papers listed below, one was authored by Prof P. C. Mahalanobis, the architect of the Second Five-Year Plan: P. C. Mahalanobis (1960). "A Method of Fractile Graphical Analysis", Econometrica, vol. 28, pp. 325–352. Fractile graphical analysis was applied extensively in the 1950s and 1960s at ISI, Kolkata.

Roy, J., I. M. Chakravarty, and R. G. Laha (1959), Studies in Consumption Behaviour, Calcutta. This is a study of concentration curves as description of consumption patterns.

Iyengar, N. S. (1967), Some estimates of Engel elasticities based on National Sample Survey Data. Journal of the Royal Statistical Society, Series A, vol. 130, pp. 84–101.

Much more work done at ISI by N. Bhattacharya, N. S. Iyengar, and P. Maiti will be reported below.

In 1978, ICSSR published seven volumes of literature review, edited by Dr. D. T. Lakdawala: A Survey of Research in Economics.

Volume 7: Econometrics was edited by Drs N. S. Iyengar and N. Bhattacharya, with seven themes (Iyengar & Bhattacharya, 1978) authored by:

- A. L. Nagar, Recent developments in econometric methods.
- V. R. Panchamukhi, A survey of econometric studies in the fields of production, international trade, and money & banking.
- N. Bhattacharya, Studies of levels of living in India.
- N. Bhattacharya, Studies on consumer behaviour in India,
- P. Maiti and N. Bhattacharya, Econometric studies on price behaviour.
- N. S. Iyengar, Size distribution of consumption and income.
- Meghnad Desai, Macroeconometric models for India- a survey.

4   Literature of the 1980s and 1990s

The chapters contributed by U. Sankar on Agricultural Economics, B. Goldar on Industrial Economics, late M. J. Manohar Rao on Monetary Economics, Radhakrishna and K. N. Murty on Complete Demand Systems, and P. R. Panchamukhi on International Economics to "Econometric Applications in India" edited by Krishna (1999) may be taken as representing the literature in Applied Econometrics of the 1980s and 1990s. The five chapters together covered five major fields of Economics.

The editor of the volume in his Introduction discussed in adequate detail, discussed Issues in Applied Econometrics. He mentioned three distinct relatively new competing methodologies:

- The LSE (London School of Economics) methodology (LSM) often associated with David Hendry.

- The VAR (vector autoregression) first proposed by Sims.
- The Bayesian Methodology (BM) associated with Leamer.

This is in the sphere of macroeconometric modelling. Major advances in microeconometrics came after the 1980s.

A short overview of each of the five chapters in the book follows:

Chapter 1: U. Sankar: Econometric Applications in Agricultural Economics

Sankar focused on producer behaviour in Indian agriculture. He emphasized the importance of model specification, data bases and estimation methods. One unique feature of the chapter it discussed studies on uncertainty and risk. Farm supply response, marketed surplus, technological change were the other topics covered.

Sankar offered several suggestions: Farm level data generated by agricultural experimental stations and Farm Management Surveys and Cost of Cultivation Surveys could be used to analyse the nature and source of inter-regional and inter-variety variation in technical and allocative efficiencies. The same databases could be used to analyse the effects of aggregation over time, crops and regions.

Chapter 2: B. Goldar: Econometrics of Indian Industry

Numerous econometric studies on different aspects of Indian industry were undertaken since the 1950s. The major topics were production functions, investment functions, labour demand functions and cost functions. New areas, such as R&D activity, Capacity utilization, growth and profitability, were also studied. Golda attempted a careful and comprehensive review of all this research. He focused on the econometric methodologies employed and presented empirical results from a few major studies.

Two production function studies using panel data for companies too were covered. One of them explored several alternative estimation methods including GMM (Generalized Method of Moments) and the IV (Instrumental Variable) methods. One study estimated a system of equations consisting of the TL (trans log) production function and revenue share equations by the Zellner efficient method. Two studies were based on sample survey data for small-scale units.

The analysis of technical efficiency through the estimation of frontier production functions too was reviewed. The estimation of flexible forms of the cost function, Generalized Leontief (GL) or TL, to analyse factor substitution and other characteristics of technology also received much attention.

Thus, the quantum of applied econometric research on Indian industry was quite impressive. However, according to Goldar's assessment, most studies used "rather crude measures of the variables, and have not paid sufficient attention econometric issues. Model specifications in future studies should incorporate the possible market imperfections and government regulations".

Chapter 3: M. J. Manohar Rao: Monetary Economics—An Econometric Investigation

Rao presented an econometric study using Indian macroeconomic data. He estimated a standard money demand function and an appropriate money supply function for

the Indian economy. He used his empirical results to analyse important issues in contemporary monetary economics.

The author presented the short and long-run elasticities of real money demand with respect to real income and interest rate as well as the dynamic patterns of the elasticities. He constructed a time series on expected rate of inflation based on the Adaptive Expectations hypothesis and introduced this variable in the demand function. The coefficient of the variable was significantly negative.

Section 2 of the chapter was concerned with money supply determination. The question of appropriate targeting was examined. High-powered money and interest rate as alternative instruments for controlling money supply were compared with the help of demand and supply functions for money estimated from annual data for the period 1950–51 to 1990–91. This pioneering exercise showed that high-powered money was to be preferred.

In Sect. 3 of the chapter, the monetarist proposition that inflation is primarily due to growth of money was examined, and the welfare cost of inflation was estimated. Using the regression for the rate of interest on expected rate of inflation, and output gap for the years 1960–61 to 1990–91, Rao drew a few important conclusions. Rao's study was an important contribution for the 1990s, although it did not pay attention to the possibility of non-stationarity of the variables.

Chapter 4: R. Radhakrishna and K. N. Murty: Econometrics of Complete Demand Systems with Illustrations for India

One of the earliest and most important uses of econometrics is its application in the estimation of consumer demand functions. There are two broad approaches to the estimation of demand functions. The first and earlier approach deals with the estimation of demand function for a particular commodity or commodity group, paying attention to any special characteristics including the relevant market conditions. The second and more recent approach involves the joint estimation of the complete demand system (CDS). The second approach is preferred for theoretical reasons, although it involves the use of more advanced econometric methods, such as SURE (seemingly unrelated regression estimation) or MLE (maximum likelihood estimation) which generally require the application of nonlinear optimization algorithms.

In this chapter, Radhakrishna and Murty undertook a very comprehensive exercise of detailed specification and estimation of nine CDSs in a comparative framework. These nine systems range from the linear expenditure system (LES) proposed by Stone in 1954 to the Almost Ideal Demand System (AIDS) suggested by Deaton and Muelbauer in 1980.

The major theoretical propositions of consumer behaviour theory of particular relevance to econometric analysis are given in Sect. 2 of the chapter. In Sect. 3, the specification of different demand systems, their properties and limitations are presented. The formulae for price and expenditure elasticities are also given for each system. Next, a suitable method of estimation is outlined. The method of estimation is either nonlinear generalized least squares (NLGLS) or full information maximum

likelihood (FIML), after deleting one of the equations to avoid the problem of singular covariance matrix of the disturbances.

Time series data for rural India have been utilized for illustration. The commodity groups in the illustration are total food, clothing, fuel and light, and other non-foods. The National Sample Survey (NSS) reports for 19 years spread over the 14th (1958–59) to 45th (1989–90) rounds for rural India are the major sources of data.

In Sect. 4 of the chapter, three null hypotheses of (i) homogeneity, (ii) homogeneity and symmetry, and (iii) explicit additivity, have been tested for flexible demand systems by means of the likelihood ratio (LR) test. S in earlier studies, the test results do not support the null hypothesis.

Four uses of estimated demand systems are illustrated in Sect. 5. These are (i) construction of the true cost of living index, (ii) money metric utility, (iii) nutrient consumption functions, and (iv) demand projections.

These are the very useful contributions of the exercise.

The econometric community of students and teachers will enjoy studying the most comprehensive exercise for India. It must have inspired many serious research students since its publication in the 1990s.

Chapter 5: V. R. Panchamukhi-: Quantitative Methods and their Applications in International Economics

It is clarified at the outset that Panchamukhi preferred a broader focus, Quantitative Economics, for his chapter, than Applied Econometrics. He emphasized the importance of proper measurement of variables prior to the analysis of the relationships linking the variables. He not only reviewed the earlier studies in the field but also presented results of his own new empirical work using fresh data on some of the topics covered in the chapter. This is a very valuable contribution, given the fact that Indian applications of the available methodologies were "scanty and incomplete".

Section 2 gives an inventory of the important issues and hypotheses dealt with in the literature. In Sect. 3, the different methodologies of evaluating the factor endowment theory, the measurement of revealed comparative advantage (RCA) and the analysis of its determinants, the Gravity Model, and the empirical work in the framework of the model were critically reviewed. New empirical results on all the three aspects were presented.

Several innovative econometric studies of aggregate trade flows and of sectoral trade flows were reviewed in Sect. 4. One of them estimated a moderately disaggregative model of India's trade flows covering the period 1971–91 to obtain price elasticities of exports and imports. The study sought to analyse the effect of the exchange rate variations. A model validation exercise and a policy simulation exercise were the other useful features of this study.

The measurement of India's intra-industry trade and the comparative analysis of India, Korea and Malaysia was reported in Sect. 5. A study on the determinants of FDI in India was revived in Sect. 6. ERP and DRC measures were taken up in Sect. 7.

Panchamukhi concluded that research in India on important issues in international economics was inadequate, because most universities in India lacked well-trained faculty resources in the subject.

The five chapters in Krishna (1999) were contributed by very eminent scholars. These valuable contributions need to be updated to incorporate the major advances during the past two decades. The papers being presented at the annual conferences of TIES contribute to the updating in the five areas of the book, and cover several other fields of economics.

5 Recent Indian Macroeconometric Models

This section covers recent economy-wide models for India.

Pandit and Shanmugam (2008) contains five chapters on Economy-wide models: Rangarajan (Chap. 8), Krishnamurty (Chap. 9), Pandit (Chap. 10), Panchamukhi (Chap. 11), and Sarma (Chap. 12).

Parikh (2009) introduces five macroeconomic models commissioned by the Planning Commission, Government of India, at the time of formulation of the 11th Five-Year (2007–12) Plan:

1. Planning Commission's in-house model updated by A. S. Sachdeva and P. P. Ghosh. This is a Consistency Model.
2. A VAR/VEC Model from ISI, Bengaluru. The model constructed by N. S. S. Narayana and P. P. Ghosh was the first of its kind, employing VAR (Vector Autoregression)/VEC (Vector Error Correction) methodology to be distinguished from Structural Modelling popularized by L. R. Klein in the second half of the 20th C.
3. A computable General Equilibrium (CGE) model from IGIDR, constructed by A. Ganesh Kumar and Manoj Panda.
4. An Econometric Model, from I. E. G., Delhi.

The model with an eclectic approach was originally developed by B. B. Bhattacharya and S. Kar. It was updated by S. Kar and B. K. Pradhan. It had four blocks: production, fiscal, monetary, and external. The strength of the model was the incorporation of the major channels through which domestic and global shocks were transmitted to the Indian economy. This facilitated the analysis of the effects of events such as hike in international petroleum prices, global trade slowdown or rainfall shortage on the growth rate, inflation rate and macro balances of the economy.

5. Macroeconomic Model of the NCAER, New Delhi.

The model was constructed by S. Bhide and P. C. Parida. The strength of the model was an explicit incorporation of the sources of productivity growth. The impact of infrastructure development, faster growth of Agriculture, and rising FDI could be assessed. The exercise used ordinary least squares (OLS) to estimate the equations, with corrections for autocorrelation of the regression residuals, when necessary.

At the instance of the Planning Commission, modellers from ISI, IEG, and NCAER, analysed the impacts of (1) the Oil Price Shock, (2) Global Slowdown, and (3) the Mitigation Measures on Indian macro-indicators during 2007–08 to 2011–12.

The various scenario exercises from the three macroeconometric models indicated that the direction of impacts were in agreement, in spite of the differences in the "structure and philosophy of the models". While the magnitudes of the impacts varied only slightly across the three models. Parikh (2009) in the overview chapter noted that the model estimates provided deeper understanding of the Indian economy and possible impacts of the policy measures.

Chapter 3: Macroeconomic Simulations based on VEC models, authored by N. S. S. Narayana and P. P. Ghosh in K. S. Parikh (2009) is the outcome of imaginative, methodical, and painstaking effort. Students of macroeconometrics will benefit much from a careful study of the chapter. VAR model requires the estimation of too many parameters. To circumvent the problem, the authors estimated separate models for Agriculture, Industry, and Services sectors, and household's private final consumption expenditure (PFCE), savings of financial assets (HFS) and physical assets (HPS). For each sectoral production component, a VEC model was estimated with corresponding GDP, Investment (GCF) and price (PDFL) as three endogenous variables. For the consumption component, another VEC model was estimated with PFCE, HFS, and HPS as three endogenous variables. About 15 exogenous/predetermined variables, such as rainfall, real money supply, fuel price index are listed on page 38. Data for the years 1951–2003 were used for the estimation of the models.

Model diagnostics (page 48), the simulation model (pages 48–49), dynamic simulation within the sample period (pages 49–54), Reference Run (pages 55–70) and Policy Simulations (pages 70 to 87) are the major contents of the chapter.

This exercise is a major advance in Applied Econometrics in India in the twenty-first century. One has to carefully read the chapter for complete understanding of its contribution and possible limitations.

6 Bayesian VARs, Structural Models, and DSGE Models

6.1 Bayesian VARs

Pami Dua's Presidential Address at the 52nd Annual Conference of TIES in 2016 was on the theme, "Macroeconomic Modelling and Bayesian Methods", published in 2017 in Journal of Quantitative Econometrics. It was in three Parts:

- Evolution of Macroeconomic Models,
- Bayesian Methods, and
- Application of Bayesian VAR Methods to the Indian Economy.

Dua (2017) notes that Bayesian methods, such as the Markov Chain Monte Carlo (MCMC) simulation method of sampling, have been applied extensively, with the advent of powerful and inexpensive computing. The Bayesian approach uses Bayes' Theorem to combine prior information about the models and their parameters with sample information:

Posterior density of the parameters is proportional to the product of the Likelihood function and Prior density of the parameters.

Dua (2017) notes that the most standard prior utilized for the Bayesian VAR (BVAR) model is the Minnesota prior. She outlines four forecasting applications of BVAR methods to the Indian economy. Application 1 (Dua, Mohan, & Ranjan, 2015) of forecasting INR/USD Exchange Rate, alone is outlined here, to save space. It is an extension of Dua and Ranjan (2012) for the period July 1996 to December 2014 using VECM, VAR and BVAR. Two models are estimated:

Model 1 is the Dua and Ranjan (2012) *model*

Exchange rate (e) is a function of interest differential, output differential, money supply differential, forward rate, volatility of capital inflows, order flows, and official intervention by the central bank.

Model 2: Stock price differential is an additional exogenous variable

Empirical Results include tests for non-stationarity and cointegration, and Granger causality tests, VAR, VECM, BVAR models are estimated. For the BVAR model, the Minnesota priors are selected via a grid search. See the JQE paper for full details.

Forecasting Results

Out-of-sample recursive forecasts obtained for Models 1 and 2 over the period, January 2013 to December 2014 based on VECM, VAR, and BVAR models. Based on forecasting accuracy measures, mentioned in the JQE paper, the findings are:

- Forecasts from Model 2 are in general superior to those from Model 1, for VECM, VAR and BVAR models.
- VAR outperforms the VECM model.
- BVAR forecasts are superior to the VAR forecasts.

The three authors, Dua, Mohan, and Ranjan deserve to be complimented for their careful and painstaking policy-relevant exercise.

6.2   A Structural Macroeconometric Exercise Focusing on Debt and Deficits of the Union Government

Bhanumurthy, Bose and Chakravarti (2017) have estimated a structural macroeconometric model of about 50 equations in five blocks, namely, real sector block, external block, fiscal block, monetary block, and macroeconomic block. The real sector block consists of four sectors: agriculture, industry, services, and infrastructure.

Annual data from official sources for the period 1991–92 to 2012–13 is the data set used in the exercise. The method of estimation is OLS, with corrections for serial correlation of errors. Bai-Perron tests for structural breaks have been applied, and dummy variables are introduced if necessary. Outliers in regression errors are taken into account through dummy variables, The estimated model is used for policy

simulations for the 14th Finance Commission period 2015–16 to 2019–20. The policy simulations cover three aspects:

- A shock of 15% in growth of other revenue expenditure in 2016–17 due to the 7th Pay Commission Award.
- Targeting higher growth of 8% on average for the 14th Finance Commission period through 10% shock to capital expenditure to GDP ratio with 7th Pay Commission Award endogenized.
- Targeting Fiscal deficit and total liability to 5.4 and 60% of GDP, respectively by 2019–20 through expenditure switching.

Empirical Validation:

The estimated model has been solved for the sample period 2009–2020 to 2012–2013 and validated for this period. The RMSPE (Root Mean Square Percent Error) for all key variables except Capital Flows and Trade Balance is less than 5%, implying the robustness of the estimated model. The model is found to capture majority of the turning ponies.

The model is then used for out-of-sample simulations.

The results indicate that the 7th Pay Commission Award would result in higher growth rate of 7.6% and slightly higher inflation rate, higher revenue deficit, CAD, and government liability. Expenditure switching policy which is the core of expansionary fiscal consolidation, of the increasing government capital expenditure and reducing transfers could result in higher growth with a manageable fiscal deficit of 5.3%, that also brings down the government (central + states) liability to around 60% by 2019–20,

This major study attempted by Bhanumurthy and two of his junior colleagues in NIPFP will be found very instructive by students of macroeconometrics in India. The careful specification of the model, the issues investigated, the econometric rigour, and the policy-relevant results are the strengths of this painstaking exercise.

Future work may pay attention to the 2016 demonetization and the adoption of GST in 2017, COVID-19 during 2020–21 and its new waves in macroeconometric analysis. Bhanumurthy et al. (2017) have set a good example.

6.3 DSGE Modelling for the Indian Economy

In modern macroeconomics, dynamic stochastic general equilibrium (DSGE) modelling plays an important role in analysing economic fluctuations and evaluating policy interventions. DSGE models are based on microeconomic foundations, rational expectations behaviour of the economic agents and decision rules from optimizing conditions. They incorporate market imperfections and different types of frictions. This class of models features coherent inter-temporal general equilibrium foundations to analyse both short-run fluctuations and long-run growth within a single consistent framework along with endogenous treatment of expectations. Different

sources of uncertainty are conceptualized as shocks emanating from the structure of the economy or policy interventions. These models offer scope for circumventing the Lucas Critique in econometric validation, a better understanding of the transmission mechanisms of the shocks, economic forecasting and counterfactual policy experiments.

In the wake of seminal papers of Smets and Wouters (2003, 2007) and Christiano et al. (2010), many variants of the DSGE models have been published. The progress in computational techniques has facilitated the application of DSGE models to study the linkage between monetary and fiscal policies, inflation and the business cycles, which are at the core of policy discussions. Nearly 20 central banks, including the Bank of England and the European Central Bank, the Bank of Thailand, across the globe have adopted the DSGE type macroeconomic models for policy formulation and declarations.

In India, academic research using the DSGE framework has expanded, especially in the second decade of the twenty-first century. Anand et al. (2010) study an open economy DSGE model with financial accelerator mechanism. Gabriel et al. (2012) examines a structural model of a closed economy. Levine and Perlman (2011) provide an optimal rules-based interpretation of the policy framework for the Indian economy. Goyal (2011) explores the effect of monetary policy in an open economy environment with dual labour markets. Bhattacharya and Patnaik (2015) examine the empirical puzzle of consumption volatility.

More recent studies include Banerjee and Basu on the effects of QE (quantitative easing), Khera (2016) on the macroeconomic impacts of informality and gender inequality, Anand and Khera (2016) on the macroeconomic impact of product and labour market reforms on informality and unemployment in India.

In the above set of papers for India, the quantitative analyses of the DSGE models are carried out using calibration or estimation. In the case of estimation, Bayesian estimation has been preferred over ML and GMM methods. The models are validated later with business cycle moments of variables of interest, as in the case of Banerjee et al. (2018), Banerjee and Basu (2019), and Banerjee et al. (2020). The first two papers exploit the Bayesian methodology rigorously to estimate the posteriors of structural and policy parameters using priors from the existing literature and relevant data indicators. Banerjee et al. (2020) relies on the calibration process by matching moments.

Section 8.6.3 is a comprehensive outline of the progress in the DSGE modelling in recent decades, with special reference to India.[1]

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[1] I wish to acknowledge the valuable advice and help I received from Dr S. Banerjee in preparing Sect. 8.6.3.

6.4 Econometric Analysis of Public Debt Sustainability of Indian States

Sangita Misra et al. (2021), "Subnational Govt. Debt Sustainability in India: An Empirical Analysis" in Macroeconomics and Finance in Emerging Market Economies, July 2021.

This study assesses the public debt sustainability of Indian states by employing two measures of debt: (1) conventional, denoted by D and (2) augmented, denoted by AD.

AD incorporates off-budget liabilities in the form of outstanding guarantees issued by SPSEs (state public sector enterprises). Two approaches are explored: Indicator based approach and Model-based econometric approach.

In view of space constraint, this review will be confined to the model-based econometric approach. Data for 26 states for the years 2004–05 to 2017–18 are used in the analysis.

Fiscal Policy Response Function (Bohn approach, 1998):

$$P_t = a + bD(t-1) + c'X_t + \varepsilon_t$$

is estimated, where P = Primary Balance to GDP ratio, D = Debt stock to GDP ratio, X is a vector of control variables, such as real GDP gap, revenue receipts (RR), primary expenditure; a, b, and c are parameters to be estimated; e is the regression error term.

"b" is the principal coefficient which measures the response of P to D. If $b > 0$, then debt tends to be sustainable.

The AD (augmented debt) replaces D in the second set of regressions.

Panel Unit Root tests on the variables have rejected the null hypothesis of non-stationarity.

The above functions are estimated using panel data for 26 states and 14 years. Due to the use of lagged debt variable as a regressor, the total number of observations is $26 \times 13 = 328$.

The Hausman specification test is applied to choose between FE (fixed effects) and Random Effects (RE) models, and the RE model is chosen. The FGLS model has also been estimated to deal with heteroscedasticity.

The RE regression with D as the prime regressor shows that its coefficient is significantly negative, implying the rejection of the null hypothesis of debt unsustainability.

The results for AD as the prime regressor show that debt is unsustainable. Guarantees given by states, if invoked, can turn out to be potential risk to debt sustainability for Indian states. Robustness checks reported in an Appendix show that the above inferences are robust to possible common misspecifications.

Policy implications on the fiscal side: The FRLs (Fiscal Responsibility Legislations) adopted by the states in the 2000s should be reviewed, as the Centre reviewed

its FRBM in the 2018–19 Union Budget whereby debt was explicitly added as a target variable along with fiscal deficit.

Final Comment on the study:

This review of the paper has not done full justice to the paper on an important theme with important policy significance.

There is much to learn from the careful and detailed analysis in the paper. As in all applied econometric work, involving economic theory, quality of the data base and econometric methodology, there may be scope for improvement. This is inherent in research.

The authors from RBI and IIT Bombay deserve to be congratulated.

7   Economic Well-Being and Deprivations in India

The theme of this section is the same as R. Radhakrishna's Presidential Address at the 44th Annual Conference of TIES (The Indian Econometric Society) in 2008. The theme has immense contemporary socio-economic relevance. Radhakrishna has pursued the subject passionately through his writings and addresses at important conferences in India. He has elaborated and updated his original ideas in the 2008 address. For his quantitative analysis, he has relied mainly on the NSS (National Sample Survey) interstate data on consumer expenditure for the years 1993–94, 2004–05, 2009–10 and 2011–12. In an important paper, "Assessment of Well-being in Multidimensional Perspective in Post-Reform Period", co-authored with C. Ravi and B. S. Reddy, Indian Economic Review, 48(1), 131–166, a comprehensive analysis of changes in economic well-being of the entire population and of the sub-groups of the population in rural and urban areas is based on real per capita consumer expenditure and on the Atkinson Social Welfare Function (SWF). The important aspects covered are:

- Changes in Economic Welfare and Inequality
- Interstate Disparities in Growth and Poverty Reduction
- Comparative Assessment of Well-being Across States
- Poverty Among Social Groups
- Multidimensional Poverty
- Multiple Deprivations
- Child Malnutrition, and
- India's Rank on Well-being Among Countries.

One of Radhakrishna's recent papers, namely "Growth, Well-being and Institutions in India: A Historical Perspective", summarizes the main results of his analysis, and presents India's rankings in an international perspective.

Radhakrishna's May 2021 paper mentioned above diligently exploits most recently published Indian and cross-country data sources and documents to assess Indian performance on well-being and deprivations. Drawing upon his earlier papers,

Radhakrishna notes that the recent pattern of growth and development has been characterized by a widening of interstate, rural–urban and intra-urban inequalities, a slow rate of malnutrition and slow expansion of employment. Furthermore, India is lagging behind China in literacy, education at different levels, and R&D expenditure.

Towards the end of the paper, he presents India's ranking for two time points in cross-country framework, in (i) World Happiness Index for 2011–122 and 2017–19, (ii) Social Progress Index for 2014 and 2019, (iii) Global per capita GDP (PPP$) in 2002 and 2019, and (iv) Global Hunger Index for 2000 and 2019. Whereas China registered considerable improvement over time in all four dimensions, India's position worsened in respect of the Happiness Index and the Hunger Index. Bangladesh performed better than India on the Hunger Index. Unfortunately, India is among countries at the bottom of the international rankings relating to well-being.

Conclusion: Radhakrishna's initiative and sustained effort on the theme of Wellbeing and Deprivation in India is truly praiseworthy. The economics community and policy makers will be highly grateful to him.

8 Studies in Econometrics of Diets and Child Undernutrition

8.1 Gaiha, Jha and Kulkarni (Eds., 2014)—Diets, Malnutrition and Disease: The Indian Experience

This book is a valuable research contribution in the broad area of Econometrics of Diets and Malnutrition. It meticulously documents the results of econometric/empirical analysis on eight substantive themes utilizing appropriate available micro-data sets from the National Sample Survey (NSS), India Human Development Survey (IHDS)-2005, and primary data collected for the analysis in Chap. 9: A Comparative Analysis of the Public Distribution System in Indian States. Besides one or two of the three editors of the book,

Nidhi Kaicker, Anurag Sharma, or Manoj Pandey are the authors of some individual chapters of the book. All the eight substantive Chapters 2–9, deal with themes of high socio-economic significance. There is much to learn from the insightful analyses in the chapters. In Chap. 10, the findings on the different themes are reviewed from a policy perspective. In view of the space constraint, only Chapters 2 and 7 will be reviewed in this essay.

As stated by the editors in Chap. 1, the book project began as a critique of an influential paper by Aungus Deaton and Jean Dreze (2009).

Peter Timmer, Professor Emeritus, Harvard university, in his Foreword to the book, draws attention to an important puzzle: "Why is India's rapid economic growth in recent decades not transforming the diets and health of the poor, especially in rural India?".

Chapter 2: Demand for Nutrients in India, 1993–2004, Authors: R. Gaiha, R. Jha, and V. S. Kulkarni

Objective of the Chapter: To throw more light on the decline in the intake of calorie and other nutrients (protein and fat) over the period 1993–2004.

Data: Unit record data of the NSS 50th (1993–94) and 61st round (2004–05).

Demand functions linear in coefficients for the three nutrients in rural and urban areas by pooling the data for 1993–94 and 2004–05 are estimated by OLS, with standard errors of the coefficients corrected for heteroscedasticity. The regressions are referred to as Robust Regressions.

Dependent variable: log of nutrient consumed by the household.

Explanatory variables: vector of log of food prices at the village level computed from NSS data, log of household per capita expenditure, a vector of household characteristics (adult males, females, household size), time dummy for the year 2004–05, and interaction variables of price variables with time dummy.

The regression results from pooled data for 1994–95 and 2004–05 are presented in six tables, three for rural areas (Tables 2.7, 2.8 and 2.9) and three for urban areas (Tables 2.10, 2.11 and 2.12). The sample sizes are 34,371 for rural areas and 24,802 for urban areas. Table 2.7 is for the nutrient calories, Table 2.8 for protein and Table 2.9 for fat in rural areas. The authors discuss the results in the tables in sufficient detail, carefully interpreting the sign and significance of the coefficients.

The estimated coefficients/elasticities are plausible and imply robust price and expenditure effects. The demand theory-based explanations of the authors supplement/modify the Deaton-Dreze (2009) explanation. The authors have developed an explanation for the changes in the intake of calories, proteins, and fats over the period 1993–2004 in the standard demand theory framework, with food prices and expenditure, as a proxy for income, as explanatory variables. The separate regressions for rural and urban areas bring out food price and expenditure effects very clearly. Also, changes in food price elasticities are significant. The dummy variable for 2004–05 has a significantly negative coefficient, for calories and proteins reflecting a downward shift in the demand functions for calories and proteins. However, the coefficient is positive in the case of fats. The authors of the chapter deserve to be complimented for their imaginative and meticulous exercise. Complete study of the chapter will be very rewarding. The use of unit record data for large samples is an attractive attribute of the study.

Chapter 7: Child Undernutrition in India, Authors: R. Gaiha, R. Jha, and Vani Kulkarni

The theme of child undernutrition in India has been studied extensively in recent decades. Deaton and Dreze (2009) and Swedberg (2010) have dealt with the problem in considerable detail. India is one of a few countries with the worst levels of prevalence of low birth weight, underweight, and stunting among BRIC and SAARC countries.

This chapter reviews the extent and severity of different conventional indices of child (0–5 years) undernutrition in India. A new index, CIAF, proposed by Svedberg

(2000) is constructed using data from India Human Development Survey (IHDS) 2004–05. The survey was conducted jointly by the University of Maryland and National Council of Applied Economic Research (NCAER). This index encompasses all undernourished children, be they wasted and/or stunted and/or underweight. This index is referred to as Composite Index of Anthropometric Failure (CIAF).

The constructed CIAF series for India points to more pervasive anthropometric failure, relative to conventional indicators of being underweight, stunted or wasted. The CIAF is about 59%. Among the 7 groups in terms of combinations of, stunting, wasting and underweight, stunting alone accounts for well over half of the CIAF. Children who fail in all three dimensions account for 13.5%. the underweight alone account for the lowest share (about 6 per cent).

The chapter reports several other interesting results relating to CIAF. It analyses the Determinants of Anthropometric Failures in a linear Regression framework using data for around 4600 households in IHDS, 2004–05.

The dependent variable is CIAF.

The explanatory variables are Age of household head, caste (SC, ST, OBC), gender of household head, marital status of the head, years of education of head, number of children (0–5 years), kitchen with vent, piped water, rural areas, urban metro; log PCME, log prices of 18 consumer items. In regard to the regressor education of the household head, two specifications are compared. In the first years of education of the household head is one of the regressor. In specification 2, two variables: Highest Years of Education: Female, and Highest Years of Education: Male are introduced. The detailed regression results are presented in Table 7.3.

Elasticities are presented in a separate column.

- As the authors note their analysis of determinants of CIAF yields some new insights:
- Household characteristics–specifically, mother's education, quality of kitchen, poverty and location (rural area or metro are all linked to aggregate anthropometric failure. Income matters much in reducing the CIAF.
- More important are some food price effects, as they induce substitution between commodities.
- Acceleration of income growth, together with food price stabilization will help reduce child undernutrition.
- Female education has the desired effect, but less strong than expected.

In the concluding chapter of the book, the editors highlight two major concerns with regard to child undernutrition: (1) the imperative of women's empowerment, and (2) inconsistency between ICDS (Integrated Child Development Scheme) and NRHM (National Rural Health Mission). They have made the following two recommendations:

- Public policy interventions that enhance women's educational attainments and employment options, and amendment of inheritance laws in their favour are recommended for higher female empowerment.

- A community-based programme for the management of SAM (severe acute malnutrition) of children led by ICDS through a combination of therapeutic food, nutrition counselling, regular monitoring and community mobilization should be adopted.

This is an important chapter in the book. The authors have done a very creditable job. Our review leaves much to be desired.

8.2 Causal Estimates of the Impact of ICDS on Children's Diets

Many recent studies have estimated the causal effect of a "treatment" on some kind of response. Cameron and Trivedi (2006), Angrist and Piscke (2009), Durlauf and Blume (2010), Stock and Watson (2018), Greene (2018) have useful discussion of this broad theme.

Mittal and Meenakshi (2018) reported the causal estimates of the impact of ICDS (Integrated Child Development Scheme) on quantity (calories) and quality (protein, iron, and vitamin A) intakes of children in the age groups 0–3, and 3–6 in rural areas of Bihar. They use matching techniques to define an appropriate counterfactual. The data was collected by them in a primary survey in four sample villages in two districts, selected on the basis of a suitable sampling design. In each sample village, 80 households were drawn with probability proportional to size of land holding: 30 landless households, 25 small, 12 medium and 13 large, a total of 80 per village: 320 households in all. The survey was conducted over a period of 3 months in early 2013.

Supplementary Nutrition (SN) was the service provided by the ICDS: cooked meal (lunch) consisting of rice, pulses and vegetable for children in the age group 3 to 6 at the Anganwadi centre on six days in the week. Dry ration of 2.5 kg of rice and 1.25 kg of pulses was supplied to the mother of the child every month. The monetary value of the two modes of food supplementation was Rs. 104 per month.

Mittal-Meenakshi paper presents in Table 1 the summary statistics in adequate detail.

The impact of ICDS on energy and nutrient intakes for the full sample is presented in Table 2 by type of matching. Tables 3 and 4 are for the age groups 3–6 and 0–3. Results for Pseudo -R squares are given in Table 5.

Results on the impact of the SN scheme:

- The 3–6 age group benefited from the scheme in terms of increase in calories, protein and iron but in regard to vitamin A.
- The 0–3 age group, which was supplied dry ration through mothers did not benefit.

Conclusions on the study

The two researchers planned and conducted the study with meticulous care, with full awareness of the measurement errors, and guarding against them. They were careful in interpreting the results. They have set a good example for similar exercises in other backward states in the country.

The problem of Child undernutrition on India is persisting in spite of impressive economic growth and substantial poverty reduction. It is to be hoped that ICDS has better impacts in most other states in India.

The average treatment effect on the treated is given by

$$ATT = E\left(\frac{F1}{Z}, D = 1\right) - E\left(\frac{F0}{Z, D = 0}\right)$$

where Z is the vector of covariates.

Estimation method: matching.

Several types of matching procedures including Propensity Score were explored.

9 Studies on Firm-Level Productivity, Exports, FDI, and Competitiveness

In this section several recent studies using firm-level data and employing appropriate econometric methods will be briefly reviewed.

9.1 K. Narayanan and S. K. Sahu (*2020*), Firm-Level Productivity and Exports: The Case of Manufacturing Sector in India

Narayanan and Sahu (2020) analyse total factor productivity (TFP) differences between exporting and non-exporting firms in the manufacturing sector and examine whether exports contribute to TFP differences. They use the Prowess IQ database from CMIE, for the period 2003–2015. A total of 54,139 firm-year observations for an average of 4164 firms are in their unbalanced panel dataset. The firms in the dataset are classified into two categories: (1) small exporting firms and (2) large exporting firms, based on average export intensity of exporting firms. Category (2) has 650 firms and category (2) has the rest of the firms in the sample. The average export intensity of category (2) is significantly higher than that of category (1). TFP is estimated using Levinsohn and Petrin (2003) method of estimating the production function to overcome the problem of endogeneity bias of OLS (ordinary least squares) estimates.

The cumulative distribution functions (CDFs) of exporters and non-exporters are compared using the concept of Stochastic Dominance and the difference is tested using the Kolmogorov–Smirnov test. The results show that exporting firms have a higher level of TFP. The firms with higher level of TFP self-select to the export market. Firms with lower level of TFP are forced to exit the export market, and the continuing exporters have higher TFP. The results show that size of the firm plays an important and greater role than the age of the firm in export performance. This is a pioneering study in terms of using the concept of Stochastic Dominance and applying the Kolmogorov–Smirnov test in the context of Indian manufacturing firms.

9.2   Chawla (2020), Foreign Involvement and Firm Productivity: An Analysis for Indian Manufacturing, Service, Construction and Mining Sectors

This paper deals with the recent development of outward foreign direct investment (OFDI) from India. It compares the TFP of firms that engage in OFDI and exports to those which engage in exports and domestic operations only. The analysis has wider coverage encompassing firms in manufacturing, services, construction, and mining sectors; TFP distributions across firm categories, based on foreign involvement, are compared for each sector, following the nonparametric approach of first-order stochastic dominance and applying the Kolmogorov–Smirnov test. The Prowess dataset for the period 1995–2010 is the major data source for the study.

An important methodological contribution of the study is the comparison of productivity using the Levinhosn and Petrin (LP) (2003) methodology and its modification proposed by Wooldridge (WLP) (2009) involving the value-added (VA) specification of the production function. The VA specification validates the Helpman et al. (2004) and Head and Ries (2003) hypothesis more strongly than the GO specification of the LP approach. For manufacturing and construction sectors, the cross-sectional differences in TFP between outward investors engaged also in exporting, pure investors, and domestic firms are found to support the Helpman et al. (2004) hypothesis of self-selection into foreign markets.

The VA specification, however, suggests an upward bias in the productivity advantage of internationally engaged firms, highlighting the importance of controlling the "value-added bias". Productivity differences are in some cases found to vary by two-digit industry groups. In the Services sector, TFP comparisons show that pure export firms dominate the purely domestic firms and overseas investors that also export dominate the purely domestic firms. The author concludes that "qualified support" is found for the predictions of the theories of the heterogenous firms. The paper is very comprehensive and rich in analysis. Grasping its full implications requires several hours of concentrated study.

9.3   R. Banga and K. Banga (2020), Digitalization and India's Losing Export Competitiveness

In this paper, the authors draw attention at the outset to the steep deceleration in the average annual growth rate of India's merchandise exports in the period 2011–2017 to 5.5% per year from 21% per year in the earlier period 2003–2010. India's share in global exports too experienced a steep fall from 8.4% in 2003–10 to 3.1% in 2011–17 overall. Their investigation through the estimation of Revealed Comparative Advantage (RCA) of India's exports in different sectors and products showed that it lost RCA in nine out of 15 sectors. Most of the country's traditional export products, including precious stones, jewellery, spice, tea, cotton, fabrics and leather lost comparative advantage.

The major significant contribution of this paper in the context of declining competitiveness of India is an econometric analysis of the impact of digitalization on merchandise exports. The analysis has been conducted at the sectoral level as well as firm level. Four different methodologies have been explored:

a   .Use of digital services (computer programming and information services and telecommunication services) in the production of manufactured products at the sectoral level,
b   .Value added by digital services (DS) in exports of manufactured products at the sectoral level,
c   .Impact of share of digital assets in total expenditure on plant and machinery on export intensity using system Generalized Method of Moments (GMM) estimation at the firm level, and
d   .Impact of digital assets on export intensity using random effects (RE) panel Tobit estimation at the firm level.

Estimation Results:

Sector Level: The extent of digitalization is an important determinant of the country's export competitiveness; the use of digital services in manufacturing has increased during 200–2014. However, only 9% of the total value added by digital services has been used for the exports of manufactures, while 91% has been used for the exports of services. Compared to 9% for India, the figures for Turkey, China, Indonesia and Brazil are 78%, 60%, 57%, and 54%. respectively. The authors of the paper attribute the decline in the growth rate of merchandise exports of India to the very low use of digital services in the export activity.

Firm-Level Econometric Analysis:

Both the GMM estimation and the RE panel Tobit estimations show that the higher the share of digital assets in total plant and machinery expenditure of a firm, the higher is the firm's export intensity, *ceteris paribus* Robustness checks confirm the findings. The authors of the paper have several useful policy suggestions for increasing digitization of the country's exportable sectors, especially traditional exports like textiles and clothing, leather and leather products which are low-skilled labour-intensive.

The study with its immense policy relevance is a valuable addition to the literature. The authors deserve to be profusely complimented for their painstaking research on a very important theme.

10 Contributions on Urban Slums, Rural Labour Market, and Chronic Poverty

10.1 Arup Mitra and Yuko Tsujita (2016)—Issues in Upward Mobility: Study Based on Longitudinal Data from Delhi Slums

The analysis in this paper is based on two primary field surveys of the same slum households in Delhi in 2007–08 and 2012, to measure the change in income of the individual workers and identify the important correlates of upward income mobility using econometric methods. The findings indicate an increase in the income of workers resident in the households over a five-year period. Though the rise in income is across a sizeable per cent of households, many remained below the official poverty line.

The data was collected using a 3-stage stratified random sampling design. A total of 517 households from 50 slum clusters in nine revenue districts of Delhi were in the sample in the first round of the survey during 2007–08. An attempt was made to collect the second round of data in 20,012. However only 279 households in 46 slum clusters could be identified; four slum clusters were demolished by 2012. Much of the analysis reported in the paper is based on data from 279 households, with 918 persons, including 399 workers. Data on the socio-economic background of the sample households and individuals was collected in the two rounds of the survey. The descriptive statistics for the 279 households and persons for the two survey rounds are presented in Table 1.

Upward mobility has been considered mainly in terms of workers' income increase in 2012 relative to 2007–08. Probit and tobit models have been estimated and the results are presented in Table 5. For the probit model, the dependent variable, $Y = 1$ for upward mobility of the worker, $Y = 0$, otherwise. For the Tobit model, the dependent variable is the increase in income in 2012 relative to 2007–08. The explanatory variables for the two models, are age, past income, saving, gender, education, SC, ST, OBC, Muslim, head of household born in Delhi, etc.

Main Results:

- The evidence for significant mobility across occupations is rather weak. 62 per cent of the workers gained income in 2012 relative to 2007–08.
- Education has been found to be a strong determinant of rise in income; accessing a public sector is positively associated with income increase; gender bias and caste bias have been found of upward mobility compared to the natives.

- Growth has not been found to be pro-poor; migrants show a higher probability.

The authors of the paper applied the Instrumental Variable method to deal with the possibility of endogeneity. Several alternative model specifications such as the classical regression, with income change as the dependent variable has been estimated. The authors conclude that investment in human capital formation, infrastructure development, and asset creation are crucial for upward income mobility. This is an important policy observation.

The study has several attractive features:

i. Model formulation in the light of comprehensive literature review.
ii. Study of Delhi slums at two time points in a recent period, by experienced and competent researchers, using appropriate methodology.
iii. Valuable findings with important policy implications.

10.2 S. Khanna, D. Goel, and R. Morissette (2016): Decomposition Analysis of Earnings Inequality in Rural India: 2004–2012, IZA Journal of Labour and Development (2016) 5:18

This study is about change in earnings of paid workers in rural India in 2011–12, relative to the year 2004–05, using NSS Employment–Unemployment Survey data for the two years. The theme is important, given the fact that the slowest growing sector of the Indian economy, agriculture, employs the largest share of the workforce.

The study uses the Recentred Influence Function (RIF) decomposition developed by Firpo et al. The focus is on direct measures of earnings inequality, such as, Gini and 90/10 percentile ratio, and decomposition of the change in 2011–12 relative to 2004–05 into changes in worker characteristics and changes in returns to these characteristics. The authors use unconditional quantile regressions (UQRs) to estimate the effects of worker characteristics on earnings at different quantiles. They use the RIF decomposition to divide the overall change in earnings inequality into a composition effect, due to changes in the distributions of workers characteristics, and a structure effect, due to changes in the returns to these characteristics.

During the 7-year period 2004–12, real earnings among paid rural workers increased at all percentiles and the per cent increase was greater at lower percentiles. Consequently, earnings inequality declined in rural India. RIF decompositions reveal that throughout the earnings distribution, except at the very top, both the effects increased earnings with change in the latter playing a bigger role. Earnings inequality increased as workers improved their education levels.

The kernel density estimates of the log of real weekly earnings for 2004–05 and 2011–12 are skewed to the right. The density function for 2011–12 shifted to the right and became more peaked (less dispersed). The mean weekly earnings increased from Rs. 391 to Rs. 604. However, according to the official estimates, 25.7% of the rural population was below the poverty line in 2011–12.

The authors of the study were not optimistic about the continuation of improved distribution of rural earnings in the post 2011–12 period, in view of the volatility in global crop prices and uncertain weather conditions in India. Policies designed to foster employment opportunities and wage growth of unskilled workers outside of agriculture are crucial for the economic well-being of the "second part of India".

The theme of the study has considerable policy relevance; the methodology of the study is quite novel; the choice of the datasets is appropriate; and the presentation of the results is lucid and guarded.

10.3   Brief Review of a Recent Book on Dimensions of Poverty in India

A. K. Mehta, S. Bhide, A. Kumar, and A. Shah (Eds. 2018 *): Poverty, Chronic Poverty, and Poverty Dynamics: Policy Imperatives, Springer*

This collection of essays edited by Kapur et al. is an important recent contribution to quantitative analysis of dimensions of poverty in India. The country still suffers from extreme and chronic poverty in spite of a variety of policy actions over several decades and high economic growth in recent decades. Many social scientists have devoted their research efforts to find remedial measures. During the past 10–15 years, the four editors of this volume actively participated in a research project on chronic poverty in India as part of an international initiative. The editors and other authors suggest a number of public policy actions for tackling the problem, in the framework of three Sustainable Development Goals. SDG 1, SDG 2, and SDG 3. The essays in the book are:

- Chapter 1: Mehta. Bhide, Kumar and Shah—Introduction.
- Chapter 2: Mehta and Bhide—Poverty Trends and Measures.
- Chapter 3: Bhide and Mehta—A Review of Poverty Dynamics Issues.
- Chapter 4: N. C. Saxena—Hunger, Undernutrition, and Food Security.
- Chapter 5: A. Kumar and K. Kant—Addressing Poverty and Conflict: Learning from a Gandhian Initiative in Mushahari, Muzaffarpur, Bihar.
- Chapter 6: A. Shah, I. Pattanaik and A. Kumar—Changing Scenario of Migration and Poverty in India.
- Chapter 7: A. K. Mehta and S. Pratap—Ill health and Policy: Policy Imperatives.
- Chapter 8: A. Shah and K. B. Chhokar—Interface Between Education and Poverty in India: Eluding Goals and Search for New Perspectives.
- Chapter 9: Mehta and Bhide—Conclusions.

A review of the policy measures formulated by NITI Aayog in recent years, the working of the National Assistance Programme (NAP) and the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNRES) programmes of the Government of India are appraised in Chap. 9. Focus on a systematic approach to identify people mired in poverty in each village and slum to attend to their needs

is advocated. Casual agricultural labour, marginalized groups, especially scheduled tribes deserve special attention, as highlighted in the study. The volume of essays based on field work and desk research conveys the important message that extreme and chronic poverty need focused action.

Space constraint comes in the way of a more detailed review of the book, which presents a wealth of data and analysis on different dimensions of poverty and deprivation. It may be added, in passing, that R. Radhakrishna has written and spoken extensively in recent years on human well-being and pathways out of poverty, inequality and undernutrition.

Seema Chisti, a well-read journalist based in New Delhi, has highlighted India's abject poverty and has argued that if the country is to be "repaired", the number of the poor has to be meticulously counted. (The Hindu, June 22, 2021, Editorial Page). Ms. Chisti's suggestion is related to the important Poverty Debate in India.

11   Concluding Remarks

This essay has sought to review selectively and briefly the research in the post-Independence period mainly in Applied Econometrics and to a limited extent in Quantitative Economics, with focus on the literature of the twenty-first century. The extant literature is vast and diverse field-wise. Some of this literature has been covered in the Presidential Addresses at the Annual Conferences of the Indian Econometric Society (TIES), documented and admirably reviewed in Pandit and Shanmugam (2008). The present essay adds to that review.

As mentioned in Sect. 1: Introduction of this essay, Sect. 2 is a short guide to modern econometrics, relevant to this essay. Sections 3 and 4 deal with the literature of the second half of the twentieth century, while Sects. 5, 6, 7, 8, 9 and 10 deal with the literature of the first two decades of the twenty-first century. The review spans areas in macroeconometrics as well as microeconometrics.

On account of the space constraint, the individual reviews in the current essay have been brief. The contributions in several areas by prominent senior scholars could not be covered. The author apologizes for not being able to cover the contributions of scholars, such as K. Basu, T. C. A Anant, B. Kamaiah, M. Ramachandran, S. Raja Sethu Durai, B. Chatterji, N. Hatekar, R. Dholakia, C. Veeramani, T. V. S. Ramamohan Rao and Ganti Subrahmanyam.

The contributions originating in leading institutions in the country were mentioned in Krishna (2019). One major omission in Quantitative Economics is the literature based on India KLEMS data sets; the India KLEMS project now at the CDE, Delhi School of Economics with financial support from RBI has been constructing data series on output (Gross Output or Value Added) and inputs, capital (K), labour (L), energy (E), materials (M) and services (S), for 27 industries (sectors) comprising the Indian economy, for the years 1980–81 onwards. The project is affiliated to the World KLEMS Initiative launched by D. Jorgenson at Harvard university in 2010, and ASIA KLEMS set up a little later.

Research papers on more than 300 studies in different areas of Applied Econometrics and Quantitative Economics are presented at the Annual Conference of TIES, in recent years. N. R. Bhanumurthy, Secretary, TIES, K. Shanmugan, Treasurer and their associates have been instrumental in organizing workshops in Econometrics and software in different parts of the country. The multifarious activities of TIES have been documented in Pandit and Shanmugam (2008) and Krishna (2019).

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Governance and Institutions

Governing India: What Do We Know and Need to Know?

Rahul Mukherji

1 Introduction

Seventy years of political independence is an opportune moment for reflecting on how India governs its growth and citizen well-being. The substantive part of India's democracy is ridden with many challenges. First, India's diversity had puzzled social scientists. How could a single state live with such diversity in language, religion, cultural and economic attributes (Harrison, 1960)? How could democracy emerge without a substantial bourgeoisie (Moore, 1966)? How could a nascent and underdeveloped state serve rising citizen aspirations due to industrialization, urbanization and modernization (Huntington, 1968)? Second, India's democracy was often characterized as procedural rather than being a substantive one. Citizens voted, the military never came to power, and yet poverty and deprivation were rampant. Scholars addressed this puzzle by suggesting that India is a clientelistic democracy where political parties purchase votes in return for particularistic privileges rather than seeking to benefit the citizen ryat large (Piliavski, 2014; Chandra, 2004; Witsoe, 2013; Vaishnav, 2017). Does India's liberal democracy, amidst unprecedented diversity, and rampant clientelism possess the capacity to serve the citizen and play a responsible role in the world?

We review the literature on clientelism. It reveals why India is unable to grow more rapidly and serve its citizens with greater ease. This literature is significant for explaining India's failures in governing both economic growth and citizen well-being (Mukherji, 2014b). Despite these substantial challenges to growth and well-being,

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however, populous, large and economically dynamic India has assumed a significant role in shaping global governance. India is the world's third largest economy in terms of purchasing power parity, and its growth rate is among the highest in the Brazil, Russia, India, China and South Africa (BRICS).[1]

The country's growth rate even surpassed China's. This is significant, even though China's historic most rapid growth known to mankind has produced a substantially larger economic pie.[2] What is more interesting is that India's growth is driven to a greater extent by its internal rather than the global economy compared with China's.[3] India's growth forces us to think that rapid economic growth is possible in a post-colonial and diverse liberal democracy—very different from the standard narratives of rapid economic growth in East Asia.[4] This implies that we need to explore how a liberal democracy such as India sometimes transcends clientelistic politics that characterized dismal rates of growth (Bardhan, 1984).

Concerned about miserable levels of citizen well-being, the country has launched one of the world's largest employment guarantee schemes, as part of a rights-based approach to development that includes the right to work, education, and forests rights, among others. Growth with redistribution is making an impact on India's poverty rate (Markussen, 2011; Maiorano, 2014; Mukherji, 2014; Klonner & Oldiges, 2014; Muralidharan et al., 2016; Mukherji & Jha, 2017).

This paper presents a way of thinking about the mechanisms of citizen-friendly governance in a democracy, where patronage-based clientelism is rampant. We begin with a review of the literature on clientelism. This will tell us a great deal about the pathologies of governance in India, and it will make clear why the glass of India's development is half empty.

We then turn to the issue of governance. For example, how did India govern its rapid economic growth? How did states like undivided Andhra Pradesh implement the right to work and successfully transfer resources to the poor? Thereupon, I present a tipping point model to suggest that ideas within the state matter for understanding how the Indian state develops the capacity to govern in a citizen-friendly manner. We demonstrate that ideas within the state in India evolve as a result of bureaucratic puzzling and political powering to reach a tipping mark. When politics and technocracy point largely in the direction of a certain policy paradigm, and an ideational threshold has been reached, the state develops the capacity to deliver for reasons largely internal to the state. This is the story of gradual path-dependent economic change.

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[1] See The World Bank, World Development Indicators (2017). Date accessed: 6.7.2018 http://databank.worldbank.org/data/download/GDP_PPP.pdf.

[2] ibid.

[3] Trade to GDP ratio (Trade % of GDP) in China is 38 in 2017 where as this rate in India is 41. See The World Bank, World Development Indicators (2017). Date accessed: 6.7.2018. These figures are different from the conventional wisdom, which is in the text. https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS.

[4] For the difference between India and East Asia see Herring (1999) and Mukherji(2016).

2   Clientelism and the Pathologies of Democracy

Let us consider the powerful view that India is merely a procedural democracy. The democratic failure to serve the citizen has been described by the term clientelism. Clientelism is based on patron–client relations where electoral outcomes can result from ethnic- or class-based populism that does not serve all citizens impartially. Clientelism occurs when people trade votes for particularistic favours (Hicken, 2011; Wilkinson, 2007). The first form of clientelism has an ethnic basis in India. Oftentimes, citizens vote on the basis of the age-old ascriptive Indian institution—caste. Kanchan Chandra, for example, argued that the poor and most oppressed Dalit voters voted for the Dalit-Chamar caste-based Bahujan Samaj Party (BSP) in Uttar Pradesh not because the party would uplift the socially and economically marginalized groups. They voted to feel more secure with their own caste or ethnic group in prominent positions of leadership. Ethnic voting for Chandra becomes rational because the marginalized Dalit population felt comfortable with a Dalit party in the absence of other candidate in formation in a predatory social system. The Congress Party had earlier provided representation to Dalits, but the BSP was a Dalit party that gave representation to upper-caste groups as well. The tables had clearly turned (Chandra, 2004).[5] Another scholar argued that the rise of backward caste groups in the poverty-stricken state of Bihar, though considered a governance failure for investment and growth, actually led to a general reduction in poverty, even though the substantial benefit went to one particular powerful backward caste group, the Yadavs. India has experienced a silent democratic revolution, where the hegemony of the upper castes is challenged by the numerous backward and most depressed caste groups (Witsoe, 2013).

The second form of clientelism has a class basis. Pranab Bardhan and Ashutosh Varshney contended that interest-based coalitions in India such as powerful farmers, industrialists and professionals have a stake in regressive and fiscally unsustainable policies such as free electricity to farmers, no agriculture tax, subsidies for unproductive industrialists and professionals, not because these benefit the citizenry at large (Bardhan, 1984; Varshney, 1998a; Mukherji, 2007; Murali, 2017). These subsidies were accorded to strong and powerful voting coalitions. The state in India, unlike East Asia, had failed in infrastructure provision and growth because it splurged resources on subsidies to powerful constituencies rather than investing in productive resources.

Such is the power of caste or class-based conceptions of policies and electoral outcomes in India that scholars were really puzzled by the big-bang economic reforms of 1991. Why did India embrace globalization and greater private sector orientation when political scientists and economists had largely theorized India as a "caged tiger"? One scholar argued that these changes were due to pressures from the business class (Pedersen, 2000). Another argued that these changes could only be initiated by stealth. Policy-makers pretended as if old policies were being continued when they were really changing the policy paradigm on the ground (Jenkins, 1999). Both these arguments did not support a democratic process. Others just described the changes

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[5] On the ethnography of clientelism in India, see Piliavsky (2014).

as the result of an elite revolt, without properly conceptualizing the nature of that elite (Kohli, 2012; Corbridge et al., 2013).

There is also a third form of clientelism in the Indian context. Historian Partha Chatterjee argued that India lives in a political rather than a constitutional civil society. Politicians and bureaucrats afford citizens some rights, but not by making constitutional provisions to safeguard them. Rather they look in the other direction when citizens grab basic amenities such as housing and spaces for selling by illegal means. Poor people vote more often than the rich, so it is important to make these illegal exceptions to garner the vote. Even this logic of governance is clientelistic— the state acts to help the ruling party remain in power rather than benefit the citizenry at large (Chatterjee, 2011).

Clientelism is a kind of populism based on caste, class and other narrow interest group pressures. Clientelism-based explanations reveal why India lacks the capacity to grow and serve the poor. Scholars therefore need to turn their gaze to other explanations for exploring the roots of rapid economic growth and poverty alleviation. Clientelistic politics tells us why the glass of India's development is half empty. If we wish to explore why it is half full as well, we need to pursue another explanatory path.

3   The Governance Literature

How did the Indian state develop the capacity to govern? India's consolidation as a democracy and its rapid economic growth in the new millennium, has spurred scholarship on governance. Several arguments have been proposed in this regard. Scholars such as Atul Kohli, Pradeep Chhibber and Irfan Nooruddin have argued, for example, that the nature of the party in power mattered for the provisioning of public goods. Kohli (1987) contended the Communist Party of India—Marxist, with a pro-poor social base and coherent ideology, was much better positioned to launch land reforms in West Bengal than was the centre-left Congress Party in the province of Karnataka. Chhibber and Nooruddin proposed a different conjecture. Two-party competition was more like lytoen gender public goods rather than a contest among many parties. Bi-polar competition was likely to garner overarching interests rather than a large number of parties each serving a small voter base (Chhibber & Nooruddin, 2004).

Parties often times worked indirectly with non-governmental organizations (NGOs) to serve citizens. It has been contended that the BJP was able to reconcile its upper-caste social base with lower-caste voters because some NGOs favouring the BJP, but seemingly independent of it, provided higher quality of health and education services than the ones provided by the government. The NGOs would seemingly work as non-party organizations. Closer to the elections, however, these NGOs would use their subtle persuasive skills to persuade the lower caste, lower class and tribal voters to vote for the BJP. This is how the BJP could reconcile their upper-caste sup-port base with votes from the deprived castes and classes as well (Thachil, 2014).

Another scholar argued for the significance of dense-party networks after comparing Jaipur and Bhopal. Where party networks were dense, slums were better served by politicians than where party networks were scarce. When parties realized that there were potentially poor and supportive voters, they afforded dense-party networks with efficient party workers. These areas enjoyed better public amenities such as roads and sanitation than those lacking such networks (Auerbach, 2016).

Local intermediaries and their contacts can also engender citizen concern. Local leaders often belonging to a lower social strata and with smaller land-holdings than the erstwhile elite have emerged as facilitators of development because they possess information and contacts. These local intermediaries were able to bring projects to villages from the district headquarters, often playing a substantial role in assuaging grassroots demands. It was because of these elites—for example "gaonkeneta" (village leaders)—that modernization theory's worst predictions were not realized in India. India was a country within creasing and diverse social demands that needed to be met in the context of limited institutionalization. Local leaders, according to some, played a signal role in ensuring that these demands did not become too burdensome for the state to manage (Krishna, 2007; Mitra, 1991; Jha, 2018a). Kruks-Wisner (2018) contended that rural citizens who travelled more widely and were extensively networked demanded more services compared with those who lived within villages and were less networked.

Some scholars have argued for the agency of political leaders as well for producing successful policies. Prime Minister Rao's biography stresses his role in the reforms of 1991 (Sitapati, 2016). There is also a substantial literature on chief ministers as CEOs that demonstrates why economic reforms succeeded in some states and not others. State-level chief ministers according to this account played an important role in advancing growth and welfare. According to this view, Chandrababu Naidu was able to guide Andhra Pradesh from a backward state to one that became well known for information technology—one that invited substantial Indian and foreign investors to Hyderabad's HiTech City (Rudolph & Rudolph, 2007). Similar arguments have been made less persuasively for welfare policies as well. Jenkins and Manor, for example, argue that implementation of the right to work in Madhya Pradesh and Rajasthan owed a great deal to the agency of the chief minister (Jenkins & Manor, 2017).

3.1   The Puzzle

There is substantial scholarship around the pathologies of governance or the lack of citizen orientation in India. These arguments are important for understanding why India remains mired in poverty and infrastructural bottlenecks. These theoretical frameworks, however, are unable to explain why India has consolidated itself as a plural democracy—a country that was known for the Hindu rate of growth, an adage where the word Hindu was meant to characterize laziness and incapacity. Moreover, afflicted by caste and powerful interest groups such as capitalists, commercial farmers

and professionals, India was supposed to be locked in low levels of human well-being as well. Democracy, it seemed, could not be married with well-being in India.

The status quo of a closed economy favouring the dominant coalition described above has been transcended to some extent. India has globalized substantially. A country that had all but banished foreign investment till 1991, now garners more investment than China in a typical year. India has afforded freedoms to entrepreneurs and state-level governments. Competition has driven down prices. India has one among the cheapest mobile call rates. How could a liberal democracy like India deal with powerful social actors ranged against the promotion of domestic and global competition?

Human development in India has also evolved over the years. Undivided Andhra Pradesh's capacity to implement the most successful right to work programme with the Congress Party in power around 2005 is puzzling for the above explanations. There is a powerful constituency of scholars who maintain that the rights-based approach embodied in programmes like the Mahatma Gandhi National Rural Employment Guarantee Scheme did make a dent on Indian poverty.[6]

Andhra Pradesh's spectacular success is puzzling for the conjectures discussed above. First, the landed classes in Andhra Pradesh have been historically very powerful—one of the reasons why the communists, though respected, could not rule the state (Bernstorff, 1973; Elliott, 2016; Harrison, 1956; Sankaran, 1996; Srinivasulu, 2002). The Congress Party was in power when MGNREGS was launched in 2005. In CPIM-ruled West Bengal, on the other hand, the program was challenged by farmers who needed cheap labour. The CPIM, you will recall, has been praised for launching the most successful land reforms in West Bengal in 1977 (Kohli, 1987). Second, the Congress's farmer support base ensured that other Congress governments such as the ones in Maharashtra or Jharkhand were not so spectacularly successful in implementing the right to work. An exclusively party-driven explanation therefore has its limitations. Fourth, dense-party networks cannot explain a macro-level outcome at the level of the entire state. Last but not least, successful implementation of the rights-based approach weakens the political society argument. If the state guarantees work to citizens, it no longer needs to be conducted illegally by those who deserve work and do not get it.

I will in the following section describe an another approach to state-capacity building by highlighting two important cases—the first is India's transition to globalization and greater private sector orientation, and the second is the successful implementation of the right to work in Andhra Pradesh.

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[6] See for example: Markussen, (2011); Maiorano, (2014); Mukherji, (2014); Klonner and Oldiges, (2014); Muralidharan et al., (2016); Mukherji and Jha (2017).

3.2 The Approach

How the state thinks is significant for governance (Mukherji, 2014a, 2014b; Mukherji & Jha, 2017; Jha, 2018b). This is a neglected area of theorizing in Indian and comparative politics and development. We find that bureaucrats and technocrats are incessantly puzzling and powering about policy. A lot of this puzzling occurs within an organization that Max Weber famously described as the bureaucracy made up of permanent professional experts with assured salaries and job guarantees. Job permanence and expertise are two characteristics that endow the bureaucracy with the ability to puzzle and think about how policies should be experimented and how they should evolve.[7] The relationship between the technocrat or bureaucrat and politician is very important for understanding both how the state thinks and evolves the capacity to act.

3.3 Ideas Matter

Bureaucracies learn from experiments and ideas the world over. How these ideas are implemented, however, depends on how this learning is internalized. When the USA implemented Keynesian policies during the great depression, this policy paradigm was undoubtedly imported from Britain. Keynes had developed a powerful framework for governing macro-economic management in Cambridge, England. Despite this import, the USA substantially prior to Britain became the first country to give shape to these policies ideas as a governance framework that stressed that markets fail and that employment may have to be artificially created by the state. Keynesianisms travel back to Europe as a policy paradigm that occurred in the aftermath of World War II, when Europe was devastated and the USA was flushed with funds. This travel of Keynesianism to Europe via programmes such as the Marshall Plan subsequently entrenched Keynesian ideas in many European bureaucracies (Blyth, 2002; Hirschman, 1989). In a similar vein, Hugh Heclo found that welfare programmes in Britain and Sweden had little to do with political variables such as party ideology or competition and more with how bureaucrats pursued these political agendas with pro-labour and conservative parties (Heclo, 1974). Peter Hall argued that neo-liberal ideas in the UK were born within the Treasury and these ideas preceded the arrival of Margaret Thatcher as Prime Minister (Hall, 1993). When technocrats met Margaret Thatcher, the result was the entrenchment of monetarism.

Similarly, the rise of neo-liberal market orientation in the West had a lot to do with the economics literature that argued persuasively that over-regulation had the effect of rent-seeking industrialization. Regulation rather than directing investments towards developmental agenda was being used to favour certain constituencies in return for rents or bribes. The parallel literature on rent-seeking in the industrialized and less developed world began to suggest that regulation should be reduced and

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[7] On "puzzling and powering", see Heclo (1974); Hall (1993).

markets should play a greater role in furthering economic growth and human well-being. These economic ideas subsequently had a powerful impact on the World Bank, the International Monetary Fund and developing countries (Derthick & Quirk, 1985; Stigler, 1971).

3.4 Ideas and the Indian State

Can we infer, therefore, that ideas merely diffuse and produce policies? How technocrats think and win political support for ideas that evolve is important for understanding how India moves. A few examples will be labour the point. Jawaharlal Nehru, India's first prime minister, was impressed both by Soviet Planning and by Mao's experiments. In fact, India's Second Five-Year Plan was influenced by a Soviet experiment of 1928 (Frankel, 2005; Hansen, 1966).[8] The Second Five-Year Plan was also the work of technocrats such as Mahalanobis and I G Patel. Nehru needed technocrats to understand the nature of the Indian economic problem and ways to escape the decline that India had suffered during colonial rule. The father of Indian planning P. C. Mahalanobis not only founded Indian planning, he also founded the world-renowned Indian Statistical Institute, where economists across the ideological spectrum ranging from Maurice Dobb and Oscar Lange to Milton Friedman were invited to reflect on India's problems. The Planning Commission of India was thus founded within the Indian Statistical Institute, which has sustained a high reputation for scholarship. Despite influences from the world over, India's mixed economy was neither Soviet nor Chinese style planning (Patel, 2004). Neither did it promote entrepreneurship like the USA nor was it British in outlook. India opted for liberal democracy with property rights, where private entrepreneurship was stringently regulated but never abolished.

Another example will demonstrate the importance of how the Indian state thinks. The country faced a severe balance of payments crisis owing to food shortages in 1966. India had become heavily dependent on subsidized US's Public Law (PL)-480 supervised food-grains. The USA was impressed with Indian planning in the early years and wanted to showcase India's democracy as a successful developmental experiment, especially in relation to communist China in the late 1950s. Consequently, India was flushed with USA aid between 1957 and 1963. Given its status as a non-aligned country, both the USA and the USSR were competing to help India industrialize. These funds were used largely to promote heavy capital intensive industrialization to the detriment of Indian agriculture. It was opined that capital intensive industrialization was the key to India's catch-up with the industrialized West (Muirhead, 2005).

Agriculture was relegated to the background. It was assumed that organizational changes such as land reforms and the cooperatives movement would ensure food security. When the monsoons failed, the US PL-480 wheat came to India's rescue.

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[8] On ideological contestations, see Kudaisya (2009).

India did not suffer a famine as did China in the 1960s, largely because of the support from the USA (Paarlberg, 1985; Varshney, 1998b; Frankel, 2005).

This approach changed when President Lyndon Johnson came to power in 1963 after the assassination of President Kennedy. The US government and the World Bank turned sceptical about Indian planning. When India suffered a severe food shortage in 1966, unavailability of imported non-subsidized food-grains would have halted India's planned development. President Johnson and the World Bank under George Woods now wished to coerce India into a private sector-friendly, export-oriented economic strategy. The most famous condition for sending US food-grains to India was to devalue the Indian Rupee. Currency devaluation increases the price of imports and reduces the price of exports. It was opined that devaluation would discourage imports and increase the country's capacity to buy imports with exports.

Powerful Indian technocrats such as IG Patel and LK Jha held exactly the opposite view. Large parts of the Indian technocracy and the political class felt that this was an imperial command of the USA that should not be respected. Prime Minister Indira Gandhi consulted her technocrats and momentarily devalued the India Rupee to ensure that US shipments arrived as expected. This led to a thunderous anti-American uproar in the Indian Parliament.

India's policy response was to defy American goals at a time when the technocrats and the political class disagreed. The majority of the technocrats had no faith in the export-led model of growth that became popular after the East Asian growth story. When the balance of payments situation became comfortable by 1967, India moved in exactly the opposite direction. India became even more closed to the world, and large-scale private entrepreneurship was regulated more stringently than ever before after 1967 (Bhagwati & Srinivasan, 1975; Denoon, 1986).[9]

The moral of the story was that India is a stubborn country that thinks right or wrong but remains quite pig-headed about it.

3.5   The Tipping Point

I have argued that India follows an evolutionary tipping point model of institutional and economic change. A tipping point has some salient characteristics. It resembles the earthquake model of change. Changes are evolutionary, gradual and largely endogenous. Changes continue to evolve over a period of time till they reach a threshold. What appears to be a momentous change resembles an earthquake. When centuries of tectonic movements under the earth's crust make the tectonic plates hit hard against each other, people on the surface often get devastated. What we observe as a symptom (earthquake) appears drastic, but it is the result of centuries of gradual movement. Meteorologists, even though they cannot exactly predict an earthquake, area ware of vulnerable points because they have been observing seismic activity over decades. They know which parts of the earth are unlikely to experience an earthquake

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[9] Mukherji (2014a), Chap. 2.

and where people should be careful. How then can we locate a tipping point in social life like the meteorologist? A tipping point must have the following characteristics. First, we should be able to observe small-scale changes that have accumulated over a period of time. These changes may not be clear to a casual observer, but they should be clear to anyone who has studied an institutional path carefully through a particular policy trajectory. These are slow-moving and almost invisible processes to the casual observer. There should be substantial difference between the institutions and policies that evolved gradually and what occurred when the policy earthquake changed the course of history. This is substantially a story of gradual endogenous change (Capoccia & Kelemen, 2007; Pierson, 2004).[10]

We hold that the momentous economic reforms of 1991 and the success of the right to work programme in Andhra Pradesh each constituted a tipping point. In both cases, the state in India found the capacity to deal with powerful groups ranged against the new set of institutions and policies. When the state was resolute and technocrats found political will, it could change course, building over decades of thinking and puzzling over past policies. What is also germane to the tipping point model is that politics in democracy meets technocrats—and technocrats cannot just function like autocrats. We view the state as an arena where policy ideas have a structural character rather than merely being the will of some technocrat or politician.

3.6   India's Globalization

I have argued that the reforms of 1991 were not the result merely of a balance of payments crisis that occurred in 1991. After all, if financial crisis was to be the reason, reforms could have occurred in 1966 as well. I have described above the considerable pressure from the USA and the World Bank that had paradoxically led India in a direction quite opposite to embracing the global economy.

Why then did the shift in policy paradigm, embracing an Indian style of globalization and unleashing entrepreneurial energies, occur in 1991? India had reached a tipping point in technocratic and policy evolution by 1991—having critically examined autarkic policies and having experimented with new ones since the mid-1970s. Significant reports of the Government of India criticized the closed economy model for being over regulated and inefficient. The public sector was supposed to acquire the commanding heights, but it was inefficient and consequently an unsustainable loss to the national exchequer. The overregulated private sector had become a rent-seeking racket. I. G. Patel, the technocrat who drafted the second Five-Year Plan, as Director of the London School of Economics lamented in his famous Kings-ley Martin Lecture at Cambridge University in the mid-1980s that they had no idea that regulated industrialization would become a rent-seeking racket between the politicians, bureaucrats and entrepreneurs. Turkey and India were two countries that singularly inspired the economic literature on the pathologies of import substitution

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[10] Mukherji (2014a), 23–33.

famously known as rent-seeking industrialization (Bhagwati & Desai, 1970; Krueger, 1974). Technocrats and their reports from the mid-1970s therefore argued for freeing the economy of controls, promoting trade and unleashing the potential of the private sector (Mukherji, 2014a, 66–69).

Gradually policy change ensued in the 1980s. The freedoms given to Indian entrepreneurs were enhanced. The Indian Rupee was gradually deregulated. The pace of change, however, resembled the tipping point model before the system tips. These changes were so gradual that political opposition to reforms remained muted.

Then came the balance of payments crisis of 1991. Montek Singh Ahluwalia, one of the chief technocrats, narrated this story. Ahluwalia and Prime Minster V. P. Singh visited Malaysia in 1990. So impressed was Prime Minister Singh with the economic development of Malaysia that he requested Ahluwalia to write a confidential memo regarding how India could aspire to the Malaysian levels of development. That confidential memo of Mr. Ahluwalia in 1990 formed the basis of India's economic reforms. India's technocrats knew what had to be done. There was substantial political will building over gradual policy experiments (Mukherji, 2014a, 81).

The balance of payments crisis of 1991 was like the cycle that crosses a bridge about to collapse. The external shock was no greater in magnitude than the oil shocks, but India had over spent beyond its means and commercial lenders were unwilling to lend in 1991. The technocrats knew what was needed. 1991 was not 1966. There were substantial areas of agreement between the International Monetary Fund (IMF) and the Indian government. Both were convinced that devaluation, globalization and deregulation were absolutely essential for the Indian economy to take off.

Prime Minister Rao and Finance Minister Dr. Manmohan Singh formed a formidable political and technocratic team on the eve of the reforms. Rao was an experienced and erudite statesman who like Jawaharlal Nehru understood the need for technocrats at the very time when the Cold War had ended and India was embroiled in another financial crisis. The finance minister who was the leader of the economic team was a respected economist who had served in all the major economic policy positions including the Governorship of the Reserve Bank of India in the 1980s.

Not only was he part of the incremental changes of the 1980s, he was the one economist who had written a brilliant doctoral dissertation at Oxford in 1962, arguing that devaluation was good for India (Singh, 1964). He was the first Indian economist to systematically make this point. Such was the acuity of his judgement that Nobel Laureate Amartya Sen wrote an essay in Singh's honour, pointing out that Singh was able to see merit in devaluation even when Sen did not. Not only did he see merit, his research systematically demonstrated how devaluation could solve India's foreign exchange problem. Singh was therefore far ahead of his times. He would lead a team of technocrats, which included Ahluwalia and other brilliant economists who had experimented with reforms in the 1980s (Sen, 1998, 81).

The multilateral agencies acknowledged what had been achieved in the 1980s. India and the IMF signed an unusually heterodox programme. The IMF generally dictates, and countries like Argentina and Pakistan have never recovered. IMF is known to be a bad doctor for solving economic problems. India, on the other hand, was at a tipping point. The political and technocratic conviction was resolute. This

allowed the Indian state to negotiate a rather unusual programme. Labour laws were not amended. There was hardly any privatization of the public sector. Government spending was also not reduced drastically beyond the first year. The fiscal responsibility act was enacted many years later when the IMF was no longer involved with India. The Indian state was able to deploy dependence on the IMF to globalize the economy and promote entrepreneurship. The Rupee was devalued in July 1991. The budget of July 24 1991 changed the course of India's economic history. Industrial licencing was abolished. This meant that the state would no longer interfere in simple entrepreneurial decisions. India's famous rent-seeking state renounced a variety of controls. Second, tariffs were reduced substantially. Third, foreign investment, which was less than worth $200 million in all, was sought aggressively. It is these reforms that tipped in 1991 that have produced entrepreneurship and growth, building on India's entrepreneurial talent that had lain dormant for many decades.

The crisis was used effectively to deal with the interest groups that would oppose reforms. The vast majority of influential Indian industrialists, for example, would oppose the reform process. Large and powerful industrialists were used to trade protection. Devaluation would make their imports more expensive. Government controls favoured a small group of powerful industrialists because they had learned to manage government. Devaluation, trade and foreign investment liberalization and deregulation would make the business environment uncertain for established industrialists. The crisis helped to deal with Indian industry. It was under these circumstances that a relatively less well-known Confederation of Engineering Industry which would be rechristened as the Confederation of Indian Industry in 1992 became the lead industry organization—because they were more supportive of government policies. No sooner had the balance of payments crisis ended, the Bombay Club of industrialists, a powerful group, began lobbying with the government to turn the clock backwards (Mukherji, 2014a, 89–92). But the political will was resolute and the institutions had changed quickly and dramatically after reaching a tipping point. The clock could now not be turned back after the system had tipped comprehensively in a direction. Over time, given this direction of the state, old and new industrialists realized that the state had directed them in the direction of fortunes that they could never have dreamt of in the context of old institutions.[11]

4   MGNREGS in Andhra Pradesh

Implementation of the right to work in Andhra Pradesh has a similar causal narrative. Andhra Pradesh implemented this program more spectacularly than even neighbouring Tamil Nadu—a state whose reputation in economic growth and human wellbeing has been studied more extensively. Not only did undivided Andhra Pradesh create more jobs, the poor were targeted more efficiently as well. The Congress Party in Andhra Pradesh, which was not so successful in other states, implemented

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[11] These views are derived from research presented in Mukherji, (2013) and Mukherji (2014a).

the most successful right to work. Neither could the Communist Party of India equal this record in West Bengal.[12]

We need to refine our understanding regarding how political-bureaucratic synergies evolved to produce welfare in Andhra Pradesh. Our research suggests that Andhra Pradesh created a cadre of bureaucrats in rural development who developed a passion for serving the poor. These civil servants working with their political masters empowered the most deprived classes overtime. Consequently, Maoism vanished from the very state where it was so powerful at one time and found home in greener pastures such as Chhattisgarh and Jharkhand. Myco-authors Hossein Zarhani, K. Raju and I find that the state has made the transition from a need-based phase where political-bureaucratic synergies produced subsidized rice to the poor. When the need-based phase was found to be fiscally unsustainable, women's self-help groups based on unleashing the entrepreneurial energies of poor women were unleashed. This successful programme was supported by the World Bank. Investment in women would uplift the class of socially and sexually oppressed citizens. We now know that the self-help groups in Andhra Pradesh area success story. This experience was central to the capacity that the state enjoyed on the eve of unleashing the right to work in the state. The state transitioned from a need-based to a growth and redistribution-based phase, finally moving towards a citizen-empowering phase. The state had evolved the technocratic capacity to implement the right to work (Mukherji et al., 2018).

Let us see why technocratic conviction is important. Granting a right does not mean that this right is implemented. Communist-ruled West Bengal and Congress-ruled states such a Maharashtra and Jharkhand did not take this matter so seriously. Our research suggests that the political will favouring the implementation of the right to work had a lot to do with bureaucratic–political interactions. The bureaucracy was able to convince the chief minister that this programme would help the poor, as well as win him elections. Political-bureaucratic synergies had reached a tipping point in Andhra Pradesh that had equipped it for implementing a radical programme.

There was substantial political opposition to programme implementation arising from the politically powerful lobby of rich farmers and construction companies. Convincing chief minister Y. S. R. Reddy meant that the technocrats would credibly argue that with political will, it would be possible to insulate the programme from its powerful opponents. This required the Department of Rural Development to use funds from the British Department for International Development to strategize a plan that would insulate the programme from its powerful adversaries. The strategy they devised was neither known to the World Bank nor the DFID. This was a uniquely Indian solution to a problem. It was only when the powerful arguments were presented to the chief minister that he agreed to insulate the programme from its adversaries—famously calling it his Ayappa programme after the famous temple in Kerala. Reddy assured the technocracy that he would put his political weight to insulate the programme, despite substantial opposition within the Cabinet (Mukherji & Jha, 2017, 55).

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[12] My views on Andhra Pradesh are based on Markussen, (2011); Maiorano (2014); Klonner and Oldiges, (2014); Muralidharan et al., (2016); Mukherji and Jha, (2017).

The implementation had three strategic characteristics. First, India's famous village governments would be circumvented. Rural employment programmes would be discussed within the village but a rural civil servant—field assistant—would bring the project to the village. The field assistant would organize workers. And, payments would be made directly to the poor without any intervention of the village head. The implementation agreed with Ambedkar's vision. It is well known that Dr. Ambedkar, the chairman of the drafting committee of the Indian constitution and himself a Dalit, had argued that Indian village was the den of caste hierarchy; Gandhi, the father of the Indian national movement, on the other hand, had reposed greater faith in village-level decentralization (Mukherji & Jha, 2017, 56).

Second, Tata Consultancy Services provided a transactions software free of cost. This software would track where the cash came from and where it went. The cash was supposed to come from the Central Government and go to the worker. It was this governance innovation that lead to the opening of a large number of postal and bank accounts in Andhra Pradesh so that wages could be delivered directly to the worker. The launching of the now famous universal identity cards and bank accounts for every Indian, a project that was conceived by the Congress Party and finally launched by Prime Minister Modi's government, had its roots in this experiment conducted in Andhra Pradesh (Mukherji & Jha, 2017, 56).

Finally, and most pertinently, state-society synergies engendered the creation of the Society for Social Audit, Accountability and Transparency (SSAAT) which is designed to bring society back into the state. The Department of Rural Development created a regulator that would monitor corruption. It experimented village-level public hearings with NGOs such as Mazdoor Kisan Shakti Sangathan (MKSS) and Action Aid. Initially, NGOs were even tried out as organizations that could monitor corruption by conducting public hearings. These experiments revealed that the government needed a standardized regulator. The result: state-society synergy. SSAAT was created with funds from the Central Government's Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). The Chair of the Governing Board was the Principal Secretary of Rural Development of the Government of Andhra Pradesh. But its Director Sowmya Kidambi was a social activist trained by MKSS. She was a consultant and not a government employee. On SSAAT's governing board sat eminent social activists such as Aruna Roy, Nikhil Dey and Harsh Mander. The success of SSAAT has depended a great deal on how technologies of accountability and transparency tried out by NGOs were standardized within the state. SSAAT's credentials are impeccable. The ethnographic work conducted by my colleague Himanshu Jha and myself revealed that the Social Audit Office's data is precise. It can track corruption very efficiently, even though it cannot always act. SSAAT now deals with non-MGNREGS projects as well and has earned the adulation of the Comptroller and Auditor General of India (Mukherji & Jha, 2017, 56–58).

5 What Do We Know and Need to Know?

The rich literature on clientelism has revealed a great deal about the pathologies of governance in India. Indeed, India's economic growth is matched with rising inequalities and low levels of human development. Despite these pathologies, India's growth rate and initiatives to uplift the poor seem to suggest that this is a sleeping giant just awakened. This is a chaotic rise—India's streets are filled with potholes and the cities are getting more polluted than ever. You cannot remove the poor from the slums beside the Sahar International Airport adjoining Mumbai. So chaotic and diverse is India that you can easily go back with the impression that the state in an unusual nation has lost all of seventy years of post-colonial development. A lot of the literature will tell why.

We know much less about how India moves despite these problems. India is unique in the annals of history to have begun a post-colonial trajectory with such diversity as a poverty-stricken liberal democracy. It therefore takes much greater effort to create a consensus within such a large and diverse society. This happens slowly after a lot of political-bureaucratic powering and puzzling—often change takes the form of a tipping point when debating over policy reaches a threshold.

I have described this puzzling and powering towards a tipping point in two arenas of public policy and institutional change—India's embrace of globalization and entrepreneurship as a route to development, and its embrace of a rights-based approach, in this case the right to work. Both constituted a change in the normative structure of public policies and institutions in India. Clientelism can tell us why the glass of India's governance is half empty.

Political–bureaucratic interactions leading to a tipping point, on the other hand, can reveal how new institutional paths get consolidated, despite substantial opposition. Puzzling and powering are very important for the state in the process of governance. India's liberal democracy is not the product of any democratic upsurge. Neither was India's globalization due to pressures from the business class nor was India's rights-based approach to development powered by social movements. Technocrats and politicians, often after taking social actors and movements into consideration, puzzled and powered to take India along a path that no other country has trodden. Have we then neglected the power of ideas that have emanated from political–bureaucratic interactions that scholars like Max Weber (Gerth & Mills, 1946), Heclo (1974) and Hall (1993) have pointed towards? This research programme points to the fact that there is no one rationality in politics. It is important to discover how new rationalities are born in bureaucracies and how they interact with politics to produce governance.

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NITI Aayog—An Alternate Think Tank

Atul Sarma

1 Introduction

The NDA government came to power in May 2014. In the same year in his Independence Day address, Prime Minister, Narendra Modi, announced that a new institution would replace the Planning Commission. On 1 January 2015, the Cabinet passed a resolution to set up the National Institution for Transformation of India (NITI) Aayog. This brought to the end of the erstwhile Planning Commission, which had played an important role in the country's economy for over six and a half decades from very low initial conditions to a high growth trajectory.

This paper addresses the following issues relating to the NITI Aayog:

1. What has motivated the new government to replace the Planning Commission with the NITI Aayog?
2. What are the roles and functions assigned?
3. What is its organizational design?
4. How does its functional architecture look like?
5. What are some of its major initiatives in the last four years?
6. Was it inevitable to dissolve the Planning Commission and create a new institution to do what the NITI Aayog is doing?
7. Concluding remarks: Making a case for redesigning NITI Aayog.

1.1 Rationale

The Cabinet Resolution setting up the National Institution of Transforming India (NITI) Aayog has noted that India has vastly changed since the establishment of

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the Planning Commission way back in March 1950. It has explicitly recognized the country has undergone huge transformation that the country has under gone in terms of its demography, nature and size of economy, role of the private sector, global integration, role of states and technology.

Population has increased threefold to reach 121 crore. More important, the young population (below the age of 35) has stood at 55 crore—one and a half times the population in 1950. So has urban population: an addition of 30 crore. With the growing level of development, rising literacy and communication, the society has become highly aspirational.

The economy (GDP) has grown to reach Rs. 100 lakh crore from the level of Rs. 10,000 crore—a rise of hundred times—and has emerged as the world's third largest economy. Its structure has also undergone a massive change: agriculture losing its share in GDP to less than 15% from over 50%. the union government's plan size rose to Rs. 43 lakh crore in the Twelfth Plan from Rs. 2400 crore in the First Five-Year Plan.

There has been a paradigm shift in the nature of the economy in terms of shrinking role of the government. From the public sector being at the commanding height, the economy has started relying more on market. Operating in an increasingly open and liberalized environment, the private sector has emerged as a vibrant and dynamic force. Such changes have called for evolving the role of government from allocating resources in a command-and-control eco- system to one of "directing, supporting and regulating a market eco-system". National development must be seen beyond the limited sphere of the 'public sector.' Government must thus transition from being a 'provider of first and last resort and 'major player' in the economy to being a 'catalyst' nurturing an enabling environment, where the entrepreneurial spirit of all, from small entrepreneurs to large corporations, can flourish. This importantly frees up the government to focus its precious resources on public welfare domains, such as essential entitlements of food, nutrition, health, education and livelihood of vulnerable as well as marginalized groups".[1]

The global environment has also changed. Now, India is connected by modern transport, communications and media, and, integrated with international markets and institutions. India not only contributes to global dynamics, but also is impacted by global happenings. This continuing integration process with the world needs to find an important place in the policymaking functions of the government.

In our federal system, states are not to be seen as a mere appendage of the Centre. They are to be evolved to become the actual drivers of national development. The development of states must be at the core of the national goal. For, the nation can progress only if the states do. As Dr. Ambedkar observed, it is 'unreasonable to centralize powers where central control and uniformity is not clearly essential or is impracticable'. Thus, emanating from global experiences and national synergy, development 'strategies will need to be calibrated and customized to local needs and opportunities'.[2]

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[1] GoI (2016), NITI Aayog, Transforming India, p. 5.

[2] Ibid. P. 6.,

Advancements in technology and access to information have unleashed enormous creative energy in the country. These have also contributed to integrating our diverse regions and ecosystems into an interlinked national economy and society, thereby opening up wider avenues of coordination and cooperation. Technology is also playing an important role in enhancing transparency and efficiency, making the government more accountable. It is thus imperative to make technology central to the system of policy and governance.

All such changes warrant realigning and reorienting the planning process, strategies and policy thrusts.

It will be worthwhile to recall here what had motivated the then government of India to establish the Planning Commission three years after Independence. The resolution dated 15 March 1950 which established the Planning Commission stated: 'For some years past the people of India have been conscious of the importance of planned development as a means of raising the country's standard of living. …During the last three years the Centre as well as the Provinces have initiated schemes of development but experience has shown that progress has been hampered by the absence of adequate coordination and of sufficiently precise information about the availability of resources'. In view of various problems that the country was encountering, '[t]he need for comprehensive planning based on a careful appraisal of resources and on an objective analysis of all relevant economic factors has become imperative. These purposes can best be achieved through an organization free from the burden of the day to day administration, but in constant touch with the Government at the highest policy level'.[3]

No doubt, the Planning Commission was set up under a different set of economic and social conditions as also under a different development paradigm. The resolution of establishing NITI Aayog has rightly noted that the contexts have drastically changed after six and a half decades in terms of the level of social and economic development parameters as also in development paradigm. The basic issue is whether one needs to abolish an institution which had been steering the Indian economy through thick and thin for many years thereby losing the institutional memory and set up an altogether a new institution as has been done or to reorient the role of or redesign the existing institution to suit the new contexts. We would be back to this at the end. Before that, we may give a brief profile of the NITI Aayog.

1.2 Roles and Functions

In view of the above changes, the Government of India established the NITI Aayog to provide policy advice to the government. The NITI Aayog will:

i.   Evolve shared national agenda.
ii.   Provide a platform for operationalizing cooperative and competitive federalism.

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[3] Quoted from Vithal and Sastry (2002).

iii.   Promote decentralized planning by way of restructuring planning process into a bottom-up model.
iv.   Develop vision and scenario planning by designing medium- and long-term strategic frameworks with a 'big-picture vision' of India's future.
v.   Pay special attention to the vulnerable section and the section bypassed by the development process.
vi.   Prepare domain strategies.
vii.   Network for bringing mainstream ideas and expertise into government policies and programmes.
viii.   Create knowledge and innovation hub.
ix.   Facilitate harmonization of actions across different layers of government through communication, coordination, collaboration and convergence amongst all stakeholders.
x.   Provide a platform for mutual resolution of inter-sectoral, inter-departmental, inter-sectoral as well as centre–state issues of conflict.
xi.   Build repository of research on good governance and best practices.
xii.   Monitor the implementation of policies and programmes and evaluate their impact.
xiii.   Enable capacity building and technology upgradation across government, benchmarking with latest global trends and providing managerial and technical knowhow.

To sum up, 'through its commitment to a cooperative federalism, promotion of citizen engagement, egalitarian access to opportunity, participative and adaptive governance and increasing use of technology, the NITI Aayog will seek to provide a critical and directional and strategic input into the development process. This, along with being the incubator of ideas for development, will be the core mission of NITI Aayog'.[4]

In carrying out the above functions, the NITI Aayog is to be guided by an overall vision of development, which is inclusive, equitable and sustainable.

1.3   Organizational Design

The NITI Aayog is intended to be a lean organization, modelled as a network of experts, focusing on functionality, flexibility and domain knowledge.

The NITI Aayog will comprise:

Governing Council: comprising the prime minister of India as chairperson and the chief ministers of all states and lieutenant governors of union territories as members.

Regional Councils: that will be formed to address specific issues and contingencies affecting more than one state or region. Strategy and planning will be anchored from state-level, with regional councils being convened by the prime minister for

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[4] Cabinet Resolution: New Delhi, 1 January 2015. P. 9.

identified priority domains. Regional councils will be put under the joint leadership of concerned sub-groups of states (grouped around commonalities that could be geographic, economic, social or otherwise) and central ministries.

Regional councils will:

- Have specified tenures, with the mandate to evolve strategy and oversee implementation.
- Be jointly headed by one of the group chief ministers (on a rotational basis or otherwise) and a corresponding central minister.
- Include the sectoral central ministers and concerned secretaries as well as state ministers and secretaries.
- Be linked with corresponding domain experts and academic institutions.
- Will have a dedicated support cell in the NITI Aayog.

It is expected that states would in this process be empowered to drive the national agenda; that deliberation would be more grassroots informed and recommendations would have more ownership, given their joint formulation.

- Special invitees: experts, specialists and practitioners with domain knowledge as nominated by the prime minister.

Full-time organization of NITI Aayog comprises:

- Prime minister as the chairperson,
- Vice-chairman: to be appointed by the prime minister.
- Full-time members.
- Part-time members: maximum of 2 from leading universities, research organizations and other relevant institutions in an ex-officio capacity; part-time members will be rotational.
- Ex-officio members: maximum of four members of the Union Council of Ministers to be nominated by the prime minister.
- Chief executive officer: to be appointed by the prime minister for a fixed tenure, in the rank of secretary to the Government of India.
- Secretariat: as deemed necessary.

1.4 Functional Architecture

The primary functions of NITI Aayog are grouped under four broad categories: (i) fostering cooperative federalism; (ii) acting as Resource Centre; (iii) designing policy and programme framework; and (iv) monitoring and evaluation.[5]

The entire activities of NITI Aayog are to be carried out between two hubs: Team India Hub and Knowledge and Innovation Hub. Team India Hub would carry out the mandate of fostering 'Cooperative Federalism' and Designing Policy and Programme

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[5] GoI (2016), NITI Aayog, Annual Report 2015–16:4.

Frameworks. It would provide the requisite coordination and support framework to NITI Aayog in its engagement with the states.

Knowledge and Innovation Hub would fulfil the mandate of developing a state-of-the-art Resource Centre. This is to be a repository of research on good governance and best practices in sustainable and equitable development that would (a) help disseminate information to stakeholders; (b) provide advice and (c) encourage partnership between key stakeholders and national and international like-minded 'Think-Tanks' as also educational and policy research institutions.

Team India would deal with six subject matter verticals while Knowledge and Innovation Hub would deal with ten subject matter verticals. The sixteen verticals are: (1) Administration, (2) HRD, Governing Council Secretariat and Coordination, (3) Agriculture and Allied Sectors, (4) Data Management and Analysis, (5) Governance and Research, (6) Industry, (7) Infrastructure Energy, International Cooperation, General Administration and Accounts, (8) Infrastructure Connectivity, (9) Natural Resources and Environment, (10) Project Appraisal, Public–Private Partnership and PIB, (11) Rural Development, (12) State Coordination and Decentralized Planning, (13) Science and Technology, (14) Social Sector-I (Skill Development, Labour and Employment, Urban Development), (15) Social Sector-II (Health and Nutrition, Women and Child Development) and (16) Social Justice and Empowerment.

The Chief Executive Officer of NITI Aayog would head both the hubs.

Following the recommendation of the task force on restructuring the NITI Aayog Secretariat, the staff strength has been brought down to 500 from the initial strength of 1255. In addition, there is a provision for appointing Young Professionals, Consultants and Senior Consultants for carrying out specific tasks. There is also an internship scheme to engage under graduate/graduate/postgraduate students and research scholars as interns in order to acquaint them with the planning process. Both Team India and the Knowledge and Innovation Hub have been constituted along with the corresponding verticals and subject divisions.

The NITI Aayog in its first year of functioning engaged five consultants for (a) carrying out specific tasks/research on a variety of economic and social issues, (b) building database and best practices sections of NITI Websites under the direction of the chairman and members, (c) research and policy work on transportation with particular focus on the North East, (d) research and policy work in social sectors with particular focus on health, women and child development and poverty reduction, (e) research and policy work in legal areas such as reform of statutes and administrative law and (f) technology development in strategic sectors like railways, engineering, communication/IT and environment, including techno-commercial evaluation of technology development schemes, etc. It has also initiated the process of engaging one mission director and five managers in Atal Innovation Mission and Self-Employment and Talent Utilization to promote a culture of innovation and entrepreneurship and to find low-cost solutions to India's pressing and intractable problems.

One consultant is engaged for the designing and implementation of a portfolio of policy initiatives, innovative projects and partnerships in the area of governance and public service delivery.

Development Monitoring and Evaluation Office (DMEO) has been set up for the evaluation and monitoring of tasks assigned to the NITI Aayog.

The National Institute of Labour Economics Research and Development (NILERD), established by the Government of India in 1962 with the objective of conducting research, collecting data and providing education and training, has been reorganized by and attached to the NITI Aayog.

In short, NITI Aayog is designed to play a leadership role in policymaking in the central government by working closely with state governments, serving as a knowledge hub and monitoring the progress in the implementation of policies and programmes of Government of India. It provides the union and state governments with relevant strategic and technical advice across the spectrum on key policy elements. These cover matters of national and international importance in the economic front and dissemination of best practices from within the country as well as from other countries. It also infuses new policy ideas and provides specific issue-based support.

As the premier policy 'Think Tank' of the Government of India, the NITI Aayog endeavours to evolve a shared vision of national development with the active participation of states. It adopts consultative and other mechanisms to inform the states about the best practices put in operation in one or more states or in other parts of the world for possible adoption in their respective states. It attempts to promote cooperative federalism through structured support and policy guidance on a continuous basis.

The NITI Aayog develops strategic and long-term policy and programme frameworks and initiatives and monitors their progress and efficacy regularly. Based on the feedbacks obtained and lessons learnt from monitoring exercises, it makes innovative improvements, and even mid-term policy corrections, if needed. Its active monitoring and evaluation include identification of the required resources to strengthen the prospect of success of the programmes and initiatives.

The Aayog's research papers on contemporary issues are placed in public domain. It publishes books on best practices and prepares model laws to encourage states to reform their policies. It also organizes workshops and conferences. For the purpose of providing directional and policy inputs, it maintains a repository of research on good governance and disseminates the research products to stakeholders.[6]

1.5 Major Initiatives in the Past Four years[7]

Just to indicate the nature of activities that the NITI Aayog has undertaken in the past four years (2014–18), only a few important initiatives have been discussed.

The Governing Council in its first meeting held on 8 February 2015 had decided to constitute three major Sub-groups of Chief Ministers: (a) Rationalization of Centrally

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[6] NITI Aayog, Annual Report 17–18, p. 4.

[7] Discussion in this section is based on the NITI Aayog's Annual reports.

Sponsored Schemes (CSS); (b) Skill development and (c) Swachh Bharat Abhiyan. It was also decided that the states would constitute two task forces—one on agriculture and the other on poverty elimination—under the leadership of the NITI Aayog.

The sub-group on Rationalization of CSS recommended that the 'focus of the CSS should be on the schemes that comprise the National Development Agenda where the Centre and the States work together in the spirit of Team India'.[8] Accordingly, it recommended that the schemes should be classified into 'Core' and 'Optional' schemes. Further, schemes for social protection and social inclusion from amongst the Core schemes should be treated as 'Core of the Core.' The sub-group also recommended that the expenditure level in the Core schemes should be maintained at the existing level so as not to shrink its optimum size. The cost sharing between the centre and states would be formula based, and the formula was to be worked out by a three member committee comprising secretary of the nodal ministry implementing CSS, financial adviser of the Ministry implementing CSS and adviser of the NITI Aayog. Based on the recommendation of the committee, the sharing pattern would be in the ratio of 90:10 for eight Northeastern and three Himalayan states and 60:40 for other states. In the case of Optional schemes, the sharing pattern would be 80:20 for the Northeastern and the Himalayan states and 50:50 for the rest. Based on these recommendations, the total number of CSS schemes was brought down to 28 (six Core of the Core schemes, 19 Core schemes and three Optional schemes).

The other important Sub-Group of Chief Ministers on Skill Development made the following key recommendations.[9]

- Strengthen the institutional delivery at the state level by strengthening the State Skill Development Missions;
- Improve the access, outreach and quality of skill development programmes;
- Improve the availability and quality of trainers;
- Identify alternative sources of funding to scale up skill development;
- Ensure active involvement of the private sector in all aspects of skill development including development, delivery mechanism and certification; and,
- Involve the Panchayati Raj institutions in spreading awareness about skill development.

One important initiative that the NITI Aayog has supposedly undertaken is that it has attempted to resolve the pending centre–state issues that delay development effort in the states.

Amongst several other works that the NITI Aayog has initiated, mention may be made of the following: it held consultations with states on the role of NITI Aayog, published a resource book comprising 37 case studies on good practices in social sector delivery, prepared a repository of district level disaggregated data on 51 indicators for all states and union territories, prepared a concept note on port-led development, supported states for strengthening decentralized planning and prepared several district human development reports.

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[8] NITI Aayog, 2015–16 p. 10.
[9] NITI Aayog, 2015–16. P.12.

The NITI Aayog played a policymaking role in terms of activities such as preparing a model act on agricultural land leasing, contributing to the development of a new comprehensive National Energy Policy for India, developing a strategy for electronic products and preparing a roadmap for poverty elimination on the basis of the recommendations of the task force on poverty elimination. The NITI Aayog prepared, in-house, a draft roadmap for the development of Northeastern region and similarly placed states, viz. Bihar, Chhattisgarh, Jharkhand, Odisha and West Bengal.

Noting that public utility industries lack a consistent and coherent regulatory framework, the NITI Aayog prepared a Draft Regulatory Reform Bill.

It also undertook an appraisal of the Twelfth Five-Year Plan (2012–17). The appraisal covered physical and financial targets vis-à-vis achievements for the first four years of the plan (2012–16) and the financial targets (budget estimates) for the terminal year of the Twelfth Plan.

The NITI Aayog published reports, occasional papers and other works. Its publications stood at 90 as on 27 September 2018 in addition to six working papers, several policy briefs and MoUs. While some of these are in-house publications, others are by Consultants.

Way back in 2015–16, the NITI Aayog proposed to prepare (i) a 15-year vision document focusing on social goals, (ii) a seven-year strategy from 2017–18 to 2023–24 to convert long-term vision into an implementable policy and action as a part of the National Development Agenda and (iii) a Three-year Action document for 2017–18 to 2019–20 in alignment with the predictability of financial resources during the 14th Finance Commission.

In fact, Three-Year Action document charting "an ambitious, transformational yet achievable Action Agenda for the government during 2017–19" to 2019–20 that constitutes the last three years of the Fourteenth Finance Commission has been published. Former Union Minister, Y. K. Alagh, commented "The agency does not have the resource allocation function but the plan has sections called 'Objectives', 'Expenditure Targets, 'Resource allocation', 'Sectoral Plans' and 'Special problems' like the documents of the Planning Commission. Resource allocation in India was earlier done by the Planning Commission based on socio-economic criteria. These were measurable indicators. In some projects funded by the Government of India, 'backwardness' at the district level was also used as a criterion (sic)".[10]

On 19 December 2018 Strategy for New India @75, a document that lays out the road map for policymaking in India over the next three years has been released. An editorial in the Business Standard observed[11]: "The document lays out the aim of accelerating the average annual economic growth rate to 8% during 2018–23, and propel the country towards a $ 5-trillion economy by 2030 in order to create enough jobs and prosperity for all. To achieve this goal, it underscores the need to boost the investment rate in the economy from 29 now to 36% by 2022; turn farmers into

[10] Alagh (2019), 'Struggling to be Rich', Indian Express dated 21 January 2019. See also, Alagh (2018), 'Planning Circa 2018 and Past Experience', in Louis Albrects, ed., *Do They Make A Difference*, (Forthcoming), KULeuven ASRO, Heverlee, Belgium.

[11] Business Standard (20 December 2019), Volume XXV Number 176 (Editorial).

'agripreneurs'; promote zero budget natural farming and codification of labour laws, among other things. In other categories, too, the suggestions read like old wine not in so new bottle………..".

> All these are honest intentions. But the point is that there is no lack of guidance on what to do: the problem is how to do it.

There is also a long-term vision presented in the form of charts.

The above mentioned is just an indicative spectrum of activities that the NITI Aayog has undertaken in four years of its existence. These are undoubtedly commendable. What is noteworthy is that it has explicitly moved away from planning and most of its focus has been on policy. Up until 2016–17, policymaking was within the framework of the Twelfth Five-Year Plan. Thereafter, there have been policies but without any explicit framework. It is difficult to ascertain how much of its policy advice has influenced the actual policies of the government or contributed to transforming India since NITI Aayog does not exercise allocative powers. It can only give advice. The finance minister allocates resources amongst the states in the central schemes. In contrast, the erstwhile Planning Commission allocated resources in the annual plan based on Gadgil-Mukherjee Formula. Now the allocation is ad hoc or could even be arbitrary. However, it takes time for a new institution to work its way through for being truly effective.

2   Inevitability to Dissolve the Planning Commission and to Create a New Institution to Do What the NITI Aayog is Doing?

Having indicated the type and range of activities that the NITI Aayog has initiated, one can raise a question: Could not have the Planning Commission been remodelled and reoriented to suit the new contexts and policy thrusts? Was it inevitable to dissolve an existing institution like the Planning Commission to put in place a new one de novo to do what the NITI Aayog is doing?

It is true that in the planning process over the years and even during the reform period, several areas of inefficiency and inconsistency have loomed large with undesirable consequences on economic performance as well as on Indian federalism. We would flag a few such areas.[12]

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[12] For comprehensive discussion on plan formulation and the planning process in India, see, Sarma, Atul (2014) 'Redefining the Role of Planning Commission in Post-reform Context: An Appraisal' (Unpublished), presented at the International Symposium on *Towards a Desirable Future for India in an Increasingly Globalised Society*, organized by Institute for Human Development, New Delhi, in honour of Professor Yoginder K. Alagh, 9–11 March 2014.

a. **Mismatch between Concerns for Allocative Efficiency of Resources and Efficient Utilization of Resources**.

In centralized planning that we pursued for long years, the thrust on allocative efficiency of resources unaccompanied by matching thrust on utilization of resources had huge consequences on the realization of plan goals. Parikh (1996) has brought out the gravity of the issue by giving an illustration of target setting for steel industry during the Fifth Plan. When the issue of whether steel capacity target should be 17 million or 17.5 million was intensely debated, the annual output was 8 million tonnes against an installed capacity of 13 million tonnes. 'Clearly, the target', Parikh argues, 'was quite irrelevant and any gain accrued from making a target precise was more than offset by waste due to improper utilization of created capacity'.[13] Even in the regime of indicative planning where public sector's role is largely limited to social sector, infrastructure and the sectors where market failure exists, implications of such mismatch would be adverse.

b. **Disconnect between Plan Allocation and Annual Budget**.

Plan allocations are made for the entire plan period while the actual allocations take place during the annual plans. The annual plans are prepared every year on the basis of the resource made available by the Ministry of Finance even if the parameters of government revenue and expenditure are laid down in the plan. Different central ministries put forward their respective requirements for the plan schemes for the year. If the planned requirements of different ministries exceed the resources available, cuts are imposed on a *pro rata* basis. In such situations, committed expenditures on ongoing schemes and projects get precedence over new projects, and therefore, the cut in outlays falls disproportionately on the latter. It implies that the sectors that require special emphasis and thus larger investment do not get adequate allocations unless there is substantial reallocation from other ministries. As can be expected, such reallocations are strongly resisted, and therefore, only marginal changes can be effected during the Annual Plans.[14]

Such a disconnect between plan allocations and actual allocations arises because, as Bagchi puts it, 'although the budgets of both the centre and the states are expected to incorporate the amounts needed to meet the (physical) targets of the FYP, the link between the two is seldom there. The reason is that there is no year-wise phasing of the plans either in physical or in financial terms. The lacuna in the plan implementation process still persists'.[15]

c. **Plan–Non-Plan Dichotomy**.

The Plan-Non-Plan Dichotomy in government expenditure and its pernicious effects on efficient allocation of government expenditure has been widely recognized and

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[13] Parikh (1996).

[14] See, 'A Note on Economy Wide Modelling and Sectoral Outlays' **by Adviser, PPD, quoted** in Arun Shourie's *Governance and the Sclerosis that has Set In*, Rupa & Company, New Delhi, pp. 103–105, 2004.

[15] Bagchi (2007), 3 November.

discussed for long. Even though there is no clear link between the annual budget and the plan as discussed earlier, the government expenditures both at the levels of the centre and the states are required to be shown under 'revenue' and 'capital' spending classifications instead of as plan and non-plan expenditures. The purpose is to show the budget provision for expenditure on new schemes and projects so as to achieve the objectives of the plan.

To take account of the expenditure on developmental schemes undertaken by the government under the plan in a given year, all capital expenditures on projects/schemes under a Five-Year Plan are classified as 'Plan.' The implementation of such schemes for tangible asset creation (such as a hospital building) requires some current expenditure (such as doctors' salary for new hospital under a plan), which are classified under the under 'revenue spending' of the Plan. Expenditures shown under revenue and capital are further subdivided into plan and non-plan. Such classification has adverse consequences such as the following:

The Plan has come to be treated as synonymous with development, and therefore, governments tend to go for larger and larger plans while neglecting to provide for expenditure required to maintain the asset already created. As a result, large allocations are made for new schemes/projects while the potentials already created get neglected.

Another consequence of this practice is that large parts of revenue expenditures are funded by borrowing if these happen to be under the Plan. Assuming that the revenue component of the expenditures under a plan will not be more than one-third of the total, the Planning Commission stipulated central assistance for state plans at 30% as grant and the rest as loan.[16] This expectation in reality was rarely realized. What is worse, to get political leverage by announcement of a bigger plan than before, state governments started coming up with their annual plan proposals without separately showing revenue and capital components and the Planning Commission kept approving the state plans in terms of only total outlays without specifying the break-up of their revenue and capital components. To quote Bagchi, 'The annual plan discussions, that were held individually with the states every year turned out to be a process of according approval of the quantum of borrowing of the states without specification of the schemes in view of their requirement of expenditure under revenue and capital. The grant component in the assistance for state plans (for general category) continued to be no more than 30% while revenue expenditures constituted to be over 50%'.[17] Since the balance from the current account is inadequate, borrowing is required to finance plan revenue expenditure as well.

Despite adverse comments on the deleterious effects of the plan-non-plan dichotomy on government finances, particularly on asset maintenance from various quarters including Finance Commissions, the distinction stayed on. But, this distinction has lost its relevance, if there was any, in the context of the following two developments. First, incomplete projects/schemes in the preceding plan are allowed

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[16] Loan component was discontinued following the recommendation of the Twelfth Finance Commission.

[17] Bagchi (2007), *op. cit*., p. 96.

to be carried forward to the next plan, leaving smaller room for plan expenditure on new schemes/projects. Second, government has come to recognize that it is the outcome and not outlay that is of consequence. All ministries have indeed started bringing out an outcome budget of their own. With that, the distinction between plan and non-plan has become both 'redundant and misleading.' The High Level Expert Committee[18] constituted in April 2010 to examine the anomalies hindering efficient management of public resources has also recommended the removal of the distinction between plan and non-plan in the budget.

d.   **States' Autonomy in State Planning**.

An asymmetry in the division of functions and fiscal powers between the centre and the states in the Indian Constitution is widely recognized: expanding and expensive functions are assigned to the states while more elastic sources of revenue in addition to monetary resources, borrowing and external fund are allocated to the centre. Tax sharing and grants as instruments and the Finance Commission as an institutional body to determine states' share as also individual state's share every five years have been provided for to remove the possible vertical and horizontal imbalances. The Finance Commission strives to design a scheme of allocation to ensure fiscal autonomy of the states by enabling the states to carry out the functions assigned to them.

When the Planning Commission was set up and centralized planning was adopted to promote economic development, the centres' and states' efforts were to be coordinated so that the formulation and implementation of their respective plans were in conformity with the national plan. State plans were formulated on the basis of the Planning Commission's guidelines and even approved by it. The annual plan drawn up within the overall state plans, which finalizes the size and sectoral allocations in conformity with resource availability, was also to be approved by the Planning Commission.

Plan transfers determined by the Planning Commission became one of the important sources of financing a state plan. Up until the Fourth Plan, such transfers were scheme based and thus tied to projects/schemes. But 1979 onward, these transfers were based on the Gadgil formula and were given to the states as untied or block grants.

Another source of financing a plan is the balance on current account (BCR). If there is any surplus in non-plan account, it is because of Finance Commission transfers in terms of shared taxes and grants-in-aid (in the case of states with non-plan deficits). This means that even this resource which the states receive as a matter of right gets tied up to state plans drawn up in conformity with the centrally prepared national plan, leaving little room for financing development schemes of their own choice.

With liberalization and decontrols, it was expected that the states would regain their autonomy in economic policymaking. Subsequent developments belied that hope. These are illustrated below.

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[18] Government of India (2010).

Gross budgetary support (GBS) is for financing a plan. It is allocated for central plan and central assistance for state and union territory plans. In the post-reform period, the share of the states declined sharply. For example, it came down to 26.52% in the Eleventh Plan (2007–12) and further down to 24.04% in the Twelfth Plan projections (2012–17) from 41.27% in 1990–91. What is more, the Gadgil formula-based component, i.e. normal assistance, which is untied, has also declined significantly and tied transfers have become dominant. This is incidentally against the National Development Council's (NDC) resolution: not to allow more than one-sixth of the central assistance for state plans outside the Gadgil formula. The point is that to the extent to which the central assistance for state plans tied to centrally designed schemes on state subjects increases, state's autonomy in policymaking gets compromised.

On top of this, the states are required to contribute anything between 10 and 50% of the outlay on 12 flagship schemes.[19] Leaving aside those included in the Additional Central Scheme (ACA), there are numerous other smaller Centrally Sponsored Schemes (135 in number) in which, too, states are required to share a part of the cost. Thus, state's own fund gets deployed in implementing the CSS, leaving smaller fund for schemes of their own choice.

Even if states do not get much for implementing their plans, the practice of obtaining approval of their annual plan continues. 'With the stoppage of on-lending by the centre following the recommendation of the Twelfth Finance Commission, the Annual Plan discussion yields only the amounts of additional central assistance for special problems of individual states'.[20]

Notwithstanding such serious pitfalls of the planning process, it played a few important roles. To cite a few, first, the Planning Commission played the mediation role effectively between the centre and states whenever a state faced a fiscal problem and thus maintained the federal fabric without a rupture. Such a situation often occurs since the Finance Commission makes recommendations on fiscal transfers for five years and then disappears and there is no mechanism to address any major fiscal needs of a state in the intervening period due to reasons not foreseen by the Finance Commission. The Planning Commission, 'the second pillar of India's Fiscal Federalism'—the first pillar being the Finance Commission—as a continuous body could resolve such crises. It could do so because the Planning Commission had allocative power. Second, fiscal transfers in the form of plan assistance were formula-based rather than being arbitrary. Here lies one significant difference between the Planning Commission and the NITI Aayog: the NITI Aayog is not having any allocative power while the Planning Commission was having it. The Planning Commission allocated plan assistance amongst states and even the central share for centrally sponsored

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[19] These are: Nirmal Bharat Abhiyan, National Rural Drinking Water Programme (50:50), National Health Mission (75:25), Integrated Watershed Management Programme (90:10), Indira Awas Yojana (75:25), MGNREGA (90:10), National Rural Livelihood Mission (75:25), Padhan Mantri Gram Sadak Yojana (100 per cent), Rajiv Gandhi Panchayat Sashaktikaran Yojana (75:25), Mid-Day-Meal Programme (65:35), Sarva Shiksha Abhiyan (65:35) and Integrated Child Development Services Scheme (90:10).

[20] Bagchi (2007), *op cit*., p. 98.

schemes based on Gadgil-Mukhrjee formula while it is the Finance Ministry which currently makes central transfers outside the Finance Commission. The latter is ad hoc and arbitrary. Third, the Planning Commission was the only body within the government system, which could do integrated thinking with respect to the process of plan formulation[21] even if equally integrated follow-up measures did not accompany. Finally, the Planning Commission attempted to coordinate the activities of different ministries and departments of the central government and those of the state governments within the broad framework of a plan.

3 Concluding Remarks: Case for Redesigning NITI Aayog

The new dynamics unleashed by market-led and increasingly globalized economy did call for drastic reforms in the planning framework. In fact, the issue as to the role of planning in the new context was widely debated.[22] Almost immediately, a consensus emerged as to the relevance of planning even in the new context. Indeed, the Eighth Plan, which came immediately after liberalization, quickly recognized the demands of the new economic environment. Yet, it clearly saw the need for pursuing planning, though of indicative type for the following reasons. First, when resources are scarce as are indeed in India, there remains the issue of prioritization of deployment of resources based on a suitably designed plan. Second, a body like the Planning Commission has to build a long-term strategic vision of the future keeping in view both the global and domestic challenges and set forth the priorities of the nation. Third, planning is necessary to provide information that would guide both the public and private sectors, thus playing an indicative role. Fourth, in view of the prevailing objective conditions such as widely prevalent poverty, wide disparity in social and economic conditions across the states, the public sector has to serve as a facilitator and as a provider of basic infrastructure—physical, social and financial. Fifth, a central body such as the Planning Commission with the requisite expertise could legitimately prepare the plan and set the parameters to guide action. Sixth, there is a need for a central expert body to harmonize and/or coordinate the plans of different ministries and government agencies and monitor results. Finally, an expert body like the Planning Commission can nudge the behaviour of both the public and private sectors by way of suggesting policies with implications for the entire country, such as those like goods and services tax that would promote growth and unification of the market. All these considerations remain valid even in the new context.

The NITI Aayog in its short existence has no doubt taken a wide spectrum of commendable and relevant initiatives as indicated earlier. Its thrusts have been entirely on policies; however, policy thrusts without a framework tend to be ad hoc or blind. Until 2016–17 the Twelfth Plan provided the framework. Thereafter, the Three-Year Action document for 2017–18 to 2019–20 might have guided NITI

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[21] For the detailed process of plan formulation, see Sarma (2014), *op. cit*.

[22] See, for instance, Bagchi (2007), *op. cit*.; Parikh (1996), *op. cit*.; and, Dandekar (1994), 11 June.

Aayog's policy advocacy. It is too early to evaluate how much of NITI Aayog's inputs have influenced policies in the real world. However, some negative influence of NITI Aayog is observable. For example, its motivated unprofessional intervention in generation of statistics as in the recent case of back series GDP generation has raised question on the credibility of Indian statistics. Again, NITI Aayog's engagement of consultants for preparation of policy documents/advice may not lead to policy advice, which is firmly rooted in ground realities, even if some of them may contain profound ideas.

Even in the market driven system, there are many areas of market failures as in the case of poverty elimination, regional disparity, infrastructure creation and basic and social services such as health and education. All these call for focused attention. The resource required for effective policy actions in such areas is enormous while the available resources have competing demands. Such a situation warrants prioritization of resource allocation within a properly articulated plan framework. As I have indicated earlier, the Three-Year Action document could not have done that.

One can argue that a restructured and reoriented Planning Commission dispensing with its negatives features such as micro-management and excessive bureaucratization but retaining the positive ones in sync with the changed contexts could have done better than what NITI Aayog has been doing. Abolition of the Planning Commission lock, stock and barrel has proved costly. The cost has been in terms of losing the institutional memory as well as its time-tested positive features.

Finally, for the considerations such as above, it is essential to redefine the role of NITI Aayog incorporating in its present design features such as the following:

First, it should be mandated to 'make available to the highest level of policymaking the knowledge-based advice and provide the national and long-term perspective on the policy proposals. Today, there is no such advice available to our cabinet. I cannot over emphasize the need for such a perspective, as every ministry tends to take a sectional or sectoral view. Equally, individual ministries cannot fully take into the inter-sectoral implications or the long-term implications for the different regions of India'.[23]

Second, 'an establishment of Independent Evaluation Office in the new NITI Aayog will be *sin qua non* as it will be a needed instrument to improve the development outcomes, expenditure efficiency and accountability'.[24]

Third, the NITI Aayog should be mandated to prepare a comprehensive plan for addressing the areas of market failures and structural issues such as development imbalances across states.

Last but not least, the NITI Aayog should be given allocative function for effective intervention in the above areas as also for coordinating the relevant

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[23] Kelkar (2019), 'Towards India's New Fiscal Federalism', Prof. Sukhamoy Chakravarty Memorial Lecture delivered at the *55th Annual Conference of the Indian Econometric Society*, National Institute of Securities Markets (NISM), Mumbai, 8 January, pp. 15–16.

[24] *Ibid.,* p. 16.

schemes/programmes of the concerned ministries and departments of the central and state governments.

Essentially, it is argued that the NITI Aayog should be redesigned by way of combing the positive features of the erstwhile Planning Commission with the perceived needs that have arisen from the changing contexts. The short point is that an institution is evolved moulding according to the demands of the changing contexts but rarely dissolved to bring a new one to address the challenges in a new context. These are only broad suggestions towards making the NITI Aayog a truly transformative institution.

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Indian Official Statistical System

V. S. Ranganadham Maddali

1 Constitutional Provisions on Statistics

There are about twenty-five federal systems of governance in the world and India is one of them. India has a quasi-federal structure with more powers with the Centre compared to States. A statistical agency in such a setup is a Unit or Office of the Government (at different levels) whose principal function is to collect, compile and disseminate statistics relating to its subject area. Such statistics are called official statistics. The provisions in the Indian Constitution relating to statistics have been examined by an Expert Committee headed by Prof. N. R. Madhava Menon[1] in the year 2011. The subject areas to be handled by the Government (at different levels) are broadly defined in terms of division of powers given in the Seventh Schedule of the Indian Constitution, which provides for the Union List (List I), the State List (List II) and the Concurrent List (List III). Residuary powers on matters not covered in the three lists as also the powers on matters arising out of international agreements are with the Centre. 'Statistics' is incidental to every subject area in the three lists and is specifically covered under two entries, namely, Entry 94 of the Union List (List I) [Inquiries, Surveys and Statistics for the purpose of any of the matters in this List] and Entry 45 of Concurrent List (List III) [Inquiries and Statistics for the purpose of any of the matters in List II or List III].

The subject 'statistics' is not specifically covered under the State List (List II), which means that 'statistics' on all matters in the State List fall under the concurrent jurisdiction of the Centre and the States. There are many matters in the three Lists on which statistics are collected. Entry-69 (Census) in the Union List, Entry-20

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[1] Report of the Menon Committee is available at https://mospi.gov.in/documents/213904/0/legislative_measure_stat_matter_18jan12.pdf/bdac5af6-8b82-52e5-ec9f-78c61b501bae?t=1595173405435. Author of this paper was the Member Secretary of this Committee.

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(Economic and social planning) and Entry-30 (Vital statistics including registration of births and deaths) in the Concurrent List are more relevant to the statistical fraternity.

Till recently, under the Constitution (Application to Jammu and Kashmir) Order, 1954, the Seventh Schedule was applicable to the State of Jammu and Kashmir in respect of the Union List and the Concurrent List with certain exceptions. The State List was not applicable, but residuary powers were with the State. In the light of the Constitution (Application to Jammu and Kashmir) Order, 2019, which superseded the 1954 order, the Seventh Schedule is now wholly applicable without any exceptions to the State. The Jammu and Kashmir Reorganisation Act, 2019 made the Jammu and Kashmir region as one Union territory and the Ladakh region as another Union territory. Being Union territories, the matters in the State List pertaining to the erstwhile Jammu and Kashmir State now fall under the domain of the Centre.

Statistics are generally collected as a by-product of administration in respect of different subjects in the three Lists of the Seventh Schedule and specifically collected through censuses, complete enumerations, and sample surveys. Statistics, in its general connotation, is collected for the purpose of planning and policy formulation, which intent is broadly covered under Entry-20 (Economic and Social Planning) of the Concurrent List.

2   Legal Basis for Collection of Statistics

In accordance with the constitutional provisions, the Parliament and the State Legislatures enacted various laws on their respective subject areas. Most of the laws contained an enabling provision on power to obtain information, which formed the basis for appropriate rulemaking to collect statistics periodically. Some of the laws also provided for registration/licencing and this resulted in preparing lists of registered/ licenced persons/units from time to time. These lists are used as statistical frames in surveys. Such statistics are called 'administrative statistics', as they are collected as a by-product of administration, either at the time of registration/ licencing of units under various laws or in exercise of power to obtain information under various statutes/ rules/ regulations.

There are also exclusive statistical laws, which cater to the data collection needs of the Government. They are given below:

- The Census Act, 1948 and the Census Rules, 1990 made thereunder
- The Registration of Births and Deaths Act, 1969 and the Rules made by States under the Act
- The Collection of Statistics Act, 2008 and the Collection of Statistics Rules, 2011 made thereunder.

The decennial human population censuses are being conducted as per the provisions of the Census Act, 1948 and the rules made thereunder. Data on count of population and other household and demographic characteristics are being collected in the censuses. Summary data of censuses are disseminated in the form of Primary Census

Abstracts and other tables. The Census data are used as area frame in the surveys of the National Sample Survey Office. Section 15 of the Census Act, 1948 provides for confidentiality of census records. However, the Office of Registrar General and Census Commissioner has taken up a special project for making available past census microdata (after anonymising individual and other sensitive fields) for research.

The Registration of Births and Deaths Act, 1969 deals with mandatory registration of births and deaths across the country. The implementation of the law is the responsibility of the State Governments through rules formulated by them. The Office of the Registrar General of India releases annual reports on the data collected under this law.

The Collection of Statistics Act, 2008 facilitates collection of statistics on economic, demographic, social, scientific and environmental aspects, through a statistical survey (census or a survey) or otherwise. Thus, it is an enabling legislation. It came into force on 11th June 2011. The earlier Act, namely, the Collection of Statistics Act, 1953 was repealed under this new law. The new law was initially extended to the whole of India, except the State of Jammu and Kashmir. On 23rd October 2010, the Jammu and Kashmir State Legislature has enacted the Jammu and Kashmir Collection of Statistics Act, 2010 on the lines of the Collection of Statistics Act, 2008, which was applicable for the whole of the State. This Act was brought into force on 15th March 2011. It repealed the Jammu and Kashmir Collection of Statistics Act, 1961. Since the 2010 Act of the State cannot extend to the subjects falling in the Union List, the Collection of Statistics (Amendment) Act, 2017 was enacted mainly to extend the 2008 Act of the Centre to the State in respect of subjects falling in the Union List and the Concurrent List, as applicable to that State. It was brought into force on 3rd October 2017.

The Jammu and Kashmir Reorganisation Act, 2019 repealed the Jammu and Kashmir Collection of Statistics Act, 2010. *Vide* the Jammu and Kashmir Reorganisation (Adaptation of Central Laws) Order, 2020, the Collection of Statistics Act, 2008 was further amended to extend the law to the whole of India.

The Collection of Statistics Act, 2008 provides for adequate restrictions for confidentiality and security of data collected under the Act, while permitting anonymised data to be made available for research and for statistical purposes.

Statistics on subjects falling in their domain are collected by Government Departments/ offices from time to time not only on statutory basis but also on voluntary basis. Data in respect of all the censuses (except the human population census) were being collected on voluntary response basis. Recently, the economic census data have been collected under the provisions of the Collection of Statistics Act, 2008. Similarly, data in respect of all the sample surveys and price/production index surveys are being collected on voluntary response basis except the data of the Annual surveys of industries (ASI), which are collected under the provisions of the Collection of Statistics Act, 2008.

3 Administrative Statistics

Administrative statistics is the most important, but neglected, component of the statistical system. Using administrative records presents several advantages to statistical agencies. As they already exist, they do not add to expenditure on data collection. Statistical uses of administrative records include: (i) preparation of list frames, (ii) avoiding data collection (using of taxation returns/other returns obtained from enterprises and establishments without separately surveying them), (iii) summarising data of relevant sectors, and (iv) survey evaluation (comparison of survey estimates with estimates from relevant administrative records). As such, they are being used increasingly in many countries for statistical purposes. A few illustrations relevant to India are given in the next two paragraphs.

The list of factories registered under the Factories Act, 1948 is being used as a list frame for conducting the ASI. The establishment/enterprise numbers available from economic censuses are being used as area frames for conducting National Sample Surveys of enterprises/establishments. But, administrative statistics provide some alternatives. The Companies Act, 2013 and the rules made thereunder, for example, provide for mandatory registration of companies and for submission of balance sheet and profit and loss account in the form of annual returns. These can be used for compilation of corporate sector statistics and in preparation of National Accounts Statistics (NAS) and State level Gross State Domestic Product (GSDP) estimates. As of now, the corporate database is being used in the compilation of NAS for corporate sector. Information collected under tax laws also have statistical potential. The Goods and Services Tax Network (GSTN), implemented from July 2017, has been throwing up a large database, which can also be used as a vital input for the NAS and GSDP. The Income Tax Act provides for mandatory submission of online tax returns by companies. These data sources may provide a sampling frame for the establishment/enterprise surveys of the NSSO and may also be useful in estimation of various national indicators of sustainable development goals (SDGs) including National Accounts Indicators, like GDP, IIP, etc. They may also be useful in estimating sub-national level indicators.

The population census figures published at village/ urban ward level are being used as area frames for conducting National Sample Surveys of households. But there are other sources available in the system. Unique identification number is assigned to each of the residents under the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016. Besides, the Citizenship Act, 1955 and the Citizenship (Registration of Citizens and issue of National Identity Cards) Rules, 2003 provide for preparing a National Population Register (NPR) containing a list of usual residents of the country at the local unit (village/sub-town) level. These exercises facilitate preparation of list frame of residents, which could be used in statistical surveys, in place of area frames.

4 Institutional Arrangements and Problems

While the division of powers indicate the matters, which fall in the domain of the Centre and the States, they are further assigned to various administrative departments at both the levels. The Government of India (Allocation of Business) Rules, 1961 provides the details of allocation of subjects to different Central Ministries/Departments. Similar arrangement exists at the State level. Institutional arrangements have been evolved over the years in the statistical system in accordance with the division of powers and further allocation of subjects.

The Statistics Wing called the National Statistical Office (NSO), comprising the erstwhile Central Statistics Office (CSO) and the National Sample Survey Office (NSSO), of the Ministry of Statistics and Program Implementation (MOSPI) is the nodal agency for a planned development of the statistical system in the country and for bringing about coordination in statistical activities among all the statistical agencies. Major chunk of the statistical workforce at the Centre is in this Ministry. Besides coordination and regulation, the CSO is engaged in important statistical products, such as National Accounts, consumer price indices, Indices of Industrial Production (IIP), statistical abstracts, economic census and annual survey of industries. The NSSO established in the year 1970 along with its Governing Council has been conducting nation-wide multipurpose sample surveys every year in the form of rounds under the technical oversight of the Council. The States/UTs also participate in these survey programs on matching sample basis. Other Central Departments with substantial statistical functions have statistical units/cells/divisions of appropriate size to meet their requirements.

The Statistical System in the States/UTs is like that at the Centre. It is laterally decentralised over the Departments of the State Government. Major Departments have large statistical divisions and other Departments have small statistical cells for managing the work of departmental statistics. The Directorate of Economics and Statistics (DES) declared as nodal agency on statistical matters at State/UT level has large organisation at its headquarters, with statistical offices at district and sub-district level. The DESs publish statistical abstracts, handbooks, annual economic reviews, budget analysis, estimates of the State Domestic Product (SDP) and engage in other relevant statistical activities. In large-scale statistical operations such as national level censuses and surveys conducted by the Central Government, the actual field operations are conducted by the States. The DESs are sub-ordinate offices under the Planning Department in most of the States.

As per the recommendations of the Rangarajan Commission (2001),[2] the Government constituted National Statistical Commission (NSC) in July 2006 through an executive order and it has been functioning since then. The Chief Statistician of India (CSI) is the Secretary of NSC and he is also the head of the NSO and the Secretary, MOSPI. The NSSO Governing Council was abolished, and its functions were entrusted to the NSC since 30th August 2006. The NSC, in its Annual Reports, made

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[2] The Rangarajan Commission Report is available at: https://mospi.gov.in/web/mospi/report-of-dr.-rangarajan-commission.

several recommendations for the Centre and the States to improve their statistical systems. The Annual Reports of the NSC along with action taken reports are placed before the Parliament from time to time.

The institutional arrangements at the Centre and in the States clearly indicate that India has a decentralised statistical system. Such a system, on the face of it, appears to be a weakness, but it is not so. Small statistical units with well-demarcated subject domains will often be able to adapt faster to provide information relevant to public debate and changing policy needs. Lack of proper leadership may not be a problem in a decentralised system as one improper leader in a unit may not pose problems to the system. But, in a centralised system, this would prove disastrous. If a third party, such as the National Statistical Commission, plays the role of a coordinator between policy makers and statistical offices in a decentralised system, it would pave way to an efficient and amicable system. Decentralisation has these three main virtues. Interdependency is a norm and a requirement in such a system, which needs to be respected by official statistical agencies.

Peculiar aspect in the Indian system is that not even a single Department at the Centre or at the State level has exclusive jurisdiction over any sector in most of the cases. For example, in the case of mining sector, the subject matter falls in the domain of the Centre as per the entries 53, 54 and 55 of the Union List and of the States as per the entries 5, 23 and 50 of the State List. At the Centre, different aspects of the subject 'mining' fall in the domain of about ten Ministries/ Departments, viz., Ministry of Development of North Eastern Region, Ministry of Heavy Industries and Public Enterprises, Ministry of Steel, Department of Atomic Energy, Ministry of Coal, Department of Commerce, Department of Higher Education, Ministry of Labour and Employment, Ministry of Corporate Affairs and Ministry of Mines. At the State level, the subject is dealt by at least three Departments. Broadly speaking, the subject 'major minerals' is in the domain of the Centre and the subject 'minor minerals' is in the domain of the States. This kind of a decentralisation requires the use of common statistical concepts, definitions, and classifications for facilitating compilation of statistics on the mining sector for the nation as a whole and for compiling statistics that are comparable across States and regions. The position is the same in respect of most of the other sectors as well.

There are issues of quality, timeliness and of missing observations/records in administrative statistics which need to be addressed to make them useful. Secondly, the formats, in which they are collected, if improvised a little, will greatly benefit the statistical system. For example, if State level information on employment, number of establishments and industry code for each company is collected in the corporate returns, it will make the database more complete. Thirdly, dissemination of administrative/statutory records may be different from what is usually followed in the statistical system. In case of surveys, data after anonymisation can be placed in the public domain since the statisticians are not interested in the identification details of respondents. But, in case of administrative/statutory records, list of respondents may be available for public inspection, whereas other information about them could be confidential. Thus, administrative/statutory records can be shared for statistical purposes subject to adequate precautions to be taken on security and confidentiality

of data. But statistical records without anonymisation cannot be shared to administrative/ statutory authorities as their use for non-statistical purposes (taxation, penal action etc.) would be detrimental to the statistical system. There are also problems in protecting the privacy of information when administrative/statutory records having common respondents are linked or when such records are linked to statistical records.

Thus, there are barriers and limitations in using administrative/statutory records for statistical purposes which need to be sorted out through appropriate data sharing protocols. There are certain laws, like Income Tax Law, GST Law, Companies Law and Census Law, which prohibit sharing of data to other agencies. There is a need to evolve protocols, like anonymisation, to make the data shareable within the framework of such laws. Because of these reasons, the enormous statistical potential of the administrative statistics has not been fully exploited yet.

Decentralised statistical system, although a virtue, has been ineffective due to centralised coordination. As observed by the Rangarajan Commission (2001), the statistical system is laterally decentralised among the Central Ministries and in every one of them vertically decentralised between the Centre and the States. Unless statistical coordination, particularly in respect of administrative statistics, is also decentralised as per this pattern, it would not be effective. In case of the mining sector, it is highly improbable mainly due to lack of domain knowledge that the MOSPI could coordinate with all the concerned offices at the Centre and in the States and compile national level statistics or comparable State/Regional level statistics on mining sector. This responsibility must be entrusted not to the MOSPI, but to the statistical unit in the Ministry of Mining. The situation is same in respect of other sectors as well. Position is similar at State level. This lacuna in the institutional arrangements has been resulting in not reaping the benefits of having a decentralised system. This has also resulted in our not being able to take a holistic view in measuring any sector in its different dimensions, in attempting data integration and in assessing data gaps effectively. Hence, the coordinating statistical agency must understand the context under which the administrative data was created (e.g. legislation/regulation, objectives, and needs), the universe covered, the contents, the concepts, definitions, and classifications used, the frequency and timeliness, the quality of the recorded information, and the consistency over time, to harmonise them to produce integrated data that will enhance the statistical potential of such data.

If data are collected under the provisions of the Collection of Statistics Act, 2008, it cannot be used for purposes other than statistical purposes and is not admissible as evidence in any court proceedings except the proceedings for violation of any provision of the Act. Whether or not data get collected under this law, reliable and timely responses of informants require this kind of an assurance that their responses will be held in confidence and would not be used as evidence against them in any proceedings by the Government. However, this may not suffice so long as the statistical units are an integral or inseparable part of the concerned Government offices. In offices having substantial statistical functions, there is a need to have a separate statistical unit or wing for four major reasons, namely,—(a) to achieve qualitative and efficient production of statistics in a professional manner, (b) to ensure completeness in data in a given subject area which may fall in the domain of not only that office but

other offices as well, (c) to protect confidentiality of responses received from individuals and organisations, and (d) to maintain time series of data free from undue influences and making them available to all users. This can be achieved by assigning a given statistical product to the nodal office (the agency that is purely statistical) or to another office which has no conflict of interest with the subject matter of the statistical product. If these two options are not feasible, then appropriate institutional arrangements should be worked out within the office to establish separate units at arm's length to distinguish statistical from non-statistical functions.

5   Nodal Role and Statistical Coordination

With the NSO at the Centre and the DESs at the State/UT level, there are thirty-six nodal statistical offices in the country. In a decentralised system, leadership role or nodal role on statistical matters becomes very important mainly for the following purposes, namely: (1) to take the responsibility of setting statistical standards (concepts, definitions and classifications) and protocols for all the other Departments to follow, (2) to produce statistical products requiring higher skills (unlike the skills required for administrative statistics), (3) to produce survey related statistics on subjects which do not fall in the domain of any other Department or which fall in the domain of more than one Department, (4) to produce survey related statistics which fall in the domain of another Department but cannot be produced by that Department due to possible conflict of interest, (5) to advise other Departments on statistical methodology, (6) to ensure effective statistical coordination and (7) to be an interface between producers and users.

The nodal agencies at the Centre and in the States, that are required to provide leadership in maintaining statistical standards and protocols, being also engaged in production, have not been able to exercise their leadership role effectively. The main reason for this is combining of production functions and regulatory/advisory functions. Offices where such arrangement exists will regulate/advise only to the extent they follow in production, and they will produce only to the extent they regulate/advise others. This conflict has been adversely affecting both the functions. In many offices, planning and program implementation functions have been combined with statistical functions. This has also been affecting the statistical system adversely. This problem can be addressed by the nodal offices to some extent if they have separate Divisions earmarked for handling production functions and regulatory/advisory functions. Thus, apart from relevant protocols to protect privacy and confidentiality of informants and data, functional separation is also required for statistical offices.

Capacity building has been one of the challenges in the statistical system. Educational institutions teaching or doing research in official statistics are gradually going down in number. Attraction for qualified people entering statistical profession in the Government has been showing a declining trend. Most of the offices have non-professionals handling statistical work without any training and/or without clear directions on what is expected of them. This position is distinctly visible in offices

handling administrative statistics. In most of the field offices of the NSSO, persons not knowing the local language and customs are recruited to collect data on voluntary basis in socio-economic surveys. Due to human resource constraints, many offices have been resorting to outsourcing statistical activities, which is resulting in not being able to maintain quality and institutional memory.

If an office has been producing, using, and furnishing to other users a statistical product, and suddenly due to a policy change it ceases to use the product, then either it stops production or may produce it without the same quality and timeliness. This creates difficulties to other user offices. Agricultural statistics being produced by Revenue Departments at State level provide such an example due to abolition of land revenue. There could be many such cases. In a federal system, in whatever way the mandate of each Department is defined, there is a likelihood of overlap in production of official statistics. This may invariably result in duplication and wastage of resources. For example, economic census is handled by the MOSPI, but the data of registered entities collected in economic census is already available with other Departments in the form of administrative statistics. There could also be an element of omission of a subject area by all the official agencies.

Effective statistical coordination results in: (a) creating a statistical system with harmonised concepts, definitions, classifications and sampling frames to have data on various socio-economic facets comparable over time and across regions, (b) avoiding duplication of data collection efforts by different offices, which may unduly burden respondents, for which arrangements for efficient data collection including the use of administrative records and data sharing among different user offices are required, (c) enhancing the image of official statistics with well-laid down dissemination methods and data pricing policies, and (d) representing country's interests on statistical matters internationally.

The more the system is decentralised (as is the case in India), the more important the statistical coordination becomes. The tools considered most important for coordination are: (a) the ability to control or at least to significantly influence the budgets for statistical activities, (b) the ability to identify which office is more competent and appropriate to take up a statistical activity on a given subject, (c) the ability to decide on classifications and standards for the statistical system, (d) review of formats used by different offices for administrative and other data collection to reduce respondents' burden, (e) re-examining data collection models in terms of cost, flexibility, operational efficiency, and service to the public, (f) sharing of statistics produced with other offices, data linking and integration, (g) sharing action plans, technical expertise, success stories and experiences of using statistics, particularly in respect of quality and timeliness, (h) engaging in joint statistical activities, (i) evolving policies and procedures to guarantee consistent and uniform application of confidentiality for data, and (j) addressing legal impediments, if any, in sharing of data for statistical purposes (e.g. census data, taxation data, corporate data, etc.).

Statistical products, particularly those that are regularly or periodically produced by one office, require statistical audit through an external expertise. It may be argued that internal quality control instruments are adequate, but often these instruments address implementation processes to the extent feasible within the given timeframe

and resources and do not cover the entire gamut of activities. Many countries are moving towards establishing quality control frameworks and statistical audit mechanisms. In India, the NSC got statistical audit done in respect of IIP in the year 2011. Thereafter, no efforts seem to have been made in this direction.

6 Sequence Followed in Production Process

General rationale followed in statistical measurement of an economy or a society is to first identify among the subjects of measurement (persons, households, enterprises etc.), larger ones (based on some criteria) and smaller ones. This means that the subjects of measurement are grouped into homogeneous size classes to apply a census or a sample methodology to each class to measure them. Internationally, it has been recognised that the so-called larger ones find their place in administrative statistics in some way (e.g. registration/licencing records, land records, institutional households). The lists of such individuals/entities along with other information relevant to classify them, available in administrative records, are used to measure different sectors more efficiently. The classification enables better decision making on periodicity of measurement. For larger subjects, more frequent coverage is desirable, say, in every year and for smaller subjects, it may be infrequent. Typically, the steps ought to be taken and usually followed in the Official statistical system are as follows:

(1) *Identifying statistical products that are needed from time to time for planning and policy formulation*: User consultation is very important in the statistical system for it to be relevant all the time. Government (at different levels) is the main user of official statistics among several users. Of late, in the wake of programs like Members of Parliament Local Area Development Scheme (MPLADS) and Members of Legislative Assembly Local Area Development Scheme (MLALADS), demand for data at the level of political constituency, say, parliamentary constituency and assembly segment, which provides comparison with the past as also in the present with reference to other constituencies has been growing. Such data are not available. No office in the Government which produces official statistics does it for its own consumption alone and no official user of statistics produces all those statistics that are required by it. For many of the statistical products, the list of users is either not fully known or even in cases it is known, the way statistics are used is not known. In some cases, the policy makers require very quick products even of less quality than what is desirable, which is not appreciated or at times not in the knowledge of concerned statistical offices. This leads to wastage of resources as the offices, in pursuit of desired quality, take more time to produce such statistics, which become either unusable or outdated. Thus, there is a wide communication gap between policy makers/ users and statistical offices, which needs to be addressed. Presently, user consultation is carried out by the offices like NSSO through constitution of committees in which some of the users are

represented. Occasionally, user meetings are held mainly to familiarise users with a product.

(2) *Identify an office which should be entrusted with the job of production of statistics identified in step (1) and reviewing resources required for the purpose*: Statistics should be produced in a professional manner free from undue influences. It would be ideal to entrust the job to an office, which is not involved in advisory statistical functions and in policy making functions connected with those statistics, as otherwise the production process will have to face undue influences and conflict of interest. If this requires organisational changes, it must be planned and executed in a manner that the transition takes place smoothly. Surveys conducted by offices to, directly or indirectly, evaluate their own programs violate this principle.

(3) *Examining existing statistical sources including administrative sources (to avoid unnecessary duplication) to see whether the whole or a part of the identified products could be obtained from them*: This is a very professional job involving different statistical skills to be applied in different situations. This includes validation of the existing data (including administrative sources), data linking and merging and recognizing data gaps. To achieve this, statistical coordination among producers of administrative statistics and census/survey statistics should be effective. Internationally, it has been recognised that data emanating from infrequent large-scale survey operations (say, censuses) followed by frequent operations (such as indices, sample surveys) can be used to provide detailed data in the form of time series (with high frequency) at a very disaggregated level using statistical techniques such as small area estimation. This will reduce burden on resource requirements as also on the data providers.

(4) *Evolving standards (concepts, definitions, classifications, codes, etc.) and methodology to bridge data gaps where necessary in respect of each identified product*: This again is a highly professional job. Internal expertise should be augmented with external subject matter expertise to bring in more objectivity and acceptability in producing statistics of desired quality. Best practices and standards/methodologies available within the country and internationally need to be considered in the exercise. More importantly, experience, if any, in the field giving rise to errors in judgement in methodology and data collection (sampling and non-sampling errors) as also issues of conflicting statistics need to be considered.

(5) *Planning and execution to produce required statistics with the cooperation of other offices*: This requires collection of statistical frames, where necessary, from other offices, mobilizing human and other resources required for the job, training of data collection/processing machinery, quality control and feedback mechanisms, monitoring various activities and ensuring confidentiality/security of individual (of each respondent) information. Adequate safeguards need to be taken in cases of outsourcing to ensure that professionalism, confidentiality, and security are not compromised.

(6) *Dissemination of statistics produced including sharing of those statistics with other offices*: This must be carried out as per pre-specified plan and time-lines, which should be in the knowledge of data providers and users. More importantly, metadata (data about data) also needs to be disseminated along with statistics to facilitate better understanding of users on fitness to use data and its limitations, if any. In case of censuses and sample surveys, Statistical Disclosure Controls must be evolved and followed.

(7) *Integration of statistics using common geographical codes, common classifications, etc. and disseminating them*: This would facilitate availability at one place of data of a common class of respondents collected/ aggregated by different offices. This exercise adds value to the data collected by each office and would be more user-friendly as in the case of a single window system, as the users need not knock the door of many offices. This is a highly professional job which requires reviewing the metadata of each source and deciding on the manner of integration. Special integration frameworks, such as the National Accounts and the Satellite Accounts of different sectors, require higher level of professional acumen. Presently, there is a practice of putting together compiled tables drawn from different sources in the form of statistical abstracts.

(8) *Repeating steps (1) to (7) periodically, say once in five years*: As in the case of zero-based budgeting, there should be a periodical review (say, once in five years) by the nodal offices in consultation with other offices to see whether the existing products should be continued with or without modification and whether any new product needs to be introduced.

7   General Problems in Some Statistical Products

NAS provides a broad and integrated framework to describe an economy. The economic activities/data sets to be covered and the methodology fixed in a base year is followed throughout the cycle till the base year is revised. NAS is all about the position of the economy in the base year and subsequent growth within the cycle. However, back casting of National Accounts is done to provide comparable time series to users. There will be problems in back casting when new data sets are used in a base revision exercise, when such data sets are not available for the previous cycle(s). For example, in the NAS with base year 2011–12, corporate database of the Ministry of Corporate Affairs has been used. For back casting, this database for the period prior to 2011–12 was not available. In view of this, in future, it is desirable that unless a data set is available from the current cycle onwards, it should not be considered in the next base revision exercise. Accordingly, advance planning must be done.

Another problem in NAS is non-availability of data for some sectors which results in adopting some proxy methods or at times, even ignoring such sectors. For example, as of now, no benchmark survey has been done for construction activity. Due to non-availability of survey estimates, output of construction activity in the total economy is

compiled using both commodity flow approach and expenditure approach and taken as the combined production costs of accounted and unaccounted construction activities. As per international standards, 'construction' is also supposed to be included in IIP. This has not been done due to non-availability of regular data flow.

Non-Profit Institutions Serving Households (NPISH) sector, an institutional sector in the compilation of NAS, has a poor database. While compiling NAS, the CSO groups all resident institutional units in the economy under (i) general Government; (ii) financial corporations, (iii) non-financial corporations; and (iv) household sector including NPISHs. The NPISH sector is not shown as a separate entity in the NAS due to paucity of data but is merged with the above groups to whom they serve. Societies, Trusts, Religious Endowments, Waqfs and private limited companies registered under section 25 of Indian Companies Act, 1956 (now section 8 of the Companies Act, 2013) are NPIs in India. They include large societies such as the Board of Control for Cricket in India (BCCI), which perhaps are presently not being covered in the National Accounts. The Ministry of Corporate Affairs or the States have not established a regular data flow in respect of registered societies. Similarly, religious institutions, such as temples, mosques, and churches, are not included in the data sources. In Bangalore Water-Supply and … versus R. Rajappa and Others 1978 SCR (3) 207, the Hon'ble Supreme Court while interpreting the ambit of 'industry' as defined in Sec. 2(j) of the Industrial Disputes Act, 1947 held as follows:

> "*Where (i) systematic activity, (ii) organized by cooperation between employer and employee (the direct and substantial element is chimerical); (iii) for the production and/ or distribution of goods and services calculated to satisfy human wants and wishes (not spiritual or religious, but inclusive of material things or services geared to celestial bliss e.g., making on a large scale prasad or food), prima facie there is an 'industry' in that enterprise.*"

Thus, in some of the religious institutions, there is an element of enterprise, which needs to be covered in NAS and SDP. For this purpose, either the Centre or the concerned State must establish regular data flow from these entities.

Reference year is an important element for the purpose of international comparability. International statistics compiled by the UN agencies are based on the calendar year. According to the report '*World Economic Outlook April 2016*' released by the IMF (IMF has 189 member countries), most of the countries in the World have calendar year as reference period for National Accounts and Government finance. This is an important matter to be considered in future.

Methodological research is somewhat a neglected field in the statistical system. Main reason for this seems to be not having exclusive resources earmarked for this purpose. There are many important issues to be tested in the field. Rangarajan Commission suggested a few topics for methodological studies. Recently, the NSSO, in its 72nd round, tested the use of split questionnaires by splitting the main consumer expenditure schedule to facilitate canvassing the schedules in different households in relatively lesser time to elicit better response from them.

Another important area is measuring non-sampling errors scientifically, which has not been taken up so far even in the NSSO surveys although several field measures have been taken up to control them. It is very difficult to measure non-sampling errors

in a large-scale sample survey, such as the NSSO surveys. However, some attempts can be made to assess them in a limited way as follows:

Sub-sample-wise data in an interpenetrating framework could be analysed for the extent of differences. Data collected by different enumerators can be studied for possible enumerator bias.

Actual measurement of non-sampling errors requires collection of data two times. Firstly, the data must be collected by the usual enumerators. Subsequently, the data must be collected from the same set of samples by well-trained enumerators. Both the data sets could be compared to measure the non-sampling errors. In the NSSO surveys with lengthy schedules of inquiry, it may not be possible to do this on a large scale, mainly because of possible non-cooperation and fatigue of informants. But, in a limited way, this can be tried. The NSSO has a very good system of conducting non-concurrent field inspections through Supervisors. This is presently being done in about 50% of villages/urban blocks, called First Stage Units (FSUs). In each FSU, non-current check may be done in at least one Second Stage Unit (SSU), i.e. a household or enterprise. This arrangement can be taken advantage of, in devising a study on non-sampling errors. A few items in the schedule of inquiry (it will not be possible to select all items) may be selected, which are very important, and the Supervisors may be asked to collect data on these items independently. Presently, the Supervisor, after looking at the filled-in schedule of the enumerator, does this exercise by probing the respondent to check whether the data has been collected correctly. However, for the purpose of study on non-sampling errors, the Supervisors may be asked to collect data independently on the limited no. of items without looking at the data already collected by enumerators on those items. The two data sets so collected on the selected no. of items could be used to measure non-sampling errors.

8 International Participation

India, being a Member of the United Nations General Assembly, suitably adopts the statistical programs, methodology, protocols, conventions and best practices of the various organs of the General Assembly from time to time. The General Assembly adopted a resolution on 29th January 2014, concerning the ten Fundamental Principles of Official Statistics (FPOS). The FPOS relate to relevance, impartiality and equal access, professional standards and ethics, accountability and transparency, prevention of misuse, sources of official statistics, confidentiality, legislation, national cooperation, use of international standards, and international cooperation. The United Nations Statistics Division (UNSD) brought out 'United Nations Fundamental Principles of Official Statistics—Implementation guidelines' in January 2015. Realising the importance of FPOS, the Government of India notified formal adoption of the FPOS on 15th June 2016.

Principle 9 of the FPOS is about the use of international concepts, classifications and methods by statistical agencies in each country and Principle 10 of the FPOS talks about bilateral and multilateral cooperation in statistics. The United

Nations Statistical Commission (UNSC) is the functional Commission of the United Nations Economic and Social Council (ECOSOC) for developing and setting statistical standards and methodology and for their implementation at national and international levels. All the international agencies, including the UNSC, handling statistical matters as a main function or subsidiary function, are mainly involved in the following matters:

1. Setting statistical standards and methodology in respect of different subject domains for international comparability, in consultation with various countries and experts
2. Conducting statistical surveys and releasing reports in collaboration with countries
3. Disseminating internationally comparable data
4. Providing financial and technical assistance for statistical activities.

On the methodological front, concepts, definitions and classifications evolved by the international agencies have been suitably adopted by the concerned Government Departments in India in their statistical programs. To ensure international comparability of statistics, various statistical classifications, such as national industrial classification, national occupational classification, goods and services classification, disease classification, land use classification, time use classification and Indian Standard Classification of Education have been evolved based on the corresponding international classifications.

India has adopted the latest United Nation's guidelines on System of National Accounts, 2008 (SNA-2008) in compilation of NAS (base year: 2011–12). India is a subscriber country to the International Monetary Fund's (IMF) Special Data Dissemination Standards (SDDS) w.e.f 27-12-1996. For the releases and dissemination of national accounts statistics, the MOSPI follows the standards laid down for real sector by the IMF under its SDDS. India's metadata are posted in the Dissemination Standards Bulletin Board (DSBB) of the IMF since 30-10-1997 and according to the IMF, India met the SDDS standards since 14-12-2001. Under the SDDS framework, India has been releasing not only annual GDP but also quarterly GDP. The press releases on GDP are according to an advance release calendar, which is available at the MOSPI's website and the IMF's website.

India participates in global statistical programs from time to time to facilitate availability of internationally comparable data. For example, India participated in almost all the phases of the International Comparison Program (ICP) of the World Bank, which is a global statistical data collection program intended to assess purchasing power parities and comparable price level indices. The latest phase was of the year 2017.

India also participated in the Millennium Development Goals (MDG) monitoring program, originated from the Millennium Declaration adopted by the UN General Assembly in September 2000. The MOSPI brought out national level statistical monitoring reports on MDGs since 2005 and the final report was brought out in November 2017. India is presently participating in the Sustainable Development Goals (SDGs) monitoring program, adopted by the UN General Assembly in its

70th session. The MOSPI has developed a National Indicator Framework to monitor the progress of the SDGs and associated targets in India. The India SDG Dashboard is available on the MOSPI's website which is serving as a unified data repository on SDG Indicators as per the National Indicator Framework.

9   Independence of the Statistical System

Since official statistics are produced in Government Offices, there would be a natural presumption among the public that the process of production is controlled by the Government of the day to suit its interests. Hence, official statistics should earn public trust through its production and dissemination methods. The UN Handbook of Statistical Organisation defines a statistical office/unit as a service agency, whose independence is related to its methods and results, not to its objectives.

The earliest visible organisational behaviour towards exhibiting independence was of the NSSO, which functioned as per the directions of its Governing Council. For every NSSO round, the Council exercised full authority on the choice of subjects, items on which data must be collected, sampling design, tabulation, analysis, and publication of results. The composition of the Council with non-official chairperson and the functional autonomy it enjoyed and executed has earned public trust to the NSSO over the years. This system has been continued with the NSC taking the role of the Council. On occasions when the functional autonomy was not respected, the NSSO lost public trust.

Primary mission of the statistical offices shall be to provide to public policy makers, accurate, timely and credible statistics that are relevant for policy decisions. Accuracy requires consistency of cross-sectional and time series data sets over different geographic units to ensure comparability and appropriate statistical indicators for assessing errors in the data. Timeliness requires producing and disseminating data well in time to capture changes dynamically before they become outdated. Credibility requires not only depiction of reality but also impartiality and independence from political control. The means employed in production of statistics should not only be free from undue influences but should also appear to be so.

In order to promote trust in official statistics among the users and the public at large, policy making in the areas of priority setting, standardisation, protocols for ensuring transparency in statistical operations, proper dissemination policy, quality control framework and statistical audit, monitoring mechanism, timeliness and credibility of important statistical products, if done and implemented in letter and spirit, would meet the legitimate expectations of the public at large and the users in particular. This process would eventually promote statistics as a public good in such a manner that they would be contextually relevant, technically robust and widely accessible.

Moving in this direction, on the recommendations of the NSC, the MOSPI notified guidelines on four aspects, namely national quality assurance framework, data sharing arrangements, general guidelines on socio-economic indices and guidelines on surveys. The details are given below:

(1)   *National Quality Assurance Framework*

A generic national quality assurance framework (NQAF) was developed by an Expert Group, constituted by the United Nations Statistical Commission (UNSC) in the year 2010. At its 43rd session (28 February–2 March 2012), the UNSC fully endorsed the Generic NQAF template proposed by the Expert Group. The UNSC encouraged countries to use the NQAF.

NQAF comprises five sections, namely, (a) quality context, (b) quality concepts and frameworks, (c) quality assurance guidelines, (d) quality assessment and reporting, and (e) quality and other management. The Expert Group focused on (c) quality assurance guidelines, identifying 19 core NQAF lines and detailing the corresponding elements to be assured as well as supporting mechanisms.

Template for the generic NQAF provides for elements (342 in number) against 19 NQAF lines intended for mapping existing quality assurance frameworks/practices in respect of different statistical products to understand the level of quality assurance in respect of each product. The 'elements to be assured' are listed in separate tables under relevant NQAF lines. The template for NQAF, the NQAF checklist, guidelines for the template and glossary are available online at the link given below:

https://unstats.un.org/unsd/dnss/qualitynqaf/nqaf.aspx

To promote the use and compliance to the NQAF among official statistical agencies at the Centre and in the States/UTs, the MOSPI notified detailed guidelines on 6th April 2018 to be followed on voluntary basis.

Under these guidelines, the official agencies were asked to map the existing practices in respect of each of their statistical products and place, in the public domain periodically, reports on the status of compliance against each element along with detailed explanation. Mapping means indicating a choice for each element in the NQAF by giving a tick mark under the categories: 'Yes', 'no', 'partially true' and 'not applicable', to describe in the best possible manner, the present quality assurance practice and framework of each product. The NQAF will guide the producers of statistics in assuring quality to their products. It will also help users in assessing quality before using any product.

(2)   *Data Sharing arrangements*

The MOSPI declared a National Data Dissemination Policy way back in the year 1999. The policy laid down inter alia that:

- In addition to published reports, validated data, though unpublished, including unit-level data, after deleting identification particulars, should be disseminated.
- Price of data should only include costs of stationary, computer consumables, computer time and postal charges but not the cost of collection and validation of data.
- Survey results/data should be made available to users after the expiry of three years from the completion of field work or after the reports based on survey data are released, whichever is earlier.

The Government of India (Department of Science and Technology) notified a National Data Sharing and Accessibility Policy in the year 2012 to provide inter alia access to the public on sharable non-sensitive data available in the Government.

Under the NDSAP-2012, Government Departments would classify from time-to-time data sets available to them into four categories, namely, negative list, restricted data, sensitive data and sharable data. All the shareable data along with metadata of different Central Departments have been made available on 'as-is where-is' basis online on the website 'data.gov.in' through National Informatics Centre. The policy also provided for clearly defining open access, registered access and restricted access by the respective Departments and for bringing out pricing policy of the data under registered and restricted access.

The MOSPI brought out Guidelines for Statistical Data Dissemination in compliance with the NDSAP-2012. The guidelines provided for open access free of cost to users to aggregated/analysed information and publications in respect of National Accounts, consumer price indices, indices (at NIC two-digit level) of industrial production, annual survey of industries, NSS reports and other reports. It provided restricted access free of cost to primary unit-level data collected through surveys/censuses, and item level data collected from secondary sources, after suppression or anonymisation of the identification details of individuals/establishments. The guidelines also provided details of restricted access data which is priced and non-shareable data.

Subsequently, from 1st April 2019, the MOSPI has decided to provide free of cost, single point access and support of Microdata of Census and Surveys conducted by the Ministry to users through national repository.

(3) General guidelines on socio-economic indices

Considering the issues of quality, timeliness and credibility of various short-term economic indicators being produced by Official agencies at the Centre and in the States/Union territories, the MOSPI notified guidelines on 26th April 2018. The guidelines provided inter alia that:

- The base year may be revised once in five years and may be aligned with the quinquennial consumer expenditure survey period of the National Sample Survey Office (NSSO), to facilitate better comparison of trends of different indices by users.
- The revision of base year may be pre-announced, at least two years in advance so that relevant data for the chosen base year may be collected without much recall lapse.
- Dissemination plan for release of indices (provisional as well as final) may be pre-announced. When an index is released, weighted response rate may also be disseminated.
- Anonymised unit-level data may be placed in the public domain immediately after releasing final index.
- Indices may be made available at State/UT level and for important urban centres. Indices may provide not only comparison over time but also across different

States/UTs/major cities at a given point of time. Thus, it is important to have spatial indices also. Indices may be provided for important occupational classes as well.

- Computation of weighting diagrams, the choice of database for computing weighting diagrams and formulation of methodological instruments may be done in consultation with the concerned nodal office.
- All the official agencies at the Centre may furnish unit-level data to the CSO and those in the States/UTs to the concerned DES, for facilitating maintenance of an inventory of all the unit-level data and for releasing, if necessary, broad item-wise data (in terms of ranges) periodically.

(4) Guidelines on surveys

To address the issues of unnecessary duplication of data collection efforts resulting at times in conflicting statistics, MOSPI has taken the following steps:

(1) Appointed a nodal officer in MOSPI to provide guidance to other Central Departments on avoiding unnecessary duplication as per the provisions of the Collection of Statistics Act, 2008 and the rules made thereunder (Similar arrangement exists at State level also.)

(2) In order to streamline the conduct of various statistical surveys by different Central Departments, which may at times generate statistics conflicting with those available through the surveys undertaken by the National Sample Survey Office and the Central Statistics Office, the MOSPI notified detailed guidelines on 5th December 2011.

The guidelines *inter alia* provided that:

- Each Department, before deciding to conduct a statistical survey, should get a certificate from the nodal officer (appointed under the Collection of Statistics Rules, 2011) that the proposed survey if conducted would not amount to unnecessary duplication. Thereafter, the proposal for conducting a survey may be referred to the National Statistical Commission.
- On receipt of the proposal, the Commission may decide to integrate the proposed survey with any survey of the NSSO or to have a separate survey conducted by the NSSO or to concur with the proposal of the concerned Department to conduct the proposed survey, subject to the oversight of the Commission.
- In cases where the Commission has given concurrence to a Department to conduct a survey, the Department, in consultation with the Commission, has to constitute a Technical Committee to formulate methodology for the survey.
- The methodology formulated should be presented before the Commission for its concurrence and the survey shall be carried out in accordance with the methodology approved by the Commission.
- The survey report has to be finalised in consultation with the Commission. Where the data relate to economic status of the population or a sector, the views of the Planning Commission (now, NITI Aayog) shall be taken.

- The survey report and the unit-level data (after suppressing identification details of informants) of the survey shall be placed in the public domain as per the National Policy of Dissemination of Statistical Data.
- The Commission may have concurrent statistical audit conducted in respect of any statistical activity of the proposed survey.

Implementation of the above guidelines will disallow duplication in conducting surveys, ensure consistency between different data sets and enhance reliability of data.

10   Way Forward

The NSC recommended for regulation of statistics of national importance, called core statistics and identified 120 data sets/products/processes for the purpose. Regulating core statistics cannot be wholly left to the Government, as the Government (at different levels) is the main producer. Regulation comprises laying down standards, notifying standards and conducting audit to assess adherence to the standards. The first function, which is advisory in nature, and the last function will have to be entrusted to the NSC responsible to the Parliament, to be constituted as a statutory corporation by law by Parliament, as recommended by the NSC. Since it can sue and be sued, its functional autonomy is not one sided unlike the NSSO Governing Council. The NSC will also monitor the implementation process. The second function, namely, notifying standards could be with the Government, which it will exercise after due consultation with all stake holders and commit its resources. The NSC responsible to the Parliament would advise on standards for core statistics for facilitating the Government to notify them, monitor compliance to the standards and conduct statistical audit to assess adherence to the standards notified. The CSI, supported by nodal officers from different Ministries/ Departments, must be made responsible for implementation of the directions on core statistics. The nodal officers must be made professionally responsible and accountable to the CSI on all core statistics. The NSC could be entrusted with advisory functions on administrative and other official statistics. Specifically, the NSC may advise the Centre and the States on collection, compilation, and dissemination of administrative statistics with such periodicity and in such format, as may be useful for statistical purposes. Based on the advice, the concerned Department may notify directions overriding anything contrary to any existing law. A draft Bill to provide statutory status to the NSC with these features was prepared by the MOSPI based on recommendations of the NSC. Further, a draft National Policy on Official Statistics (NPOS), which includes Code of Statistical Practice and Guidelines for Outsourcing, has also been recommended by the NSC.

Based on the above recommendations, the MOSPI circulated a draft NPOS and a draft NSC Bill to elicit comments and suggestions. The draft NPOS provides a framework and mechanisms for promoting and assessing compliance in furtherance

of the FPOS. Strategy adopted in the policy is to focus attention on production and dissemination on core statistics with quality, credibility and timeliness. The good practices and protocols that would be introduced in respect of core statistics would induce similar measures to be followed voluntarily in other official statistics and vice versa. Thus, both the components would act as nudges to each other and it would foster integrated development of the system. The budgetary assurance (Budget speech 2020) made by the Government in the Parliament, extracted below, gives hope that the policy would be notified soon.

> "*86. There is a growing need for the Indian Statistical system to meet the challenges of real time monitoring of our increasingly complex economy. Data must have strong credibility. The proposed new National Policy on Official Statistics would use latest technology including AI. It would lay down a road-map towards modernised data collection, integrated information portal and timely dissemination of information.*"

The draft NSC Bill, if enacted, and the NPOS, if notified and implemented, will enormously improve the Indian Statistical System and address most of the systemic concerns.

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Poverty and Unemployment

Poverty in India: Measurement, Trends and Other Issues

C. Rangarajan and S. Mahendra Dev

1 Introduction

Growth is not the sole objective of economic policy. It is necessary to ensure that the benefits of growth accrue to all sections of the society. Eradication of poverty is thus an important objective. Human beings need a certain minimum consumption of food and non-food items to survive. However, the perception regarding what constitutes poverty varies over time and across countries. Nevertheless, there is need for a measure of poverty. Only then, it will be possible to evaluate how the economy is performing in terms of providing a certain minimum standard of living to all its citizens. Measurement of poverty has, therefore, important policy implications.

This paper presents the methodology followed by the Expert Group (Rangarajan) and explains some of the issues that were raised after the publication of the Report.

There are in fact many approaches for measuring poverty. Some analysts focus on deprivations of people in terms of health, education, sanitation or housing. There are, however, many problems associated with this approach including difficulties in aggregating deprivations on several scores derived from different sources. Perhaps the best approach is look at it in terms of certain minimum consumption expenditure per person or preferably per household. Any household failing to meet this level of consumption expenditure can be treated as a poor household. This minimum level of consumption expenditure can be derived, in turn, in terms of minimum expenditure on food and non-food items. The poverty ratio, which is the ratio of number of poor to the total population, is expressed as percentage. It is also known as head-count ratio (HCR). The poverty ratio is measured from an exogenously determined poverty

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line quantified in terms of per capita consumption expenditure over a month and the class distribution of persons obtained from the large sample survey of consumer expenditure data of the National Sample Survey Office (NSSO).

In India, we have had a long history of studies on measurement of poverty.[1] The methodology for estimation of poverty used by the Planning Commission has been based on the recommendations made by Working Group/Task Force/Expert Groups consisting of eminent experts in the field. The Planning Commission has constituted these Groups from time to time to revisit the methodological issues related to the measurement of poverty so as to make the estimates more relevant to the contemporary economic situation. After the Working Group of the Planning Commission delineated the methodology of poverty estimation in 1962, it has been intensely debated by the academicians, experts, policy planners, etc., over the years. In response, the Planning Commission has constituted Task Force/ Expert Group from time to time to review the methodology. These include the Task Force under the chairmanship of Alagh, the Expert Groups under the chairmanship of Lakdawala and Tendulkar (2005).

In June 2012, the Government of India (GoI) appointed an Expert Group (C. Rangarajan as Chairman) to take a fresh look at the methodology for the measurement of poverty. The Committee submitted its report towards the end of June 2014.

2 Approaches of the Earlier Committees

The Planning Commission is the nodal agency in the GoI for estimation of poverty, and these estimates are based on the recommendations of the committees appointed by it. Before going to the Expert Group (Rangarajan), the approaches of earlier committees on estimation of poverty are described below.

The Working Group 1962 recommended that the national minimum consumption expenditure for a household of five persons (four adult consumption units) should not be less than '100 per month or '20 per capita per month in terms of 1960–61 prices. For urban areas, this figure was '125 per month or '25 per capita per month to cover the higher prices there. The poverty line excluded expenditure on health and education, both of which, it was assumed, were to be provided by the State. The Working Group (1962) appeared to have taken into account the recommendation of balanced diet made by the Nutrition Advisory Group of the Indian Council of Medical Research (ICMR) in 1958. This poverty line was widely used in the 1960s and 1970s to estimate the poverty ratio at national and state levels.

Task Force 1979 (Alagh) (GoI, 1979) estimated average calorie requirements and the poverty line corresponding to the calorie requirement. The estimated calorie norm was 2400 kcal per capita per day in rural areas and 2100 kcal per capita per day in

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[1] Srinivasan (2007) reviews the evolution of poverty lines in India from a historical perspective and critically discusses some issues relating to official poverty lines. Srinivasan (2013), among other things, discusses about poverty lines in India in the recent past.

urban areas. To work out the monetary equivalent of these norms, 28th Round (1973–74) NSS data relating to household consumption both in quantitative and value terms were used. Based on the observed consumer behaviour in 1973–74, it was estimated that, on an average, consumer expenditure (food and non-food) of '49.09 per capita per month was associated with a calorie intake of 2400 per capita per day in rural areas and '56.64 per capita per month with a calorie intake of 2100 per day in urban areas. The NSS distribution of private consumption was adjusted pro-rata to correspond to the consumption estimates of National Accounts Statistics (NAS) made by the Central Statistical Office (CSO). Using the poverty line and the adjusted distribution of persons by expenditure classes for the reference year the percentage of persons below the poverty line was estimated. The poverty line defined by the Task Force at 1973–74 prices was updated by the Planning Commission (to estimate poverty for a later year) using the implicit Central Statistical Office (CSO) private consumption expenditure deflator.

Planning Commission appointed Expert Group (Lakdawala) in 1989 which submitted its report in 1993 (GoI, 1993). The Expert Group (Lakdawala) did not redefine the poverty line. It retained the one defined by the Task Force (Alagh) which was at national level in rural and urban areas. It disaggregated these national poverty lines into state-specific poverty lines in order to reflect the inter-state price differentials measured by Fisher's index. These state-specific poverty lines of base year (1973–74) were updated for subsequent years by using Consumer Price Index for Agricultural Labourers (CPIAL) for rural areas and Consumer Price Index for Industrial Workers (CPIIW) for urban areas. Two factors largely distinguish the Expert Group (Lakdawala) methodology of poverty estimation from those of the Task Force (Alagh). First, the Expert Group (Lakdawala) method uses state-specific poverty lines as against national poverty line for estimation of poverty in the state; it thereby captures the cost of living in the states more accurately (as compared to the Task Force method). Second, the Expert Group (Lakdawala) uses the state-wise consumption distribution of the NSS without any adjustment to the NAS consumption. This is a major departure from the Task Force method, which did this adjustment on a pro-rata basis.

The Expert Group under the chairmanship of Suresh D. Tendulkar was constituted by the Planning Commission in December 2005. This group submitted its report in November 2009 (GoI, 2009). The Expert Group (Tendulkar) did not construct a poverty line. It adopted the officially measured urban poverty line of 2004–05 based on Expert Group (Lakdawala) methodology and converted this poverty line (which is URP-consumption based) into MRP consumption.[2] The Expert Group (Tendulkar) method of estimation of poverty is described in the following three steps:

Step 1: Convert the URP-consumption-based urban poverty line into MRP-consumption-based poverty line. Here, the MRP-consumption-based urban poverty

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[2] URP-consumption = consumption data are collected from the households using 30 day recall period for all the items. MRP-consumption = consumption data for five non-food items, viz. clothing, footwear, durable goods, education and institutional medical expenses are collected using 365-day recall period and 30-day recall period for the remaining items.

line is worked out as the level of per capita consumption expenditure in the MRP-consumption distribution that corresponds to the bottom 25.7% of the population.

Step 2: State-specific urban poverty lines are derived from the (MRP-consumption-based) national urban poverty line using urban state-relative-to-all-India Fisher indices.[3]

Step 3: The state-specific rural poverty lines are worked out from the state-specific urban poverty lines by applying within-state rural-relative-to-urban Fisher indices.[4]

Here, the state index numbers relative to the all-India numbers and the state-specific rural prices relative to the state-specific urban prices are computed from the implicit price indices derived from the quantity and value of different items of consumer expenditure gathered in the NSS consumption expenditure.

Urban poverty is same for both Expert Groups (Lakdawala and Tendulkar) at 25.7% in 2004–05. However, the all-India rural poverty ratio at 41.8% is one and a half times the estimate of Expert Group (Lakdawala) which was 28.3% in the same year as Expert Group (Tendulkar) uses urban basket for rural areas.

3 Suggested Methodology by Expert Group (Rangarajan)

The high rate of increase in per capita income and consumption in the first decade of this century and the consequential changes in the structure of the economy as well as in people's perspectives on poverty was viewed as requiring a fresh look at the poverty line and its composition. Alongside, significant changes have occurred in the composition of private consumption expenditure: a reduction in the share of food, of foodgrains within food and of cereals within foodgrains.

It is against this background that the Expert Group (Rangarajan) has to define its methodology for drawing up the poverty line and the measurement of poverty.[5] In the past, the Planning Commission had constituted Expert Groups after a gap of about 12

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[3] This national level urban poverty line is disaggregated into state-specific poverty lines using "urban state-relative-to-all-India" price differentials. The prices differentials are constructed from a variety of price data most of which are implicit. For 15 commodity groups namely, cereals, pulses, milk, oil, egg-fish-meat, vegetables, fresh fruit, dry-fruit, sugar, salt-spices, other-food, intoxicants, fuel-light, clothing and bedding and footwear, the Fisher indices are computed using implicit prices obtained from the NSS consumer expenditure data of 61st Round (2004–05); for five item groups namely entertainment, personal care items, miscellaneous goods, miscellaneous services and durables, Labour Bureau price data underlying CPIAL and CPIIW is used. The pricing of educational services are constructed from the employment- unemployment survey of the NSS 61st Round (2004–05) and of health services are constructed from the health and morbidity survey of NSS 60th Round (January-June 2004).

[4] The state-specific rural poverty lines (of 2004–05) are worked out by adjusting the state- specific urban poverty lines (of 2004–05) with the "within-state-rural-relative-to-urban" price differentials computed from the similar price statistics as in the case of disaggregating the national poverty line into state-specific poverty lines in urban areas.

[5] The Expert Group (Rangarajan) has the following terms of reference:

to 15 years. However, Expert Group (Rangarajan) has been constituted less than three years after the submission of its recommendations of Expert Group (Tendulkar) and only one and a half years after the acceptance of its recommendations by the Planning Commission. The apparent urgency with which the Expert Group (Rangarajan) has been formed reflects a need to examine the estimation of poverty in India keeping in mind the changed aspirations regarding the minimally acceptable standards of living in the country.

The first step in measurement of poverty involves determining the poverty line basket (PLB) of goods and services and the associated level of monthly per capita (total) private consumption expenditure as captured by the NSS Consumer Expenditure Surveys. The Expert Group opted for Modified Mixed Recall Period (MMRP) reference period while Expert Group (Tendulkar) considered Mixed Recall Period (MRP) reference period consumption expenditure for estimation of poverty.[6] Experts of Rangarajan group are of the view that the mix of reference periods for different items underlying the MMRP estimates may be expected to yield estimates that are closer to their true value. Further, in all future NSS Consumer Expenditure Surveys, only the MMRP estimates will be available. It automatically implies that deriving poverty estimates using MMRP distribution is not possible for all years prior to 2009–10.

In defining the new consumption basket separating the poor from the rest, the Expert Group (Rangarajan) is of the considered view that it should contain a food component that addresses the capability to be adequately nourished as well as some normative level of consumption expenditure for essential non-food item groups (education, clothing, conveyance and house rent) besides a residual set of behaviourally determined non-food expenditure.

As a first step towards defining the food component of the poverty line basket, the Expert Group (Rangarajan) has recomputed the average requirements of calories,

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(a) "To comprehensively review the existing methodology of estimation of poverty and examine whether the poverty line should be fixed solely in terms of a consumption basket or whether other criteria are also relevant, and if so, whether the two can be effectively combined to evolve a basis for estimation of poverty in rural and urban areas.

(b) "To examine the issue of divergence between consumption estimates based on the NSSO methodology and those emerging from the National Accounts aggregates; and to suggest a methodology for updating consumption poverty lines using the new consumer price indices launched by the CSO for rural and urban areas state-wise.

(c) "To review alternative methods of estimation of poverty which may be in use in other countries, including their procedural aspects; and indicate whether on this basis, a particular method can be evolved for empirical estimation of poverty in India, including procedures for updating it over time and across states".

(d) "To recommend how the estimates of poverty, as evolved above, should be linked to eligibility and entitlements for schemes and programmes under the Government of India".

[6] In the MMRP, the consumer expenditure data is gathered from the households using the recall period of: (a) 365-days for clothing, footwear, education, institutional medical care, and durable goods, (b) 7-days for edible oil, egg, fish and meat, vegetables, fruits, spices, beverages, refreshments, processed food, *pan*, tobacco and intoxicants, and (c) 30-days for the remaining food items, fuel and light, miscellaneous goods and services including non- institutional medical, rents and taxes.

proteins and fats, per capita per day at the all-India level for 2011–12, separately for the rural and the urban populations. This is based on ICMR norms differentiated by age, gender and activity for all-India rural and urban regions to derive the normative levels of nourishment. Accordingly, the energy requirement works out to 2155 kcal per person per day in rural areas and 2090 kcal per person per day in urban areas. Based on some studies, it is, however, more appropriate to treat the normal calorie requirements to be within a range of ±10% of these values and the lower level of such a range to be adequate enough to not adversely affect health.[7] The protein and fat requirements have been estimated on the same lines as for energy. These requirements are 48 and 28 g per capita per day, respectively, in rural areas; and 50 and 26 g per capita per day in urban areas.

A food basket that simultaneously meets all the norms for the three nutrients, with the calorie norm being satisfied at least at the lower level of the range defines the food component of the poverty line basket proposed by the Expert Group (Rangarajan). The latest information on class distribution of nutrient-intake, based on estimates of food consumption on MMRP, is available for the year 2011–12 (NSS 68th Round). It is seen that the nutrient-intake norms, including the calorie–norms at the lower end of the range, are met for the persons located in the sixth fractile (25–30%) in rural areas and for those in the fourth fractile (15–20%) in urban areas. The average monthly per capita consumption expenditure on food in these fractile classes is '554 in rural areas and '656 in urban areas.

The non-food component of the PLB has both a normative component and, a component given by the observed consumption pattern of households in the fractile group in which the food– component of the PLB is located. The normative component relates to the private consumption expenditure aimed at capabilities in respect of education, clothing, shelter (rent) and mobility (conveyance). Since it is difficult to set minimum norms for these essential non-food items, the Expert Group (Rangarajan) recommends that observed expenditures on these items by households located in the median fractile (45–50 percentile) be treated as the normative minimum private consumption expenditure on these items. For all other non-food goods and services, the observed expenditure of that fractile class which meets the nutrient norms (the 25th–30th percentile in rural India and the 15th–20th percentile in urban India) is taken to define the PLB in respect of these items.

The monthly per capita consumption expenditure (MPCE) which constitutes new poverty line basket, separately in rural and urban areas, is given in Table 1.

The MPCE of '972 (554 + 141 + 277) in rural areas and '1407 (656 + 407 + 344) in urban areas constitutes the new poverty lines at the all-India level as per the recommendation of the Expert Group (Rangarajan). They translate to a monthly per household expenditure of '4860 in rural India and of '7035 for urban India—assuming a family of 5-members in each case.

Estimations of poverty line made for the Expert Group (Rangarajan) based on independent large survey of households by CMIE and using a different methodology wherein a household is considered poor if it is unable to save yield results that are

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[7] see Sukhatme (1981), Meenakshi and Viswanathan (2013).

Table 1 Consumption expenditure of PLB in rural areas and urban areas-2011–12 (MPCE in Rs.)

Items	Rural		Urban	
	Sixth fractile	Median class	Fourth fractile	Median class
	(25–30%)	(45–50%)	(15–20%)	(45–50%)
Food	554	678	656	977
Four essential non-food items	102	141	181	407
Other non-food items	277	347	344	571
Total MPCE	933	1166	1181	1955
MPCE poverty line	972		1407	

Source Derived from NSS Consumer Expenditure Survey 2011–12, 68th Round

remarkably close to those derived using the NSSO data. This provides additional evidence to the poverty line derived by the Expert Group. However, the alternative approach can be established only when NSSO initiates surveys on income and expenditure as recommended by the Committee to Review the Methodology for the Estimation of Savings and Investment.

We can look at the proposed poverty line level in terms of PPP dollars per capita per day. As per the most recent (World Bank, 2014) PPP values, the poverty line translates to $2.14 per capita per day for rural India, $3.10 per capita per day for urban India and $2.44 per capita per day for the country as a whole (In PPP conversion US $1 = '15.11.).

Compared to the poverty lines based on the methodology of the Expert Group (Tendulkar), the poverty lines estimated by the Expert Group (Rangarajan) are 19% and 41% higher in rural and urban areas, respectively. The Expert Group (Rangarajan) uses the Modified Mixed Recall Period consumption expenditure data of the NSSO as these are considered to be more precise compared to the MRP, which was used by the Expert Group (Tendulkar) and the URP, which was used by earlier estimations. 67% of the increase in the rural poverty line and 28% of the increase in the urban poverty line is because of the shift from MRP to MMRP.

The national level poverty lines are disaggregated into state-specific poverty lines in order to reflect the inter-state price differential. The method of constructing the state-wise poverty lines from the national level poverty line in 2011–12 is broadly similar to that outlined by the Expert Group (Tendulkar). Implicit prices are calculated from the quantity and value of consumption gathered in NSS consumer expenditure data of the 68th Round (2011–12). From these, state-relative-to-all-India Fisher price index has been computed, separately in rural and urban areas. Using the Fisher Index, the inter-state price differential is calculated separately in rural and urban areas and from these the national poverty lines (separately in rural and urban areas) in 2011–12 are disaggregated into state-specific poverty lines.

Using these and the state-specific distribution of persons by expenditure groups (NSS), state-specific ratios of rural and urban poverty were estimated. State-level poverty ratio was estimated as weighted average of the rural and urban poverty

Table 2 Poverty estimates in 2009–10 and 2011–12

Year	Poverty ratio			No. of poor (million)		
	Rural	Urban	Total	Rural	Urban	Total
Expert Group (Rangarajan)						
1. 2009–10	39.6	35.1	38.2	325.9	128.7	454.6
2. 2011–12	30.9	26.4	29.5	260.5	102.5	363.0
3. Reduction (%age points)	8.7	8.7	8.7	65.4	26.2	91.6
Expert Group (Tendulkar)						
1. 2009–10	33.8	20.9	29.8	278.2	76.5	354.7
2. 2011–12	25.7	13.7	21.9	216.7	53.1	269.8
3. Reduction (%age points)	8.1	7.2	7.9	61.5	23.4	84.9

Source GOI (2014)

ratios and the national poverty ratio was computed again as the population-weighted average of state-wise poverty ratios.

The Expert Group (Rangarajan) estimates that the 30.9% of the rural population and 26.4% of the urban population was below the poverty line in 2011–12. The all-India ratio was 29.5%. In rural India, 260.5 million individuals were below poverty and in urban India 102.5 million were under poverty. Totally, 363 million were below poverty in 2011–12. The state-specific poverty ratio and number of poor estimated for the year 2011–12 are given in the Expert Group (Rangarajan) report (GoI, 2014).

Expert Group (Rangarajan) also estimated poverty ratios for the year 2009–10. The price inflation during the period 2009–10 to 2011–12, at the state level (separately in rural and urban areas), has been calculated from the increase in the cost of the consumption basket of the poor, that is the poverty line as estimated by the Planning Commission for these two years using the Expert Group (Tendulkar) methodology.

The estimate of poverty ratio for the years 2009–10 and 2011–12 derived from the Expert Group (Rangarajan) methodology and Tendulkar methodology is summarised in Table 2.

A comparison of the poverty ratio for the two years 2009–10 and 2011–12 derived from the Expert Group (Rangarajan) method and the Expert Group (Tendulkar) method shows that the average level of poverty ratio derived from the Expert Group (Rangarajan) method is higher than that derived from the Expert Group (Tendulkar) method. The all-India poverty ratio derived from the Expert Group (Rangarajan) method is 8.4 percentage points higher in 2009–10 and 7.6 percentage points higher in 2011–12 than that derived by the Planning Commission using the Expert Group (Tendulkar) method. The all-India poverty ratio in Expert Group (Rangarajan) fell from 38.2 to 29.5%. Totally, 91.6 million individuals were lifted out of poverty during this period. Though Rangarajan Committee methodology gives higher level of absolute poverty ratio, the reduction in poverty ratio from Rangarajan method is not very different than that of Tendulkar method.

The Expert Group (Rangarajan) recommends the updation of the poverty line in the future using the Fisher Index. The weighting diagram for this effort can be drawn from the NSSO's Consumer Expenditure Survey. For the food group, it recommends that the current practice of relying on the unit values derivable from the NSSO consumer expenditure surveys should continue till such time a new consumer price index (CPI) of CSO with a weighting diagram based on the 2011–12 pattern of consumption becomes available. In respect of non-food items, the price indices available in the existing CSO Consumer Price Indices can be used in the construction of requisite Fisher indices. Once the new series of CPI numbers (with 2011–12 as the base year) becomes available, it may be used for updating the future poverty line.

4 Clarifications on the Issues Raised by Others

Since the submission of the report of Expert Group (Rangarajan), there have been few comments on the report published particularly in The *Economic and Political Weekly* (Mishra, 2014; Ray & Sinha, 2014; Subramanian, 2014) and *The Hindu* Newspaper (Deaton & Dreze, 2014). Of course they also indicated the positive aspects of the report. We provide clarifications below on various issues raised by them and also discuss some additional conceptual and empirical issues on poverty measurement and trends.

4.1 What is New in the Approach for Poverty Line?

It may be noted that poverty line computed by Rangarajan group has three components: (a) food component, (b) normative level of expenditure for essential non-food items such as education, clothing, conveyance and house rent, and (c) behaviourally determined expenditure for other non-food items. The group has gone back to the idea of separate poverty line baskets for rural and urban areas. This stands to reason. This is also consistent with the way we have derived the poverty line. The introduction of norms for certain kinds of non-food expenditures is an innovation. It is a simple recognition of the fact that these expenditures constituted a significant part of total consumption. In the absence of any other normative criteria, the median fractile class expenditures were treated as the norm. In fact, non-food consumption as a proportion of total consumption has been steadily rising. That is why the group decided to take a fresh look at the basket rather than only updating the old basket for price changes.

Mishra (2014) says that the Expert Group takes commodity basket from two fractile groups, and it poses a behavioural dilemma. It may be noted that when we adopt two norms one for food and the other for certain non-food expenditures; obviously, the emerging basket will not correspond to the behavioural pattern of a particular expenditure class. Our attempt has been to estimate the level of private consumption expenditure which will meet certain minimum requirements.

Srinivasan (2007) calls for a new approach to poverty measurement. He says that, "Useful starting points for a new approach lie in anchoring poverty lines in social norms and in the distinction made by PPD[8] between goods and services to be bought by households from their own resources and those to be supplied by the state, thus providing a meaningful way of distinguishing the responsibilities of households (i.e. the private sphere) and those of the state (i.e. the public sphere)." In a personal correspondence with one of the authors of this paper, he elaborates his idea as follows.

> I have suggested an alternative, namely to start from a socially defined poverty bundle of goods and define as those who do not consume that bundle. In valuing the bundle and updating it requires the use of prices actually paid by the poor and also excluding that part of the bundle whose cost is in part met by subsidies.

The suggestion of Srinivasan that we should start from a "socially defined poverty bundle of goods", is a good idea. But, the problem is how to arrive at such a socially defined poverty bundle. In some ways, this is precisely what we have done regarding private expenditure. We have arrived at a minimum level of private consumption expenditure both in relation to food and non-food items. Unless, a method is specified to arrive at socially defined poverty bundle of goods, it may be difficult to measure poverty. We have discussed below on the contribution of public expenditures.

Among other things, Subramanian (2014) provides a critique of the Expert Group's methodology for identifying the poverty line particularly unvarying "poverty line basket". It may be noted that the report of the Expert Group chaired by Lakdawala discussed the issues of fixed commodity basket and varying commodity basket and opted for the fixed one for comparability. It may, however, be noted that while the basket may remain the same in terms of composition, weights for price indices could change since the updation of the poverty line is to be done using the Fisher Index. As the Expert Group (Tendulkar) says, "the proposed price indices (Fisher Ideal indices in technical terms) incorporate both the observed all-India and the state level consumption patterns in the weighting structure of the price indices" (GoI, 2009: 2).

4.2   Use of Calories

Deaton and Drèze (2014) criticise the group for going back to calorie norms. Ray and Sinha (2014) appreciate the use of calories, but they do not agree with sharp reduction in rural daily calorie requirements. They also mention Amartya Sen who said that there was no decline of calories for the population around the poverty line. Apart from taking the recent ICMR norms, the revised calorie norm is also justified on the following grounds:

i.   First, as a recent study by Meenakshi and Viswanathan (2013) shows, the average calorie norms could be significantly lower if we replace the 95th percentile heights and a BMI of 21 that underline the ICMR norms for adults

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[8] PPD refers to Perspective Planning Division of the Planning Commission.

     by a possibly more appropriate (for the current adult population whose height is given) median (or mean) heights and a BMI of 19 that is still higher than the lower limit of 18.5 that defines a healthy adult.

ii.   Secondly, we have the idea (Sukhatme, 1981) of a margin of homeostatic adaptation within which individuals can adapt.

without adverse impact on health and activity status, to variation in intakes around the norms. These two factors would suggest that the calorie norms are treated as lying in range of say, ±10%, where intakes at the lower level need not compromise an adult's health and activity status.

    The new poverty line is not limited only to calorie intake but also extends to fats and proteins. As mentioned above, calories, fats and proteins are used mainly for locating food component. It is true that there is no direct correlation between calorie and nutrition. Some use calorie norm directly as cut-off for measuring poverty. This method may give implausible results (see Dev, 2005). There are many other factors which contribute to nutrition. But taken in conjunction with other factors mentioned in the Report, relating minimum food consumption to calorie, fat and protein requirements appears to be a reasonable approach. The Expert Group (Rangarajan) takes the considered position that, taken in conjunction with public provisioning of a range of public goods and services (sanitation, drinking water, immunisation and vaccination, etc.) on a universal basis, the access to the food component of the PLB will have a favourable impact on the nutrition-status outcomes for the population. Without such norms, the minimum level may turn out to be arbitrary. Tendulkar Group itself did not abandon calorie norms. They took the urban poverty basket as given. They also claimed that ultimately the poverty line they recommended satisfied FAO norms.

    Ray and Sinha (2014) rightly point out the importance of micronutrients for nutrition. We recognise the need for micronutrients, but data on this are not readily available to include it in the food component of poverty line. They also mention that variations in dietary habits vary across regions and poverty line should be based on state variations in consumption. This is not a new thing, and these issues were discussed in Lakdawala Expert Group report. In fact, there was a note of dissent by S. Guhan highlighting the need for separate poverty lines based on variation in consumption of different states. But, all the Expert Groups (Lakdawala and subsequent reports) decided to have all India consumption basket only.

4.3   Non-food Criteria

One of the novel features of the Rangarajan Committee Report is that for the first time, it incorporates a normative component for four essentials of non-food items. The Committee recommended that the observed expenditures on these four items by households located in the median fractile (45–50 fractile) are treated as the normative minimum private consumption expenditure on these items. Some observers have commented that both selection of items as essentials and locating households in

the median fractile are arbitrary. It may be noted that the Committee had to use some judgement in selecting items and fractile group. One can use different judgement and change the items to be included in normative component and also locate different fractile groups. Any normative criterion can be subject to such a criticism of arbitrariness.

4.4 Poverty Estimation: Headcount and Depth

A World Bank report (2015) on poverty brings out poverty ratios across countries including India. According to these estimates, India's poverty ratio based on "uniform reference period" (URP) in which recall period was 30 days for all items was 21.2% in 2011–12. The poverty line is $1.90 per capita per day. The report says that poverty in India could be even lower if we use 'modified mixed reference period'(MMRP) in which recall period is 7 days for some food items, one year recall for low frequency non-food items and 30 days for rest of the items. World Bank poverty report indicates that use of MMRP estimates leads to a significantly lower poverty rate of 12.4% in 2011–12.

Differing Estimates

The Rangarajan Committee on poverty estimates that 29.5% of India's population was below poverty line in 2011–12. The poverty line for all India is around Rs. 1105 per capita per month. In terms of latest purchasing power parity terms, this comes to around $2.44 per capita per day. The World Bank's poverty line of $1.90 per capita per day is about 78% of Rangarajan's committee's poverty line. Thus, low poverty line was the reason for low poverty ratio of 12.4% in World Bank estimates as compared to Rangarajan Committee's estimate of 29.5% in 2011–12. The poverty problem looks much more manageable if we take World Bank's poverty line. But, Rangarajan Committee's estimates show that poverty was still substantial at nearly 30% based on MMRP in 2011–12.

World Bank report also talks about depth of poverty. It examines the trends in new poverty measure called person-equivalent headcounts. According to the report, the depth elasticity at the global level between 1990 and 2012 was 1.18 indicating that the reductions in traditional head-count ratios were accompanied by even-larger reductions in person-equivalent poverty ratios. This is true for the regions such as sub-Saharan Africa, South Asia region and East Asia and Pacific where bulk of the poor reside.

Depth of Poverty

We examine here the depth of poverty for India in a different way by looking at the poverty ratios using different cut-offs of poverty line (PL). The first issue is whether the poverty ratios with lowered poverty line cut-offs are declining as fast as those with poverty line or the raised poverty line cut-offs. The second one is about the location of the poor, i.e. whether the poor are located much below the poverty line

or around the poverty line. This is done for total, rural and urban areas for all India and total for few states. Poverty ratios for different cut-offs are given in Table 3. The major conclusions are the following.

One conclusion is that even if we raise the poverty line to 125%, the reduction in poverty ratio was 9 percentage points between 2009–10 and 2011–12. This is also true for poverty ratio based on 115% of poverty line. In the case of 85 and 75% of poverty lines, the percentage points' decline was lower than those of raised poverty line. But, if we account for base poverty ratio, the decline of poverty ratio was faster for 85 and 75% poverty lines compared to those of 100–125% poverty lines.

Head-count ratio is criticised on the ground that it does not measure the "depth" of poverty. It is seen, however, that more than 50% of the poor lies between 75% of the poverty line and the poverty line (PL). This is true both in 2009–10 and 2011–12. In fact, 65% of rural poor and 61% total poor lie between 75% of PL and PL in 2011–12. It may also be noted that many of the non-poor also live just above the poverty line between 115% of PL and PL or between 125% of PL and PL. Another point is that there is negligible population below 50% of PL—less than 2% in 2011–12. In fact, below 50% of PL, urban poverty ratio was higher than that of rural areas.

Comparison among States

We also looked at the poverty ratios with different cut-offs of poverty lines for two relatively poorer states Bihar and Orissa and two developed states Tamil Nadu and Gujarat (Table 2). It provides interesting results. In the case of Bihar and Orissa, the rate of decline in poverty is lower for raised poverty lines of 125 and 115% as compared to poverty line and the lower cut-offs of 85 and 75% PL. The decline is even much faster for these two states at lower cut-offs if we take into account the base poverty ratio. The raised poverty lines for Orissa reveal only marginal decline for both 125 and 115% of PL. In the case of Gujarat, the decline in percentage points is more or less similar across the raised and lowered cut-offs. If we take into account the base effect, the rate of decline is higher for the lowered cut-offs. As far as Tamil Nadu is concerned, it shows a slightly different pattern. The decline in percentage points in poverty was higher for raised poverty line compared to those of lowered

Table 3 Poverty ratios using different cut-offs: rural and urban areas, all India

Poverty line (PL) cut-offs	Rural		Urban		Total	
	2009–10	2011–12	2009–10	2011–12	2009–10	2011–12
125% of PL	60.0	51.3	49.8	40.1	57.1	48.1
115% of PL	53.0	43.5	44.0	34.7	50.4	41.0
100% of PL	39.6	30.9	35.2	26.8	38.2	29.5
85% of PL	25.6	18.3	25.4	18.1	25.5	18.3
75% of PL	16.7	11.1	18.5	12.4	17.2	11.5
50% of PL	2.0	1.4	4.4	2.2	2.7	1.7

Note 100% refers to Rangarajan Committee's poverty line
Source NSS Household Level data

poverty lines. However, if we take the base effect, the rate of change is more or less similar (Table 4).

As far as a concentration of poverty is concerned, it is clear that in all the four states, bulk of the poor is between the poverty line and 75% of the poverty line. In the case of two advanced states Gujarat and Tamil Nadu, the concentration is even higher. In 2011–12, in Gujarat 71.5% of the poor were within these limits. For the same year, in the case of Tamil Nadu, the percentage of the poor falling within these limits is 63%. The proportions are, however, much lower in the case of Bihar and Orissa. In Bihar, it is 40.9% and in Orissa it is 45.4%. Unlike in the case of Bihar and Orissa, both in Gujarat and in Tamil Nadu the percentage of the poor falling between these limits has increased between 2009–10 and 2011–12 indicating a faster decline in the depth of poverty.

Where Do We Stand?

There are three conclusions from the all India and state-wise analysis. First, the rate of decline in poverty ratios for lowered cut-off is similar or more than those for PL or raised PL. Second, poverty is concentrated around the poverty line. Third, the percentage of population for 50% of PL is negligible at all India and state level.

There is a considerable amount of debate on how to measure poverty. Prescribing a minimum level of income or consumption expenditure for defining poverty appears to be the most appropriate method. Obviously even with reference to the prescription of a minimum, there can be considerable differences of opinion. There is bound to be a range of poverty lines. Our Committee in 2014 had set out a methodology for prescribing the minimum level of consumption expenditure of food and non-food items. The World Bank uses a single poverty line defined in terms of dollar and uses

Table 4 Poverty ratios using different cut-offs: total (rural + urban) for four states

Poverty line (PL) cut-offs	Bihar		Orissa		Gujarat		Tamil Nadu	
	2009–10	2011–12	2009–10	2011–12	2009–10	2011–12	2009–10	2011–12
125% of PL	82.1	69.3	67.5	67.4	53.7	46.1	47.1	38.6
115% of PL	76.6	60.0	60.7	59.9	47.7	39.0	39.9	32.6
100% of PL	63.9	41.3	48.5	45.9	36.4	27.4	27.7	22.4
85% of PL	46.2	24.3	33.7	28.9	22.7	14.5	17.3	14.0
75% of PL	34.2	15.3	22.7	20.3	14.1	7.8	11.2	8.3
50% of PL	4.4	1.6	4.3	2.5	1.4	1.1	1.3	1.0

Source Same as Table 3

purchasing power parity exchange rate to determine each country's poverty line. This becomes inevitable when comparisons across countries have to be made. We must however recognise the limitations of such an exercise.

Head-count ratio is a reasonable indicator of poverty measurement, although we may need to supplement it with some measures of depth. Bunching of poverty around the poverty line in our country gives us hope that the problem of reducing poverty is more manageable. On the other hand, had the poor been concentrated at the lower level, the task could have been more arduous. The yardstick that we have chosen to measure poverty is more stringent than the one used by World Bank.

4.5 Multidimensional Poverty

Ray and Sinha (2014) are critical of the report saying that the group did not widen the concept of poverty in terms of multidimensional poverty as mentioned in the terms of reference. They use NSS and NFHS data to highlight multidimensionality. Subramanian (2014) also says that the Expert Group has "forfeited an opportunity to press the case for a multidimensional assessment of poverty". It may be noted that the group discussed these issues and has given the reasons in the report why it has not attempted estimating multidimensional poverty. The search for non-income dimensions of poverty possibly stems from a view that, in terms of the capabilities approach to the concept and measurement of poverty, some of these "capabilities" may not be tightly linked to the privately purchased consumption basket in terms of which the poverty lines are currently drawn. Therefore, poverty based on income or consumption is different from deprivations based on education or health.

Even the trends given by multidimensional poverty are similar to that of estimates of consumption-based poverty. Amidst the din caused by the story of rising billion-aires, the message on India's poverty decline in a report of the Oxford Poverty and Human Development Initiative has been lost. UNDP and Oxford University released the report on Global Multidimensional Poverty Index (MPI) 2018. This report covers 105 countries. The MPI is based on 10 indicators: health, child mortality, years of schooling, school attendance, cooking fuel, sanitation, drinking water, electricity, housing and assets. This report has specifically discussed the case of India. It is well worth quoting the opening paragraph on India: "India has made momentous progress in reducing multidimensional poverty. The incidence of multidimensional poverty was almost halved between 2005/6 and 2015/16, climbing down to 27.5%. The global Multidimensional Poverty Index (MPI) was cut by half due to deeper progress among the poorest. Thus within ten years, the number of poor people in India fell by more than 271 million—a truly massive gain". This is indeed high praise. The report also says that the poorest groups had the biggest reduction in MPI during the period 2005/6 to 2015/16, indicating they have been "catching up".

Is the conclusion of global MPI a new revelation? No. The estimates of poverty—based on consumer expenditure and using the Tendulkar committee methodology—show over a seven-year period between 2004–05 and 2011–12; the number of poor

came down by 137 million despite an increase in population. According to the Rangarajan Committee methodology, the decline between 2009–10 and 2011–12 is 92 million, which is 46 million per annum. For a decade, it will be larger than that of global MPI.

The poverty ratios based on Tendulkar and Rangarajan Committee methodologies are lower than as estimated by global MPI. We have reservations on using multiple indicators as these multidimensional indicators/measures raise several issues regarding their measurability, aggregation across indicators, and, crucially, of databases that provide the requisite information at reasonably short intervals. These need to be considered and evaluated carefully. Aggregation is another problem. In principle, they should be independent. Access to safe drinking water, for example, cannot be aggregated with indicators like child mortality. Even in respect of independent indicators, analytically appropriate rules of aggregation require that all of them relate to the same household. More generally, this requirement poses several data constraints.

It may be noted that we are not against multidimensional poverty or deprivations. One can analyse the progress of non-income indicators like education, health, sanitation, drinking water, child mortality, etc. over time with income or consumption poverty. But, converting all of them into an index poses several problems. Deaton and Dreze (2014) also indicate that "it is important to supplement expenditure-based poverty estimates with other indicators of living standards, relating for instance to nutrition, health, education and the quality of the environment".

On multidimensional issues, Srinivasan (2007) says viewing the public services as another dimension besides consumption in a multidimensional conceptualisation of poverty is more fruitful. However, he is critical of multidimensional indices. He says that "collapsing many relevant but not necessarily commensurate dimensions into a single index defined as an arbitrarily weighted sum of disparate indexes makes little sense. The Human Development Index pioneered by the United Nations Development Programme is an example of an arbitrarily weighted sum of non-commensurate indexes. It certainly is not a multidimensional conceptualisation in any meaningful sense but simply yet another arbitrary unidimensional index" (Srinivasan, 2007: 4162).

In the minds of most people, being rich or poor is associated with levels of income. The various non-income indicators of poverty are in fact reflections of inadequate income. Defining poverty in terms of income or in the absence of such data in terms of expenditure seems most appropriate, and it is this method which is followed in most countries.

4.6 Higher Urban Poverty in Many States

Deaton and Dreze (2014) and EPW (2014) say that in Rangarajan group method urban poverty ratio is higher than rural poverty in many states. Based on Tendulkar Expert Group methodology, urban poverty is lower than rural poverty (except for Punjab) in

2011–2012. In fact, there was severe criticism of Tendulkar Expert Group methodology for urban basket for rural areas and underestimating urban poverty. Their report has also been criticised for not taking into account the aspirations of people. Therefore, Rangarajan group tried to correct this problem by including median fractile expenditures for four essential non-food items.

It is true that based on Rangarajan Expert Group methodology, 13 out of 28 states showed higher urban poverty than rural poverty. These states are: Andhra Pradesh, Bihar, Goa, Haryana, Jammu and Kashmir, Karnataka, Kerala, Manipur, Nagaland, Punjab, Rajasthan, Tripura, Uttar Pradesh and Uttarakhand.

What are the possible explanations for higher urban poverty in some states? One can give the following explanations.

It may be noted that Lakdawala committee-based estimates for 2004–05 show that 10 out of 28 states showed higher urban poverty than rural poverty. Lakdawala group and Rangarajan group have consumption baskets separately for rural and urban areas. On the other hand, Tendulkar group had only one consumption basket for urban areas which is used for rural areas. Obviously, in Tendulkar group methodology, rural poverty would be higher than urban poverty because getting urban basket in rural areas is costly. In contrast, there are two baskets (rural and urban baskets) separately in Lakdawala group and Tendulkar group.

In Rangarajan group, the median fractile (45–50%) values of clothing expenses, rent, conveyance and education expenses are treated as the normative requirements of the basic non-food expenses of clothing, housing, mobility and education of a poverty line basket. This works out to '141 per capita per month in rural areas and '407 in urban areas. The basic non-food expenses constitute 14.5% of total poverty line in rural areas and 29.1% in urban areas. It shows that the share of these items in urban areas is twice to that of rural areas. It is known that particularly house rents and conveyance charges are much higher in urban areas than rural areas. As a result of this higher share of basic non-foods, the share of total non-foods in total poverty line in urban areas is 53 per cent as compared to 43 per cent in rural areas.

One may ask the question: Why only 13 states have higher urban poverty? What about other 15 states which have higher rural poverty than urban poverty? It is possible in these 15 states, in spite of inclusion of normative expenses on basic non-foods and higher expenses on housing and conveyance, the purchasing power of more number of people in rural areas is not matching with those of urban population. This needs a detailed study.

It is also possible that in spite of MGNREGA and other schemes, significant number of rural poor may be migrating to urban areas in search of employment. In other words, poverty is being exported from rural areas to urban areas. Studies have shown that seasonal migration is quite high from rural to urban areas. This also needs investigation.

4.7 NSS and SECC

When the government released the Socio-Economic Caste Census (SECC) 2011 data, there have been views in the media that hereafter we need not have consumption-based poverty estimates using National Sample Surveys (NSS) data. It is viewed that SECC data would alone be enough to estimate poverty and deprivation. The purpose of this section is to briefly examine the differences between the two and clarify that NSS consumption-based poverty estimates are still relevant. SECC-based estimates are important, but it does not substitutes for NSS-based poverty ratios.

4.8 Measurement of Poverty Based on NSS Estimates

Based on the analysis presented in the Expert Group Report (Rangarajan), MPCE of '972 in rural areas and '1407 in urban areas is treated as the poverty line at the all India level. Assuming five members for a family, this will imply a monthly per household expenditure of '4860 in rural areas and '7035 in urban areas. The Expert Group estimates that the 30.9% of the rural population and 26.4% of the urban population was below the poverty line in 2011–12. The all-India ratio was 29.5%.

The estimates of poverty provide the proportion and size of the poor population and their spread across states and broad regions. But, they can't be used for identification of the individual poor which is necessary to ensure that the benefits of these programmes and schemes reach only the deserved and the target group.

SECC, Deprivation and Identification of the Poor

After the release of SECC estimates, some commented that earlier targeted programmes were designed based on sample surveys and SECC was an innovation for the first time. This is not true. Even previously for identification of poor, below poverty line (BPL) censuses were conducted. The first two BPL censuses (conducted in 1992 and 1997) yielded the estimate of percentage and number of poor households at village, block, district and state levels, and the beneficiaries in these programmes were chosen by the State governments depending upon their location/position in the BPL list. The third BPL census was conducted in 2002. It did not identify the number of poor households straightaway or estimate their numbers as in the previous two censuses. Instead, it ranked the households within the village in terms of their socio-economic status, based on 13 indicators reflecting the levels of living and quality of life. SECC.

2011 is thus part of this continuing process of conducting BPL censuses in rural areas.

According to SECC data, 8.69 crore out of 17.91 all rural households have one of the 7 deprivations. In other words, 48.5% of all rural households suffer from at least on 1 of 7 deprivations. 30% of households suffer from 2 deprivations, while 13% have 3 deprivations. Only 0.01% households suffer from all deprivations. The

automatically included contributed 0.92% of the total rural households. Information on urban households is not yet available.

The rural poverty ratio estimated by the Expert Group based on NSS data was around 30.9 per cent in 2011–12. This is almost equal to households with two deprivations plus automatically included. However, NSS-based estimates are per capita based while SECC data refer to households. A look at 7 deprivations shows that they are not deprivations in the conventional sense of deprived of income, health and education. Therefore, the question is whether SECC data is appropriate to estimate poverty ratios. For example, it is true that landless households deriving a major part of their income from manual labour constitute the largest number under deprivation households. It is not clear whether landlessness (or manual labour) can be sufficient to conclude that they are suffering from poverty. Over time landlessness will increase and people will diversify their income with rise in non-agricultural activities and migration. In the same way, some of the other criteria are not clear indicators of poverty.

Lastly, what is the rationale for having poverty estimates based on consumption estimates?

First, in the minds of most people, being rich or poor is associated with levels of income. The various non-income indicators of poverty are in fact reflections of inadequate income.

Second, historically, the number of identified poor based on the successive BPL censuses in rural areas has differed widely from the measured poverty. For example, the percentage of households identified as poor in the first BPL census in 1992 was nearly twice the poverty ratio estimated by the Planning Commission. Usually, the identified poor households through these censuses contain a mix of poor and non-poor for which there could be several reasons. One of the main reasons behind such mix-up could be due to the fact that people know beforehand that the census was going to decide the status of the household as poor or non-poor and therefore its entitlement.

Third, the deprivation criteria by themselves do not indicate the level of poverty. A judgement has to be made as to the number of deprivations taken together constitute a measure of poverty. This can turn out to be highly subjective.

What is the purpose of NSS consumption-based estimates if they are not used for allocation of funds and capping beneficiaries under government programmes? These poverty ratios would be used basically for assessing the changes in poverty at national and state levels or district level. This will be useful for making appropriate policies. For example, one can examine changes in poverty in different phases of post-reform period to understand what impact anti-poverty programmes in conjunction with growth have had on poverty.

To conclude, SECC and NSS data-based estimates have different purposes. SECC would be important for identification of beneficiaries of programmes, while NSS-based estimates would be useful to assess changes in levels of living at the macro level over time.

4.8.1 Poverty and Inequality in India

In recent years, there has been lot of discussion on increasing inequality within several countries of the world including India particularly after the publication of Piketty's book on inequality. It is true that rising inequality has adverse economic and social consequences. Gini coefficient or other measures of inequality are being used to examine trends in inequality. In this paper, we examine the trends in inequality and show that poverty ratio is equally important as Gini coefficient in analysing the issues relating to growth and distribution.

Trends in Inequality

Inequality represented by Gini coefficient for rural areas declined marginally during 1983–84 to 1993–94 while it recorded marginal rise during the high growth period of 2004–05 and 2011–12 (Table 5). In the case of urban areas, Gini coefficient stayed the same during 1983–84 to 1993–94 while it increased during 2004–05 and 2011–12.

Using long time series since 1951, a study by Dutt et al. (2016) shows that inequality in rural areas declined while it increased in urban areas in the post-reform period particularly in the high growth period (Fig. 1).

Table 5 Inequality (Gini coefficient) of consumption expenditure: all India

Sector	1983–84	1987–88	1993–94	2004–05	2011–12
Rural	0.304	0.299	0.286	0.304	0.311
Urban	0.342	0.350	0.344	0.376	0.390

Source Singh et al. (2015)
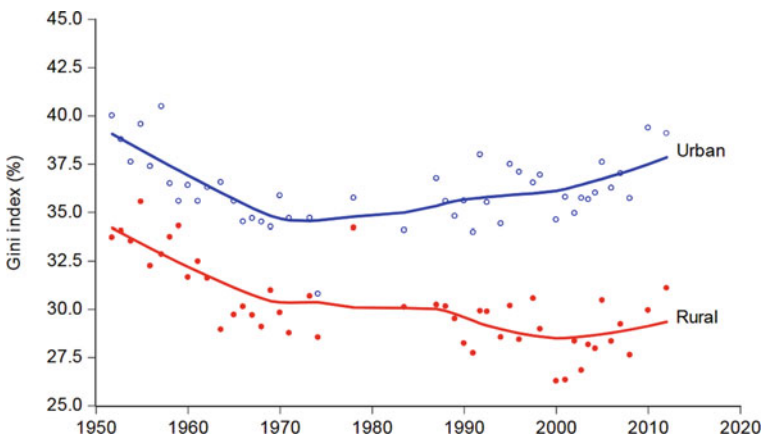
Fig. 1 Trends in urban and rural inequality. *Source* Ravallion and Murugan (2016)
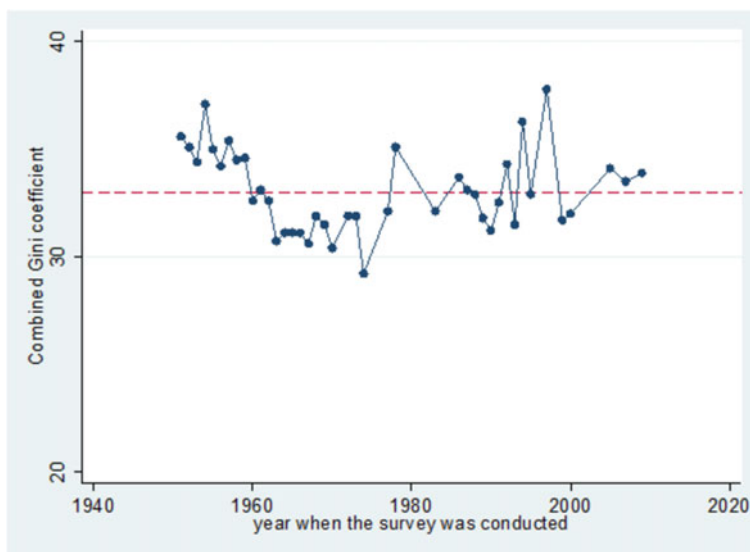
Fig. 2 Gini coefficient in consumption: 1951–2011-12 (Rural + Urban). *Source* Milanovic, "The Question of India's Inequality", http://glineq.blogspot.in/2016/05/the-question-of-indias-inequality.html

The overall inequality for longer period shows fluctuations without any trend. It declined significantly in the late 1950s to mid-1970s when growth was low (Fig. 2). The Gini coefficient rose in the post-reformed period.

One view is that inequality in consumption may be an under estimate as NSS data may not be capturing the consumption of the rich adequately. Difference between the consumption expenditure according NSSO and national income could be partly due to this factor. However, there is no evidence that underestimation in NSSO is only relating to the upper-income groups. In fact, Rangarajan Committee examined the issue of differences in consumption between NSSO and NSS. According to the Committee, these two estimates of consumption (NAS and household survey based) do not match in any country and India is no exception. What is alarming in India is that the difference between NAS and NSS is widening over time. For example, the difference was less than 10 per cent in the late 1970s; it rose to 50% in 2009–10. The differences are much higher for non-food (46%) as compared to food. Some adjustments made in the report reduced the differences from 45.8 to 32.5%. But still the differences are high. Apart from problems in NAS, the fatigue of the respondents in NSS might not be able to capture some of the non-food items.

Income and wealth inequalities are much higher than consumption inequality. As shown in Table 5, consumption Gini coefficient is 0.36 in 2011–12 (Fig. 3). On the other hand, inequality in income is high with a Gini coefficient of 0.55 while wealth Gini coefficient is 0.74 in 2011–12 (Table 6). Income Gini is 20 points higher than consumption Gini while wealth Gini is nearly 40 points higher than consumption

Trends in Inequality (Rural+Urban)
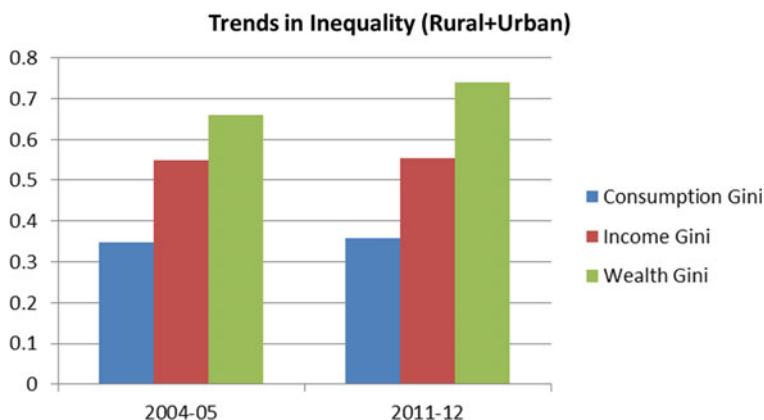
Fig. 3 Trends in inequality in consumption, income and wealth. *Source* Same as Table 5

Table 6 Consumption, income and wealth inequality in India: rural, urban and total, 2011–12

Sector	Total	Rural	Urban
Consumption Gini	0.359	0.287	0.377
Income Gini	0.553	0.541	0.506
Wealth Gini[*]	0.740	0.670	0.770

[*]Refers to 2012

Sources Himanshu (2015) for Consumption Gini; Income Gini coefficients are Estimated from the data of Indian Human Development Survey (IHDS); Anand and Thanpi (2016) for wealth Gini coefficients.

Table 7 Trends in inequality (rural + urban)

Sector	1993–94	2004–05	2011–12
Consumption Gini	0.300	0.347	0.359
Income Gini	–	0.548	0.553
Wealth Gini[*]	0.650	0.660	0.740

[*]Wealth Gini refers to 1991, 2002, 2012

Gini. Thus, inequality in income and wealth is much higher than that of consumption.[9] Inequality in consumption and wealth is lower in rural areas as compared to urban areas. However, inequality in income is higher in rural than urban areas.

Many studies have shown that inequality in consumption increased in the post-reform period.[10] Most of the studies show that it increased marginally in rural areas while it rose significantly for urban areas. Table 7 provides trends in inequality in

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[9] India has made tax data public recently by releasing it for the year 2011–12 (assessment year 2012–13). But, it is very small sample to look at overall income inequalities.

[10] For example, see Radhakrishna (2015).

consumption, income and wealth. It shows consumption and income Gini increased marginally between 2004–05 and 2011–12. However, wealth inequality increased significantly from 0.66 to 0.74—by 8 points during the same period.

Source Same as Table 2

The data base for computing income inequality is not as solid as the base for consumption expenditure. The NSSO surveys have been studied for long and have gone through critical analysis. The sharp differences between consumption Gini coefficient and income Gini coefficient are difficult to explain. Also using the income tax data for computing income distribution has also many problems. In India, only 5 per cent of people come under the income tax net.

Trends in Poverty

There are two conclusions on the trends in poverty. First one is that a World Bank study by Datt et al. (2016) shows that poverty declined by 1.36% points per annum in post-1991 compared to that of 0.44% points per annum prior to 1991. Their study shows that among other things, urban growth is the most important contributor to the rapid reduction in poverty even in rural areas in post-1991 period.

Second conclusion is that within post-reform period, poverty declined faster in 2000s than in 1990s. The official estimates based on Tendulkar poverty lines show that poverty declined only 0.74 percentage points per annum during 1993–94 to 2004–05. But, poverty declined by 2.2 percentage points per annum during 2004–05 to 2011–12. Around 135 million people were lifted above the poverty line in the post-reform period. The all-India poverty ratio in Expert Group (Rangarajan) fell from 38.2 to 29.5%. Totally, 91.6 million individuals were lifted out of poverty during this period. Though Rangarajan Committee methodology gives higher level of absolute poverty ratio, the reduction in poverty ratio from Rangarajan method is not very different than that of Tendulkar method.

Poverty Trends: Growth and Distribution

The trends in poverty show that the pace of reduction was much higher in the post-reform period particularly during high growth period. The impact of higher growth on poverty reduction can also be seen from the decile-wise growth in per capita consumption expenditure. In the period 2004–05 to 2011–12, an increase in per capita consumption had taken place across all the ten deciles of the population both in rural and urban areas. Table 8 gives a comparison of the growth rate of per capita consumption (in real terms) during the periods 1993–94 to 2004–05 and 2004–05 to 2011–12. It shows that the average growth of per capita consumption of the top five deciles is more than that of the bottom five deciles. However, the ratio of the average growth rates of the two periods is higher for the bottom five deciles as compared to the top five. It implies that the expansion of consumption of the lower deciles of the population was more than the upper deciles.

Datt et al. examine the linkages of poverty decline with growth and inequality. In the post-reform period, "the acceleration in rural poverty decline was higher than that for urban poverty. This happened alongside a significant increase in inequality both within and between urban and rural areas, in contrast with a decline in rural inequality

Table 8 Decile-wise growth in per capita consumption (% per year, compound)

Decile	1993–94 to 2004–05		2004–05 to 2011–12	
	Rural	Urban	Rural	Urban
First decile	0.70	0.66	2.91	2.96
Second decile	0.49	0.54	3.00	3.28
Third decile	0.56	0.66	3.15	3.39
Fourth decile	0.55	0.91	3.17	3.42
Fifth decile	0.54	1.00	3.17	3.41
Sixth decile	0.55	1.24	3.30	3.35
Seventh decile	0.52	1.36	3.40	3.30
Eighth decile	0.61	1.35	3.45	3.40
Ninth decile	0.71	1.47	3.48	3.45
Tenth decile	1.61	2.30	3.71	4.52
Bottom five deciles	0.57	0.75	3.08	3.29
Top five deciles	0.80	1.54	3.47	3.60

Note The growth rates are in real terms and derived from URP-consumption data
Source Twelfth Five Year Plan

and no trend in urban inequality pre-1991. Despite the increase in inequality, we find greater post-1991 responsiveness of poverty to growth in the aggregate, regardless of whether growth is measured based on national accounts or survey-based consumption. Thus, faster growth also appears to have been more pro-poor when the latter is measured by the growth elasticity of poverty reduction" (p. 28, Dutt et al., 2016).

To conclude, there has been lot of discussion in recent years on inequality. There is no doubt that inequality in itself has several undesirable consequences. It was Simon Kuznets who had argued in a famous paper in 1955 that in the early period of economic growth, distribution of income tends to worsen and that only after reaching a certain level of economic development, an improvement in the distribution of income occurs. In this context, measuring inequality is not the same as measuring the changes in level of poverty. Even if the Gini coefficient remains the same or picks up, poverty ratio can be steadily declining. This has been true of India. The decline in poverty is much higher particularly in the recent period 2004–05 to 2011–12 in spite of rise in inequality. Even if inequality increases, higher growth can lead to reduction in poverty. Thus, the behaviour of poverty ratio is equally important indicator to monitor.

4.8.2 NAS-NSS Consumption Differences

Ray and Sinha (2014) say that the committee discussed NAS-NSS differences but lost opportunity in suggesting a compromise to resolve the issue. It may be noted that these two estimates of consumption (NAS and household survey based) do not

Table 9 Private consumer expenditure of NSS as percent of national accounts statistics

Year	Food	Non-food	Total
1972–73	118	83.3	94.5
1977–78	91.7	86.0	89.6
1983–84	81.5	66.1	75.1
1987–88	86.5	66.7	77.6
1993–94	71.1	50.8	61.9
1999–00	63.5	50.0	56.3
2004–05 (MRP)	62.5	42.0	50.2
2009–10 (MMRP)	74.2	42.9	54.2
2011–12 (MMRP)			46.9
2017–18	–	–	32.3

MRP Mixed reference period; *MMRP* Modified mixed recall period;
Source Rangarajan Committee up to 2009–10; Estimated by the authors for 2011–12 and 2017–18

match in any country and India is no exception. What is alarming in India is that the difference between NAS and NSS is widening over time.

From a difference of less than 10% in the late 1970s, it has come to 68% in 2017–18, i.e. the survey estimate is only 32.3% of NAS estimates (Table 9).

The Expert Group (Rangarajan) made an analysis of possible reasons for the difference between the estimates. It made some headway but could not fully explain. Therefore, it continued with the practice—initiated by the Expert Group (Lakdawala) and continued by the Expert Group (Tendulkar)—of estimating poverty in India solely by the reference to the size distribution of private consumer expenditure based on NSSO methodology. However with the difference rising to 68%, the time has come for a deeper analysis of the factors contributing to the difference.

According to National Accounts Statistics, private consumer expenditure increased from Rs. 4,910,447 crores in 2011–12 to Rs. 7,417,489 crores in 2017–18. This was an increase of 51%. The per capita consumer expenditure increased by 41% during this period. But according to NSSO survey, per capita consumption expenditure decreased by 8.8%. The difference is too big to be pushed under the carpet. The NSSO Advisory Group or the National Statistical Commission must study the problem and come out with possible suggestions for improving the collection of data through both routes.

4.8.3 Poverty Measures in Other Countries

There are also comments that we should look at the poverty measures of other countries. The Expert Group looked at the methodology of poverty estimation of other countries. Most of the developing countries use consumption basket poverty line. Developed countries generally use the concept of relative poverty. In some

countries, poverty line is exogenously set proportion of mean or median income of population. Ray and Sinha (2014) also talk about inequality and relative poverty. However, if we look at the Indian data the proportion of population with consumption as a fraction of the median remains largely invariant over time.

Reviewing the method of estimation of poverty in other countries and World Bank, the Rangarajan Expert Group arrived at the conclusion that neither their methodological nor procedural aspects are superior to what is being used in India at present. The estimates of poverty in India are based on a methodology which stands far apart for it is able to measure the incidence of poverty by capturing the demographic pattern and consumer behaviour separately in rural and urban areas and also by capturing the state-wise variation in the prices of goods and services.

4.8.4 Public Expenditure and Poverty

The official poverty ratios in India are estimated using certain minimum level of private consumer expenditure on food and non-food items. For example, according to Rangarajan Committee Report on Poverty, the MPCE of '972 in rural areas and '1407 in urban areas is treated as the poverty line at the all India level in 2011–12. This level of private expenditure has to be seen in the context of public expenditure that is being incurred in areas like health, education, food security, sanitation and drinking water. In this article, we argue that the actual well-being of the household will be higher than what is indicated by the poverty line, if we take into account public expenditure along with private expenditure. This aspect is specifically dealt with by the Rangarajan Committee.

The issue of public expenditure on social sector has been mentioned in earlier committees on poverty as well. For example, the 1962 Expert Group of the Perspective Planning Division (PPD) of the Planning Commission recommended a national minimum of private consumption expenditure on food and non-food items for estimating poverty ratios. The Committee Report says that "this national minimum excludes expenditure on health and education, both of which are expected to be provided by the State according to the Constitution and in the light of its other commitments".

Similarly, Lakdawala Committee on Poverty (1993) says that the "poverty line derived from personal consumption patterns and levels do not take into account items of social consumption such as basic education and health, drinking water supply, sanitation, environmental standards etc., in terms of normative requirements or effective access". It also says "consumption of free goods and services provided by the State or charitable institutions is not recorded. Social consumption of these publicly provided services is in the nature of transfer from the government to the people. In other words, the real levels of living of the poor, inclusive of social consumption are expected to be higher than what is reflected through the estimates of private consumption expenditure reported in NSS data".

Public expenditure, particularly in the areas of health, education, food, sanitation, etc., constitutes a significant proportion of the total consumer expenditure of these

items. Their proportion is high particularly among the poor as these services are provided either free or at nominal cost to them. In the seven-year period 2004–05 to 2011–12, public expenditures on education and health per capita at constant 2004–05 prices have nearly doubled with an implied compound annual growth rate of close to 10 per cent per annum (Table 10).

Given that these services are, typically, provided at heavily subsidised prices—if not given free, the reported private expenditures as captured in the NSS Consumer Expenditure Surveys on them would be lower than their true value. However, in the absence of data on the distribution of the public expenditures on these social services by size-class of private consumption expenditure, they cannot be factored into either the construction of the poverty line or in the assessment of their impact on measured poverty. However, it is reasonable to assume that the bulk of the public expenditures on health and education would have gone to meet the needs of lower deciles of population.

Unlike in education and health, in the case of public distribution system (PDS), we do have information on the MPCE of households using PDS and the quantities of grains, etc. bought. One could, therefore, analyse the impact of PDS on measured poverty.

Himanshu and Sen (2013) estimate the size of PDS transfers and the impact of these transfers on poverty. According to their estimates, the value of PDS transfer was 2.4% of MPCE for the population as a whole and 5.2% of MPCE for the bottom 40%. In other words, poor benefited more than others due to these in-kind food transfers. Their study also shows that with PDS transfers, total poverty ratio (Tendulkar methodology) was 30.68% in 2009–10. Without PDS transfers, poverty ratio was higher at 33.85% in the same year.

A survey on "Social Consumption: Education" was conducted in NSS 71st round (January-June 2014). In this survey, information was obtained for each student on various educational incentives received by them such as free education or tuition fee waived, scholarship/ stipend/reimbursement, books or stationery free or at a subsidised price, mid-day meal, student's concession in public transport etc.

Table 10 Per capita per month public expenditure at constant prices (2004–05)

Year	Education	Health
2004–05	78	20
2005–06	90	25
2006–07	85	26
2007–08	95	27
2008–09	101	28
2009–10	129	32
2010–11	146	36
2011–12	157	38

Source Estimated from Budget Documents, Ministry of Finance, GOI

Table 11 Percentage of students receiving scholarship for each quintile class of UMPCE: 2014

Quintile classes of UMPCE	Rural			Urban		
	Male	Female	Person	Male	Female	Person
1	30.7	36.0	33.2	16.0	20.1	18.0
2	26.4	29.9	28.1	11.4	14.0	12.6
3	22.5	24.4	23.3	9.7	11.8	10.7
4	19.0	24.0	21.2	7.6	8.5	8.0
5	11.9	14.8	13.1	5.6	5.5	5.6
All	21.9	26.1	23.8	10.0	12.2	11.0

UMPCE Usual monthly per capita expenditure
Source NSS 71st Round (Jan-June, 2014). Report no. 575

Table 11 provides proportion of students receiving scholarships in rural and urban areas for each quintile class of MPCE. Percentage of students receiving scholarships was higher for lower quintile classes. For example, in rural areas, 33% of students received scholarships for bottom quintile while compared to that of 13% for highest quintile. Table 11 also shows that female students were getting more scholarships than males.

The survey on education also shows that around 57% of males and 63% of female students were getting free education in primary schools. In the case of upper primary, these percentages were 58% for males and 64% for females. Regarding secondary schools, 32% of males and 37% of females were getting free education. The proportion of students getting free education must be much higher for the poor. Similarly, poor must be getting higher benefits from the public expenditure on health.

To conclude, it is suggested here that increased public expenditure on health, education and other social services will have to be taken into account while assessing the trends in poverty. This is because the actual well-being is higher than what is indicated by the poverty line and it has policy implications.

4.8.5 Poverty Ratio for Eligibility Under Programmes

Finally, the Planning Commission has earlier decided to delink the consumption-based poverty estimates for allocating resources to states. The Expert Group deliberated on the issue of use of poverty ratio for determining the eligibility and entitlements for a wide range of poverty alleviation programmes and social welfare schemes implemented by various Ministries and Departments of the GoI in association with the State governments.

The Group recommends that the beneficiaries under target group oriented schemes of the Government may be selected from the deprivation-specific ranking of households. Such ranking of households could be generated for a large number of indicators representing deprivation and levels of living for which the information has

been gathered at the household and individual level in the SECC-2011 and population census. The beneficiaries could be selected from this set of households until the resources earmarked for the programme/scheme permit. Ray and Sinha (2014) also argue for multidimensional measures for identification of the poor. Poverty ratio of Planning Commission can play an important role in deciding allocation of resources among States although now it is delinked as mentioned above. The Ministries and Departments in association with the State governments may draw the guidelines for defining the beneficiaries for their programmes. The process could be similar in rural and urban areas.

5 Conclusion

To conclude, one has to review from time to time the methodologies for arriving poverty estimates in keeping with the changing needs of the population. Poverty lines are only approximations to the socially accepted minimum standards. Thus, in any poverty line approach, an inevitable element of arbitrariness is inescapable. It is by nature subjective and judgmental. There is a hilarious description of how the poverty line evolved in the USA in the latest book by Deaton (2013) entitled *The Great Escape*. Nevertheless, an attempt has been made in the report of Expert Group (Rangarajan) to approach the subject on methodology of measurement of poverty as systematically as possible.

The methodology adopted by the new group on poverty is based on sound principles. However, as the group has clearly indicated, this measure is not considered as an appropriate basis for determining entitlements under various programmes. Each programme focusing on a particular deprivation may have to choose that criterion which is most appropriate for it. But to obtain a general picture of the progress of the country, a suitable measure on poverty is useful. Poverty is not the same as hunger. Hunger is far worse. Nor does the poverty line means a comfortable standard of living. It represents absolute minimum. Obviously, policy should work towards not only to reduce the number of people below that line but also ensure that people in general enjoy a much higher standard of living. Numbers do indicate that poverty ratio in India is coming down even though it may remain at a high level. Policy makers must continue to follow the two-fold strategy of letting the economy grow fast and attacking poverty directly through poverty alleviation programmes.

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A Note on Unemployment and Its Measurement in India

Sripad Motiram

1 Introduction

The purpose of this paper is to shed light on some similarities and connections that have been underappreciated in the literature on development. A few examples will clarify these. A poor individual or household is not just poor but could be slightly poor, moderately poor or severely poor. An unemployed person could be slightly unemployed (for a short duration) or severely unemployed (for a long duration). A literate person could be just literate, slightly educated, moderately educated or highly educated. Finally, a person who participates in the labor market or work could do so slightly (for a small fraction of the time available for him or her), modestly (for a large fraction of the time available for him or her) or for the entire time available for him or her. These examples illustrate the idea that the phenomena under investigation (poverty, unemployment, labor/work force participation and educational attainment) is better conceptualized as continuous or discrete with multiple levels, rather than as dichotomous (e.g., poor versus non-poor or unemployed versus employed). Those who are poor, unemployed, out of the work force and so on (deprived, broadly speaking) are not all alike (e.g., slightly poor, moderately poor; slightly unemployed, severely unemployed). The same is true of those who are non-poor, literate, employed, in the labor or work force and so on (non-deprived, again broadly speaking). When there are comparisons across individuals, incorporating this diversity can introduce considerable complexity but also necessary realism—socioeconomic processes and events (e.g., recessions, natural disasters) have differential impact on individuals and households, and this can be captured better.

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The above ideas have been formalized and empirically applied in the analysis of poverty (e.g., Chakravarty, 2009). But, with respect to other phenomena (in particular, labor and work force participation and unemployment), especially in the Indian context, they have been underappreciated. Therefore, in the discussion below, I will focus on unemployment and labor and work force participation in India by drawing on some of my previous work (Motiram & Naraparaju, 2018), which itself draws on other studies (e.g., Lambert, 2009; Paul, 1991; Shorrocks, 2009). The official discourse in India has used four different approaches to conceptualize and measure participation and unemployment: Usual Principal Status (UPS), Usual Principal and Subsidiary Status (UPSS), Current Weekly Status (CWS) and Current Daily Status (CDS).[1] The principal status of an individual is what he or she has been involved in (e.g., self-employment, work at a regular wage, work as a casual laborer, attending an educational institution, attending domestic duties) for the major part of the year (365 days) before the survey. Under the UPS approach, an individual is considered to be in the labor force if his or her principal status is work (self-employed, regular wage/salary, casual labor) or unemployment (looking for or being available for work). In the UPSS approach, an individual who is outside the UPS labor force, but who has worked for at least 30 days during the previous year (which is deemed as his or her subsidiary status) is also included. To be considered as unemployed, an individual who is part of the UPSS labor force should be unemployed for at least 30 days during the previous year. Under CWS, the status is based upon the reference period of the week before the survey. The labor/work force participation and unemployment of India or a state has been measured by using a simple head count ratio: (Number of individuals in the labor force/population) and (number of unemployed individuals/number of individuals in the labor force), respectively.[2] It is clear that these approaches and measures ignore the differences among individuals and diversity of deprivation e.g., two individuals who are unemployed for 8 months and for the entire year are treated in the same manner.

Under the CDS approach, each day of the reference week is divided into two halves and a status (like earlier, work as self-employed etc.) is assigned to an individual for each of the fourteen halves. The size of the labor force for India (or a state) is calculated in person days by aggregating the time spent by each individual in the labor force. Labor force participation for the country is then the fraction of this to the total number of person days for the population. Analogously, the unemployment rate is the total person days of unemployment as a fraction of the total labor force (as calculated above). In this approach, we can see that individuals are treated differently based upon their duration of their labor force participation and unemployment. To illustrate, consider a simple example of an economy with two individuals (1 and 2) who are in the labor force for 6 days of a reference week, and who are unemployed for 2 days and 1 day, respectively. The labor force participation and unemployment rates are: 12 $(= 6 + 6)/14$ and 3 $(= 2 + 1)/12$, respectively. However, even this approach suffers

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[1] UPSS has also been referred to as Usual Status.

[2] See the reports from various surveys of employment and unemployment situation conducted by National Sample Survey Office (NSSO) e.g., NSS (2013).
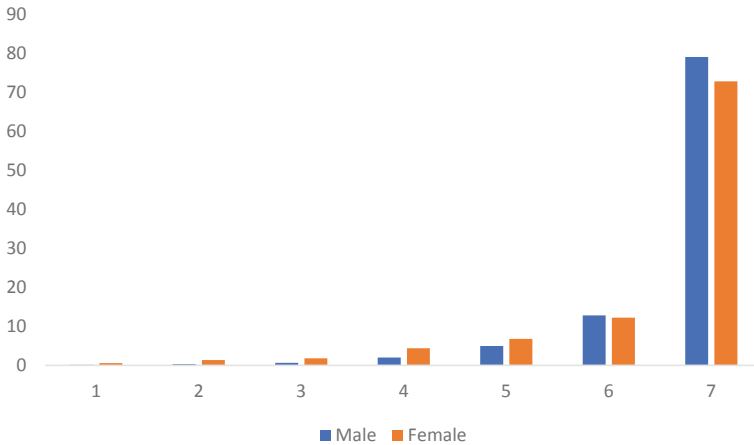
Fig. 1 Distribution of days unemployed (rural). *Source* Author's computations from PLFS2 unit-level data. Percentages calculated among those unemployed, i.e., for at least one day

from an important weakness. If some process (e.g., a recession) worsens the condition of an individual who is more unemployed and equally benefits a less unemployed person, this does not change the unemployment measure. In the above example, if the unemployment of the first individual increases by 1 day and the unemployment of the second individual decreases by the same amount, then total unemployment duration remains the same and the unemployment rate would not change. We would have liked the unemployment measure to increase since the unemployment of the more unemployed person has increased, whereas the less unemployed person has witnessed the opposite. A measure that does justice to this concern, satisfies the property referred to as "distribution sensitivity" in the literature. None of the approaches used in the Indian context, described above, satisfy this property. Motiram and Naraparaju (2018) draw on the parallels highlighted in the literature between the measurement of poverty and unemployment to develop a distribution sensitive measure of unemployment. They illustrate the utility of this measure for India using surveys on employment and unemployment situation conducted by NSSO during 1993–2012.

Are the issues and concern that we have discussed so far relevant for India today? In Figs. 1 and 2, I present estimates of the distribution of days of unemployment for rural and urban areas, respectively. These estimates are from the latest periodic labor force survey (PLFS2, 2018–19), which I will discuss in detail below.[3] We can observe variation in unemployment, both in rural and urban areas, and for both men and women. We can also observe differences between rural and urban areas and

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[3] I will also discuss the assumptions that are needed to generate estimates in Figs. 1 and 2, but to state them briefly here: (i) those unemployed on a particular day are assumed to be so for the entire day, and (ii) those in the labor force are assumed to be so for the entire day. This implies that the length of the working day is the same for everyone, although it is different in reality.
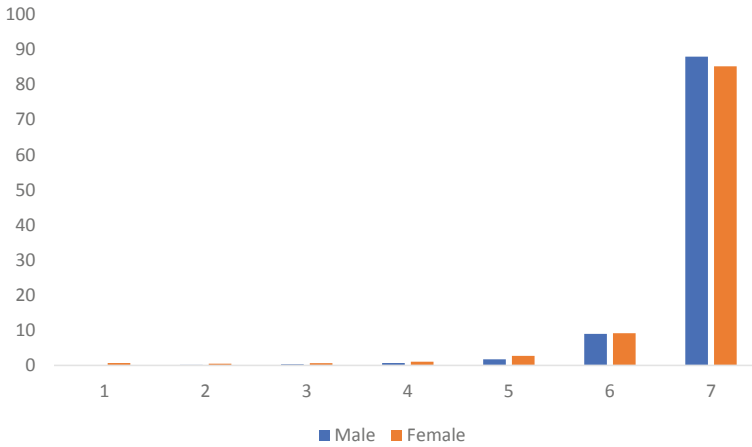
Fig. 2 Distribution of days unemployed (urban). *Source* Author's computations from PLFS2 unit-level data. Percentages calculated among those unemployed, i.e., for at least one day

between men and women. In particular, the percentage of people unemployed on all the seven days is higher in urban areas.

In Figs. 3 and 4, I present estimates of the distribution of days during which individuals are participating in the labor force in rural and urban areas, respectively. Again, we can observe variation in labor force participation, both in rural and urban areas, and both for men and women. The findings represented in Figs. 1, 2, 3 and 4 are unsurprising since a large proportion of Indians work in the informal sector (NCEUS, 2008), which is characterized by sporadic employment and voluntary and involuntary withdrawals from the labor force, particularly by women. These patterns establish the relevance for India of differences in participation and unemployment across individuals.
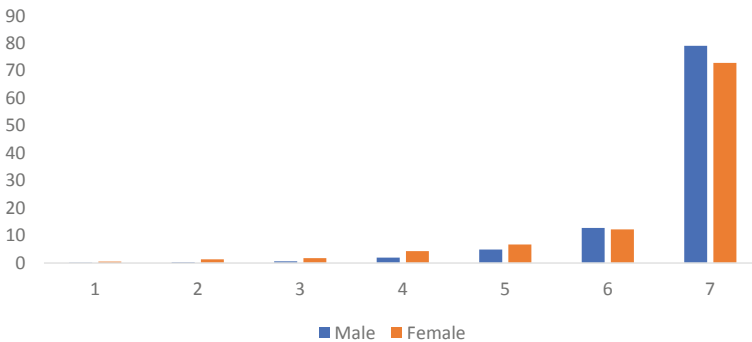
Fig. 3 Distribution of days in labor force (rural). *Source* Author's computations from PLFS2 unit-level data. Percentages calculated among those in the labor force, i.e., for at least one day
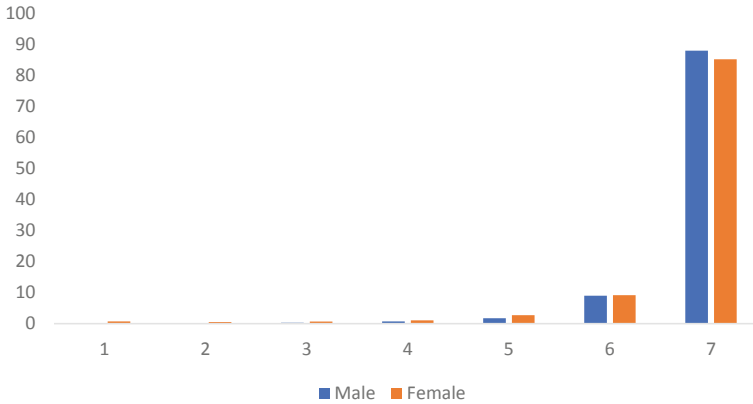
Fig. 4 Distribution of days in labor force (urban). *Source* Author's computations from PLFS2 unit-level data. Percentages calculated among those in the labor force, i.e., for at least one day

Apart from the limitations of official conceptualizations and measures, there are other problems that have been highlighted that concern data on work and unemployment in the Indian employment and unemployment surveys. For example, individuals in developing countries like India, particularly women, simultaneously participate in multiple activities (e.g., child care and work) and this is inadequately accounted for. Similarly, given its features mentioned above, informal work is also imprecisely captured. Several scholars (e.g., Hirway, 2009) have therefore highlighted the advantages of time use surveys (e.g., their ability to account for multiple activities and entry/exit from work and labor force) and suggested that India should conduct and rely on them.[4] The 19th International Conference of Labor Statisticians (ICLS), while arriving at a more systematic definition of work and labor force classification, also highlighted the benefits of time use surveys.[5] In 2019, a time use survey was conducted for India by MOSPI and the data was recently released to the public.[6]

The rest of this paper is organized in the following manner. In the next section, I will discuss a theoretical framework that incorporates differences across individuals and distribution sensitivity in the measurement of unemployment. In Sect. 3, I apply this framework to understand unemployment in India using PLFS2. Section 4 concludes with a discussion.

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[4] An expert group of the Ministry of Statistics Planning and Implementation (MOSPI) looking into the 62nd round of the employment and unemployment survey also recommended a time use survey.

[5] Organized by the International Labour Office (ILO) in Geneva during 2–3 October 2013, see: https://www.ilo.org/wcmsp5/groups/public/-dgreports/-stat/documents/publication/wcms_2 20535.pdf.

[6] For details, see: http://mospi.nic.in/time-use-survey. Previously, a pilot time use survey was conducted in 1998–99 covering six states in different regions of India. The details of this survey are given in Hirway (2009).

2 Theoretical Framework

Before going into the details of the theoretical framework, it is useful to lay out the following notation:

N—Size of the population = number of individuals.

D—length of the reference period in days, which is the same for all individuals.

l_i—duration for which individual i (=1, 2, 3, …, N) is in the labor force during the reference period.

L—size of the labor force in person days = $\sum_{i=1}^{N} l_i$.

s_i—contribution of individual i to the total labor force = l_i/L.

w_i—duration for which individual i is working during the reference period.

W—size of the work force in person days = $\sum_{i=1}^{N} w_i$.

u_i—duration for which individual i is unemployed during the reference period.

U—total unemployment duration in person days = $\sum_{i=1}^{N} u_i$.

l_i/D—labor force intensity = fraction of the reference period during which individual i participates in the labor force.

w_i/l_i—work force intensity = fraction of the reference period during which individual i participates in the work force..

u_i/l_i—unemployment intensity = duration for which individual i is unemployed, expressed as a fraction of the duration during which he or she is in the labor force.

HCL—Head count of those participating in the labor force.

HCW—Head count of those participating in the work force.

HCU—Head count of unemployed.

The official measures used in India are simple head count ratios. For example, the rate of labor force participation, work force participation, and unemployment according to the Usual Principal Status (with the reference period of a year) are: *HCL/N, HCW/N* and *HCU/HCL*, respectively. The CDS measures are a bit more involved and the corresponding formulae are: *L/ND, W/ND* and *U/L*, respectively. We are now in a position to clearly state the property of distribution sensitivity in the context of unemployment: the unemployment measure should increase if the unemployment duration of an individual decreases and the unemployment duration of another individual with equal or higher unemployment (intensity and duration) increases by the same amount. As explained in the introduction, none of the official measures satisfy the property of distribution sensitivity. Motiram and Naraparaju (2018) formally demonstrate that the following measure satisfies distribution sensitivity (and some other desirable properties):

$$U^* = \left(\sum_{i=1}^{N} s_i \left(\frac{u_i}{l_i} \right)^2 \right)^{1/2}$$

For our purposes, it is sufficient to understand the intuition for this result. We can note that the weight on the unemployment intensity of an individual i is: $s_i \left(\frac{u_i}{l_i} \right) = \frac{u_i}{L}$. The result follows from the fact that those with higher unemployment (durations and intensity) receive higher weights. This is similar to the case of the coefficient of variation satisfying the Dalton-Pigou property in inequality measurement and Foster-Greer-Thorbecke measure (FGT (2)) satisfying the transfer property in poverty measurement (see Chakravarty (2009) for a discussion of these). For the example that we considered above, with the two individuals 1 and 2, $l_1=7$, $u_1 = 2$, $\frac{u_1}{l_1} = \frac{2}{7}$, $s_1 = \frac{1}{2}$, $l_2=7$, $u_2 = 1$, $\frac{u_2}{l_2} = \frac{1}{7}$, $s_2 = \frac{1}{2}$, $U^* = \left(\frac{5}{98} \right)^{1/2}$. Note that 1 has higher unemployment duration and intensity as compared to 2. If the unemployment duration of 1 increases by 1 day and the unemployment duration of 2 decreases by the same (i.e., 1 day), then U^* increases (to $\left(\frac{9}{98} \right)^{1/2}$). By using the same idea and the labor force and work force intensities defined above, we can derive distribution sensitive measures for labor and work force participation.

If the population is divided into sub-groups (e.g., religious groups, groups which differ in their educational attainment, ethnic groups), then it would be useful to have a measure that can show how unemployment in the population is related to unemployment for these groups. One of the advantages of the simple head count ratios discussed above is that they enable such an analysis. If the population is divided into M groups indexed $m = 1, 2, \ldots, M$, then the unemployment rate of the population (U) can be written as:

$$U = HCU/HCL = \sum_{m=1}^{M} a_m U_m$$

a_m and U_m are population share and the unemployment rate (as measured by the Head Count Ratio) of the sub-group m, respectively. Whether a sub-group is contributing too much or too little to overall unemployment can be assessed by comparing its contribution ($a_m U_m / U$) to its population share (a_m). If the contribution is higher (lower) than the population share, then the sub-group is overrepresented (underrepresented). It is obvious that the same result can be obtained by comparing the sub-group specific unemployment rates (U_m) and the overall unemployment rate (U). Sub-group m is overrepresented if $U > U_m$ and underrepresented otherwise.

Motiram and Naraparaju (2018) demonstrate that U^* is also amenable to similar analysis with respect to sub-groups. They show that:

$$(U^*)^2 = \sum_{m=1}^{M} \frac{L_m}{L} \left(U_m^* \right)^2$$

L_m is size of the labor force of sub-group m, so that $\frac{L_m}{L}$ is the share of sub-group m in the total labor force. U_m^* is the unemployment rate of the sub-group m. The contribution of a sub-group m to overall unemployment is given by: $\frac{L_m}{L}\left(U_m^*\right)^2/(U^*)^2$ and its overrepresentation or underrepresentation in total unemployment can be assessed by comparing this contribution to its share of the labor force.

Having laid down these theoretical concepts, we are now in a position to examine the unemployment scenario in India.

3 Analysis of Unemployment in India

To understand unemployment in India, I examine data from PLFS2. NSS (2020) (the annual report) presents the details of the survey methodology and the sampling strategy. From the two recent labor force surveys conducted by Central Statistics Office (CSO), PLFS1 (2017–18) and PLFS2 (2018–19), we can observe that the CDS approach has fallen out of favor and official estimates of unemployment are being generated using the other approaches. In PLFS2, two activities were enumerated per each day of a reference week (as earlier). However, a person who is unemployed on a particular day is given this status for the first activity and the status of the second activity is left missing. Therefore, in the analysis below, I assume that if an individual is unemployed, he or she is unemployed for the entire day. For an individual who has worked, PLFS2 gives several details, including the hours worked in each activity of a particular day and the total hours worked in the day. A worker can have different status for the two activities in a day e.g., self-employed and regular salaried worker. A person is in the labor force if he or she works or is unemployed. Given the assumption above regarding unemployment, I make a similar assumption regarding labor force. If a person is unemployed or works during a day, I assume that he or she is in the labor force for the entire day. This is an approximation since individuals do differ in the lengths of their working day, and this is being ignored.

In Table 1, I present estimates of unemployment for various states and union territories and for the entire country. Apart from U^*, I also present estimates using the CWS method. The CWS measure (since it is a simple head count ratio) is easy to interpret as a percentage, and is usually presented in this manner (e.g., see NSS (2020), Table 36). U^* is not amenable to easy interpretation as a percentage. Nevertheless, I present U^* figures in percentage form to facilitate comparison with CWS, and they should be interpreted as simple percentages, e.g., 33.1% is simply 0.331. The first observation that we can make is that the unemployment rates are quite high, both at the all-India level and for several states (e.g., Nagaland, Uttarakhand, Lakshadweep).[7] For a few decades now, scholars (e.g., Kannan & Raveendran, 2009)

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[7] While not strictly comparable, for purely suggestive purposes, the 68th round (2011–12) CWS unemployment estimates (see NSS (2013), table S32) can be examined. For males and females in rural India, these are: 3.3% and 3.5%, respectively. The corresponding figures for urban areas are: 3.8% and 6.7%, respectively.

Table 1 Unemployment rates—all-India, states and union territories. *Source* Author's computations from PLFS2, unit-level data

State/union territory	CWS (R)		CWS (U)		$U^*(R)$		$U^*(U)$	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Andhra Pradesh	8.8	10.5	7.8	13.7	35.7	40.1	30.8	38.8
Arunachal Pradesh	5.9	14.0	7.3	29.4	24.6	37.2	27.1	54.5
Assam	6.3	7.0	10.1	18.8	25.9	27.9	32.1	43.1
Bihar	11.0	3.5	11.2	13.1	33.7	17.9	33.7	35.3
Chhattisgarh	7.6	2.1	8.5	11.0	29.7	17.1	30.9	34.2
Delhi	1.3	0.0	11.9	10.6	12.0	0.0	34.9	33.1
Goa	2.9	16.8	7.4	10.2	20.5	42.0	28.7	32.7
Gujarat	4.1	2.2	3.9	2.3	22.4	18.9	20.9	16.3
Haryana	13.4	10.5	11.1	10.0	38.6	36.1	34.5	32.8
Himachal Pradesh	10.6	6.7	10.5	10.1	35.2	26.7	33.8	32.2
Jammu and Kashmir	5.3	7.6	6.4	33.3	28.1	27.9	26.7	58.7
Jharkhand	8.5	2.0	11.2	9.9	35.1	19.9	35.3	31.1
Karnataka	5.9	3.0	5.7	7.2	27.9	23.2	25.5	27.9
Kerala	8.0	19.0	7.9	20.9	41.4	51.5	38.6	49.4
Madhya Pradesh	8.2	8.1	11.1	7.7	34.8	35.5	36.0	30.6
Maharashtra	9.0	9.5	7.7	14.4	34.1	35.5	29.3	38.8
Manipur	7.7	16.0	9.6	7.6	27.9	41.0	31.6	28.4
Meghalaya	2.1	2.2	4.6	13.1	15.7	16.0	22.4	37.5
Mizoram	4.1	8.0	8.1	12.5	21.7	30.2	29.0	36.5
Nagaland	14.4	21.2	15.1	42.0	40.5	49.1	39.4	65.3
Odisha	12.2	7.6	12.7	23.4	40.2	32.5	37.9	51.4
Punjab	8.7	11.8	7.4	13.6	33.6	36.9	29.3	39.0
Rajasthan	10.4	2.9	10.4	17.4	34.1	17.9	33.3	42.3
Sikkim	3.6	2.0	3.9	6.5	19.6	14.3	20.1	25.7
Tamil Nadu	10.5	10.5	8.2	11.5	39.8	41.4	34.0	36.9
Telangana	10.0	8.4	9.6	20.3	33.7	34.2	32.9	45.9
Tripura	5.9	33.7	8.7	31.0	29.3	62.8	32.9	57.6
Uttrakhand	7.9	13.1	12.2	33.9	31.4	37.9	35.9	59.3
Uttar Pradesh	8.7	3.3	13.0	9.9	34.5	20.5	37.6	29.1

(continued)

Table 1 (continued)

State/union territory	CWS (R)		CWS (U)		$U^*(R)$		$U^*(U)$	
West Bengal	7.6	6.7	7.1	4.9	35.5	30.9	29.4	23.2
Andaman and Nicobar	8.2	34.7	8.1	38.5	30.6	62.3	29.8	64.3
Chandigarh	0.0	10.9	8.7	8.4	0.0	34.4	30.0	30.1
D and N Haveli	16.2	0.0	1.3	6.2	42.0	0.0	11.6	24.9
Daman and Diu	2.2	0.0	0.0	0.0	15.5	0.0	3.7	0.0
Lakshadweep	39.3	48.2	21.8	48.7	69.9	72.2	49.4	69.8
Puducherry	15.9	21.2	9.1	7.5	47.1	52.2	34.7	28.8
All-India	8.8	7.3	8.9	12.1	33.9	32.0	32.1	36.3

R–Rural, *U*–Urban
For the definitions of unemployment rate based upon CWS, see Sect. 1. For U^*, see Sect. 2

have been arguing that India has been experiencing jobless growth and creating jobs in unremunerative sectors (e.g., rural construction, see Thomas, 2012). This tendency seems to have only been deepened during the National Democratic Alliance (NDA) regime, 2014–2019. The second observation is that state-level comparisons reflect some differences between the two unemployment measures (i.e., CWS and U^*). For example, when we compare rural male unemployment in Andhra Pradesh and Maharashtra, we can observe that CWS and U^* give different rankings. This reflects the fact that while U^* is distribution sensitive, CWS is not. The higher U^* for Andhra Pradesh is due to the larger share of individuals with longer unemployment spells. For older data, Motiram and Naraparaju (2018) document similar differences between unemployment rates as measured by CDS and U^*. This underscores the virtue of using both distribution sensitive measures and multiple measures to get a better picture of unemployment.

One of the concerns about unemployment around the world is with respect to young people (e.g., Economist, 2013a, 2013b). If educated youth are unemployed, this reflects both underutilized/wasted talent and the potential for social conflict. As discussed in the previous section, both CWS and U^* are measures that can help analyze populations with sub-groups. We can use this feature to shed more light on the issue of youth unemployment. In Table 2, I present the results of a decomposition exercise for CWS and U^* considering only adults, aged twenty years or above. I divide them into three age groups: 20–30 years, 30–40 years and 40 years and above. From Table 2, with both CWS and U^*, we can observe that the youngest group is overrepresented among the unemployed, whereas the other groups are underrepresented. This is true for both rural and urban areas. With CWS, this can be inferred by comparing the age-specific unemployment rates with the overall unemployment rate. With U^*, the same can be inferred by comparing the age-specific labor force shares to the contribution to overall employment (columns (2) and (5)). The unemployment rate among the youngest group is also quite high. A substantial proportion of these

Table 2 Age and unemployment—results of a decomposition. *Source* Author's computations from PLFS2 unit-level data

	CWS	Share of LF	$(U*)^2$	(2) * (3)	Contribution
	(1) (%)	(2) (%)	(3)	(4)	(5) (%)
Rural					
Aged 20–30	18.86	23.85	0.222	0.053	52.97
Aged 30–40	4.71	27.41	0.073	0.020	20.03
40 or older	3.11	48.89	0.055	0.027	27.00
Total	7.27	100.00	0.100	0.100	100.00
Urban					
Aged 20–30	21.53	27.32	0.229	0.063	62.16
Aged 30–40	5.76	28.43	0.069	0.020	19.38
40 or older	2.79	44.41	0.042	0.019	18.46
Total	8.73	100.00	0.101	0.101	100.00

Sample restricted to individuals aged 20 years or older. For details of the decomposition, see Sect. 3
Figures in column (2) do not add up to 100 due to rounding

unemployed youth are highly educated, e.g., in urban areas, about half (47%) have graduate or higher educational attainment.[8] Although it is true that younger people are keener on searching for a job and relatively less likely to drop out of the labor force due to discouragement, these findings raise serious concerns about unemployment among educated youth.

4 Discussion and Conclusions

In the above discussion, I have highlighted the importance of considering differences among deprived and non-deprived individuals and households rather than using a dichotomous approach. I have considered the phenomenon of unemployment and shown how this can be done by drawing upon my previous work on a distribution sensitive measure of unemployment. Using PLFS2, I have demonstrated the relevance of these ideas for the Indian context.

There are certain policy implications that emerge from the above analysis. First, the periodic labor force surveys are providing annual data. They have other advantages over previous surveys on employment and unemployment situation, e.g., documenting the hours of work and earnings for various kinds of workers. However, more details on labor force participation and unemployment should be collected and would be useful for researchers and policy makers. Individuals in developing countries, including India, perform multiple activities during the day and could enter or

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[8] Percentage calculated by examining general educational attainment of individuals with unemployed CWS status.

exit the labor force or employment status. This is the reason for some scholars (e.g., Wadhwa & Ramaswamy, 2012) to consider CDS as the best measure of unemployment. It would be useful to collect some information on those unemployed or out of the labor force that is similar to what is being collected for those in the work force (e.g., hours in the activity). Second, from the empirical findings on unemployment, it is obvious that this is a serious problem. Unemployment among educated youth is of particular concern. Both job creation (e.g., through public investment) and welfare schemes to protect the unemployed (e.g., insurance, training to prevent obsolescence of skills) are absolutely essential.[9]

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[9] A few older studies on India (e.g., World Bank 2010, 2012) are still relevant in this context.

Sectoral Issues

Towards Inclusive Urbanisation in India

Saiyed Raza Hashim

1 Introduction

Transformation of the world from rural to urban has been quite fast during the last half a century or so. The world which was about one-third urban in 1960s is over 55% urban today. Developed countries are already 80–90% urban and the rest of the world is catching up fast. Urbanisation has been a concomitant phenomenon of economic growth generating unprecedented acceleration in productivity and consumption. In comparison, the urbanisation process in India has been slow. India was about 31% urban in 2011 and might not be more than 35–36% urban in 2020. Thus, whereas more than half of the world population enjoys the benefits of urban life, i.e. better job prospects, access to better health and education services, higher levels of productivity and income, a majority of Indian people are deprived of these benefits. Unlike in China, there are no restrictive regulations in India about the movement of people from village to city, but a number of factors and government policies indirectly impede and discourage such movements. Cities are not very accommodating of the poor migrants and discourage them in a variety of ways. Because of the low level of urbanisation and its concentration in a few mega-cities, most of the rural hinterland is also deprived of the benefits which accrue from proximity to a city.

The inclusiveness of urbanisation need to be considered with reference to the overall impact and implications of the urban process not only for those who live in an urban settlement, but also for those in rural areas. A more inclusive urbanisation will reach out to larger number of people with trade and productivity linkages and better health and education services and spread of knowledge. Inclusiveness of urbanisation has to be considered also with reference to the impact and implications of urbanisation for the weaker sections of the society, particularly the poor. Problems of social exclusiveness, housing shortages, water scarcity, commutation to work and urban

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crimes become more acute as the city expands, and the poor, the women and children suffer more from these problems. These problems need sharper focus as part of urban planning and urban governance. The observation in the Introduction to the State of World's Population Report is quite apt in this context: 'Urbanisation …. is inevitable, but can also be positive. The current concentration of poverty, slum growth and social disruption in cities does paint a threatening picture; yet no country in the industrial age has ever achieved significant economic growth without urbanisation. Cities concentrate poverty, but they also represent the best hope of escaping it' (UNFPA, 2007).

This paper examines a number of propositions in the context of what impedes the inclusive urbanisation in India and what needs to be done.

One proposition is that growth itself makes urbanisation more inclusive. Urbanisation is both a consequence and a cause of economic growth and prosperity in the society. When the society proceeds on the path of growth and prosperity, the advantage inevitably spreads and touches all sections of the people, however disproportionate may be the advantages that percolate down when the economy slips on the path of retardation, the burden of the decline falls much more heavily on the poorer sections of the society.

The second proposition is that a widely spread and even pattern of urbanisation is more inclusive because such a pattern of urbanisation will connect with more rural areas and reach larger number of people. It does not mean that all the cities have to be nearly equal in size. There is a hierarchy in the natural growth of cities, and different sizes of cities perform different roles in economic, cultural and intellectual development of the society. However, a more even spread of cities and towns will reach out to a larger number of people and will be more inclusive.

Some villages acquire urban characteristics overtime in terms of population size, population density and nature of economic activities satisfying threshold of the definition of an urban settlement. Such villages are designated as 'towns' by the Census of India. Short of statutory recognition, they are called census towns. These census towns are not recognised statutorily as urban settlement by the governments of the states in which are located mostly for fiscal reasons, and are thus deprived of urban governance structure and financial support. Between the census years 2001 and 2011, there has been a proliferation of such towns. They have come up in large numbers in less urbanised states and also in rural hinterland away from big cities. Our proposition is that if formally recognised and supported, these towns can play an important role in urban inclusiveness by reaching out to vast rural hinterland deprived of the benefits of urbanisation.

A facet of slow rate of urbanisation in India has been a slow rate of migration from rural to urban areas, even though the city offers better jobs and income prospects. There are a variety of factors that discourage the migrants. Poor job seekers find it difficult to secure a living place in a city. Casual nature of work, absence of social security and community support, lack of portability of essential entitlements, etc., are the impeding factors. At the same time, the city needs workers and some are able to answer this call. They come to the city, but their life is full of difficulties, and

becomes perilous in times of crises, as the COVID-19 pandemic has vividly demonstrated. Cities cannot be made inclusive without seriously addressing the plights of the migrants.

Poverty measurements, in spite of repeated attempts to widen them to include more of non-food requirements, remain food-centric in essence. Food is not the most acute problem of urban poor today. The most acute problems of urban poor today are housing, lack of access to essential services and a number of vulnerabilities arising from casual nature of work, lack of social security and absence of community support. Poverty measures have to take these difficulties into account and poverty alleviation programmes in urban areas have to address these vulnerabilities of the poor.

A severe limitation of studying urbanisation in India in this year 2020 is that the basic demographic data are available only up to the year 2011, the last census year. During the nine years since then, many changes in the nature and extent of urbanisation would have taken place, which we will know more clearly only after a few years when the first flashes of data from census 2021 are available. But I believe, sufficiently meaningful conclusions can still be drawn from the analysis of the available data to inform an outline of a long-term urban vision for India.

2   Economic Growth and Urbanisation

Economic growth and urbanisation are not only closely related, but urbanisation is a driving force in economic development. Industry, trade and finance do need to come together in space for close interaction, and those activities need workers. A concentration of industry, trade, finance and the workers related to these activities generates secondary activities and also creates systems for the delivery of health, education and entertainment services. Transportation, communication and energy infrastructure develops. These in turn attract more activities and more people, and the process of urban expansion sets in. Because of concentration in space of all these productive agents, urbanisation promotes efficient use of land and natural resources and more efficient use of energy and infrastructure. There are increasing returns to scale accruing from spatial concentration (Anthony Venable, 2009). Cities bolster productive efficiencies in developing countries just as they do in developed countries (Gills Duration, 2009). It was found that doubling city size increased productivity across industries in the USA by 3.8% and the informal sector also benefitted from economies of agglomeration (Annez & Buckley, 2009). On the relationship between economic growth and urbanisation, it was found that 'in the United States, urbanisation rates and per capita income moved together until about 1940 when urbanisation reached close to 60%, thereafter per capita income expanded much more rapidly. Rapidly growing developing countries have followed a similar path, although the rapid takeoff in per capita income in China took place at an urbanisation rate of about half that of the United States' (Annez & Buckley, 2009, p. 4). The take-off level of urbanisation will of course be different for different countries. In the USA, that stage was reached in about 1935–1940 with per capita income level of about

$6760 and urbanisation level of 56%. In China, the breakthrough came at income level of about $600 and urbanisation level of about 22% (numbers are approximate and have been derived from Fig. 1.2, p. 3 of Annex & Buckley, 2009).

In what follows, we examine the long-term growth in urbanisation and economic growth in India. Table 1 sums up the history of urbanisation and economic growth in India for more than a century, i.e. from 1901 to 2011. As can be seen from columns 7 and 8 of the table, growth rates of per capita GDP and changes in the percentages of urban population are fairly aligned except for the decades ending 1941, 1951 and 1981. But these were exceptional decades showing extra-normal increases in urban population as explained in what follows. At the beginning of the twentieth century, with agriculture as the mainstay of the economy, urban population was less than 11%

Table 1 Growth and urbanisation in India

1	2	3	4	5	6	7	8
Census years	Size of country's population (million)	Percentage of urban population	Growth rate (expo) of total population	Growth rate (expo) of urban population	Growth rate (average annual) of GDP	Growth rate of per capita GDP	Change in percentage of urban population
1901	238.4	10.84	–	–	–	–	–
1911	252.1	10.29	0.56	0.03	n.a	1.30	−0.55
1921	251.3	11.18	−0.03	0.79	n.a	1.30	0.89
1931	279.0	11.19	1.04	1.75	n.a	−0.10	0.01
1941	318.7	13.86	1.33	2.77	n.a	−0.10	2.67
1951	361.1	17.29	1.25	3.47	n.a	−0.10	3.43
1961	439.2	17.97	1.96	2.34	3.94	1.98	0.68
1971	548.2	19.91	2.20	3.21	3.75	1.55	1.94
1981	683.3	23.34	2.22	3.83	3.16	0.94	3.43
1991	846.4	25.72	2.16	3.09	5.40	3.24	2.38
2001	1028.7	27.78	1.97	2.73	5.70	3.73	2.06
2011	1210.2	31.16	1.64	2.70	6.80	5.16	3.38

Note

n.a. = not available

expo = exponential

In col. 7 of the table, growth rate of 1.3% has been assumed for the entire period 1901–1921, and—0.1% has been assumed for the entire period 1921–1951.

Sources

Source for cols. 2, 3, 4 and 5 is Census of India (2011), *Size, Growth and Distribution of Population*

Source for growth rate of GDP from year 1951 to year 2011 is *New National Accounts Series*—Base Year 2011–12, CSO, GOI

Source for approximation of per capita income growth rate for the period 1901–1951 is Dutt and Sundaram (2010). Dutt and Sundaram have estimated average annual growth rates of per capita income as:

1905–1925—1.3%

1925–1950— −0.1%

of the total population. The census data show that after a decline in urban proportion in 1911, an increase was recorded in 1921, and again there was no increase in the proportion of urban population in 1931. 1941 recorded a big increase of 2.67% points in urbanisation. This is surprising because there were no economic factors or any other event to push the process of urbanisation beyond an increase of say, around 1% which could be taken as normal change in urbanisation in that era. This apparent burst of urbanisation in 1941 is explained in a Note from Census Commissioner (Census of India, 1941). It is reported that there was under enumeration in 1931 Census. The 1931 Census coincided with Civil Disobedience Movement, causing a good deal of localised trouble at many places in Bombay and Bengal Presidencies, which happened to be also the more urbanised of the provinces at that time. This underenumeration in 1931 was made over in 1941 census. The real big change in urbanisation, i.e. an increase of 3.43% points, is recorded in 1951 census. This was the first post-independence census. The partition of the country in 1947 brought millions of refugees who almost entirely settled in urban areas or created new urban settlements. The next big jump in the proportion of urban population is recorded by the 1981 census. This again could be largely attributed to a big refugee influx from Bangladesh following the war with Pakistan in 1971.

If we consider a longer span of economic history of India, say from CE 1600 onwards, a period for which certain features of economic history have been reconstructed by researchers in recent times, it would appear that late nineteenth century to early twentieth century was the worst period in the economic history of India, and this period also coincided with the lowest levels of urbanisation. The Indian economy was quite in good shape in the seventeenth century. A decline started from the middle of eighteenth century and a sharper decline began from the middle of the nineteenth century.

William Dalrymple (2019, p. 14) writes that India in early 1600s 'was producing about a quarter of global manufacturing; indeed in many ways it was the world's industrial power horse and the world's leader in manufacture textiles'. Dalrymple (2019, p. 411) quotes Angus Maddison: 'in 1600 Britain was creating 1.8% of world GDP, while India was creating 22.5%. The figures for 1700 are 2.88% versus 22.44%.'

The economic prosperity and decline of India in that era were reflected in the levels of urbanisation also. Broadberry and Gupta (2012) have produced estimates of urban population of India from 1600 CE onwards. Selected figures are set out in Table 2. We note that the population of India declined in absolute terms from 2.56 million in 1571 to 238 million in 1901. Level of urbanisation declined from 15% in

Table 2 Urban population in India 1600 CE to 1871 CE

Year	Population (million)	Urban share (%)
1600	142	15.0
1700	164	14.0
1801	207	13.0
1871	256	8.7

Source Broadberry and Gupta (2012, p. 29)

CE 1600 to 8.7% in 1871 and was at 10.3% in 1911. The severe economic decline was the cause of recurrent famines and epidemics. A de-industrialisation process during this period was the cause of de-urbanisation.

3 Pattern of Urbanisation

The benefits of urbanisation extend to the rural hinterland through a variety of linkages. Urban centres are linked to their rural hinterland through trade, commutation for jobs and commutation for access to health, education and other services. Intensity of these linkages depends on the size of the city, distance from the city and the efficiency of transport and communication system. The extent and the intensity of such linkages is a measure of inclusiveness of the urban centre. Higher level of urbanisation and a reasonable degree of dispersion of urban settlements in space will make urbanisation more inclusive. It has been generally observed that at low level of urbanisation, there are fewer urban centres and a vast area of rural hinterland is devoid of the benefits of urbanisation. The level of urbanisation and dispersion of urban centres in space are closely related with the level of economic development.

For a large country like India, regional levels of urbanisation and regional distribution of urban centres need to be particularly considered. At lower level of economic development, the variations in the regional level or urbanisation are very high. At higher level of economic development, there is a tendency for convergence in the regional levels of urbanisation.

Before we turn to analyse the Indian situation in this regard, it would be interacting to consider the historical expansion of the USA on the progress of regional urbanisation. Starting with a very uneven pattern of urbanisation in the different regions of the USA, the urbanisation level has converged to more or less to an equal level over a century (Table 3).

Around the year 1900, North-East region given an early start in commercialisation was the most urbanised (66%), the South was the least urbanised (only 18%) and the West was urbanised at the average level of USA's urbanisation (40%). After a century, all the regions caught up to have come close to the average level of USA's urbanisation

Table 3 Regional pattern of urbanisation in the USA (% of urban population)

Year	North-East	Mid-West	West	South	USA
1900	66.1	38.6	39.9	18.3	39.6
1930	77.6	57.9	58.4	34.1	56.1
1960	80.2	68.7	77.7	58.5	69.9
1990	84.0	73.9	87.6	71.5	78.0
2010	85.0	75.9	89.8	75.8	80.7

Source Basic source of the data is Census Bureau; taken here from Wikipedia: Urbanisation in the United States. en.wikipedia.org>wiki>

(80.7%). Range of urbanisation between the regions is now only 76–90%. There were three decades of phenomenal growth in urbanisation, particularly in the West and the South after the Second World War. West has now emerged as the most urbanised region of the USA. What is even more interesting to note is that the West is also the leading agricultural region of the country. California is the dominant state in the West, in terms of both population and the size of the economy. California is the most urbanised state of the USA with 95% of population living in cities. California is a world leader in innovation and creation of frontier technology, particularly in the field of information technology and artificial intelligence. California also produces the highest agricultural value in USA not only in absolute terms but also on per capita basis. California produces between 13 and 14% of total agricultural value produced in the USA, Texas being the next state contributing about 6–7%. Thus, high level of urbanisation can very well co-exist with high level of agriculture. In fact, urbanisation helps in raising the productivity of agriculture.

We present here in Table 4, the data on the level of urbanisation, per capita net state domestic product (NSDP) and the distribution of cities by size classes for 20 of Indian states, all with population above 5 million in 2011. Very small states and union territories including the NCT of Delhi are not included, though the figures for all-India include all of them. A number of observations can be made from this table. The range in the level of urbanisation in 2011 is very wide, from a primitively low level of urbanisation of 10% to a fairly high level of urbanisation of 48.4%. Tamil Nadu, Kerala, Maharashtra and Gujarat are among the most urbanised states. Kerala joined this group in 2011 breaking rank from the below all-India average group of states in 2001. This is a very rapid transition. Among the least urbanised states were Odisha, Assam, Bihar and Himachal Pradesh, maintaining the same status in ranking in 2011 as well as in 2001. The ranking of all the states except Kerala in the level of urbanisation has remained more or less the same in the two census years a decade apart. The ranking of states in the level of urbanisation is broadly aligned with ranking in per capita NSDP, notable exceptions in this respect being Uttarakhand and Himachal Pradesh.

The number of four-million-plus towns in India is only eight, one of which is NT of Delhi, and the other seven are all located in five above average level of urbanised states. Kerala, Punjab and Haryana among the above average urbanised states do not have a single city of 4 million + category.

Four of the eight mega-cities of India, Delhi, Mumbai, Kolkata and Chennai have been historically big cities. Kolkata, Mumbai and Chennai particularly emerged as big cities during the colonial times and retained their lead position in post-independence India as centres of industry, trade and finance. In more recent decades, Bangalore, Hyderabad, Ahmadabad and Surat have started emerging as faster growing mega-cities. Indications are that by 2021, Bangalore and Hyderabad may overtake Kolkata and Chennai in size.

On the whole, it may be concluded that the regional pattern of urbanisation is uneven because of uneven pattern of regional economic growth. High level of urbanisation need not be based only on the presence of mega-cities, though mega-cities

Table 4 Statewise urbanisation in India

States	Population	Urban population	Urban population	NSDP per capita	No. of cities by population size (million)		
	2011 (million)	2011 (%)	2001 (%)	2011–12 Rs. (000)	0.1–1.0	1.0–4.0	4.0+
Tamil Nadu	72.1	48.4	44.0	93	29	2	1
Kerala	33.4	47.7	26.0	98	7	–	–
Maharashtra	112.4	45.2	42.4	100	34	10	1
Gujarat	60.4	42.6	37.4	87	25	2	2
Karnataka	61.1	38.7	34.0	90	25	–	1
Punjab	27.7	37.5	33.9	86	15	2	–
Haryana	25.3	34.9	28.9	106	19	1	–
Andhra Pradesh	84.5	33.4	27.5	78	39	2	1
West Bengal	91.2	31.9	28.0	51	59	1	1
Uttarakhand	10.1	30.2	25.8	100	6	–	–
Madhya Pradesh	72.6	27.6	26.5	39	28	4	–
Jammu & Kashmir	12.5	27.4	24.8	53	2	1	–
Rajasthan	68.5	24.9	23.4	57	26	3	–
Jharkhand	33.0	24.1	22.2	41	8	2	–
Chhattisgarh	25.2	23.2	20.1	55	8	1	–
Uttar Pradesh	199.8	22.3	20.8	32	57	6	–
Odisha	42.0	16.7	15.0	49	10	–	–
Assam	31.1	14.1	12.9	41	4	–	–
Bihar	104.1	11.3	10.5	22	25	1	–
Himachal Pradesh	6.8	10.0	9.8	88	1	–	–
India	1210.0	31.2	27.8	–	450	38	8

Note

The count of cities in this table is according to the administratively delineated cities, as different from 'urban agglomerations'

This table does not include the union territories including NCT of Delhi and Chandigarh and states with population less than 5 million in the year 2011. All India figures include all of them

Sources of data are:

Population figures are taken from Census of India, 2011

NSDP-per capita figures are at factor cost and at current prices taken from RBI Handbook of Statistics on Indian States, 2019

Source for percentage of urban population is Handbook of Urban Statistics, 2019, GOI

have played an important role in giving a lead to economic growth. New mega-cities more dispersed in space are emerging.

4   Urban Concentration

Urbanisation in India is often described as top heavy, i.e. too much concentrated in a few big cities/agglomerations. One of the evidences cited in favour of this assertions is that the percentage of urban population in cities with population of 4 million plus in India was very high, i.e. 23.5%, whereas the world average of such concentration was only around 15% and Europe's average was 7.5% (Kundu, 2014). Actually, the concentration in cities 4 million plus in India was 22.6% in 2011 (Table 5). Two points need to be considered in this respect. Comparison with the world which was more than 50% urbanised and with Europe which was more than 80% urbanised appears to be somewhat misplaced. At low level of urbanisation when the urban population as a proportion of total population is very small, it is obvious that the population which lived in big cities will bear a larger proportion of the smaller total urban population. As the level of urbanisation increases, a larger proportion of urban people are bound to live in smaller cities and towns. In fact, about 7.5% of the world's population lived in big cities. Comparable percentage for India was 7.2% in 2011. This ratio suggests that irrespective of the level in the world or a larger part of the world like Europe and India, a certain proportion of the total population is bound to live in large cities. This hypothesis needs to be explored further. Historically, irrespective of the overall level of urbanisation, a few large cities comparable to the biggest in the world have always existed in India. Kolkata, Mumbai, Delhi and Chennai emerged in this capacity and still remain the largest four cities of India, though other competitive cities have started to emerge now. An emerging economy like India needs some large cities. Low level of overall urbanisation will not be able to impose a proportionate limit on the size of the large cities. There will, at the same time be natural economic constraints on their further expansion. The most important constraint that has emerged on the size of large cities is the cost of land and housing. Further migration to the older metros like Delhi and Kolkata has almost stopped (Kundu, 2011). A trend of moving out to the suburbs and to satellite towns has already started. This is creating larger agglomerations and economically integrated functioning of a number of satellite cities. It is in this way that Delhi is emerging as one of the largest few urban agglomerations of the world.

   With the advancement in technology, transport costs are no longer a dominant factor in clustering. But the tendency for industries/activities to cluster has become even stronger, though manufacturing is now getting away from big cities. With accelerated growth and dominance of knowledge-based industries, pool of trained and talented workers and knowledge spill-overs have become more important factors in clustering (Glaesar, et al.). Knowledge-based industries and knowledge-creating activities are clustering more around big cities, raising the cost of land and housing and also raising the average level of wages in these clusters. A leading example of such a cluster in the world is the Bay Area in California. Bangalore has emerged as

Table 5 Urban concentration

States	2011		2011		2001	
	N_1	N_2	P_1	P_2	P_1	P_2
Tamil Nadu	4	1	38.0	24.8	33.6	23.9
Kerala	7	–	76.2	–	16.4	–
Maharashtra	6	2	58.8	46.1	57.1	40.0
Gujarat	4	1	55.0	24.7	51.9	–
Karnataka	1	1	36.1	36.1	31.7	31.7
Punjab	2	–	26.9	–	29.0	–
Haryana	1	–	16.0	–	17.3	–
Andhra Pradesh	3	1	49.1	27.2	39.1	27.6
West Bengal	2	1	52.6	48.3	64.7	58.9
Uttarakhand	–	–	–	–	–	–
Madhya Pradesh	4	–	32.0	–	25.4	–
Jammu & Kashmir	1	–	37.1	–	40.8	–
Rajasthan	3	–	30.4	–	17.6	–
Jharkhand	3	–	46.1	–	36.2	–
Chhattisgarh	2	–	36.8	–	–	–
Uttar Pradesh	7	–	31.5	–	28.1	–
Odisha	–	–	–	–	–	–
Assam	–	–	–	–	–	–
Bihar	1	–	17.4	–	–	–
Himachal Pradesh	–	–	–	–	–	–
India	53	8	42.6	22.6	38.0	21.2

N_1 = Number of million-plus cities and agglomerations
N_2 = Number of agglomerations with population 5 million and above
P_1 = Population of N_1 as % of urban population of state
P_2 = Population of N_2 as % of urban population of state
Notes
The same states as in Table 4 have been included here and are arranged in descending order of urbanisation in 2011
All-India figures include the NCT of Delhi and Chandigarh also
Agglomeration is defined in Census of India as follows: An urban agglomeration is a continuous urban spread constituting a town and its adjoining outgrowths, or two or more physically contiguous towns together with or without outgrowths of such towns. This is still a narrower definition of agglomeration as it does not include cities across states
Sources: Table is constructed using the data from Handbook of Urban Statistics, 2019, Govt. of India, Ministry of Housing and Urban Development

a big cluster in ICT industries, and the next in line appears to be Hyderabad. These two cities are growing fast and most probably will become bigger than Kolkata and Chennai by the next census—2021.

Indicators of urban concentration in terms of percentage shares of million-plus cities/agglomerations in total urban population, state wise, for the census years 2011 and 2011 have been presented in Table 5. There were eight 5-million-plus agglomerations in the country in 2011. These were: Mumbai, Delhi, Kolkata, Chennai, Bangalore, Hyderabad, Ahmadabad and Pune. The last two of these were new additions in 2011. Surat (with a population of 4.6 million) was almost there. Surat, Jaipur, Kanpur and Lucknow will most likely be added to this category in 2021. The overall ratio of 5-million-plus cities to total urban population of India was 22.6 in 2011 and 21.2 in 2001. Million-plus cities accounted for 42.6% of the urban population. A notable feature in Kerala, which is one of highly urbanised states is that there was no 5-million-plus city in Kerala even in 2011. The number and population of million-plus cities in Kerala have dramatically gone up over a decade. The population of million-plus cities which was of 16.4% of urban population has become 76.2% in 2011. All the seven cities in this category in Kerala are only in the size range of 1–2 million. Kochi, the biggest among these was 2.1 million in size. Thus Kerala with 48% urban population shows a very well distributed pattern of cities. West Bengal shows a decline in the share of both million-plus and 5 million-plus cities, implying a considerable increase in the number of smaller towns, which again is a good development. Punjab and Haryana, the two other highly urbanised states also do not have any 5-million-plus city and show a slight decline in the share of million-plus towns. On the whole it is seen that with increase in the overall level of urbanisation, the concentration of population is not increasing much in the 5-million-plus cities. At state level, only Maharashtra, Gujarat and Karnataka have shown notable increase in the concentration of urban population in 5-million-plus cities. West Bengal has shown a very significant decline in the ratio. At all-India level, the increase in this ratio is modest. Tendency for further concentration does not appear to be strong.

5 Growth of Informal Urban Settlements

Major contribution to urbanisation prior to the year 2000 came from the growth of formal urban settlements, i.e., statutory towns as the Census of India designates them, including the outgrowth of such towns. Overtime, some villages acquire urban characteristics in terms of population size, population density and non-agricultural economic activities and are designated as towns by the Census of India, but are not recognised as such by the Governments of the states in which they are located. Hence they are termed as census towns by Census of India with an informal status of an urban settlement. Contribution of such towns to urbanisation in the past was not very significant. Between the census years 2001 and 2011, there has been a proliferation of such towns and their contribution to the net addition to urban population (net of internal growth) has turned out to be very significant. This could be considered

as a very positive development in the direction of inclusive urbanisation. Some of them are in the neighbourhood of big cities/urban agglomerations, but a very large number of these informal towns have emerged in the states which had a few or no big cities and were in the backwaters of the developmental process. But the formal recognition of these emerging urban settlements remains an issue. In the absence of such recognition, they are still governed by rural panchayats, are devoid of a share in the funds earmarked for urban development, have little urban infrastructure and there is no urban planning. If they were given the essential support, they could have played a much desirable role in decentralising and spreading economic growth, and making it more inclusive.

According to the Census of India, constituents of urban area are statutory towns, census towns and outgrowths. All places with a municipality, corporation, cantonment board or notified town area committee are statutory towns (ST). census towns (CT) are the places that satisfy the following criteria: (a) A minimum population of 5000 (b) At least 75% of the male main working population engaged in non-agricultural pursuits (c) A density of population of at least 400/km^2. Outgrowths (OG) are defined as those villages or special settlements which are contiguous to a statutory town and possess urban features in terms of infrastructure and amenities such as pucca roads, electricity, taps, drainage system, education institutions, post offices, medical facilities, banks, etc. Examples of special settlements are railway colonies, university campuses, port areas, etc.

There are many villages which are very large having population of more than 5000. Density also increases with size. But the essential point in the definition of census towns is diversification of economic activity away from agriculture. It is also worth noting that the Indian definition of census towns is more restrictive than what many other countries adopt for defining an urban settlement. The lower limit of population size for a settlement to be designated as urban is 2500 in the USA with density similar to that required for census towns in India. Many other countries have even lower size limits, but the imposition of the restriction of the nature of economic activity is rare.

Census towns in India have already achieved a diversification of economic activity away from agriculture to a significant extent, that too without much of infrastructural and institutional support. If they were provided with such support, they have all the potentials for emerging as local hubs for small scale industries particularly in the line of agro-processing, textiles and agricultural tools and implements. China promoted deliberately and systematically the rural industrial hubs for achieving faster industrialisation.

We present in Table 6 data on growth of statutory and census towns in India over the decade 2001–2011.

In the year 2001, total number of towns including both STs and CTs was 5161 and in 2011 the total was 7933 showing a growth of 54%. Growth in the number of statutory towns was only 6.4% while the growth in the number of census towns was 185.5%. It needs to be noted here that the Census of India have separate enumeration schedules for towns and villages, and therefore, they have to prepare the listing of towns and villages separately before the census operations begin. This listing is

Table 6 Increase in the number of statutory and census towns—2001–2011

S. No	States/UTs	Statutory towns		Increase	Census towns		Increase
		2001	2011	%	2001	2011	%
1	Andhra Pradesh	117	126	7.7	93	227	144.1
2	Arunachal Pradesh	0	26	–	17	1	−94.1
3	Assam	80	91	13.8	45	123	173.3
4	Bihar	125	139	11.2	5	60	1100.0
5	Chhattisgarh	75	168	124.0	22	14	−36.4
6	Goa	14	13	−7.1	30	57	90.0
7	Gujarat	168	195	16.1	74	153	106.8
8	Haryana	84	80	−4.8	22	74	236.4
9	Himachal Pradesh	56	56	0.0	1	3	200.0
10	Jammu & Kashmir	72	86	19.4	3	36	1100.0
11	Jharkhand	44	39	−11.4	108	189	75.0
12	Karnataka	226	220	−2.7	44	127	188.6
13	Kerala	60	58	−3.3	99	462	366.7
14	Madhya Pradesh	339	364	7.4	55	112	103.6
15	Maharashtra	251	255	1.6	127	279	119.7
16	Manipur	28	28	0.0	5	23	360.0
17	Meghalaya	10	10	0.0	6	12	100.0
18	Mizoram	22	23	4.5	0	0	–
19	Nagaland	8	19	137.5	1	7	600.0
20	NCT of Delhi	3	3	0.0	59	110	86.4
21	Odisha	107	107	0.0	31	116	274.2
22	Punjab	139	143	2.9	18	74	311.1
23	Rajasthan	184	185	0.05	38	112	194.7
24	Sikkim	8	8	0.0	1	1	0.0
25	Tamil Nadu	721	721	0.0	111	376	238.7
26	Tripura	13	16	23.1	10	26	160.0
27	Uttar Pradesh	368	648	1.6	66	267	304.5
28	Uttarakhand	74	74	0.0	12	41	241.7
29	West Bengal	123	129	4.9	252	780	209.5
30	India	3799	4041	6.4	1362	3892	185.8

Source Handbook of Urban Statistics (GOI, 2019)

prepared on the basis of the preceding census data. Thus, the census towns listed for the Census of 2011 had already achieved the required criteria for being counted as towns in 2001, and the census towns which achieved this status in 2011 will be counted only in the census of 2021. The 2530 additional census towns listed in 2011 Census had already become towns in the year 2001, though at that time they were

included in the village list. It can therefore be said that the number of census towns in any census is a significant underestimate, and faster the rate of growth of such towns the higher is the extent of underestimation. And therefore the urbanisation level in India is underestimated. In terms of absolute numbers, West Bengal and Kerala have registered the highest increases in the number of CTs. U.P., Rajasthan, Tamil Nadu, Maharashtra, Jharkhand, Bihar, Jammu & Kashmir, Andhra Pradesh, Assam and Gujarat also show remarkable increases in numbers of census towns.

2553 new census towns accounted for 29.5% of increase in urban population during the decade (Pradhan, 2013). Census towns have made highest contribution to urban growth in Kerala and West Bengal. Only 37.2% of new census towns are in the proximity of class I towns (Pradhan, 2013). A large number of these towns are in the middle of remote rural areas and are geographically dispersed. A large number of such towns have emerged in the states which had low level of urbanisation and only a few big cities, for example Assam (123), Jharkhand (189), Madhya Pradesh (112), Odisha (116), U.P. (267) and Rajasthan (112). But the largest number of census town came up in West Bengal (780), Kerala (462) and Tamil Nadu (376). West Bengal had all along been dominated by Kolkata and the agglomeration around it. Emergence of a large number of census towns in this state is definitely a progress in dispersion of urban centres. Tamil Nadu and Kerala, as noted earlier, have the highest level of urbanisation and also have widely dispersed urban centres. Emergence of census towns in such large numbers in these two states further strengthens that trend.

In a study of census town of West Bengal (Chatterjee, 2016), it has been pointed out that the census towns suffer from the worst of both, the rural and the urban. Loans under rural schemes are not relevant for the people in these towns since the majority of the people there are engaged in non-agricultural activities. They are not eligible for loans under urban loan schemes because these towns are not recognised as statutory towns by the state governments. Those towns are not eligible for funds under various types of urban development projects either. Provision of services and infrastructure in these towns is very poor. The Gram Panchayats which are supposed to govern these settlements still have neither the resources nor the capabilities of creating infrastructure and amenities appropriate to non-agricultural activities of these towns. It has been pointed out that the state governments are reluctant to give statutory recognition to census towns mainly on account of the financial burden it entails (Pradhan, 2013). It also appears that the flow of assistance from the Central Government to the states is more for rural areas. Pradhan (2013) cites a government order of the Government of Tamil Nadu, issued in 2004, directing reclassification of 566 town panchayats as village panchayats since most of these were financially weak and rural in character.

The formal recognition of these emerging urban settlements is an important issue. Given the necessary support, these towns can play a much desirable role in decentralising and spreading economic growth, generating employment for rural youths and making the growth process more inclusive. There is every indication that a significant contribution to urban growth in India in future will come from census towns.

The National Commission on Urbanisation (NCU, 1988) made a point by way of a long-term urban policy that there was a need to intervene in the process of

urbanisation in the country for bringing about the desirable spatial hierarchy of settlements in the country. The commission further emphasised that the process of urbanisation could and must be used to improve agricultural performance and create localised employment opportunities. Supporting the census towns in terms of proper governance structures, infrastructure, amenities and finance is exactly what is required to realise that vision.

6 Rural-to-Urban Migration

One of the most important tests of the inclusiveness of a city is how the city treats its migrant workers. Migration from rural-to-urban settlements is a crucial factor in sustaining the prosperity and the growth of the cities. The city needs the migrants as much as the migrants seek the city in the hope of better job prospects and better access to education and health services. Yet the migrants are the losers in the bargain simply because they do not have firm foothold in the city.

Putting a precise number on rural–urban migrants is somewhat problematic. Migrants have been moving to urban centres over a long period of time. Some migrants settle down permanently in the city. Some stay for a long period, but maintain connection with their place of origin. A large number of migrants consist of a floating population. And then there are commuters who work in the city but live outside of the city. Those who have stayed at least for six months are counted as migrants in the major sources of data. Those who have stayed for shorter duration including the commuters are not counted as migrants, even though they use the city infrastructure to a considerable extent. The Working Group (2017) has noted that a number of inter-censal migrants are not classified by rural or urban origins. This number rising to 9.8% in 2011 may indicate a blurring of distinction between rural and urban. Srivastava (2020) has assessed that short-term and circular migrants in the informal economy including both rural-to-rural and rural-to-urban migrants could number 60–65 million and with family members their number would not be less than 100 million. The Working Group (2017) has estimated that the number of all inter-censal migrants during 2001–2011 was 139 million. 22.1% of this was rural to urban and 7.8% was urban to rural, thus giving net inter-censal rural–urban migration as 19.9 or, say, about 20 million.

We suggest another approach for estimating net inter-censal rural-to-urban migration for the decade 2001–2011. The urban population of India increased from 286.1 million in 2001 to 377.1 million in 2011. This increase of 91 million has to be distributed over three components, i.e. increase due to natural growth of the urban population, increase due to the population of new census towns, and increase due to net rural to urban migration. The growth of Indian population for the decade 2001–2011 was 17.6%. Urban population has a slightly lower growth than the rural population at all-India level, though some of the states show equal or higher growth rate of urban population as compared to rural population. Short of a precise estimate of the natural growth rate of urban population, we assume it to be 17% which, we

Table 7 Components of decadal increase in the urban population 2001–2011

		Increase (million)	Percentage increase
(a)	Due to natural growth (assuming 17% growth)	48.6	53.4
(b)	Due to new census towns	26.8	29.5
(c)	Due to net rural–urban migration	15.6	17.1
	Decadal increase in urban population	91.0	100.0

believe, will not be wide of the mark. The contribution of new census towns to the decadal increase in the urban population was 29.5%. The residual increase is due to the net rural-to-urban migration. These figures are set out in Table 7.

The net decadal increase of 15.6 million in rural–urban migration could be rounded up to 16 million. Working Group (2017) estimated it to be about 20 million. The exact number would be somewhere within this range. If we take into account the migrants who would have returned back during the decade, and also the short period migrants and commuters, the numbers would be much larger.

Whichever way one looks at it, the numbers are staggering. And this is with the slow pace of urbanisation and reluctant migration. Migration process in India has been slow because of social and political resistance on the part of the cities to admit poor rural migrants (Kundu, 2011). Migrant workers face discrimination and inequalities vis-a-vis the native workers. Migrant workers were given lower wages and lower quality of work and more of casual work. Migrants had to pay higher rates for similar accommodation (Sreedevi & Gopinath, 2020). Examples of political resistance to welcoming migrants are that, despite constitutional protections, states have at times introduced local administrative requirements of being 'domicile' for accessing certain benefits, placing migrants at disadvantage (Working Group, 2017). This is particularly so far inter-state migrants. Portability of entitlements, like access to PDS, pension, a variety of subsidies and reservation in jobs are denied. Many state governments do not recognise the SC, ST or OBC status given by other states. Each state has its own list of castes included for reservation in job entitlements. Many times admission to government sponsored schools and colleges also requires 'domicile' status.

Among other political attempts to retain people in villages are a variety of rural schemes, like MGNREGA, Indira Awas Yojana and other state and community specific programmes (Mistri, 2005). The MGNREGA programme, in fact, is specifically advertised in rural areas as a programme to make it unnecessary for work seekers to move to the cities. Non-portability of entitlements causes a lot of deprivation to the poor migrants. The migrants who are registered to claim access to a number of legal and other entitlements at their source locations, loose access to these benefits upon migrating to different locations. This is particularly aggravated in the case of inter-state migration, which is further complicated by barriers of language and jurisdiction, but is also true of intra-state migration (Working Group, 2017, p. 20).

One of the most important factors making life difficult for migrants in a city is the prohibitive cost of housing. The poor job seekers find it difficult even to secure

a place in a slum. If somehow they get a foothold, their living environment is very unhygienic. One solution for this problem is to move most of the high job creating industries to smaller towns and to the outskirts of the city and to provide affordable integrated transport system not only within the city but within a larger area in the city's hinterland at commutable distances. Bombay's (now Mumbai's) suburban local train system created in early twentieth century to meet the commutation needs of workers in a fast-growing city linking the city with far distant suburbs and townships has been an excellent example not replicated elsewhere at the same scale.

One could argue with equal validity that migration to urban areas is slow, and in effect the urbanisation process is slow because the cities have not created the job opportunities enough to attract more migrants. In other words, the process of industrialisation and economic development has been slow. States with more developed economies like Punjab, Haryana, Gujarat, Maharashtra, Karnataka and Tamil Nadu were the major recipients of migrants and other states were the net senders of migrants in 2011. During the decade 2001–2011, Tamil Nadu received the highest proportion of migrants. Tamil Nadu has emerged as the most advanced industrialising state during the last two decades. Migrants from as far as U.P., Bihar, Odisha and North-Eastern states are migrating to Tamil Nadu, breaking the barriers of distance and language. It is also true that the Indian migrant does not want to flock to the city losing the security of living with the family and the community in the village, even though in poverty, without assessing the opportunity of work in the destination through well-established network of pioneering migrants from the community.

'Living on the edge' literally is how the life of a migrant worker could be described. A little nudge, and she/he falls from the edge. This could have never been demonstrated so vividly as during the crisis created by lockdown in the wake of COVID-19 pandemic. A very large number of workers lost their jobs during the lockdown and with that the means of their very existence. They lost their shelter and their hope. The lockdown had closed all the means of transport. The highways were closed even for walking. Having no alternatives and afraid of dying of hunger, many, alone or with family, started walking to their home destination, hundreds or sometimes thousands of miles away. A number of them perished on the road. Some of them managed to hire unauthorised private vehicles, mostly trucks, at exorbitant cost throwing away all their savings. They also suffered from police action and unwelcome reception back home. According to the Wikipedia (2020), which is sourced on newspaper reports, those who stayed back suffered discrimination and assault from neighbours. Upon return to their home destination, they were treated with either fear or 'class bias'. Migrants travelling by Shramik Special Trains (end of May, 2020) reported that food and water were either not provided or dumped at the entrance to the trains leaving them crowding and fighting with each other for their share. All this happened in spite of the announcements and efforts on the part of the Government to help them. The crisis was simply too big to be managed with the given capabilities of the administration. There is no exact assessment of numbers involved as yet. But the numbers were significant enough to create a panic among the employers that they would not be able to resume their businesses and industrial work after the crisis melts down. It is reported that some workers have started returning. But it will take some more

time to have an assessment of the full impact of the crisis. Not all the workers might return.

7 Urban Poverty

Dealing effectively with urban poverty depends on how the urban poverty is perceived and how the poor are identified. The conventional methods of estimating poverty fall short of accommodating the dimensions in terms of which the poverty, and particularly the urban poverty, should be perceived and the estimates based on those methods do not capture adequately the magnitude of the poverty problem. Conventional methods of measuring poverty focus on macro-estimates of a poverty ratio, at national or state levels, and the detailed methodology on the basis of which those estimates are arrived at do not at all help in identifying the poor on the ground. As a result, when poverty alleviation programmes had to be implemented, the poor households (the target of these programmes) had to be identified by local functionaries, generally by following certain broad guidelines and mostly on an ad hoc basis and in an uncoordinated manner. This created scope for misidentification of the poor and misdirection of the programmes. The ground-level functionaries identified much larger number of target households than the macro estimates would warranty. There have been efforts on the parts of the state government to evolve standard guidelines for better targeting. Ideally, the macro-estimates should have a reasonable correspondence with ground level realities.

The perception as to what is poverty and who is to be called 'poor' as well as the attitude as to what to do about poverty are very much rooted in the overall social and economic environment that prevails in a society and these have changed drastically with times (Hashim, 2016).

The Copenhagen Declaration (1995, p. 57) says: 'Absolute poverty is a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation, health, shelter, education and information. It depends not only on income but also on access to social services'. A decent living will mean capacity to participate effectively in society. It means having enough to afford a reasonable living space, to feed and clothe a family, send the children to school, having access to health clinic, access to reasonable means of entertainment, access to law, justice and security.

The idea of an income line separating poor and non-poor and pegging it at Rs. 100 per month for an urban family was mooted as early as in 1959 by Gadgil (1972), suggesting that households with income of Rs. 100 p.m. in Poona could not afford to pay the prevalent rental and hence needed to be subsidised. A Distinguished Group of economists and social thinkers, which included D. R. Gadgil, was set up by the Planning Commission in 1962 to make recommendations on the minimum level of living (Lakdawala Expert Group, 1993). The Distinguished Group recommended a national minimum of Rs. 100 per month (at 1960–61 prices) for a household of five persons for rural India and Rs. 125 for urban India. They also stipulated that, in

addition to the national minimum free education, free health care and a subsidy on urban housing was to be provided by the government.

The concept of poverty line became narrower and poverty line lower with attempts to measure it more objectively and in more precise ways. Dandekar and Rath (1971) used the NSS data (1960–61) on consumer behaviour to arrive at a 'poverty line'. Their poverty line was the expenditure level at which the average calorie intake met the norm of 2250 cal per capita per day. They arrived at a poverty line of Rs. 22.50 p c p m for urban areas and Rs. 15 for rural areas in 1960–61 prices. This poverty line turned out to be much lower than Rs. 25 and Rs. 20 for urban and rural areas, respectively, that was recommended by the Distinguished Group. The assumption that Dandekar and Rath made, and which continued to be made in most of the subsequent exercises was that if the household was able to meet the minimum food needs at a certain level of expenditure, the household was able to meet the non-food needs also at the minimum necessary level at that level of expenditure. This is a weak assumption going by the Engle's Law. Much later Tendulkar Expert Group (2009) made an attempt, though not bold enough, and Rangarajan Expert Group (2014) made a bolder attempt to get away from this assumption. The Task Force of the Planning Commission (Alagh Task Force, 1979) raised the calorie norm to 2400 and 2100 cals. p c p d for rural and urban areas respectively and using the NSS data on consumer expenditure for 1973–74, recommended a poverty line of Rs. 49.1 (rural) and Rs. 56.6 (urban) for the year 1977–78. A major change which Lakdawala Expert Group (1993) made in the method of estimating poverty was giving up the scaling-up of consumer expenditure for finding out the number of poor. The Task Force had recommended an adjustment in the NSS-based consumption expenditure levels by raising it by a factor to make it consistent with the total level of private consumption expenditure reported in the National Accounts Statistics, which used to be and still is much higher than what the NSS data would indicate. This factor became larger over time. Giving up this adjustment had the effect of raising the number of poor (Lakdawala Expert Group, 1993). Lakdawala Expert Group made further recommendations for using state-specific prices indices for updating the poverty line and for estimating poverty at the level of states, and then aggregating it to get the national average. The Task Force poverty line remained at the base. It was noted by the Lakdawala Group that with the given poverty line expenditure duly adjusted for price escalations, over time the originally stipulated calorie norm were not met and the calorie consumption of all the classes of expenditure showed a declining trends.

Tendulkar Expert Group (2009) continued to work with the Task Force line approach in the interest of 'continuity and consistency', making some departure from it at the same time. Tendulkar Group recommended that the urban consumption basket at poverty level be taken as the reference for rural and urban areas both, since urban consumption pattern was the norm towards which the rural consumption pattern was converging. This had the effect of raising the poverty line for the rural areas. Tendulkar Group also noted that the actual calorie intake was not found to be well correlated with nutritional outcomes. Tendulkar Group's approach remains the method behind the official poverty estimates. Rangarajan Expert Group was set

Table 8 Percentage of population below poverty line

Year	Urban	Rural	All-India
2004–05	25.7	41.8	37.2
2009–10	20.9	33.8	29.8
2011–12	13.7	25.7	21.9

Source Press Note on Poverty Estimate, 2011–12, Planning Commission, GOI

up by the Planning Commission in order to re-consider the method of poverty estimation. The Rangarajan Group (2014) made a few welcome departures from the conventional approach. They recommended a new norm for calories, i.e. 2125 p c p d for rural and 2090 p c p d for urban areas, and said that this norm had to be considered in a band of minus plus 10%. They took a minus 10% line of the band for actual calculations. More significantly they added something more to the poverty line beyond the calorie-based cut-off point. They added an allowance for protein and fat requirements and added median fractile values of clothing, rent, conveyance and education expenses to poverty line. Thus, the Rangarajan Group made it clear that only a calorie-based cut-off to derive the poverty line was not enough to take care of even food needs, leave alone the non-food needs. Just for the sake of comparison, it may be noted that in terms of 2011–12 prices, the rural poverty lines (expenditure per capita per month) recommended by the three Expert Groups would appear as Rs. 650 (Lakdawala Group), Rs. 816 (Tendulkar Group) and Rs. 972 (Rangarajan Group), (Subramanian, 2014).

Tendulkar Expert Group's methodology has been the basis of official poverty estimates from the year 2004–05 onwards. The estimates are given in Table 8.

Rangarajan Group's poverty line of Rs. 972 (rural) and Rs. 1407 (Urban) would have given the poverty estimates for 2011–12 as 30.9% rural and 26.4% urban. Difference between the estimates of the two Groups is much larger in case of urban poverty.

In spite of the attempts of expert groups to elevate the poverty line, adding to it explicitly some allowances for necessities beyond food, the poverty line still remains food-centric. At the same time, it has been noted that the intake of calories as well as the weightage of food in the consumption basket of even the lower fractile groups of consumers has been declining. This decline is sharper in case of urban areas. Other dimensions of living are becoming more important for the urban poor. Housing, for example, has become the most acute problem in cities. It is not so difficult to find work in a city if only one has a foothold, i.e. an affordable place to live. Larger the city, more is the opportunity or work, but also more difficult is the housing problem. The cost of housing has pushed up the poverty level even in developed countries. The Economist (Sept. 28, 2019, p. 5) reported about California (USA) that 'despite the progressive states' more generous safety net, the out of control housing costs push more people into destitution than elsewhere'. There are many other vulnerabilities from which the urban poor suffer. Working as self-employed in some of the lowest earning work, or as casual wage labour, continuity of earning is not assured. This

is compounded by absence of community and family support and because of social biases against socially low status and migrant workers. This was amply demonstrated during COVID-19 lockdown. The costs of health services and education have been rising in urban areas and access to these services is difficult for the poor.

An Expert Group (Hashim Committee, 2012) was set up by the Planning Commission to recommend a detailed methodology for identification of poor families in urban areas. The Group decided that poverty in urban areas could best be captured by identifying three categories of vulnerabilities, i.e. residential vulnerability, occupational vulnerability and social vulnerability of the urban poor. Based on this broad approach, the Group recommended a three stage identification process: (i) automatic exclusion, (ii) automatic inclusion and (iii) scoring index The Group recommended that the households qualified for automatic inclusion in the set should be taken as hard core poor. The middle group of households, which were neither automatically excluded nor automatically included would be subjected to scoring and cut-off score could then be decided to divide them in above-poverty and below-poverty sets. Houselessness or the type of house they lived in, grading of the assets they possessed, nature and regularity of work, family responsibilities and social vulnerabilities would be used in deciding about exclusion, inclusion or scoring. In order to obtain the necessary data for the exercise, it was decided to include in the Socio-Economic and Caste Census (SE&C) starting in 2011, questions helpful for such identification.

The SE&C census was completed in 2014–15. Some preliminary analysis of SE&C data was done in the Ministry of Housing and Urban Affairs, and it was reported that about 35% of urban household were found to be poor (Indian Express, 5 July, 2015).

Data in all the details will have to be obtained periodically (say, at least every 10 years) and the criteria for inclusion, exclusion and scoring will also have to be revised. The points to be underlined are that (a) Urban poverty in India, is much more widely prevalent than is indicated by officially recognised methods of estimating poverty, (b) the perceptions about poverty and the criteria to measure it need to be reviewed periodically, and (c) the macro-estimates of poverty should be in alignment with the number of poor identified on the ground.

8   Conclusion

A few important elements of urban policy corresponding to long-term vision of urbanisation in India emerge from this paper.

Urbanisation is a driving force in economic development. Urbanisation promotes efficient use of productive resources, energy and infrastructure and raises productivity. India is much less urban as compared to similarly placed economies. Growth of urbanisation needs to be encouraged and supported.

Higher level of urbanisation and a reasonable degree of dispersion of urban settlements in space will make urbanisation more inclusive. The degree of urban concentration also declines at higher levels of urbanisation. Urban growth has been directly

or indirectly restrained in India for fear of overcrowding and strain on infrastructure and amenities which are already short of what is needed. We need to invest more in infrastructure and amenities rather than restrain urban expansion. The policy of restraint will ultimately curtail economic growth.

A positive development in the process of urbanisation in recent decades has been the fast growth of census towns. These towns fill in the empty space in urban outreach and have great potential for becoming local hubs for creating jobs through small industries and other non-agricultural activities. These towns have not been given statutory status. This is one example of creating constraints in the way of urban expansion. There is urgent need to accord statutory status to these towns and provide them with financial support and proper governance structures.

A welcome development that has taken place in the last few decades is that major manufacturing industries have moved away from mega-cities releasing a lot of land for alternative uses and bringing some relief in the load of population on environment. This trend requires to be re-enforced by creating medium towns with excellent infrastructure along major transport and communication corridors. Knowledge-based industries, however, tend to cluster around big cities/agglomerations because these industries require a pool of skilled and talented workers and benefit from the vicinity of knowledge creating institutions. The experiment of setting up Knowledge Parks in Bengaluru and Hyderabad to encourage ITC enterprises and new start-ups has been very successful. Many other cities have started replicating this experiment. Such initiatives need to be further supported and promoted.

Rural-to-urban migration in India has been quite restrained and that is reflected is slow growth of urbanisation. Yet the numbers involved are very large. Migrants face many problems, such as housing, a variety of discrimination and biases, uncertainty of job and lack of security. Some of the problems of the migrants can be solved by state governments by adopting a more supportive approach and changing some of the policies accordingly. Problems in this latter category are non-portability of entitlements, non-availability of certain privileges that have requirements of being domicile and proper registration of workers. Housing problem is more complicated because of rising land prices. The poor person is also not able to retain the subsidised house for long, being tempted to sell it at a premium. The living environment in slums can be improved by providing water, sanitation, drainage, etc. Even more important could be to lay down vast networks of transport to make commutation from long distances possible and affordable.

Poverty in urban India is much more widely prevalent than the official estimates would make us believe. Official estimates are based on food-centric and narrow approach to perceiving poverty. Urban poverty is more due to residential, social and work-related vulnerabilities than just the shortage of food. An approach to quantify these vulnerabilities has to be evolved in a way that his leads to identification of the poor on the ground as well as estimation of the total number of poor. A framework

for such an approach exists. That has to be further evolved and refined over time. A system to generate the required database periodically also needs to be put in place.

Note

This paper is a revised and enlarged version of my keynote paper 'Inclusive Urbanisation' presented at the Annual Conference of Indian Association of Social Science Institutions at ISEC, Bangalore, on 27 February, 2020. In parts, the paper draws upon some of my earlier writings, in particular (Hashim 2020/2).

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Addressing Visible Inequalities: The Minimum Policy Agenda

Bhanoji Rao

1 Introduction and Outline

Usual academic and policy discourses focus on income and wealth inequalities. There are composite indexes galore on national and international levels that at the most include estimates of Gini ratios, and there ends the concern for inequalities.

Inequality is visible among people on many dimensions, ranging from skin colour, height and weight to quality of schools, hospitals and housing. This essay focuses on achieving visibility of equality on the educational front, which in many ways affects other inequalities.

Rest of this essay is organized as follows. Section 2 notes the policy prescriptions of the relatively recent treatises by some of the highly reputed economists, just to note the missing focus on visible inequalities. Section 3 is about the criticality of sound education for overall well-being and accomplishing visible equality on other dimensions such as health and housing. Section 4 is about ensuring equality of educational opportunity, which calls for the first 12 years of education in the exclusive domain of government schools. The essay ends with a short concluding note.

2 The Inequality Discourse

The US Bureau of Census provides household income Gini ratios, given in Table 1. Rising trend is not just limited to the USA. The same is the case with respect to India and China, as indicated by Gini ratios in Table 2 worked out from the data from

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Table 1 US Gini ratios

1967–80	1981–86	1987–92	1993–2000	2001–10	2011–19
0.39–0.40	0.41–0.42	0.43	0.45–0.46	0.47	0.48–0.49

Table 2 Average Gini ratios—India and China

Country	1980–89	1990–99	2000–09	2010–12	2010–17
India	0.40	0.41	0.46	0.47	
China	0.29	0.35	0.38		0.41

the website of the *Standardized World Income Inequality Database*. The Chinese case demonstrates the move from the traces of totalitarian communism to controlled capitalism.

Most academic and policy discourses focus on income and wealth inequalities. Those inequalities were at the centre stage in relatively recent discourses by celebrity scholars. Here is a small sample: Stiglitz (2012/2013), Piketty (2014) and Milanovic (2016). An attempt is made here to note their core policy recommendations.

Joseph Stiglitz (2012*/13): The Price of Inequality*

The book is predominantly about the relatively more recent increases in income and wealth inequality in the USA. The work has been succinctly summarized and strengthened in a follow-up paper (Stiglitz, 2014) presented at the May 2014 Workshop on *Sustainable Humanity, Sustainable Nature: Our Responsibility* organized jointly by the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences.[1]

The following are some of the key policy prescriptions (*ibid,* pp. 13–16): moving more people out of poverty and strengthening the middle class; more support for education (including preschool); increasing the minimum wage and giving more voice to workers in the workplace; more effective enforcement of anti-discrimination laws; better corporate governance and better financial sector regulations; and a fairer tax system. One can fairly say that there is nothing new in the policy package.

Thomas Piketty (2014)*: Capital in the Twenty-First Century*

In this, New York Times Best Seller is of *700* pages, and Piketty showcases the 'high' level of inequality across parts of the industrialized world, with USA in the top spot. His policy recommendations such as raising marginal tax rates on the rich and the levy of a progressive global wealth tax sound idealistic and may not have many takers when it comes to implementation. Martin Wolf (*Financial Times,* August 15, 2014) in his review says that the Piketty recommendations are 'unrealistic'.

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[1] http://www.casinapioiv.va/content/dam/accademia/pdf/es41/es41-stiglitz.pdf.

Milanovic (2016)*: Global Inequality: A New Approach for the Age of Globalization*

Between countries inequality declined in recent decades, but inequality within countries increased. The last chapter (Milanovic, 2016, pages 212–239) has *ten short reflections on the future of income inequality and globalization.* The tenth and last reflection (page 239) is short, sharp and the best. It is just one simple question (will inequality disappear as globalization continues?), and the answer too is straight and simple: 'No. The gains from globalization will not be evenly distributed'. There is little in terms of optimal and acceptable policy prescriptions.

In Sum

Not much can be done in regard to income and wealth inequalities as long as there is no 'efficient' substitute for free market mechanisms. Policies, however, can do all that is feasible to ensure equal opportunities.

3   Dimensions of Visible Equality

The Singapore Case

Here is a note on Singapore's transformation, based on what the author has closely observed since the middle of 1967. The City State had neither natural resources nor laudable human capital when it separated in 1965 from the Malaysian Federation. Singapore then had its 'underdeveloped' status exemplified by just a couple of good schools, a few health clinics and housing facilities that are minimalist in regard to structures, water and sanitation.

The leaders worked for the transformation of Singapore from 'third world to first' based on full adherence to MPH, as explained by Prof Kishore Mahbubani in a recent YouTube presentation[2]: M stands for meritocracy (selecting the best for any given job); P for pragmatism (a simple example: state enterprises that can compete internationally); and H for honesty (simply stated, it is total intolerance at corruption of any type).

By the late 1970s and early 1980s, the transformational change has become visible fully as a unifier of different ethnic groups: government schools that unify the youngsters; public housing that unifies families; and polyclinics that serve all the citizens and permanent residents at modest cost.

It is also worth mentioning that Cambridge (O) and (A) examinations, globally well recognized, were the foundation for the practice of meritocracy.

Educational Quality at the Core

Against the Google Search for 'indicators of educational achievement in a country', here is what comes upfront: 'Answer: Educational achievement of a country can be measured in terms of indicators like adult literacy level, enrolment ratio in schools,

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[2] VID-20200919-WA0032 (1).mp4.

years of schooling and teacher–pupil ratio. These indicators give an idea of spread of education but may not reflect the quality of education in a country'.

Educational quality has a key role. The pace of long-term economic progress depends on total factor productivity, driven by continuous invention and innovation. In societies where a small number goes to elite educational institutions and the vast majority end up as the denominator to showcase the former, the inventive zeal too may stay with a few only.

As a matter of policy, a country might opt for quantitative expansion to begin with and then aim for gradual improvement in quality. On the other hand, any laxity that gets consolidated over time may not allow for eventual quality improvement; so, one might go for excellence in quality from day one, while expanding enrolment at the same time.

4   Government Schools and Visible Equality

The MHRD Publication *Educational Statistics at a Glance, 2018,* provides the data on 2015–16 enrolments at all school levels: 142.7 million in government schools and 114.3 million in private schools, respectively 56% and 44% of the total. Government schools have relatively more girls (51%) compared to private schools (45%), perhaps an indirect indication of the cost constraint associated with private school admissions.

On the Government School Share

This subsection is about the case for raising the government sector share in secondary school enrolments. The case seems to be evident once we look at India in a comparative context.

There are 200 nations/habitations listed in global population data sets.[3] The 'countries' range from Tuvalu and Nauru each with a population of about 12,000 people (2019 estimate) to India and China, with 1.4 billion people each. To do justice to the work on hand, countries are selected on the basis of a cut-off global population share of 0.5% of total. Based on this, 37 countries have been identified making up for a total share of 82% of the world population (see Annex).

https://data.worldbank.org/indicator/SE.SEC.PRIV.ZS   provides   data   on percentage of total students in private schools at the secondary level. Using the data for 2010–2018, average percentages were computed for 33 countries. (Note: Data were unavailable for 4 of the selected 37 countries.) The 33 countries' data on private school enrolment percentage (PSEP) were juxtaposed to the population shares as well as the 2019 estimates of GDP per capita[4] and cross-country correlations were estimated. Results indicate *almost zero* relationship between PSEP and population share (r value of 0.18) and PSEP and per capita GDP (value of 0.02). No patterns then can explain the variations in PSEP.

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[3] This paper uses data from https://data.worldbank.org/indicator/SP.POP.TOTL.

[4] https://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

Table 3 Private secondary school enrolment % in the world's 33 major nations

Range of the per cent of private school enrolments					
Less than 10	11	10–20	11	21–30	5
China: 10.9					
Above 30%					
Korea, Rep	31.3	Pakistan	32.8	Indonesia	41.8
India: 49.7					
UK	54.1		Bangladesh		94.5

As the data in Table 3 show, in 27 of the 33 countries, PSEP remained below 30%; in fact, in as many as 22, it was less than 20%. India and UK, respectively, have PSEP close to 50% and a little above 50%. (Had experts opted to treat PSEP as a development indicator, Bangladesh would surely be in the top place.)

India and China in Comparison

The People's Republic has 10.9% of total higher secondary students in private schools (mostly international schools catering to expatriate children). In sharp contrast, 50% of students are in private schools in India. At the end of the day, what counts is what has been accomplished in regard to economic and social development.

Table 4 provides some comparative statistics on the two large nations. China is way ahead, and India does not seem to enjoy any special privileges arising from having half the students in private schools.

The relative positions of China and India are well summarized in a recent paper by Gechev: '…nowadays most of the major economic development indicators are in China's favor—for instance, in 2017 the value of China's exports of high-technology products was 43 times higher than India's'.

It is not out of place to mention the most visible commonality between the two nations: population size a little this side and that side of 1.4 billion. In post-Mao

Table 4 India and China, selected parameters

Parameter	India	China
Area (000 sq. km)	3287 (water: 314)	9597 (water: 270)
Population (million)	1387	1439
Labour force by sector	49 (Agr), 20 (Ind), 31(Ser)	34 (Agr), 30 (Ind), 36 (Ser)
Size of economy (PPP)	$11,321,280 million	$27,804,953 million
Per capita GDP (PPP)	$8162	$19,322
GDP composition	16 (Agr), 30 (Ind), 54 (Ser)	10 (Agr), 44 (Ind), 46 (Ser)

China, the demographic advantage was just that—disciplined workforce. Over the years, it has transformed into knowledge on many dimensions.[5]

12 Years of Education: Quality Counts

Hanushek and Woessmann (2017) have done great service to educational researchers via their survey of cross-country research on school resources and student achievement. An important observation was the following: 'Overall, the international evidence provides little confidence that quantitative measures of expenditure and class size are a major driver of student achievement, across and within countries'. The authors point out that it is the quality of inputs, most notably teacher quality, that makes the mark on student accomplishments.

As a simple extrapolation in the Indian context, one must hope to see not only government schools as the exclusive province of school education, but also an All India Teacher Service, as distinct and sought after as IAS and IPS.

NEP 2020: A Few Notes

The very first sentence of the *National Education Policy 2020* is the following:

> Education is fundamental for achieving full human potential, developing an equitable and just society, and promoting national development.

NEP is an excellent initiative, with ideas, suggestions and recommendations in multiple directions on school education (as well as higher education). If at all one wishes to identify what is missing, the following could be listed: lack of a concerted plan of action to move towards 100% of total enrolment in government schools and a single examination at the end of school education, which would give a goby to all other entrance tests.

5   In Conclusion

Pfeffer (2015), based on a detailed analysis of data for 19 high-income countries, made the following observations:

> **There is no trade-off between national levels of quality and equality in educational outcomes. (Thus, one must not just assume that we need private schools as champions of quality!!!)

> **Differentiation of the education system is negatively associated with both quality and equality. (These are the sure outcomes if governments mortgage school education to private players).

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[5] It is also worth mentioning that China's *Gaokao*, the National Higher Education Entrance Examination, is the basis for recruiting students for institutions of higher education. This nine-hour examination taken in three days is very challenging, and only 40% of students pass it the first time. The examination tests the students' skills and knowledge in Chinese, math, a foreign language and a few other optional subjects. According to their results, they will then be admitted to top universities, regular universities or institutions which operate on a provincial level.

https://www.internations.org/go/moving-to-china/education.

*Some believe that vibrant democracies have the vitality to address the issue of inequality and reverse the trend (*Inglehart, 2016*). Till now, it has not happened and will not be forthcoming unless and until conscious efforts are made to equalize educational opportunities.*

Annex: 37 Nations' Data on Population Share, Private Schooling % and GDP/Cap

Country	% of world population	Secondary students in private schools (%)	GDP per capita ($) 2019
Afghanistan	0.5	2.8	502
Algeria	0.6	0.2	3948
Argentina	0.6	26.2	10,006
Bangladesh	2.1	94.5	1856
Brazil	2.7	13.8	8717
China	18.2	10.9	10,262
Colombia	0.7	20.7	6432
Congo, Dem. Rep	1.1	16.6	545
Egypt, Arab Rep	1.3	7.4	3020
Ethiopia	1.5	10.7	857
France	0.9	25.8	40,494
Germany	1.1	9.1	46,259
India	17.8	49.7	2104
Indonesia	3.5	41.8	4136
Iran, Islamic Rep	1.1	12.4	5520
Iraq	0.5	NA	5955
Italy	0.8	7.3	33,190
Japan	1.6	19.9	40,247
Kenya	0.7	NA	1816
Korea, Rep	0.7	31.3	31,762
Mexico	1.7	13.3	9863
Myanmar	0.7	4.1	1408
Nigeria	2.6	21	2230
Pakistan	2.8	32.8	1285

(continued)

Country	% of world population	Secondary students in private schools (%)	GDP per capita ($) 2019
Philippines	1.4	19.5	3485
Russian Federation	1.9	1.1	11,585
South Africa	0.8	4.1	6001
Spain	0.6	28	29,614
Sudan	0.5	16.3	442
Tanzania	0.7	18.7	1122
Thailand	0.9	13.2	7808
Turkey	1.1	4.6	9042
Uganda	0.6	NA	777
Ukraine	0.6	0.4	3659
UK	0.9	54.1	42,300
USA	4.3	8.4	65,118
Vietnam	1.3	NA	2715

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'Khadi' Under the Neoliberal Economic Dispensation: Relevance and Issues

Amita Shah

1 Introduction

Economic growth, along with the creation of gainful employment for teeming millions, has remained the most crucial challenge in India. Whereas there has been a considerable positive impact of various poverty alleviation programmes, in terms of improving the quality of life of various disadvantaged groups, including women, their long-term sustainability is yet to be established. Questions have been raised regarding the overall growth process, particularly at the macro-level (Shah, 2005). The issue has specific relevance within the neoliberal context, wherein a new set of poor, who lose their jobs, emerges and increasingly starts depending on 'doles'. Government of India has been trying to find different avenues to create employment, especially within the right based approach such as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). The role of MGNREGA in critical times like COVID-19 has assumed further significance.

In the present context, considering Khadi,[1] with 'its marked emphasis on gender, minorities, and other socioeconomically marginalized people, as well as community-based processes'.[2] It may be noted that women comprise 80% of the workforce in the sector.[3] More importantly, 'More than two-thirds of workers [in Khadi] are from families below the poverty line. Nearly 60% of workers are either illiterate or have only primary education; 34% are illiterate'.[4] It is argued that Khadi has a significant positive impact on employment, particularly women employment. It may also be noted that Khadi accounts for about 8.49% of the total textile mill production in India.[5] However, the questions like who gains, how much and through which processes, are yet to be examined.

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The discussions on Khadi, we argue, cannot be meaningful devoid of ethics. As argued by Sen (1987),

> the nature of modern economics has been substantially impoverished by the distance that has grown between economics and ethics. (p.7)

He further argued

> …that economics, as it has emerged, can be made more productive by paying greater and more explicit attention to the ethical considerations that shape human behaviour and judgement. (p. 9)

In a similar vein, Iyengar (2014) argued that unless specific (Gandhian) values are integrated into economic analysis, it is suspect that policy prescriptions will lead to sustainable economic development.

Our effort, therefore, in this paper, is to bring a better understanding of various linkages between employment, poverty reduction, ethics and future scope for strengthening Khadi, especially in the neoliberal context. We have also attempted to map the spatial dimension of Khadi in India, to assess its role in poverty alleviation.

The time-line

History of Khadi dates back to Harappan age wherein the excavation of Mohenjo-daro found the traces of Charkha (Pal, 2017; Gupta et al., 2018; Sinha, 2018). However, it was mainstreamed as a symbol of our freedom struggle by Mahatma Gandhi in 1921 (Busenna & Reddy, 2011). Over time, the primary focus of Khadi sector has passed through several changes, from providing self-employment, and basic livelihood to market-driven economic activity, due to the policy shift from time to time, in response to the larger process of economic liberalisation.

Given this changing context, it is argued that Khadi may not be treated as merely an extension of the industrial sector. It should, instead, be linked with the broader processes of employment generation, with a specific focus on socially and economically marginalised groups (Shah, 2005).

2 Growth of Production, Sales and Employment in Khadi Sector

Historically, Khadi has passed through various stages and sustained for a long time. However, despite its significant growth, employment generation has not kept pace (Chart 1).

CAGR of Production, Sales and Employment in Khadi (2004-05 to 2018-19)
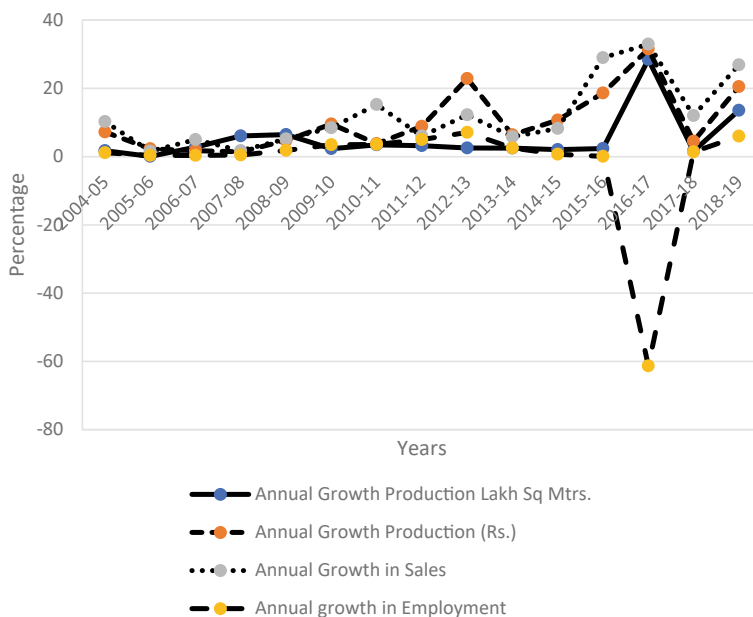
The Chart indicates that except employment, all other variables have experienced growth, of course at different rates. A strong and positive correlation was also observed among three of the four variables, viz. physical production, the value of production and sales. All the values are statistically significant. However, their relationship, as anticipated, with employment is significantly negative (Table 1).

Khadi experienced intermittent fluctuations in production and sales from 2004–05 to 2086–19. The trend rate of growth in the physical production of Khadi (in terms

Table 1 Karl Person's coefficient of correlation between various variables[a]

S. No.	Variables	Correlation and p-value
1	Physical production and production in value Rs. (Cols. 4 and 6)	0.69 (*p-value 0.004*)
2	Physical production and sales (Cols. 4 and 8)	0.67 (*p-value* 0.006)
3	Physical production and employment (Cols. 4 and 10)	(−) 0.86 (*p-value* 0.001)
4	Production in Rs. value and sales (Cols. 6 and 8)	0.83 (*p-value* 0.002)
5	Production in Rs. value and employment (Cols. 6 and 10	(−) 0.59 (*p-value* 0.002)
6	Sales and employment (Cols. 8 and 10)	(−) 0.55 (*p-value* 0.030)
7	Production of khadi and poverty levels across the states	0.097 (*p-value* 0.66)
8	Employment in khadi and poverty levels across the states	0.084 (p-*value* 0.71)

[a]*Note* Based on the information provided in Annexure I and Annexure II

of lakh square metres) was observed to be 5.54% (Annexure I). However, the value of production (in Rupee terms), and sales of Khadi registered much robust growth with the trend rate of growth of 10.74% and 12.50%, respectively. However, the changes in employment had not been commensurate with these trends. Instead, the deceleration in employment was rather steep, from 7.1% in 2012–13 to (−) 61.33% in 2016–17 (Chart 1). Though, it marginally recovered to 1.40% in 2017–18 and made an impressive growth of 5.99% in 2018–19. The long-term trend rate of growth in employment from 2004–05 to 2018–19 was (−) 1.99% (Annexure I).

The reason for such a sharp decline in employment, in 2016–17 is not clear. However, the explanation offered by KVIC contends that the employment data till 2015–2016 did not reflect accurate picture, as the new jobs that were created, had been added without taking out the number of workers who left during the same period. A communique from KVIC stressed that in January 2016, the Commission decided to pay the subsidy under direct benefit transfers, directly to artisans in their Aadhar seeded accounts, instead of paying through Khadi Institutions. It flushed out 'ghost' artisans. The data-cleaning is still in the process. This step was taken because of the allegations that Khadi Institutions were claiming the subsidy on inflated bills.[6] While the new set of data is yet to be made available, such a drastic deceleration in employment between 2015–16 and 2016–17, is intriguing.

As per the KVIC estimates, the significant chunk (3.2 lakh of the 6.8 lakh) lost the jobs in the central zone, comprising of Uttarakhand, Uttar Pradesh (U.P.), Chhattisgarh and Madhya Pradesh (M.P.). Another about 1.2 lakh persons lost the jobs in east zone consisting of Bihar, Jharkhand, Orissa, West Bengal and Andaman and Nicobar. All the regions experiencing significant job losses belong to relatively high poverty and low-income states. Besides, KVIC admitted that part of this decline could also be due to the introduction of new model charkhas that replaced the traditional single spindle 'charkhas'.[7] There could also be a small segment of workers who might have left the sector because of distress or owing to better-earning opportunities in other sectors.[8]

It may also be noted that besides Khadi, the other significant employment creating programme supported by Government, viz. Prime Ministers Employment Generation Program (PMEGP) that targeted village industries, also did not perform exceptionally well between 2014–15 and 2018–19.[9] Nevertheless, let us end with a positive note that, there has been an overall increasing trend in production and sales of Khadi, over time.

2.1 Regional Variations Over-Time

This part of the analysis provides a comparative assessment of the production of Khadi over-time, across the top ten producer states (Table 2). The table indicates that the top four states, viz. U.P., West Bengal, Tamil Nadu and Haryana have continued to dominate the production of Khadi. Collectively, they have contributed close to 59% in 2014–15; reaching up to over 69% during 2018–19.

Table 2 Production of khadi across the major states in India: 2014–15 to 2018–19

Rank	2018–19		2017–18		2016–17		2015–16		2014–15	
	State	%	State	%	State	%	State	%	State	%
1	Uttar Pradesh	24.15	Uttar Pradesh	26.79	Uttar Pradesh	24.15	Uttar Pradesh	27.19	Uttar Pradesh	25.23
2	West Bengal	13.98	West Bengal	14.07	West Bengal	13.98	West Bengal	13.61	West Bengal	13.27
3	Tamil Nadu	10.16	Karnataka	10.81	Haryana	10.84	Tamil Nadu	10.77	Tamil Nadu	10.72
4	Haryana	10.84	Tamil Nadu	9.24	Tamil Nadu	10.16	Haryana	10.50	Haryana	9.67
5	Karnataka	10.10	Haryana	8.73	Karnataka	10.09	Kerala	4.93	Rajasthan	5.82
6	Gujarat	5.25	Kerala	5.35	Gujarat	5.25	Rajasthan	4.80	Karnataka	5.64
7	Jammu & Kashmir	5.08	Gujarat	5.25	Jammu & Kashmir	5.07	Karnataka	4.66	Gujarat	4.77
8	Kerala	5.06	Jammu & Kashmir	3.34	Kerala	5.05	Gujarat	4.50	Kerala	4.31
9	Chhattisgarh	2.42	Rajasthan	2.75	Rajasthan	2.33	Jammu & Kashmir	3.85	Jammu & Kashmir	3.00
10	Rajasthan	2.33	Andhra Pradesh	3.38	Andhra Pradesh	2.23	Andhra Pradesh	2.36	Andhra Pradesh	2.85
Share of the top 10 states in the production of khadi	89.37		89.71		89.15		87.17		85.28	

Source KVIC Annual Reports from 2014–15 to 2017–18

Uttar Pradesh (U.P.) and West Bengal have maintained their lead in production throughout five years. West Bengal and Haryana, and, to an extent, Jammu and Kashmir (J&K) have shown almost consistent growth over time, except in one year here and there, whereas Rajasthan has lost its position from 5th in 2014–15 to 10th in 2018–19 (Table 2). J&K and Andhra Pradesh (A.P.) joined the top Khadi producing states only in 2014–15. However, at a disaggregated level, one finds a somewhat different picture.

Sectoral Concentration across States

Table 3 highlights the production of Khadi, at a disaggregated level in terms of product-segments, viz. cotton, silk, and woollen, during 2018–2019; and the 10 top states that cover almost 90% to close to 99% production, depending upon their share in various segments.

It is worth noting that of five states, viz. U.P., West Bengal, Haryana, Tamil Nadu and Karnataka accounted for a little over 69% of the overall Khadi production, and the top ten states accounted for over 89.37% of production in 2018–19. Of these, U.P., Kerala, Gujarat, Haryana, and Tamil Nadu accounted for 75.82% production of cotton khadi, whereas the top states account for close to 94%. West Bengal, with a share of 32.63%, emerges as the highest producer of silk, followed by Karnataka (22.46%), Tamil Nadu (20.58%), etc. The corresponding figure for the top ten states

Table 3 Share of Top 10 states in production of khadi sub sectors (2018–19)

State ranks	Total khadi		Cotton khadi		Silk khadi		Woollen khadi	
	2018–19		2018–19		2018–19		2018–19	
	State	%	State	%	State	%	State	%
1	U.P.	24.15	U.P.	43.77	W. Bengal	32.63	Haryana	30.65
2	W. Bengal	13.98	Kerala	9.97	Karnataka	22.46	J&K	20.88
3	Tamil Nadu	10.16	Gujarat	8.65	Tamil Nadu	20.58	U.P.	18.18
4	Haryana	10.84	Haryana	7.83	Chhattisgarh	8.92	Karnataka	8.71
5	Karnataka	10.10	Tamil Nadu	5.60	A. P	4.09	Rajasthan	7.78
Total % top 5 States		69.23		75.82		88.68		86.2
6	Gujarat	5.25	Karnataka	5.50	U.P.	3.07	Uttarakhand	5.54
7	J & K	5.08	W. Bengal	5.33	Jharkhand	1.85	Gujarat	3.05
8	Kerala	5.06	Rajasthan	3.43	Assam	1.79	A.P.	1.85
9	Chhattisgarh	2.42	Uttarakhand	1.89	M.P.	1.72	H.P.	1.15
10	Rajasthan	2.33	A. P	1.85	Gujarat	1.70	Bihar	0.99
Total percentage top 10 states		89.37		93.82		98.81		98.78

Source Table 5.11, KVIC Annual Report 2018–19, p. 42

is 98.81%. The production of woollen khadi is heavily concentrated in Haryana (30.65%), J&K (20.88%), and U.P. (18.18%), which together account for about 70% production.

Production of Khadi varies significantly by the product/sector across the states. Hence, any effort to revive the sector would require additional efforts for broadening its scope, especially if the idea is to bring the poor and socially margined at the forefront of the development process.

2.2   Analysis of Spatial Performance of Khadi Subsectors

We attempt to assess the comparative performance of Khadi subsectors (cotton, woollen and silk) across the major Khadi producing states during the last five years, between 2014–15 and 2018–19, in this section. As stated above, a large proportion of each subsector was concentrated only in a few states, in 2018–19. Did the top five states in 2018–19 have the same sway over the shares earlier too; or there are also losers and gainers? As seen in Table 3, there has been a marginal change in the trend of the overall production of Khadi, wherein a few states have changed their positions. However, dominant Khadi producing states appear to continue to dominate the spectrum over time, in aggregate terms. However, it warrants an examination of these subsectors over time and space.

Cotton Khadi Over Space

Table 4 shows that UP produces around 38% of the cotton Khadi, and its share remains at the top, all through (i.e. between 37.84 and 43.77%), over time. Further, it is noted that Kerala and Gujarat have increased their share in the production of cotton Khadi in the last five years. During the same period, three states, viz. Tamil Nadu, Rajasthan and A.P. experienced a decline in their relative shares. In fact, Tamil Nadu, Rajasthan, and A.P. lost most significantly by over 3.24%, 2.48% and 1.62%, respectively, between 2014–15 and 2018–19.

Silk Khadi Across the Major Silk-Producing States

Silk production in the country exhibits a trend of concentration over time. In 2018–19, the top ten states accounted for 98.81% of silk production in the country, up from about 95% in 2014–15. West Bengal and Tamil Nadu have continued to dominate the scene, with close to 60% production of the country contributed by these two during 2014–2015 and 2015–16. However, West Bengal experienced a continuous decline in its share. The most impressive performance has been that of Karnataka. The state increased its share in silk production from 6.25% in 2014–15 to 20.58% in 2018–19. Assam, Odisha, Gujarat, and M.P. seem to be significant losers during the period (Table 5).

Table 4 Share of major states in production of cotton khadi—2014–15 to 2018–19[a]

Rank	2018–19		2017–18		2016–17		2015–16		2014–15	
	State	%	State	%	State	%	State	%	State	%
1	UP	43.77	UP	42.78	UP	38.16	UP	41.5	UP	37.84
2	Kerala	9.97	Kerala	9.32	Haryana	10.53	Haryana	10.72	Tamil Nadu	8.84
3	Gujarat	8.65	Haryana	8.42	Kerala	8.79	Kerala	8.27	Haryana	8.65
4	Haryana	7.83	Gujarat	8.25	Gujarat	8.06	Tamil Nadu	7.40	Kerala	7.30
5	Tamil Nadu	5.60	Karnataka	6.45	Tamil Nadu	7.72	Gujarat	6.27	Gujarat	6.67
6	Karnataka	5.50	Tamil Nadu	5.87	Karnataka	6.54	Rajasthan	4.80	Rajasthan	5.91
7	W. Bengal	5.33	W. Bengal	5.02	W. Bengal	6.07	Karnataka	4.65	Karnataka	5.73
8	Rajasthan	3.43	Rajasthan	3.48	Rajasthan	2.52	W. Bengal	3.77	W. Bengal	4.12
9	Uttarakhand	1.89	Bihar	2.49	Bihar	2.38	A P	2.82	A P	3.47
10	AP	1.85	AP	1.83	AP	2.35	Uttarakhand	1.91	Bihar	2.09
Cumulative share		93.82		93.91		93.12		92.11		90.62

[a]Ranks as per the year 2014–15
Source KVIC Annual Reports from 2014–15 to 2018–19

Table 5 Share of major states in production of silk khadi—2014–15 to 2018–19

Rank	2018–19		2017–18		2016–17		2015–16		2014–15	
	State	%	State	%	State	%	State	%	State	%
1	W. Bengal	32.63	W. Bengal	36.32	W. Bengal	37.75	W. Bengal	43.92	W. Bengal	41.99
2	Tamil Nadu	22.46	Karnataka	20.60	Tamil Nadu	20.78	Tamil Nadu	24.91	Tamil Nadu	21.85
3	Karnataka	20.58	Tamil Nadu	19.25	Karnataka	19.85	Chhattisgarh	6.34	Chhattisgarh	6.99
4	Chhattisgarh	8.92	Chhattisgarh	6.17	Chhattisgarh	6.32	Karnataka	5.16	Karnataka	6.25
5	A.P.	4.09	A.P.	3.71	A.P.	2.86	Assam	3.96	Assam	4.80
6	U.P.	3.07	Odisha	2.76	Assam	2.59	Odisha	2.59	Jharkhand	3.12
7	Jharkhand	1.85	Assam	2.19	Odisha	2.54	Jharkhand	2.57	A.P.	2.99
8	Assam	1.79	Jharkhand	1.92	U.P.	2.18	A.P.	2.46	Gujarat	2.49
9	M.P.	1.72	U.P.	1.79	Gujarat	1.58	Gujarat	2.11	Odisha	2.32
10	Gujarat	1.70	M.P.	1.71	Jharkhand	1.05	M.P.	1.85	M.P.	2.24
Cumulative Share		98.81		96.42		97.50		95.87		95.04

Source KVIC Annual Reports from 2014–15 to 2018–19

Spatial Performance of Woollen Khadi

The states of Haryana, J&K, and U.P. have collectively continued to dominate the scene as the major producers of woollen khadi, during the entire period under review. Together, they account for close to 70% of Khadi production in the country (Table 6). The growth of Khadi production in J&K has been notable as it increased its share from 16.74% in 2014–15 to 31.29 in 2016–17. However, it lost its share subsequently and accounted for only 20.88% in 2018–19. What is surprising to note is that the relative share of Rajasthan has declined from 14.38% to 7.78% in the last five years. Both, the early phase ascendance of J&K, and overall descendance of Rajasthan call for further exploration.

The overall scenario of Khadi subsectors, across the top 10 major states in India, leads one to observe that while the two major states, viz. U.P., West Bengal, Tamil Nadu, Haryana, and Karnataka have continued to perform significantly better as compared to the other states, a somewhat dismal picture scenario is observed in the case of states like M.P., Maharashtra, and Bihar, despite having a relatively higher proportion of the poor population. Maharashtra does not emerge in any segment, among the top 10 states. It appears that, in these states, Khadi is losing its importance with respect to employment, production and sales. The impact of such a performance would possibly hurt the relatively poor population in the states. It also indicates that possibly, Khadi, in the present economic paradigm could hardly be considered as an effective approach for poverty alleviation in the country.

3   Production of Khadi and the Poverty Correlates

One would expect that poorer states will have a higher engagement of people, especially poor, women and marginalised, in Khadi, as its production does not require high skills, is decentralised and location neutral. More often than not, it is the last resort for people in extreme poverty and destitution, as it offers employment opportunities without much investment and dislocation of any kind.

Table 7 classifies major states by production of Khadi vis-à-vis poverty levels. However, it does not indicate any significant pattern. The correlation between poverty levels and production works out to only 0.097, which is insignificant. While on the one hand, poorer states like Gujarat, Karnataka, Uttar Pradesh, and West Bengal have a high share of Khadi production, as envisaged; some of the poorest states like Assam, M.P., Odisha, and Bihar have a disproportionately low share in Khadi production, on the other. States like Kerala, J&K, Haryana, and Tamil Nadu have a disproportionately high share of Khadi production, despite having low levels of poverty. We also plotted poverty against employment in the Khadi sector across states. The distribution pattern is similar to the classification based on production, except Bihar moves to the category of a high poverty—high employment in Khadi states; and, Karnataka moves to the other side (Table 8). Similarly, States of Uttarakhand and Rajasthan have moved to relatively high employment in Khadi despite low poverty rates, which is quite

Table 6 Share of major states in production of woollen khadi—2014–15 to 2018–19

Rank	2018–19 State	%	2017–18 State	%	2016–17 State	%	2015–16 State	%	2014–15 State	%
1	Haryana	30.65	Haryana	30.29	J&K	31.29	Haryana	6.71	Haryana	27.91
2	J&K	20.88	J&K	24.26	Haryana	31.15	J&K	23.17	U.P.	18.37
3	U.P.	18.18	U.P.	18.31	U.P.	13.2	U.P.	16.86	J&K	16.74
4	Karnataka	8.71	Karnataka	6.22	UK	5.95	Rajasthan	12.56	Rajasthan	14.38
5	Rajasthan	7.78	Uttarakhand	6.09	Rajasthan	5.77	UK	6.12	UK	6.47
6	Uttarakhand	5.54	Rajasthan	6.07	Karnataka	5.45	Karnataka	3.86	Karnataka	4.42
7	Gujarat	3.05	H.P.	2.20	Gujarat	1.76	H.P.	2.35	H.P.	2.7
8	A.P.	1.85	Bihar	1.67	H.P.	1.44	Punjab	2.21	Punjab	2.53
9	H.P.	1.15	Gujarat	1.64	Bihar	1.35	Gujarat	1.99	Gujarat	1.91
10	Bihar	0.99	Andhra Pradesh	1.54	M.P.	0.95	Bihar	1.46	Bihar	1.55

Table 7 Poverty levels and share of khadi production by the major states in 2018–19

Poverty levels by states	Levels	Share of states in production of khadi	
		High (>2.5%)	Low (<2.5%)
	High (>15%)	Gujarat (16.6; 5.25) West Bengal (20.0; 13.98) Karnataka (20.9; 10.10) Uttar Pradesh (29.4; 24.5)	Maharashtra (17.4; 0.27), Madhya Pradesh (31.7; 0.61) Assam (32.0; 0.81) Odisha (32.6; 0.96) Bihar (33.7; 1.75)
	Low (<15%)	Kerala (7.1; 5.06) Jammu & Kashmir (10.4; 5.08), Haryana (11.2; 10.84) Tamil Nadu (11.3; 10.16)	Himachal Pradesh (8.1; 0.25) Telangana (9.2; 0.42) Andhra Pradesh (9.2; 2.23) Delhi (9.9; 0.15) Uttarakhand (11.3; 2.22) Rajasthan (14.7; 2.33) Chhattisgarh (39.93, 0.79) Jharkhand (36.96, 2.42)
Cumulative share	98.78	98.29	98.31	97.29	96.98

Source Based on the data given in Annexure II

Note Highlighted figures show the share of states in the production of Khadi in 2018–19. Karl Pearson's coefficient of correlation between the production of Khadi and Poverty levels was only 0.097 with a *p*-value of 0.66, which is statistically insignificant even at 10% level of significance.

Source KVIC Annual Reports from 2014–15 to 2018–19

Table 8 Poverty levels and share of employment in khadi by the major states in 2018–19

Poverty levels	Share of states in employment in khadi	
	High (>2%)	Low (<2%)
High (>15%)	Gujarat (16.6; **2.52**)	Maharashtra (17.4; **0.60**)
	West Bengal (20.0; **6.57**)	Karnataka (20.9; **0.45**)
	Uttar Pradesh (29.4; **24.91**)	Madhya Pradesh (31.7; **0.31**)
	Bihar (33.7; **14.39**)	Assam (32.0; **1.08**)
		Odisha (32.6; **1.12**)
Low (<15%)	Kerala (7.1; **2.92**)	Himachal Pradesh (8.1; **0.69**)
	Jammu & Kashmir (10.4; **4.72**)	Telangana (9.2; **0.45**)
	Haryana (11.2; **11.17**)	Andhra Pradesh (9.2; **1.76**)
	Uttarakhand (11.3; **3.76**)	Delhi (9.9; **0.24**)
	Tamil Nadu (11.3; **3.23**)	Jharkhand (36.96, **2.42**)
	Rajasthan (14.7; **5.38**)	Chhattisgarh (39.93, **0.79**)

Note Highlighted figures show the share of states in employment in Khadi Sector in 2018–19. Like in the case of production, the coefficient of correlation between employment in Khadi and poverty levels was only 0.084 with a p-value of 0.71, which is statistically insignificant even at 10% level of significance
Source Based on the data given in Annexure II

encouraging. However, the correlation between poverty and employment, like in the case of production, is extremely weak (0.84) and insignificant.

We worked out the correlation between Khadi and levels of poverty across the 21 selected states that account for close to 99.93% of khadi production and about 88.76% employment in the sector. As observed above, the relationship between khadi production, or employment, with the levels of poverty across the states is extremely weak and insignificant. Recognising the size differences (in terms of population) across the states, we normalised the series by population and correlated them with the poverty levels. The correlation works out to be 0.16, which is also insignificant. It indicates that the relatively poorer states do not have any significant activity related to Khadi production. Similar correlations were observed between the number of Khadi institutions and the relative share of khadi production. The correlation between the number of Khadi Institutions and poverty levels also turns out to be insignificant, with a value of +0.33. It indicates a lack of a direct link between poverty and Khadi. However, in terms of employment, the picture is marginally different. For

example, Bihar, which has the highest poverty ratio (33.74), has the second-highest employment (66,158 persons or 15.47% share) in Khadi, next to only U.P.

Based on the pattern of distribution of states according to their levels of poverty, production, and employment in Khadi sector, one could argue that there is a need to promote Khadi, especially in states like Maharashtra, Karnataka, M.P., Assam, Odisha and to an extent Bihar, where both employment and production of khadi is relatively low despite high levels of poverty.

In this context, a few initiatives taken by the Government of Bihar, a state with the highest level of poverty, are worth the mention. Realising the potential of Khadi in employment generation and poverty alleviation, the Government appointed a private agency, viz. Grant Thornton Bharat LLP (G.T.), in 2018, for three years, to help in revamping khadi sector. The interventions included capacity building and computerisation of administration of Khadi Institutions. It focussed skill development of new artisans leading to increased employment from 8000 to 15,000 artisans during the intervention period. The wages of artisans improved significantly, reaching up to Rs. 375 per day, much higher than the minimum wages of Rs. 250 per day in Bihar. The production of Khadi increased from Rs. 10.96 crore to Rs. 17.54 crore during this period. The intervention also focussed designs by commissioning National Institute of Fashion Technology (NIFT). Marketing through corporates like Raymond, and launching an online sales store at Amazon, and organising buyer–seller meets, also resulted in higher sales of Khadi. Another interesting initiative was the opening of Khadi Mall in Patna (the largest of its kind in India). The sale of Khadi fabrics and readymade garments reached Rs. 1.5 crore per day, in the first two months of its launch (Grant Thornton Bharat LLP 2020). The project also led to the development of a manual entitled 'Reviving the legacy of the Mahatma: Developing Khadi and Village Industry Clusters in Bihar for Regional Economic Development', which provides a road map to promote Khadi systematically (Sharan et al., 2019). So far, the results are quite encouraging. However, it deserves an in-depth understanding of the sustainability of these interventions.

4   The Contemporary Context

Of late, Khadi has attracted significant debate among policymakers, planners and academia. The primary issue relates to the fact that Khadi does not seem to create meaningful employment. The question is particularly relevant now, given a shift in its socio-political context. The question, therefore, is: 'How far Khadi is still relevant in the new, market-driven paradigm of growth and employment generation in the country?' Of course, in its present form, Khadi does not seem to be a viable activity, as reflected by its continued subsidisation, year after year.

The Khadi and Village Industries Commission (KVIC) was set up to plan, promote, facilitate, organise and assist in the establishment and development of khadi and village industries in the rural areas in coordination with other agencies engaged in rural development wherever necessary. There have been contradictory views on

the contribution of KVIC. Every annual report of KVIC makes claims on its achievements during the concerned year. Besides, a recent paper by Katoch (2018) gives a scheme-wise account of the contribution of KVIC. The author concludes that:

> KVIC is playing a significant role in the development of micro-enterprises by creating self-reliance amongst the poor and building up a strong rural community spirit with the social objective of providing employment…To promote the sales and marketing of khadi and/or products of village industries or handicrafts, the KVIC has forged linkages with established marketing agencies…KVIC has registered a number of institution across the country to regulate rural business and trades in Khadi and Village Industries. These Institutions are facilitated with capital expenditure for land, building, equipment and working capital for their successful execution (p. 87).

On its face value, it looks impressive. However, its functioning has heavily been criticised (Gupta, 2018). The paper indicates that not everything is well in KVIC; it is suffering from serious systemic issues.

In this context, the Planning Commission (2001) found that the sector is not able to take a comprehensive view of interlinkages among production, sales and employment generation. Moreover, monitoring mechanisms are relatively weak, and the available information is not adequately used for planning and management decision. As a result, the performance of the sector is far from optimum. Nevertheless, it was also noted that the sector holds great potential for poverty alleviation if the specific steps are taken to give significant push through re-organisation, along with financial support. Unfortunately, the situation has remained more or less the same. Nair and Dhanuraj (2016), in a detailed analysis of the restrictive practices and policies adopted by KVIC, summarised:

> While a huge demand for Khadi products exists, the restrictive practices adopted by the Government, through the KVIC, such as creation of significant number of entry barriers… have resulted in the decline in production and sales…The prevailing low wages in the sector, created by the restrictive practices of the Government, have resulted in making the sector less attractive to skilled artisans (p. 2)

Also, Khadi institutions are finding it difficult to sustain. We, however, argue that Khadi has to be viewed somewhat differently than what it was initially considered. Once a symbol of national pride, particularly during the freedom struggle, Khadi has to be considered favourably on its strengths, such as its being an eco-friendly fabric, the mainstay of poor and women, a natural fibre which is made out of human sweat that provides dignity to masses. Therefore, state, along with Khadi organisations, need to have fresh thinking altogether.

5   Reforming Khadi: The Asian Development Bank Interventions

Recognising that agriculture has already moved beyond the scope for creating gainful employment, especially, for the rural poor, small and micro-enterprises (SMEs),

especially rural enterprises, are likely to play an increasingly important role, in the times to come. In this context, the interventions to restructure Khadi sector, supported by the Asian Development Bank (ADB), deserve special mention, which *prima facie*, highlights that Khadi sector has significant potential for generating additional employment (ADB, 2008). For the purpose, it granted a policy-oriented loan of US$ 150 million to KVIC, to be released in three tranches.[10] This involved:

(a) Identifying major policy reforms for the development of Khadi and implementation framework.
(b) Creating a 'Khadi Mark' for marketing, especially for private sectors.
(c) Improving production and procurement efficiency by facilitating raw material, introducing market-linked pricing, rationalising financial assistance for Khadi and encouraging Khadi entrepreneur and artisans.
(d) Revitalising Khadi Institutions and developing synergies with village industries.

The proposed institutional frameworks by ADB focused mainly on reviewing the performance along with its subsidiary institutions. For this purpose, 400 Khadi Institutions were selected and extended financial support, between 2011 and 2017. In this regard, the ADB Report (2008) argued that

> Sustaining Khadi through sales rebates and interest rate subsidy has had little if any, positive impact on the production and marketing and employment generation… Inflexible pricing based on the cost chart provides no incentives for new designs and effective marketing… Without an effective marketing and product strategy, khadi is unlikely to compete in the textile market. This involves a paradigm-shift from supply-side to demand-side focus experienced marketing professionals (pp. 7–8).

Nevertheless, the report also highlighted several opportunities and the potential the sector has. It emphasised that there are significant opportunities for Khadi, if properly marketed and repositioned as environment friendly, socially conscious, and fair wage characteristics.

By the time of the release of the 3rd tranche by ADB, in 2017, KVIC (inter alia, the Government of India) complied with all the conditions related to the reform principles, including facilitation the participation of private sector, which was untouchable for KVIC, thus far. Impact assessment of the programme by ADB indicated that the KVIC had adequately fulfilled all the conditions of the loan,[11] that resulted into increased sales by 58% and saving of 5–6% of the cost of subsidy; all 400 institutions covered under DRA adopting broad level reform measures, such as the adoption of the Khadi Mark, etc.; an overall increase of about 400% in the wages of the spinners and 60% increase in the wages of weavers; about one million artisans got the benefit of direct benefit transfer; and the programme also increased the insurance coverage of women artisans by 90%, etc.

Initially, the response from the private sector was relatively lukewarm. Raymond, one of the leading fabrics and fashion retailers, signed the MoU with KVIC for its involvement as late as 16th January 2016. It has already started producing Khadi-garments, known as 'Raymond Khadi'. The other major company brought on board was the Ahmedabad based Arvind Limited on 21st September 2017, with an intent

to promote Khadi denim as a global brand.[12] To the best of our knowledge, the KVIC has yet to increase its dossier of any other major private sector player.

6 Khadi from Freedom Fabric to Fashion Fabric:13

Recently, a few small but innovative entrepreneurs have entered Khadi business by adopting new approaches for producing Khadi in the context of new markets that are more conscious of eco-friendly and handcrafted natural fabrics. It may also lead to the creation of employment, along with economic development. Most of such innovations are in the domain of designing and positioning. In terms of fashion designs, noted names in the fashion industry like Ritu Beri, Ritu Kumar, Sabyasachi Mukherjee, etc., showcase a wide range of Khadi apparel and traditional sarees with work of jamdani, zari and gota-patti among many more (Singh et al., 2014; Gupta et al., 2018). Kumari and Singh (2019) also found that:

> Khadi has also made an entry in Paris, New York etc. Danish textile designer Bess Nielsen has named his store in Paris after it. Khadi has been used in the Star Wars films. There are exclusive Khadi stores in Dubai. Khadi has been in the limelight for all the right reasons (p. 241).

Though information on innovations is scanty and anecdotal, it will be worth to cite a few examples as indicative of the trend that might be the business of tomorrow, globally, given the eco-friendly appeal of Khadi. A case study of an Ahmedabad based small and upcoming organisation, viz. 'Sustainable Earth Foundation' (SEF), set up by Sonal Baid, is interesting from design, production technology and position point of view.[14] The SEF is involved in the entire value chain from spinning to marketing. They have organised artisans in 4–5 states for spinning and weaving. The niche of the organisation is to promote non-toxic, organic Khadi wherein the entire value chain is based on creating sustainable and ethical fashion, where artisans, mainly women, also get their due. They also use natural herbal dyes to give very fascination colours and patterns to the fabric. They have recently started exporting their khadi fabrics and apparels. Currently, they are working on promoting another innovation, i.e. Bamboo Charkha, designed by a Japanese innovator Hideo. The product design is still under modification. Once final, it will be cheaper, more functional and lighter in weight. However, Sonal felt that the process of certification of Khadi is quite complicated and time-consuming. Unless the Government supports such initiatives, the small organisations will find it an unviable and an unattractive proposition.

6.1 Technological Innovations and Khadi

In terms of production technology, nothing much has happened. Though it is fascinating to note that Gandhi, based on experience gained by Vinoba Bhave that a

spinner cannot earn more than '*two annas*' a day working full time on a spinning wheel (Charkha), decided to improve the situation (Dabholkar, 2019). On 24th July 1929, he announced a design competition with an award of Rs. 100,000 or Pound Sterling 7700 with the stipulation that the new Charkha should be lightweight, easy to move and should have ten times the productivity than the traditional Charkha (GYATI, Techpedia 2018). However, nothing much took place till the 4-spindle, wooden Ambar Charkha was introduced in 1954. The next breakthrough came in around 1965, when yet another improved version of the all-metal Ambar Charkha known as New Model Charkha (NMC), having spindles ranging between 2 and 12, was designed and developed. It had all the advantages of the old Ambar charkha but had much higher productivity. In 2007, Hiremath, a Bangalore based engineer, invented e-Charkha, which is now being promoted by KVIC. It generates power (electricity) while spinners spin the yarn. After almost 55 years, Government of India launched Solar Charkha Mission Scheme, under the Solar Spindle Mission, on 27th June 2018, with a target of generating five crore jobs (PM Jan Dhan Yojana, 2018).

Recently, Prashant Industries in Ahmedabad have developed a Hank making machine which could produce quality hanks, with high productivity and volume, that could feed 300 Ambar Charkhas. While the machine is likely to cost Rs. two crore, it could be installed in clusters or could cover a catchment area of 4–5 villages, to make it viable. The innovator Prakash Shah has also developed a 48-spindle Ambar Charkha which will operate at 10,000–12,000 RPM as against the current 1500 RPM (regular yarn machines have 14,000–15,000 RPM). It will improve the quality of yarn significantly. He has developed electric as well as solar variants of this Charkha. However, one is not sure if it will still be considered Khadi if the yarn is made using electricity; and, is not 'hands' spun.15.

7 Khadi: Going Beyond Economic Cost–Benefit: A Case of Saurashtra Rachanatmak Samiti (SAURAS)

The economics of Khadi, in terms of gains and losses, has been the focus of critics. However, a few organisations like the Rajkot-based SAURAS,[16] set up in 1948, look at the sector somewhat differently. This organisation has continued to remain committed to support and promote Khadi along with generating large scale employment in rural areas. Whereas the organisation has broadly proved its sustainability over a long period, questions have been raised about the relevance of such organisations, especially in a neoliberal context. However, SAURAS believes that working in Khadi should be considered as self-employment, ensuring basic livelihood to the family, including women, rather than wage employment (Desai, 2010).[17] The average earning in Khadi ranges from Rs. 85 to Rs. 224 per day. It is lower than even the minimum wages of an unskilled worker in a small-scale enterprise. However, it may be emphasised that Khadi is only a part-time activity, with a fair amount of flexibility,

that generally suits women, given their family commitments. Thus, it may not be fair to compare earning from Khadi without factoring into its social contribution and contribution at the household level.

Moreover, women have been engaged in certain specific tasks in the khadi production process, such as spinning, but rarely in weaving. Involving women in activities higher in the value chain like weaving would require additional support—financial as well as organisational. Of course, there have been instances such as in Karnataka, and a couple of other states in South India, where successful efforts have made to involve women in weaving. However, the impact of upward mobility in the value chain, on women, and the trade-offs involved therein, are not clear.

8   Future Value of Khadi

The analysis in this paper so far has focused mainly on economic outcomes. What is perhaps missing is the fact that Khadi also has significant implications for natural resources. The missed-out aspect is the 'future value' of Khadi. The analytical approach, by and large, adopted so far, has certain limitations, if one looks at it from the viewpoint of its 'existence value', particularly within the ecological economics concept. For, such valuations are based on 'economic principle of individual preferences', thereby suggesting that valuations are time-specific and contextual. Moreover, it is also often argued that economic and financial interventions have to be used to regulate ecosystem goods and services, where the market fails to function appropriately (Dasgupta and Maler, 2009; Dasgupta, 2009). Given the uniqueness in terms of products, processes, and use of natural resources across space and societies, it may also be seen in the context of its existence in future, and thereby having economic value over time.

Promoting Khadi in the present context necessitates certain basic commitments in the next phase of policy formulation wherein women and the poor are brought back at the centre stage. It is vital because Khadi is increasingly being pushed to become market-oriented. The issue of production and employment, therefore calls for re-designing the Khadi sector. Such an approach takes us back to the original idea of Gandhi, where the focus was 'Not on Mass Production but Production by Masses'. Moving towards this would necessitate restructuring in the primary approach of development wherein Khadi may have a unique role to play.[18] Unfortunately, the ongoing discourse on Khadi seems to be stuck into its marketisation and hard-core economic sustainability, rather than more critical system sustainability. Possibly, a balance between the two is warranted, keeping in view the 'future value' of Khadi.

9   In Lieu of Conclusion

The analysis of the Khadi sector presented above suggests positive pathways at this juncture. However, what is not so clear is its impact on employment in the ongoing growth process. Working in Khadi sectors generally involves more than one individual within a household. It offers significant flexibility, which could be suitable for women. Hence, work in Khadi is to be treated as a preferred activity, especially for women, poor and socially marginalised, till better employment opportunities emerge. The vital issue is how far this approach would be adequate to promote Khadi products if markets take over lock, stock and barrel. Use of natural resource is yet another critical issue, which raises broader questions on the environmental sustainability of the economy. Its 'future value' or 'existence value' must be factored in, to assess its utility. Thus, the idea here is to open up a new way of understanding the Khadi sector in the contemporary context, rather than finding only its economic outcomes.

Notes

[The author feels privileged to have been invited to write a paper in honour of Prof. R. Radhakrishna, who has been like a teacher to her. She is also grateful to Smt. Elaben Bhatt (Founder SEWA), for her inputs on various issues on Khadi.]

1. The textile sector in India consists of three major segments, viz. Khadi, wherein yarn is hand-spun, and the fabric is hand-woven; Handloom, wherein the yarn is mill spun, but the fabric is woven on handlooms; and, Mill Sector wherein the yarn is mill spun, and the fabric is machine woven.
2. Asian Development Bank (2008), p. 4.
3. Asian Development Bank (2017), p. 9.
4. Ibid.
5. To quote Shri V. K. Saxena, Chairman Khadi and Village Industries Commission, Government of India, 'It is encouraging for us that the rise in the share of khadi production in the textile sector in the last five years has gone from 4.23 to 8.49%, which is more than 200%' (Moneycontrol, PTI, 19th June 2019).
6. Times of India, '7 Lakh lose' jobs in the khadi industry, but production goes up by 32%', 14th March. 2018. https://timesofindia.indiatimes.com/india/a-clean-up-that-killed-7-lakh-jobs-in-khadi-sector/articleshow/63252059.cms, (Accessed on 31st August 2020).
7. A Charkha (spinning wheel) is a *device* for spinning thread or yarn from natural (or synthetic) fibres. Its technology has evolved from a simple wooden wheel to spindle based hand-driven spinning machine known as Amber Charkha that has 8–12 spindles. Now, solar operated Charkha has also been developed. Thus, the technology of Charkha has continued to evolve over the years, ever since about 1000 A.D. in India, the inventor of Charkha (spinning wheel).
8. Times of India (2018), op. cit.
9. Prime Minister's Employment Generation Program (PMEGP) is a credit-linked subsidy programme administered by the Ministry of Micro, Small and Medium

Enterprises, Government of India. Khadi and Village Industries Commission (KVIC) is the nodal agency at the national level for implementation of the scheme. 31st July 2017. Data for various years, on employment generation under PMRY, has been collected from various Annual Reports entitled *Khadi India. During the period 2014–15 and 2018–19, the employment figures hovered around 3.75.* While about 3.58 lakh persons were employed under PMEGP in 2014–15, the corresponding figure for 2015–16 was 3.2 lakh, for 2016–17 it was 4.1 lakh, for the year 2017–18 the number was 3.87 lakh and finally for the year 2018–19, it was 5.87 lakh. *The information on the employment generated from 2014–15 to 2018–19 has been obtained from Table 6.4 in each of the Annual Reports of KVIC available at* http://www.kvic.gov.in/kvicres/apr.php.

10. It may be noted that the $150 million policy-based loan was approved on 2nd October 2008, signed on 22nd December 2009 and became effective on 2nd February 2010. The loan was to be released in four tranches within three years based on compliance with 16 conditions for tranche 1 ($20 million), 31 conditions for tranche 2 ($40 million), 26 conditions for tranche 3 ($40 million) and 17 conditions for tranche 4 ($50 million). However, the funding was released only in three tranches, after several extensions, due to various reasons related to implementation. The closing date of the policy loan and the attached T.A. was extended to 31st December 2017, as per India: Khadi Reform and Development Program (Third Tranche), Project Number: 42151-013, Loan 2452, December 2017.

11. Khadi Reform and Development Program (Third Tranche), December 2017, op. cit, pp.1–7.

12. The idea for this hybrid fabric first floated in the mid-Nineties, when a Rajkot-based organisation Saurashtra Rachanatmak Samiti (SAURAS) began experimenting with samples. The resources involved in creating a commercial product were humongous. Therefore, it could not take off. Finally, Ahmedabad-based Arvind Limited (the largest manufacturer of denim in the world) contacted SAURAS to pool resources to commercialise it at a large scale.

13. Title courtesy ICMR (2013), 'Reviving Khadi: From Freedom Fabric to Fashion fabric'. https://www.icmrindia.org/free%20resources/casesTudies/Reviving%20Khadi-Business%20Strategy.htm (accessed on 31st August 2020).

14. Based on an interview with Sonal Baid, CEO of the Sustainable Earth Foundation, which is involved in manufacturing garments using herbal dyes on Khadi fabric. http://www.sef-india.org- The interview was carried out by the author.

15. Based on the Interview with Shri Prakash Shah, the Innovator and owner of the company.

16. http://saurasrajkot.com/category.php?id=82—Saurastra Rachanatmak Samiti Rajkot.

17. Handloom sector is also provided subsidy that ranges from 90% to scheduled tribe weavers, 75% to scheduled caste weavers and 50% to the general category weavers. By 2017 Government has announced Rs. Six thousand crore

subsidies to handloom sector. https://retail.economictimes.indiatimes.com/news/apparel-fashion/apparel/rs-6000-cr-worth-of-subsidy-for-handloom-sector-minister/59914221—August 04, 2017.

18. Some of the issues noted here are based on the discussion the author had with Smt. Elaben Bhatt, Founder of SEWA (Self-Employed Women's Association), Ahmedabad.

Appendix: Annexure I

Production, Sales and Employment of Khadi (2004–05 to 2018–19)

S. No.	Year	Production				Sales			Employment (Number)	
		Lakh sq. meters	Annual growth	Rs. in crore	Annual growth	Rs. in crore	Annual growth	Lakh	Annual growth
1	2004–05	698.90	1.75	443.07	7.24	577.63	10.28	8.58	1.17
2	2005–06	699.47	0.08	453.50	2.30	587.04	1.60	8.61	0.35
3	2006–07	718.80	2.76	461.54	1.74	617.84	4.99	8.64	0.35
4	2007–08	762.43	6.07	468.30	1.44	628.69	1.73	8.68	0.46
5	2008–09	811.80	6.48	491.52	4.72	663.19	5.20	8.84	1.81
6	2009–10	830.86	2.35	543.39	9.55	724.39	8.45	9.16	3.49
7	2010–11	859.53	3.45	565.00	3.82	855.00	15.28	9.50	3.58
8	2011–12	887.32	3.23	620.00	8.87	910.00	6.04	10.00	5.00
9	2012–13	909.85	2.54	761.93	22.89	1021.60	12.25	10.71	7.10
10	2013–14	932.51	2.49	811.08	6.40	1081.00	5.82	10.98	2.52
11	2014–15	951.90	2.08	879.98	10.71	1170.40	8.26	11.06	0.72
12	2015–16	974.50	2.37	1065.60	18.66	1510.00	29.01	11.07	0.09
13	2016–17	1252.20	28.50	1401.80	31.55	2007.60	32.95	4.28	−61.33
14	2017–18	1272.40	1.61	1465.21	4.52	2249.18	12.03	4.34	1.40
15	2018–19	1445.20	13.58	1765.51	20.50	2854.19	26.90	4.60	5.99
The trend rate of growth (%)			5.54		10.74		12.50		(−) 1.99

Source KVIC Annual Reports from 2004 to 2017

Annexure II

Khadi Activity and Levels of Poverty across States in India$^{\$}$

Rank	Zone	Name of the state	No of khadi institutions (2018–19)*	Population—2011 (in crore)**	% Population	Poverty ratios (2011–12)***	% share of states in khadi production (2018–19)+	Employment in khadi (2018–19)+	%Employment in khadi across the states	Employment in khadi per lakh population++
1	c	3	4	5	6	7	8	9	10	11
1	East	Bihar	51	10.41	8.60	33.74	1.75	66,158	14.39	63.55
2	East	Odisha	28	4.19	3.46	32.60	0.96	5132	1.12	4.93
3	NE	Assam	33	3.12	2.58	32.00	0.81	4978	1.08	4.78
4	Central	M. P	48	7.26	6.00	31.70	0.61	1403	0.31	1.35
5	Central	U. P	517	19.98	16.50	29.40	24.15	114,507	24.91	110.00
6	South	Karnataka	166	6.1	5.04	20.90	10.1	2076	0.45	1.99
7	East	Bengal	277	9.12	7.53	20.00	13.98	30,217	6.57	29.03
8	West	Maharashtra	103	11.23	9.27	17.40	0.27	2746	0.60	2.64
9	West	Gujarat	232	6.04	4.99	16.60	5.25	11,600	2.52	11.14
10	North	Rajasthan	151	6.85	5.66	14.70	2.33	24,720	5.38	23.75
11	South	T. N	53	7.21	5.95	11.30	10.16	14,847	3.23	14.26
12	North	Uttarakhand	77	1.01	0.83	11.30	2.22	17,281	3.76	16.60
13	North	Haryana	86	2.53	2.09	11.20	10.84	51,328	11.17	49.31
14	North	J &K	32	1.25	1.03	10.40	5.08	21,700	4.72	20.85
15	North	Delhi	8	1.67	1.38	9.90	0.15	1101	0.24	1.06
16	South	A.P.	59	4.79	3.96	9.20	2.23	8103	1.76	7.78
17	South	Telangana	7	3.52	2.91	9.20	0.42	2075	0.45	1.99
18	North	H.P.	13	0.68	0.56	8.10	0.35	3157	0.69	3.03

(continued)

(continued)

Rank	Zone	Name of the state	No of khadi institutions (2018–19)[*]	Population—2011 (in crore)[**]	% Population	Poverty ratios (2011–12)[***]	% share of states in khadi production (2018–19)[+]	Employment in khadi (2018–19)[+]	%Employment in khadi across the states	Employment in khadi per lakh population[++]
19	South	Kerala	40	3.34	2.76	7.10	5.06	13,657	2.97	13.12
20	Central	Chhattisgarh	18	2.56	2.11	39.93	2.42	4830	1.05	4.64
21	East	Jharkhand	30	3.30	2.72	36.96	0.79	1810	0.39	1.74
Total of 21 states			2029	116.16	95.93	21.9	99.93	403,426	87.76	34.73
All India			2065	121.08	100.00	21.90	100.00	459,664	100.00	35.31

Source [*]Press Information Bureau (2011); [**]Census of India (2011); [***]Planning Commission (2013); [+]based on Table 5.18, KVIC Annual Report 2018–19, p. 48; [++]based on Columns 5 and 9. [$]The states are ranked from highest to lowest levels, in terms of poverty ratios

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Water Security in India: Three Scenarios for 2040

M. Dinesh Kumar

1 Introduction

Any debate on future water challenges of a country should be based on development of future scenarios of water using alternative evolution of major factors driving water demand and supply situation. The key factors that drive changes in water scenario are: economic growth, demographic changes, technological innovations, social changes, changes in environment and governance change (Gallopín & Rijsberman, 2000). Economic growth is necessary for poverty alleviation. Since Independence, India has made substantial progress on the economic front with the per capita net national product recording a compounded growth rate of 1.7%. This is evident from the decline in poverty rate from 45% in 1951 to around 28% in 2000 (Source: Dutt & Ravallion, 2002).

Contribution of agricultural production to this progress in GDP growth has been quite phenomenal, as its value in real terms grew 4.5 times during the 58-year period from 1954–55 to 2012–13 (Source: author's own analysis using Planning Commission data). Irrigation, which constitutes a major share of the total water consumption in competitive use sectors (Amarasinghe et al., 2004), has been the key to enhancing agriculture production and food security situation of the nation (Acharya, 2009), though its contribution was higher in the land rich, but naturally water-scarce regions. Providing safe water for drinking and sanitation are social goals. Water is also needed for industrial production purposes, pollution assimilation and a variety of environmental services (Kumar, 2010). India has also made substantive achievements in the provision of protected water supplies for drinking and domestic uses in both rural and urban areas.

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The social, economic and environmental value of water is being felt more strongly than ever before as demographic and socio-economic processes are putting enormous pressure on the limited freshwater reserves, more so in the water-scarce regions of western, north-western and southern parts of India. The average per capita freshwater availability in India, which stood at 5178 m^3 per annum in 1951, would decline to 1221 m^3 per annum by 2041 (CWC, 2017). But this does not capture the sharp regional variations. Many major river basins in India are already water stressed, and local scarcity and environmental problems are endemic in all basins (Amarasinghe et al., 2004; Kumar, 2010). In the arid western Rajasthan, the per capita renewable water availability is as low as 200 m^3 per annum, against high values for eastern Gangetic basin areas covering northern Bihar, eastern UP, Assam and West Bengal.

The approach to planning, development and management of water resources has been, by and large, centralized, sectoral and segmented (World Bank/GOI, 1998; Kumar, 2010). This approach, which is mainly intended to maximize the benefits of water to individual sectors, not only led to unsustainable development, but also led to several negative social, economic and environmental consequences. The government responds to the problems with increasing number of environmental legislations and regulations which are, by and large, ineffective (Kumar, 2010). The recent efforts have focused on engineering solutions such as setting up of large-scale wastewater treatment systems, and direct monitoring and control of pollution of rivers, and creating market demand for treated wastewater and environmental management services (Narain et al., 2018).

Fast-growing urban population, increase in per capita income and industrialization continue to raise the demand for water in the country, and the phenomenon of high growth in water demand is more pronounced in the water-scarce regions than in the water-rich regions Yet, technological and institutional interventions to manage the same are not forth-coming. While "business as usual scenario" is most unlikely to work in the context of forecasting future water demands due to alternative evolutions of the drivers of change in demand (Gallopín & Rijsberman, 2000), a clear and objective understanding of the water–nature–society–economy nexus is essential for framing rational, efficient and equitable water policies (Tortajada, 2001).

The estimates of future water demand presented in this article are based on the premise that the water demand in certain sectors like water supplies and food production would be driven by the long-term economic growth trends and demographic trends, respectively, whereas to allow the Indian economy to grow in various key sub-sectors, viz. industry and production of commercial crops at rates seen in the recent past, we need to enhance provision of water. While doing so, economic growth itself would demand change in technology, governance and environmental conditions. But such drivers were not considered while generating scenario of demand and supplies in the estimates available so far in the Indian context.

In future, there would be greater pressure to release water from large reservoirs for environmental needs. In order to defer investments for creating new storages, there would be greater pressure to reduce "losses" in irrigation systems and to improve the efficiency of irrigation water supplies (GOI, 2013).

As per latest estimates by the Associated Chambers of Commerce of India, India loses approximately INR 926 billion (US$ 14.33 billion) on account of post-harvest losses (PIB, 2016). A country-wide study measuring crop losses revealed that the losses during harvesting, post-harvest activities, handling and storage amount to 4.6–6% in the case of cereals, 6.4–8.4% in the case of pulses, 3.08–9.96% for oilseeds, 6.7–15.88% for fruits and 4.56–12.44% for vegetables (Jha et al., 2015). Hence, India is likely to witness greater investments for reducing food losses, which in turn would help reduce the demand for water in the agriculture sector indirectly. With land prices skyrocketing and opportunity cost of using land for low value crops increasing, there would be greater pressure to invest in research towards increasing the genetic yield potential of major cereal crops. The idea is that based on the picture emerging from the "business as usual scenario" with assumptions on the evolution of limited drivers, alternative governance mechanisms and policies could be thought about to affect changes in technologies, socio-economic system and the environment.

2 Development and Economic Growth in India Since Early 90s

Since economic liberalization India witnessed rapid economic growth, with the average annual growth in GDP fluctuating between a lowest of 3.88% and a highest of 9.57% during 1992–93 and 2016–17, a major departure from a long-term average annual growth rate of 3–3.5% (Basu & Maertens, 2007). The annual agricultural growth rates also got stabilized during this period. It fluctuated between −2.97% (1997–98) and 10.4% (1996–97), again a significant departure from the earlier periods during which the fluctuation in annual growth rates in the sector was much wider, i.e. between a lowest of −11.04% during 1965–66 to a highest of 15.64% during 1988–89 (Source: author's own estimates based on agricultural statistics). One major reason for this was the tremendous growth in irrigation sector during this period, and the gross irrigated area expanded consistently from 63.2 m. ha in 1990–91 to 95.77 m. ha during 2013–14, a major portion of which came from expansion in well irrigation throughout the country.

The food grain production in the country saw a commendable growth from 50.8 m. ton in 1950–51 to 275.1 m. ton in 2016–17. A lot of the growth in food grain production resulted from crop yield improvement, while some occurred due to area expansion.[1] Another important change in the farm sector is the increasing crop diversification, with larger area under high-value fruits, vegetables, spices and other cash crops (MoAFW, 2016; Rada, 2013). The average annual growth in agricultural GDP in Indian today is far higher than that of the past, crop diversification being the

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[1] The average yield of paddy, wheat and sugarcane in India has been growing at an annual rate of 1.85%, 2.51% and 1.02 per cent, respectively, during 1980 and 2012 (Alexandratos and Bruinsma, 2012).

major contributing factor (Rada, 2013). More importantly, there has been a consistent decline in variability in annual GDP growth rates in the sector (GoI, 2013: p. 3).

Such changes had effect on several sectors. At the time of its independence in 1947, India had: a literacy rate of 18%. The life expectancy at birth was 32 years. The annual population growth rate was 1.25%. Against this in 2005/6, India had a literacy rate of around 60%; life expectancy at birth of 63 years; an annual population growth rate of 1.5%; and an annual GDP growth rate of around 8.4% (Basu & Maertens, 2007). Though there is dispute over the rate of acceleration of poverty rate reduction in India, the poverty rates did drop significantly since economic liberalization (Dutt & Ravallion, 2002).

The improvements in social infrastructure would have added to this growth. As per 1991 census, nearly 62% of the population had access to drinking water supply and this went up to 86% in two decades (source: Census of India, 1991 and Census of India, 2011). The proportion went up to 89.9% in 2015–16 as per 4th National Family Health Survey (NFHS). As regards access to improved sanitation facilities, the figures went up from 29.1% as per 3rd NFHS of 2005–06 to 48.4% as per 4th NFHS of 2015–16 (MOS & PI, 2017), and these figures have improved drastically during the past three years as a result of concerted efforts from the central and state governments, and private sector initiatives. Improvements economic growth rates mean increased demand for water for key economic sectors especially industry and commercial uses, while improvements in social infrastructure such as provision of piped water supply and improved sanitation system would raise demand for water in the domestic sector (Grey & Sadoff, 2007).

3 The Future Water Requirements for Different Sectors in India

3.1 The Assumptions

1. Improved economic conditions will encourage people to have better sanitation facilities, which would mean increased water requirement. It is expected that by the year 2025 itself, all Indian households both in rural and urban areas will have access to piped water supply in the dwelling premises, and all households will have access to improved toilets. Better access to water supply and sanitation means greater level of water use.
2. As regards domestic water use, we have begun our analysis assuming that rural areas would use around 100 lpcd of water and urban areas required 200 lpcd of water in the year 2040. In the case of urban areas, the figure of 200 lpcd is quite realistic considering the hot and arid or the hot and humid climate in which most large cities of India are located. However, considering the Ministry

of Jal Shakti's recommendation of 135 lpcd of water for urban areas, we have also considered this norm for estimation of urban water demand of 2040.

3. The actual industrial production figures were obtained from the report of the National Commission on Integrated Water Resources Development titled "Integrated Water Resources Development A Plan for Action" (GOI, 1999). They were later on verified and corrected on the basis of the data provided in the 9th plan document (GOI undated: 661). The per unit water consumption figures— as taken from the Report of the National Commission on Integrated Water Resources Development (Annexure 5.7: page 455)—were based on information available from Central Pollution Control Board (CPCB) and the Industrial Association of the particular sector of industry. Using both the figures, the industrial water consumption during 1997 was estimated for all 17 sub-sectors.

4. National Sample Survey data shows that during the period from 1987–88 to 1999–2000, the per capita aggregate fine cereal consumption declined from 135.5 to 135.5 kg in the rural sector and 115.6–114.6 kg in the urban sector (NSSO, 2001). The weighted average for the whole country was 148 kg per capita per annum (405 gram per day). The data from the 68th round of National Sample survey shows that during the period from 2004–05 to 2011–12, the per capita consumption of fine cereals went down from 126.73 to 123 kg in rural areas and 108.84–102.97 kg in urban areas (NSSO, 2015). However, the per capita food grain availability steadily increased from 166 kg during 1981 to 177.9 kg during 2017 (Source: Dept. of Agriculture, Cooperation & Farmer Welfare, 2017). The per capita availability of pulses in the recent years is on an average of 41.6 g per day in 2012 (Source: Dept. of Agriculture, Cooperation & Farmer Welfare, 2017) per capita consumption stood at a mere 28 g per day in 2011–12 (NSSO, 2015). Increasing population will increase the requirements for food grains that include fine cereals such as wheat and rice, course cereals and pulses. We have assumed a per capita food grain requirement of 500 g per day, with the fine cereals such as wheat and rice contributing 80% (i.e. 400 gm/day or 146 kg/year).

5. Though with rising per capita income and urbanization, the direct consumption of cereals has been found to decline over time (Source: based on NSSO, 2001 & 2015), the real demand for cereals will not decline due to the consumption pattern shifting towards meat and eggs, which require food grains for animal and poultry feed.

6. The key assumptions for estimating agricultural water requirement are: [1] The requirement of rice and wheat in the food consumption basket would become equal by the year 2010 (as considered by Kumar (2010)) and would continue till 2040. [2] The contribution of rain-fed paddy to the total paddy production would be 40% and that of rain-fed wheat be 0.0% by 2040. [3] The percentage contribution of groundwater and surface water to production of irrigated rice is assumed to become 25% and 75%, respectively. [4] The yield levels of wheat and rice for canal and groundwater irrigated areas were assumed as 3.0 t/ha & 3.2 t/ha and 2.70 t/ha & 3.0 t/ha respectively, figures considered by Kumar (2010) for water demand projections for the year 2025. Though there is remarkable

variation in yield of both wheat and paddy across the country—with highest yields obtained in north-western region (Punjab) to the lowest figures in Bihar (Aggarwal et al., 2008) average figures are used here to capture the aggregate situation at the country level. The yield level for sugarcane was taken as 80 t/ha in 2025. The yield of wheat and sugarcane was projected to increase at a rate of 2% per annum till 2040 and that of rice was projected to increase at a rate of 2.5% per annum till 2040 [5]. The total water supply requirement for irrigating one hectare of wheat is taken as 0.48 hectare-metre (ha m) and 0.80 ha m for groundwater and canal irrigated areas for the year 2010 in the water demand projections carried out by Kumar (2010). For rice, values taken are 1.2 ha m and 1.8 ha m, respectively, for the base year, with conveyance efficiency values of 100% and 55%, respectively, for groundwater and surface water. For sugarcane, the value is 2.18 ha m. Here, the physical efficiency of surface irrigation (including the farm efficiency) was taken as 55% including the field efficiency for the entire time frame and that for groundwater irrigation was assumed as 100% [6]. It is expected that there would be major investments coming up in the coming years for improving the efficiency of public irrigation systems, resulting in improved conveyance efficiency. It is assumed that by the year 2040, the conveyance efficiency in surface irrigation systems would rise to 80%. Though this intervention would reduce the water supply requirement at source remarkably, it will not result in real water saving, as most of the water lost in conveyance under inefficient conveyance practices is actually recycled back through wells for irrigation and other uses in the canal command areas (Perry, 2007; Perry & Steduto, 2017). [7] Water requirement for producing oil seeds, vegetables and other crops was assumed to be 20 % of the water required for producing cereals and sugarcane and treated as constant over time.

7. The industrial water requirement in India for the year 2010 was estimated to be 23.955 BCM, the figures estimated by Kumar (2010) in the water demand projections for 2000–2025. Industrial water requirements for future years were estimated by taking an per capita annual industrial growth rate of 3.5% and a per capita industrial water requirement of 18.86 m^3 estimated for the year 2010 (i.e., 23.955 X 10^9/population of 2010). It was further assumed that in 2040, the water intensity of manufacturing would reduce to 67% of the 2010 levels.

3.2 Water Requirement Projections

The national-level aggregate water requirements are estimated for projected future demographic and socio-economic scenario for the year 2040. It is well acknowledged that India is highly heterogenous country with wide variation in the physical environment and socio-economic profile of the people across regions, both having the potential to influence the demand for water in key water use sectors. For instance, the country's climate varies from cold and humid (in some pockets in the north-east) to hot and humid to hot and arid (western Rajasthan, south-western Punjab

and Kachchh). The socio-economic conditions also vary widely from highly urbanized regions with high level of industrialization in the western, north-western and southern parts of the country to very backward regions in the eastern parts. Both the above-mentioned attributes have enormous potential to influence the requirement of water in three key sectors.

As regards the influence of the physical environment on agriculture sector, it will be through its ability to alter crop yield and crop ET. For the same crop, water requirement for meeting evapotranspiration requirements would be very low in the cold and humid region and very high in the hot and arid region (Amarasinghe &Sharma, 2009), while it will be vice versa as far as yield is concerned. Finally, the demand for water to produce a kg of produce is decided by the water productivity that can be achieved in each region.

However, since the latter category of regions also have large amount of arable land, the aggregate demand for irrigation water would be much higher there, as most of the agricultural production will be from those regions (Amarasinghe et al., 2004). Water requirement for domestic and livestock uses also will be lowest in the cold and humid regions and highest in the hot and arid regions. As regards the influence of the second factor (i.e. socio-economic conditions), the per capita demand for water for domestic uses will be higher in the developed regions due to higher standard of living (with the adoption of improved sanitation systems, modern equipment for washing, etc.).

While estimating future water demands (supply requirement) in agriculture, the water productivity variations in crops due to climatic differences are reconciled with by taking average values of yield per unit of water applied, in the case of domestic use, such effects are not considered in view of the fact that its effect on the estimates of overall water demand will be insignificant.

As per the World Urbanization Prospectus of the United Nations Population Division, India's population is projected to grow to 1605 million people, with urban population accounting for 46% (744.38 million). The water requirement for various purposes such as drinking and domestic needs, livestock uses, industry and agricultural production are analysed separately. The basic assumptions involved in the analysis are: [1] population growth will increase the domestic water requirement; [2] population growth will also increase food grain requirement, meaning more area under irrigation and increased water requirements for irrigation; and [3] industrialization will increase the demand for water for production processes and indirect demand for pollution assimilation.

The domestic water demand will grow proportional to the population. The actual growth rate in domestic water demand would, however, depend on where the population actually grows, i.e. whether in the rural areas or urban areas, and how. The rise in domestic water demand induced by a growth in urban population would be higher than that created by the same growth in rural population, as the water requirement for the basic survival needs are higher in urban areas. Faster growth in urban population will impact demand for water positively. Also, per capita water demand will rise with increase in income levels. The available evidences indicate that water demand is highly elastic at low income and low water use levels and that elasticity

for domestic water will decline gradually as income and water use rise (Rosegrant et al., 1999).

We have begun our analysis based on the assumption that rural areas required 70 lpcd of water and urban areas required 150 lpcd of water in the year 2010. This is expected to grow at a rate equal to the per capita income levels till the total water requirement reaches 150 lpcd and 200 lpcd, respectively for rural areas and urban areas. Thereafter, it is expected to stabilize due to several interventions for improving water efficiency. These estimates suggest that the domestic water requirement would grow to 15.52 M. ha m in 2040. Another scenario was, however, considered in which the per capita urban water demand was assumed as 135 lpcd, in line with the current thinking in the government policy circles. As per this assumption, the total domestic water demand for rural and urban areas for 2040 was estimated to be 12.97 MCM.

The water requirement for livestock was estimated by taking the average of the estimated total water consumption by different types of livestock in two river basins of India (Luni in Rajasthan and Mahanadi in Chattisgarh) (5.08 m^3 per capita per annum), worked out in per capita terms for the basin populations and estimated for the projected future population of India. The total livestock water demand was thus estimated to be 0.815 M ham (i.e. $1605 \times 5.08/10000$).

The projections of industrial water requirement for the future years were made on the basis of the following: [1] actual industrial production figures in 17 identified sub-sectors of industries for the year 1997; [2] water requirement for unit production of industrial outputs for each of the 17 sub-sectors (Source: GOI, 1999); [3] an assumed per capita industrial growth rate of 3% per annum till the year 2040; and [4] an increase in water use efficiency of manufacturing to the tune of 50%, i.e. reduction in water intensity of industrial production by 33%. The industrial water requirement estimated for 2010 by Kumar (2010) was 2.395 M ham, with a per capita requirement of 18.86 m^3 (Kumar, 2010: Fig. 1, Chap. 2) with an annual growth of 3% in per capita industrial output and a 33% reduction in water intensity of manufacturing, the
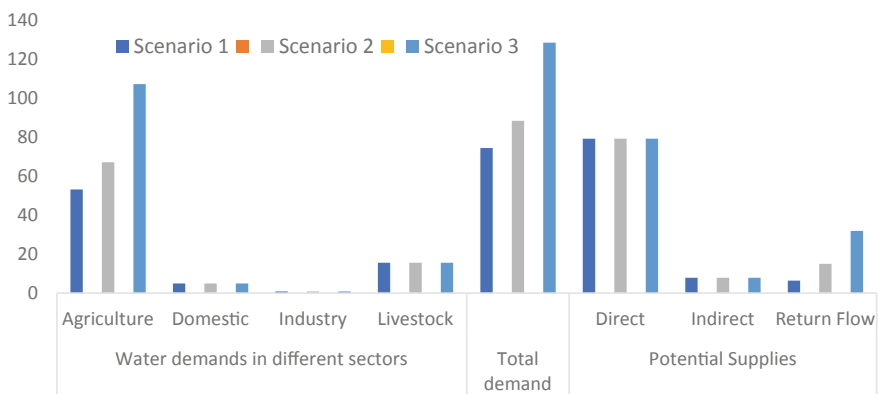
Fig. 1 Future water scenarios of India: 2040

industrial water demand in 2040 was estimated to be 4.92 M ham (i.e. 18.86 × (1.03) ^30 × 0.67).

Using the above assumptions, it is projected that by the year 2040, the food grain requirement of the country would grow to 307.6 m. ton. A substantial proportion has to be produced within the country to ensure food security. As stated above, wheat and rice constitute 80% of our diet and therefore ensuring sufficient production of wheat and rice would be the key to food security. Sugarcane is another crop which takes significant proportion of the water for irrigation. The consumption of sugar is around 21 kg per capita per annum in 2017–18 (source: USDA, 2018) from 13 kg in 1997), and we expect it to become 25 kg per capita per annum by the year 2025, and we assume that the consumption would stabilize thereafter. To meet this level of consumption, India needs to produce around 487 million ton, assuming that nearly 25% of the cane would go for jaggery making. The production of sugarcane stood at nearly 352 million ton from an area of 4.95 m. ha, with an average national-level yield of 71.1 ton/ha (MoAFW, 2017). The increase in production has to come from expansion in irrigated sugarcane and increase in crop yield.

Major share of irrigation water goes into the production of wheat, rice and sugarcane. The irrigation water requirements for these crops are estimated based on of the assumptions provided under point #7 of Sect. 3.1. As per the estimates, the total water requirement for producing 307.4 million ton of cereal (wheat, rice and pulses) and 486.5 m. ton of sugarcane in 2040 is 44.26 M. ham. Adding the water requirement for other agricultural produce such as oil seeds, fruits and vegetables, assumed on an ad-hoc basis, as 20% of the water requirement for major crops, the total water requirement in 2040 is estimated to be 53.11 M ham. Water requirement for rice production alone accounts for 42.4% of the total required for agricultural production. The high-irrigation water requirement for paddy production has serious implications for our ability to manage future water scarcity problems as the conventional water efficient irrigation devices do not work for this crop. Water requirements for wheat and sugarcane production were estimated to be 28.1% and 12.80%, respectively, of the total water requirement. It is to be emphasized here that most of this future demand for irrigation water will be affected in the water-scarce regions of the country which have vast areas of arable land lying un-irrigated (such as Telangana, Rayalaseema region of Andhra Pradesh, western Rajasthan, Madhya Pradesh, Tamil Nadu, Karnataka and Maharashtra) and not from the water-rich regions (comprising UP, Bihar, West Bengal and Assam) which already witness intensive crop cultivation (GOI, 1999; Kumar et al., 2012).

Our estimates show the total water requirement for human use, animals, industrial production and agricultural production to be 74.38 M. ham in the year 2040. A salient feature of the estimates is that domestic water requirements would constitute a significant portion of the total water supply requirements for various uses (20.8%). A major share of the future water requirement for domestic uses comes from urban areas–around 9.84 M ham. The large urban centres (metros with population above one million) constitute pockets of concentrated demand for large quantities of water. As seen by recent research, these demands will have to be met by exogenous sources, as these cities are mostly located in water-scarce regions of the country and

the local sources there (rivers and aquifers) cannot supply such large quantities of water (Mukherjee et al., 2010). This means that there would be increasing need for reallocating water meant for irrigation.

These estimates, however, do not factor in the indirect demand for water to clean the natural freshwater reserves, which are polluted and contaminated by industrial effluents and municipal waste. The water required for pollution assimilation and other environmental services could be much more than the consumptive water use by industries. Under a situation of reduced water consumption in urban areas, the total water requirement would drop to 71.81 M ham.

In the second scenario, we assumed that the irrigation (conveyance) efficiency would be only 65% (instead of 80% assumed in the first scenario), and that the storage loss of cereals would be around 15%. The total grain requirement was therefore estimated to be 332.9 m. ton. All other assumptions used for the first scenario were kept the same for this scenario as well. Under this scenario, the total irrigation water requirement went up significantly, to 67.12 M. Ham from 53.11 M. ham, an increase of around 26.3% from the base case scenario. However, under the second scenario, the water requirement for industrial and livestock sectors would remain the same as that of the first scenario. The total water requirement as per this scenario is 88.38 M. ham. Under the situation of reduced water requirement in urban areas (i.e. 135 lpcd), the total water requirement would drop to 85.81 M ham.

In a third scenario, we assumed that the irrigation conveyance efficiency would remain unchanged from the 2015 scenario (i.e. 55% as considered by Kumar, 2010), and there would be no increase in the yield of the three major crops, viz. wheat, paddy and sugarcane from that considered in the base scenario. Also, it was assumed that the storage loss of food grain would remain at 15%, with the result that the grain production requirement will be 332.9 m. ton as in scenario 2. With the lowest conveyance efficiency, under this scenario, the total agricultural water supply requirement shot up to 107.15 M. ham, from 53.11 M. ham under the most optimistic scenario, just double. The total water requirement under this scenario was estimated to be 128.41 M. ham. Under the situation of reduced water requirement in urban areas, the total water requirement would drop to 125.84 M ham.

The estimates of irrigation water requirements, with break up for paddy, wheat, sugarcane and cash crops under three different scenarios for 2040, are given in Table 1. The estimates of water requirements in the four sectors under the three scenarios discussed above are presented in Table 2.

Table 1 Projected water requirements in agriculture in M ham (2040) under three scenarios

S. No	Scenario #	Rice	Wheat	Sugarcane	Total food	Oil seeds	Grand total
1	1	22.51	14.93	6.81	44.26	8.85	53.11
2	2	29.16	18.42	8.36	55.93	11.19	67.12
3	3	48.52	27.42	13.26	89.20	17.86	107.15

Source Author's own estimates

Table 2 Projected future water requirements in four major sectors in M ham (2040) under three different scenarios

Scenario	Agriculture	Domestic	Industrial	Livestock	Total	Total (with reduced urban water consumption)
1	53.11	15.52	4.92	0.815	74.38	71.81
2	67.12	15.52	4.92	0.815	88.38	85.81
3	107.15	15.52	4.92	0.815	128.41	125.84

Source Author's own estimates

Researchers have tried to predict future water scenario of India and had come up with estimates of future water requirements in India using various methodologies (see Rosegrant et al., 1999; Seckler et al., 1998), the most recent being the estimates by David Seckler and others from the International Water Management Institute (IWMI), Colombo. The IWMI's estimates were part of the study carried out to assess global water scarcity using a demand-based approach. The estimates were for three major sectors, namely agriculture, domestic use and industry for the period from 1997 to 2025. The estimate of future agricultural water requirement assumed that the net irrigated area per capita would remain the same. With this assumption, the irrigation water requirement was estimated for two scenarios. The first "*business as usual*" scenario assumes the existing irrigation efficiencies would continue till 2025. The second scenario assumes that the country would achieve irrigation effectiveness of 70% of their gross irrigated area by the 2025. For domestic and industrial purposes, they have assumed a basic per capita requirement of 40 M^3 per annum throughout the projection period (Seckler et al., 1998). Therefore, the only driver of change they have assumed in their demand projections is the population growth. While in our projections, the drivers of change are population growth, growth in per capita income levels, growth in industrial production, the change in food consumption levels, irrigation efficiency improvements and reduction in food losses.

Kumar (2010) had projected India's future water demands for various competitive use sectors for the years, 2010, 2020 and 2025. As per the author's projections, the total water demand from four key sectors (viz. irrigation, domestic use, industrial use and livestock use) was 104.50 M ha. m. Of these, irrigation accounted for 81.1%; domestic use accounted for 8.89%; industrial sector accounted for 10.2%. The estimation considered a conveyance efficiency of 55% in surface irrigation systems and 100% in well irrigation systems. It also considered a per capita food grain requirement of 500 g per day and a grain storage loss of 15%.

Our projections, however, do not consider the water demand for meeting the environmental flows to maintain the ecosystem health. This emerging demand sector cannot be ignored, especially when we consider the fact that the income elasticity of environmental resources keeps increasing with increasing per capita income levels (Rosegrant et al., 1999). One should mention here that whereas in developed economies, the demand for water to meet the environmental flow requirements in streams, rivers and lake systems for protecting freshwater ecosystems has become a

priority in the recent decades (Pittock & Lankford, 2010), this is not the case in developing economies. In countries like India, the concerns of national food security and rural livelihood over-ride the ecosystem health concerns, and as a result, agriculture is in direct conflict with nature in many agriculturally prosperous regions.

The environmental flow requirements are not going to be uniform across the country's river basins. It depends on the natural flow regimes and the degree of alteration that had occurred to the same due to human interventions (Smakhtin & Anputhas, 2006; Smakhtin et al., 2004). In semi-arid and arid regions of the country, particularly in peninsular, western and north-western India, over-appropriation and over-allocation of stream flows in rivers to meet the increasing water needs for agriculture had resulted in drying up of stream channels in the lower reaches. Some of the examples are Sabarmati and Banas rivers in Gujarat, Cauvery River in Tamil Nadu, Krishna River in Andhra Pradesh and Indus River in Punjab (Kumar, 2010; Kumar, 2018a). Changes in land use with replacement of natural catchments by cropped land and increasing groundwater draft had also contributed to this (Wagner et al., 2013).

In sum, the water needs for ecosystem health are likely to be very high in the above-mentioned regions (Smakhtin & Anputhas, 2006; Smakhtin et al., 2004). A study by Smakhtin and others developed a water stress indicator for major river basins of the world based on degree of exploitation of water resources, and it shows that the river basins in the entire western, and most of peninsular and north-western India, and parts of central India are "over-exploited", while some pockets in peninsular and north-western India are heavily exploited (Smakhtin & others, 2004 as cited in UNDP, 2006: Map 4.1, pp. 140). It shows that the environmental flow requirements would be highest in peninsular India and western India.

This apart, many rivers in the south and western parts of the country increasingly face problems of heavy pollution from industrial and municipal effluents (CPCB, 2012). Though pollution of Ganges River had received enormous attention by politicians and policy makers alike in the recent years (see, Narain et al., 2018; Ramachandran, 2014), the problems are not very serious in the Ganges as its ecosystem has high carrying capacity. Additional water would be required to assimilate this pollution. This demand again is a function of economic growth and income levels. While in the initial stages of economic growth, the environmental pollution seems to be the price countries pay for growth at higher levels of economic growth, the investment to reduce pollution through environmental management technologies would go up, as demonstrated by the experience of European economies.

4 Balancing the Demands of Water in Different Sectors with Potential Future Water Supplies

Here we deal with four key sectors of water use that are competitive, viz. irrigation for crops; livestock water use; rural and urban domestic water use and industrial water

use. It must be stated that the projection of water supplies to meet future demands of water in these sectors for a country like India is an enormous task. The future water supply potential is dependent on three important factors: (1) the ultimate water resource utilization potential of our country; (2) the status of development of water resources as on today; (3) the historical growth trends in water development; and (4) constraints induced by poor arable land availability for irrigation expansion in regions with abundant groundwater and poor groundwater endowment in regions of high demand growth. But assessing the ultimate water resources potential (UWRP) is not easy as it would be decided by: (1) the advancements in water resource engineering, particularly hydraulic engineering, given the huge gap that exist between the total annual water resources and the currently estimated UWRP and (2) the changing societal value of water which determines the willingness of the government to invest in water resource development projects. Both are time dependent. The growing concerns about the social and environmental costs of water development projects and the emerging problems associated with water resource exploitation (Cosgrove & Loucks, 2015) were also considered while extrapolating the historical growth trends to arrive at the future levels of exploitation.

The Central Water Commission estimates the total renewable freshwater falling in the country's landmass to be 400 M ha-m, contributing a total annual runoff of 180 M ha-m. According to CWC, nearly 38% of this runoff (68.4 m. ham) could be harnessed by conventional technologies (GOI, 1999). Out of this, a total of 45 m. ham (450 BCM) of surface water is already utilized through various storage and diversion schemes in India, though the reservoir storage capacity in the country is a little less than 220 BCM. The recent estimates show that surface water potential of India is 153.36 M ham at 75% dependability, while the mean annual surface water resources is 193.36 M ham, excluding the contribution from Nepal and Bhutan (CWC, 2017). The average annual groundwater recharge is estimated to be 45 m ham. Considering the physical sustainability goals, utilizable groundwater is therefore 45 m ham. Of these, around 23.2 m. ham of groundwater resources are tapped annually through wells (GOI, 2017). Hence, out of the ultimate utilization potential of 113.4 m. ham of water, only 68.2 m. ham of water resources are currently developed.

That said, there is wide variation in water resource endowment of the country. A major share of the available surface water resources (around 55%) are in the Ganga Brahmaputra–Meghna River systems. The remaining 45% is in the Indian part of Indus, and in the river basins of central India, east India and South Indian peninsula (CWC, 2017). A large proportion of the renewable groundwater resources are also in the Indo-Gangetic alluvium and peninsular India and western India, mostly underlain by hard rocks, account for a small percentage (Bonsor et al., 2017; CGWB, 2014).

Though there has been a slowdown in the growth in surface irrigation potential witnessed during the 80s and 90s due to growing environmental concerns and lack of finance to complete the ongoing projects (Kumar, 2010), during the last decade, it has picked up with a renewed interest in completing the ongoing projects. Under the Accelerated Irrigation Benefits Programme (ABIP), the State Governments have been provided an amount of Rs. 585.037 billion as CLA/Grant under AIBP (MMI) since its inception till March 2016–17. After commencement of this Programme, 143

major/medium irrigation projects have been completed and 5 were foreclosed out of 297 projects taken up under the programme so far. The irrigation potential of 8.554 m. ha has been created through major/medium AIBP projects. During 2016–17, Central Assistance (CA) of Rs. 33.08 billion has been provided to various projects under AIBP. Further, 16 projects have been included in the scheme of National Projects (MoWR, RD & GR, 2017). The Sardar Sarovar Narmada project, which is to provide additional irrigation to the tune of 1.8 m ha, is the most striking example. Significant progress has been made in completing the project during the past 10–15 years, more importantly during the last four years (Jagadeesan & Kumar, 2015). Kaleshwaram mega-water lift project being built on Godavari River, which is targeted to irrigate 1.54 m in the newly formed state of Telangana and supply drinking water to the city of Hyderabad, is the most recent example (Rishi Kumar, 2019).

Three factors are considered for assessing the future growth trends in groundwater utilization potential. First in areas where groundwater resources are abundant such as the Indo-Gangetic plains (Bonsor et al., 2017), the growth would continue to below. The reason is that there is no scope for intensifying irrigation in western parts of IGP where irrigation has already reached a stage of saturation (Kumar et al., 2008). Whereas in eastern parts, high rates of poverty in rural areas and the poor availability of additional land which can be brought under irrigation owing to ecological factors would limit growth in well irrigation (Kumar et al., 2012). Second are the arid and semi-arid regions such as western India, north-western India and peninsular India, which are facing problems of over-development. The over-exploited and "dark" blocks are unlikely to contribute to future growth in well irrigation (GOI, 2017). Third: the increasing number of legislations and regulations on the use of groundwater will have some impact on its future withdrawal (Kumar, 2010).

Therefore, we do not expect any direct growth in groundwater irrigation in the coming decades using the natural recharge available in different regions. The only possibility is in the induced development of groundwater using the augmented recharge resulting from surface water transport to the semi-arid regions. Considering these factors, it is assumed that the surface water utilization potential would grow to 82% of the ultimate potential by the year 2040, with the annual growth rate pitched at 0.5 m. ham (5 BCM per annum) for 22 years. In sum, a total water utilization potential of 79.2 m. ham ($45 + 22 \times 0.5$ m. ham of surface water + 23.20 m. ham of groundwater) is expected. The additional surface water transferred for irrigation would result in augmentation of groundwater in peninsular and western India, through irrigation return flows. Since the amount of recharge from imported water in canal commands depends on the type of crops irrigated, quantification of this component of hydrology is not attempted. Irrigation return flows will be very high for paddy fields that can be watered by gravity systems (Ahmad et al., 2004; Singh, 2005). Though this water would actually add to the groundwater resource base in the water-scarce regions, we assume that it would help recover the water table and improve the sustainability of well irrigation in those regions rather than adding to the water supply potential.

Going by the current thrust by governments to improve the environmental conditions of urban areas, we anticipate that wastewater generated from the drinking water

Table 3 Project future water supply and demand balance (2040) under three different scenarios

Scenario	Total water supply requirement (M ham)	Total water supply from surface and groundwater systems (M ham)	Total water available from canal seepage (M ham)	Total effective water supplies (M ham)
1	74.38	87.10	6.395	93.495
2	88.38	87.10	15.01	102.110
3	128.41	87.10	31.85	118.950

Source Author's own estimates

supplied to cities and towns during the year 2040 would be treated and supplied back to agriculture, and the farming communities would be willing to pay a premium for this treated water given the great economic opportunities available through high value agriculture (Amerasinghe et al., 2013; Kumar, 2018b). If the cities are situated in regions that are facing extreme water scarcity, it is quite likely that most of this water would be recycled back to augment urban water supplies by 2040. If all urban water demands are met from the available supplies, the total amount of wastewater available from cities/towns for treatment and reuse would be around 7.87 m. ham (80% of the 9.84 m. ham of water). Hence, against the future water requirement, the total effective utilizable supplies would be 87.1 m. ham. In addition to this, under all the three future demand scenarios, there would be canal seepage, contributing to groundwater recharge. They were estimated as 6.395 M. ham under scenario 1, 15.01 M. ham under scenario 2 and 31.85 M. ham under scenario 3, respectively. As is evident from the figures, the resource availability through canal seepage will be highest under the low conveyance efficiency scenario (i.e. scenario 3).

The overall water supply–demand balance under the three scenarios is presented in Table 3. It is seen that in the first two scenarios, the available supplies would be able to adequately meet the water requirements and only in the case of third scenario, there is a supply deficit, i.e. to the tune of around 9.45 M ham. However, this is the most unlikely of the three scenarios, because this scenario assumes that there will be no growth in crop yields. Such a situation of yield stagnation is very unlikely. With growing economic power, the country is likely to witness greater investments in agricultural research, particularly when we consider the fact that the direct economic, social and environmental costs of building new water projects to augment the supplies are likely to be prohibitively high.

5 Technology, Governance and Environment

While we make efforts to meet the emerging water challenges through investments in augmenting the surface water supplies and managing the demand for water in various sectors, the improved water security achieved therein would drive development (Grey & Sadoff, 2007) and economic growth (Barbier, 2004; Grey & Sadoff, 2007).

The changes in economic conditions are likely to drive changes in the technology adoption in the water sector, governance of water and overall water environment (World Economic Forum, 2018).

Among the various governance challenges in the water sector, the challenge in dealing with transboundary water issues are greatest. Transboundary rivers are common features of today's hydrologic and political landscape. Within different regions/provinces that share a river, it is vastly beneficial to come to an agreement on how to share the water in times of stress before that stress occurs rather than to work out such agreements during times of stress (Cosgrove & Loucks, 2015). Foreseeing the large economic and social benefits that water development can produce, the Indian states are likely to witness greater cooperation for sharing of water from the inter-state river basins and renewed interest in the transfer of water from water surplus states to water-scarce states The plan to set up a permanent tribunal through the passing of an Inter-state Water Disputes Amendment Bill (2019) for adjudicating on water disputes is one such step on the governance front. Another such step is the initiative of the Union Water Resource Ministry to get certain water surplus states to agree on water transfer proposals, conceptualized under the National River Linking Plan, and the plans to enact a new national law on water that would bring water in the Union list. Unlike in the past, in India, the same political party is in power since 2014 at the centre and several provinces. Under such circumstances, the said initiative of the centre is likely to bear fruit.

Similarly, while the cost of building new irrigation schemes is likely to be high (in terms of cost per ha of land brought under irrigation and the resource cost), with improving economic conditions of the farmers who benefit from the services that are provided, even expensive water would increasingly become affordable. The gradual shift in cropping pattern towards high-value crops, including fruits, vegetables and dairying in the recent years resulting in an impressive growth in agricultural GDP (Rada, 2013), increased the economic value of water in agriculture. This combined with the need for improving the quality of irrigation would result in greater willingness on the part of irrigation bureaucracies to invest in improving the technical efficiency of irrigation systems so as to manage irrigating larger area with lesser amount of water as their revenue from collection of water charges increase. Such investments will also become necessary to justify the huge investment in building the basic infrastructure for irrigation such as reservoirs and water distribution systems. In such cases, there would be greater investments to improve conveyance efficiency with the use of underground pipelines for water delivery instead of open channels. The states of Karnataka, Rajasthan and Gujarat are already making large capital investments for installing underground pipelines for water conveyance and micro irrigation systems for water application on the farms in the some of their irrigation commands to improve the technical efficiency of water use.

Needless to say, the increasing scarcity value of water and the ever-increasing demand for the same from industry and urban domestic sector would demand greater accountability from irrigation bureaucracies, thereby forcing them to constantly improve their operating efficiency to reduce the amount of water they divert from the river basins for agricultural uses. New institutions are likely to emerge in the

water sector for allocating water from river basins and for resolving conflicts, as competition between various water use sectors increase over water use (Grey & Sadoff, 2007). The setting of a Water Resources Regulatory Authority by the state government of Maharashtra in 2006 for managing inter-sectoral water allocation and regulating water withdrawals by each of the large-water consuming sectors under the Maharashtra Water Resources Regulatory Authority Act-2005 (https://mwrra. org/wp-content/uploads/2018/07/MWRRA-Act-Regulatory-English.pdf) is just one example.

As the demand for fruits and vegetables increase in the market and farmers start growing such high value crops (MoAFW, 2017), that are generally water-sensitive, the future demand would be for high quality irrigation. As marginal returns are likely to be high, farmers would be willing to pay high price for this water. As a result, the irrigation bureaucracies are likely to promote adoption of water storage systems that control water delivery in the field, and precision irrigation systems to improve water use efficiency among farmers in the irrigation commands, through capital subsidies. However, real improvements in water use efficiency through introduction of such precision irrigation systems would be affected for distantly spaced crops in arid regions with deep water table conditions (Kumar & van Dam, 2013),

On the other hand, increasing per capita income and the consequent growing demand for environmental management services would force water bureaucracies to free increasing proportion of the renewable water earlier appropriated by them from rivers for irrigation and municipal water supply for ecological needs. Out of the 30 world river basins identified as a global priority for the protection of aquatic biodiversity (Groombridge & Jenkins, 1998), nine are in India and attract immense attention due to their extensive and continuing development. These basins are the Cauvery, Ganges–Brahmaputra, Godavari, Indus, Krishna, Mahanadi, Narmada, Pennar and Tapi. Except for the Ganges–Brahmaputra, all these basins have also been categorized as "strongly affected" by flow fragmentation and regulation (Nilsson et al., 2005). With greater willingness among the urban dwellers to pay for clean environment and water for recreation, and the increasing scope for reuse of treated wastewater in agriculture and investment cost recovery (WWDR, 2017), greater investments are likely to be witnessed for environmental management technologies (such as wastewater treatment systems) in the urban areas that would clean up the lakes and rivers, reduce the demand for freshwater to meet irrigation needs and recover nutrients and energy from the wastewater. This will be complemented by emergence of new water quality regulations or (pollution) tax for control of water pollution. Simultaneous changes are likely to be witnessed in the institutional environment governing water use in Indian cities. Since the cost of importing water would be high, the urban water utilities will be encouraged to invest in technologies to reduce system losses, thereby reducing the cost of water supply. On the other hand, consistent improvement in the economic conditions of urban dwellers would increase the ability of utilities to start metering all water connections and price water at levels that reflect the scarcity value of the resource. Such prices will induce efficient use of water, thereby reducing the overall demand.

6   Concluding Remarks

The estimates of water requirement and supplies for the year 2040 presented in this paper for three different scenarios are first-cut estimates and have several limitations. *First* they do not consider the recent economic boom in the country and its impact on water conservation. In the recent past, many water-scarce areas of Indian countryside had experienced a boom in adoption of micro-irrigation systems with institutional financing and new subsidy structures. For instance, area under drip irrigation had increased from 3,67,000 ha in 2000–01 to 3.30 m. ha in 2015–16 (Moin & Kamil, 2018). *Second*: Indian agriculture is also becoming export oriented and is getting slowly diversified into horticulture, vegetables, floriculture and fisheries (MoAFW, 2017; Rada, 2013). This would also mean that the farmers' preference for traditional cereals and pulses would decline, at least in agriculturally prosperous regions, if they increasingly experience physical scarcity of water. This can reduce the water requirements for generating the same amount of agricultural wealth. *Third*, in the analysis, we have not considered the increased water demand due to changing food habits, other than that which is caused due to changing composition of grain intake. With increasing preference for meat and milk-based food products, an impact of economic growth and rising income levels, the overall water requirement would go up, even if we assume that the calorie intake would remain almost the same. This is because the water requirement per unit calorie intake would be much higher for meat and milk-based food products than cereals and vegetables (Alexandratos & Bruinsma, 2012; Mekonnen & Hoekstra, 2012). For instance, water footprint for kilo calorie of chicken meat is 3 L and that for bovine meat is 10.2 L, while that for cereals is around 0.5 L (Mekonnen & Hoekstra, 2012). However, we have not considered any major change in food habits in our assessment of grain requirements, and resultant water requirement.

Nevertheless, from a practical perspective, the two assumptions made by us, i.e. about food self-sufficiency (that cereal demand for direct consumption will have to be met from production inside the country), and about food consumption pattern, will not induce much error in estimation of water demand. This is because: [1] there would be an increase in demand for cereals as cattle feed and poultry feed, which could even offset the reduced demand for cereals for direct consumption; and, [2] the growth in aggregate demand might force country to import feeds to meet the grain deficit.

Our estimates suggest that if we are able to keep pace with the ongoing economic development in the country with rapid public investments in water resources development and agricultural research, we will be able to meet the water and food demands of 2040, even with low levels of improvement in efficiency of water conveyance, and with high degree of loss of food grains. The estimated future water demands under the first two scenarios are much less than the estimates currently available from various sources (see for instance, GOI, 1999). Therefore, future investments in agricultural research to develop varieties that produce high yields without increasing consumptive water requirement, and that are flood, drought and salt resistant through

plant genetics would yield high social, economic and environmental returns (Kijne, 2001). This is extremely important for regions where the yield potential is not realized for major crops, due to agro ecological reasons. For instance, while genetic yield potential of paddy and wheat is realized in Punjab and Haryana in the farmers' fields, in large paddy-growing areas of Bihar, the average yield obtained is very low with a very high yield gap due to ecological factors, mainly floods, waterlogging and salinity and poor incidence of solar energy (Pathak et al., 2003).

But we should also reckon with the fact that conveyance efficiency improvements in irrigation will have adverse 'third-party effect'. Higher levels of efficiency in conveyance systems of irrigation schemes mean less amount of water available in shallow aquifers from canal seepage, etc. that can be effectively recycled to meet local water needs using wells and pump sets (Perry, 2007). Hence, such interventions can adversely affect the well-owning farmers who depend on this water. However, this is hardly recognized by India's water planners as is evident from the great emphasis given to improvement in engineering efficiency of irrigation schemes (see, GoI, 2013). Further, though such measures would help defer investments for building more surface storages in near future, they would ultimately reduce the effective water availability for meeting the local water needs by drying up underground sources and drainage channels.

Hence, priority should be on research on plant genetics to develop varieties that transpire less water while producing same or more yield (Kijne, 2001). On the other hand, augmented supplies of water to meet the growing needs of cities would add to the quantum of wastewater generated (Kumar, 2018b). If treated, this can add to the country's overall water balance, meeting the irrigation water demands in the periurban areas. With increasing application of economic and business models by integrating the considerations of reuse of treated water, and resource (energy and nutrient) recovery with public health concerns in investment decision making (WWDR, 2017), large-scale investments are likely to come up in the wastewater treatment sector.

Overall, consistent improvement in the water situation through measures for improving water supplies and managing water demand will create favourable conditions for faster economic growth in the country. The same growth will demand better technologies of water use and improved governance mechanisms to further improve efficiency of water use on the one hand and better environmental conditions on the other.

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Agriculture

The Viability Crisis and Institutional Challenges Before Indian Agriculture

M. V. Nadkarni

1 Introduction

This article draws to some extent from the author's earlier article, 'Crisis in Indian Agriculture—Can it be Overcome?' published in the Economic and Political Weekly, 53(17), 28 April 2018, pp. 28–34.

I had the privilege of knowing Professor Radhakrishna almost since the beginning of his outstanding career, at the Dr B. R. Ambedkar Marathwada University at Aurangabad in Maharashtra since 1970, where both of us were teachers. He struck his colleagues and students there as an extraordinarily brilliant teacher, engaging conversationalist, and what is more, a very friendly, lively, helpful and gentle human being. He was a very popular teacher there. We became attached to each other in no time. He later left for Ahmedabad to join the Sardar Patel Institute of Economics and Social Research on a higher position, and wanted me too to come there. However, I chose to come to Bengaluru in my home state. Our contacts and friendship continued in spite of this geographical distancing. I still feel nostalgic about those happy days of our being together in the University at Aurangabad.

Since those days at Aurangabad, Prof. Radhakrishna has emerged as a great giant among economists, and even among social scientists. He has established his reputation as an outstanding researcher at the very top rung and as an institution builder and academic administrator. He is widely loved and admired both by fellow social scientists and a huge number of students and young economists whom he mentored. It is a pleasant privilege and honour to pay my tribute to him through an article in this festschrift.

Prof. Radhakrishna's work has covered many areas of applied economics especially related to India. Whatever he has dealt with, he has embellished both through width of vision and depth of analysis. Apart from econometrics of consumer

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behaviour and macroeconomic issues like economic growth and inflation, he has also analysed problems of poverty, food security, employment and agricultural development—issues of life and wellbeing. In this, we shared a common interest, especially in agricultural economics. His Presidential Address at the 79th Annual Conference of the Indian Society of Agricultural Economics in 2019 is a typical example of his vast scholarship, wealth of insights, and valuable policy recommendations. I need not summarise it here, but will refer to some of his incisive observations relevant to the discussion here as I go along.

2 Focus Needed on the Farmer, not Merely on Farming

Agriculture anywhere has two aspects—land and man, or farm and farmer. Both are equally important, though policy makers and agricultural experts often take the former—land or the farm as more important. Increasing the productivity of land and water is important, but it is only instrumental in improving the welfare of the farmer and his family, and of course the welfare of the whole population. Moreover, productivity can be hardly improved if the human dimension is ignored. The welfare of people at large also cannot be brought about by neglecting the farmer. The Government of India has now officially recognised the equal importance of the agricultural producer as against production, by renaming the Ministry of Food & Agriculture as the Ministry of Agriculture and Farmers' Welfare. When we speak of the farmer, however, the hired agricultural labourer is also included for he or she is also a producer in own right. But if the farmer himself is in penury, how can we expect him to pay a fair wage for labour? A crisis in agriculture affects all those who depend on it for livelihood. And that is a substantial part of the national population in India.

A concern for the farmers and their welfare needs to take care of the institutional environment in agriculture, which is relevant both in increasing production and incomes of farmers. Right since Independence, the Indian state both at the centre and states, have shown awareness of the institutional issues, though as usual with India, this awareness has not necessarily been translated into adequate implementation. But there were sustained attempts—though often half-serious, at improving the incentives, institutions and infrastructure in agriculture so that both agriculture and the agriculturist can thrive. These attempts covered land reforms, strengthening credit and marketing institutions, and improving irrigation, rural roads and so on. It is not the intention of this paper to make a review of all these attempts, but to point out and emphasise the still growing weakness in the very structure of agriculture and what challenges we face as a result.

3   The Worsening Viability

The main contention of this paper is that Indian agriculture is growing in its structural weakness resulting in non-viability for a bulk of its farmers and of farm land. This is happening because of the fast declining number of viable holdings and the falling proportion of land operated by them. By a viable holding, we mean that the holding should be of the size which leaves a net income after covering the cost of production which is enough to maintain the family in reasonable comfort, and leave a saving which can meet the needs of current inputs and investment necessary for the next agricultural season, and repay loans with interest. It is necessary to clarify that a mere positive rate of profit is not viability, though it is needed for viability. Viability is a question of the absolute size for a family and is at a higher level than mere profitability. A vendor of vegetables on a cart may recover his expenses and make a small profit by the end of a day, but that may not be enough to feed his family adequately and keep it in reasonable comfort. Actually even 2 ha, that is, 5 acres, may not be enough for this purpose particularly if there is no irrigation for the holding. But we may assume 2 ha only as a rough measure of *minimum* viability. It is necessary to emphasise that the viability line for holdings or farm families would be different from and much higher than the poverty line. Unfortunately, there seems to be no information about the incidence of poverty in different size-classes of agricultural holdings, but we can safely guess that it would be highest among the non-viable holdings. The negative correlation of the incidence of poverty with the size of holding would emerge stronger particularly if the holding sizes are standardised for irrigation and soil fertility differences.

Though the Green Revolution in Indian agriculture made the country self-sufficient and also contributed to increasing farmers' incomes on the whole, it also made agriculture capital—and technology intensive. This made the farmers much more market-dependent even for inputs, as never before. Theoretically, the Green Revolution was claimed to be size-neutral because HYV seeds and fertilisers could be divided into small doses and even small holdings could adopt the new technology. In practice, however, small and marginal farmers were handicapped because of institutional weaknesses. Often the small farmers were, at least partially if not fully, had leased-in land which did not have any written record. Such farmers could not get adequate credit to purchase their inputs. Even otherwise, small farmers could not enjoy the same access to credit and marketing facilities as the large farmers. Unfortunately, however, the demographic forces have been driving down the average size of holdings below viable levels. More crucial than the demographic pressure, the root cause of the growing size of the non-viable part of agriculture is the failure of non-agricultural sectors in generating employment, adequately enough to absorb the excess population dependent on agriculture.

This is evident from the continuously falling share of agriculture in the National Gross Value Added at a much faster rate than the proportion of workforce in agriculture—a fact which has been pointed out by several economists since the 1980s. Prof

Table 1 Weakening structure of Indian agriculture

	1970–71	1990–91	2010–11	2015–16
Proportion (%) of operational holdings with 2 ha or less	69.90	78.28	85.01	86.07
Proportion (%) of area operated by holdings with 2 ha or less	33.88	53.72	71.15	74.07
Proportion (%) of operational holdings with more than 2 ha	31.10	21.72	14.99	13.93
Proportion (%) of area operated by holdings with more than 2 ha	66.12	46.28	28.85	25.93
Average size holdings with 2 ha or less (hectares)	0.68	0.64	0.60	0.59
Average size of holdings with more than 2 ha (hectares)	6.00	4.83	4.26	4.11
Average size of all holdings together (hectares)	2.28	1.55	1.15	1.08
Total number of operational holdings (million)	71.01	106.64	138.35	146.45
Total area operated by all holdings (million)	162.18	165.51	159.44	157.82

Source: Census of Agricultural Holdings 2015–16, All India Report, Ministry of Agriculture & Farmers' Welfare, Gov. of India, 2019

Radhakrishna has shown that the phenomenon is still operating, resulting in significant decline in relative incomes of agricultural workers. Thus, the share of agriculture in the total gross value added declined from 56.7% in 1960–61, to 49.6% in 1970–71, 35.1% in 1990–91, and steeply down to 18.3% in 2010–11. During the same years, the share of agricultural workforce in total workforce declined from 72.4%, to 70.1%, to 67.0% and to 54.6%, respectively (Radhakrishna, 2019: 14). What is noteworthy is that it is not a question merely of decline in relative per worker income in agriculture, but more worryingly one of the increasing non-viability of farms which is a direct result of the phenomenon. The extent of increasing non-viability over the last few decades can be viewed from Table 1.

We can see from Table 1 that the average size of operational holdings has continuously declined in India from 2.28 hectares in 1970–71, 1.55 hectares in 1990–91, to 1.33 hectares in 2000–01 and further down to only 1.08 hectares in 2010–11. If we roughly take a viable holding as 2 hectares, then the average holding in agriculture ceased to be viable by mid- 1970s.

As can be expected, not only is the average size of holding fast declining, the proportion of holdings below the viability size, assumed here to be 2 hectares, and the proportion of area covered by such holdings have also been fast increasing. This means that more and more farmers, and greater and greater parts of agriculture are becoming non-viable. Thus, while in 1970–71, 70% of holdings were small with 2 hectares or below, their proportion increased to 85% in 2010–11 and further to 86.1% in 2015–16. Similarly, while these small and marginal holdings had under them only 34% of total cultivated area in 1970–71 and their share increased to 74%

in 2015–16. In Indian agriculture, its non-viable part is rapidly increasing and is becoming uneconomical.

4   Implications of the Situation

It is necessary to appreciate the implications of this situation. Increasing productivity requires more of both working capital and fixed capital, which the non-viable holdings cannot easily raise. Moreover, when the holding size is given and small, there is a limit up to which you can raise net incomes. Of course, by raising productivity and high-value crops, the incomes can be raised, but when the holding itself is given and small, there is a limit for it and it is hard to raise the limit much. This is in short the basic structural weakness of Indian agriculture. All attempts to raise productivity and high-value crops run against this basic constraint of a non-viable holdings. And unless a revolutionary structural transformation takes place, the curse of non-viability will continue to haunt Indian agriculture, which can affect the prospects of future growth. When such a huge part of an economic sector is uneconomical, it has an immensely sensitive human dimension. Massive poverty is inherent in such a situation. The main reason for persistence of poverty in India is to be sought in this crisis in agriculture. Non-viability also means that agriculture will have to depend continuously on government support. Growing tensions between the farmers and the government are inbuilt in such a situation, because a huge part of population is dependent on agriculture and forever craving for support. The large incidence of suicides by farmers is basically a symptom of this deep malady affecting Indian agriculture.

The crisis in Indian agriculture is not one of decline or stagnation in productivity, nor one of adverse terms of trade any more, though particular crops or states concerned may need remedial attention. There is no general crisis of profitability as such (See Nadkarni, 2017 for details). A crop grown on a tiny farm, even if highly profitable in terms of rate of return over cost, may not make the farm viable in itself if the total absolute profit is not enough to take the family above the poverty level. The crisis is structural in nature and quite basic. It is a crisis of viability itself arising from non-viable size of holdings themselves. And this crisis has been aggravating over the decades, instead of being reversed. Though the crisis of viability is not a crisis of profitability per se, it is certainly not good for private capital formation in agriculture, and its long term profitability. What profitability we may find today is not sustainable in the long run, under agriculture which is increasingly non-viable.

An important implication of non-viability is its vulnerability to crises. A sufficiently viable holding should be able to earn a surplus not only over its needs of consumption for the family and current inputs in agriculture, but also save something to meet any exigencies like a crash in production due either to droughts or pest attacks, and also to meet the needs of investment. Climate change which is already occurring has on the whole a negative impact on agriculture, and is increasing the vulnerability of agriculture. A non-viable farmer is particularly vulnerable to this crises. The structural weakness of Indian agriculture makes it unprepared to tackle

climate change and to remain resilient. Struck by a drought, a non-viable farmer tends to sell productive assets like bullocks because he cannot get loans for meeting consumption needs in a drought, and even if a normal year returns, he would still be unable to cultivate due to the loss productive assets. Moreover, even if a farmer takes a loan for meeting investment needs, he should earn enough surplus over current costs and consumption to return the loan and pay interest by instalments at least. Non-viable farmers sometimes cannot do that, either because the holding was not viable enough to make the investment paying, or because of crop loss, or because of a post-harvest crash in the prices. When he cannot return a loan, he loses face, cannot get further loans and thinks of an escapist solution in the form of suicide, with the hope that even if he dies, his family may get some relief or compensation from the government. Increasing dependence on the government to tide over crises is a sure sign of increasing non-viability and vulnerability.

The marginal and small farmers in traditional agriculture could survive because they had common lands where they could graze their animals and extract a good deal of their bio-mass needs both for the farm and the home. These common lands have greatly declined in size and number now, and have become non-existent or at least insignificant in most places, which had earlier informally subsidised these farmers and made them viable. On their own holdings also, farmers, particularly with larger holdings, used to grow trees suitable for leaf manure and fodder. Now with increased pressure on land resulting in subdivision of holdings, every inch of land tends to be used for crop cultivation with reduction in the space meant for trees. There is pressure on fallowing too. Regular rotational or seasonal fallowing was practised by farmers earlier in order to enable the soils to replenish their fertility. Now it tends to be more of a forced nature following droughts, rather than voluntary. Considerations of sustainability are sacrificed on the whole now, making agriculture more vulnerable to climate change. Thus, the structural weakness of agriculture affects not only its viability, but also its sustainability. The foundation of Indian agriculture thus is not strong enough to sustain human wellbeing and makes it vulnerable to frequent humanitarian crises.

The structural weakness of Indian agriculture, affecting the viability of cultivation, is also leading to neglect of the health of land. It is estimated that about 96.4 million hectares of India's land area, which constitutes 29.3% of total land mass of the country was degraded during 2011–13 period. What is further disturbing, the trend of degradation is in the direction of increase rather than decrease, for, during a previous period for which a comparable estimate is available, viz. 2003–05, the extent of degraded area was 94.5 million hectares (Chaudhury & Roy, 2016). Thus in less than a decade, nearly 2 million hectares more of the precious land have been lost to degradation or desertification. This has added to the structural crisis in agriculture since effective or usable land per cultivator has been further reduced.

To add to these woes of farmers, there are attempts now to dilute a hard-won legislation passed by the Parliament to safeguard the rights of farmers in land acquisition. The historic pro-farmer Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act of 2013 was tried to be diluted by the Central Government through an amendment in 2015 to more easily transfer land

from agriculture to industries at the cost of farmers. When the attempt failed, the central government encouraged the states to pass their own laws of land acquisition. It is reported that some states like Tamil Nadu, Gujarat and Telangana have already moved in the matter to pass laws or amendments which do not require the safeguards of the 2013 Act (Ramesh & Khan, 2016). The 2013 Act not only requires fair compensation, rehabilitation and resettlement of farmers whose lands were to be acquired, it also calls for a proper social impact assessment of the project which involves land acquisition. This has been supposed to be an obstruction in making India business or investor-friendly and in accelerating economic growth. There may be a case for transferring some land, particularly if degraded, for non-agricultural use. But this cannot be done arbitrarily without safeguards to farmers. The 2013 Act does not ban the transfer of land from agriculture to non-agricultural sectors, but only imposes safeguards for protecting farmer rights so that they do not become destitute. A further loss of land to agriculture without reducing dependence on employment in agriculture would only further reduce the size of holdings and the viability of agriculture.

5 Towards a Solution

What caused this situation to arise in the first instance? Though apparently, the demographic pressures on the limited cultivated area come to our mind as the cause, it would be a mere arithmetic truism to blame increasing population for this. In the course of economic growth of countries, a transfer of increasing parts of agricultural population takes place being employed more and more in non-agricultural sectors. In an article first published as early as in 1966, Professor V M Dandekar had warned: 'The problem of Indian agriculture is the disproportionately large burden of population which it has to bear and which causes net capital consumption rather than capital creation in agriculture. Hence, to transform traditional subsistence agriculture into commercially viable agriculture, the surplus population must be withdrawn from agriculture, that is, from current operations of cultivation, and conditions must be created whereby capital from outside agriculture may flow into agriculture' (Dandekar, 1966, republished in 1994: 29). But how can the surplus population from agriculture be absorbed into other sectors? Only if the economic growth in other sectors is not only significant but also employment creating, not labour displacing. Unfortunately, the kind of economic growth that is taking place in non-agricultural sectors has not done the job of labour absorption well enough, because its motto is: economise on labour.

The solution to this problem does not lie within agriculture alone. The non-agricultural sectors both in urban and rural areas have to generate many jobs enough to absorb surplus population in agriculture. Gandhi had proposed a decentralised process of economic growth which depends on many cottage and small-scale industries scattered all over India both in rural and semi-urban areas. Unfortunately, the path of economic growth chosen rested mainly on large and heavy industries. Though

service industry developed later, it could not absorb much of rural workforce. The attention is more on maximising income growth rather than employment. Between 2000 and 2010, India's National Output grew at an unprecedented rate of 7.7% per annum, but employment grew only by a mere 0.3% per annum (Joshi, 2016, 60). Such jobless growth has only increased the dependence on agriculture and aggravated its unviability. But there is an alternative. Small-scale agro-processing units have a great growth potential and they can be encouraged all over the country. This can also address the problem of seasonal gluts in production, apart from providing non-farm rural or semi-urban employment. There is a challenge with marketing institutions at present, since any seasonal glut induces a crash in prices received by farmers particularly in perishable fruits and vegetables. Agro-processing industries should be able to take care of such gluts. Farmers themselves should take a lead in starting such industries. However, there is a need for quality assurance for consumers, and institutions have to be developed to cover the whole country to develop appropriate technologies, teach, these technologies, assure quality and help in marketing the products of these industries. Such enterprises can promote technical skills and entrepreneurship in rural areas.

In a cross-sectional comparative study of 15 villages in drought-prone areas, with five each respectively from Ananatpur district in Andhra Pradesh, Bijapur district from Karnataka, and Coimbatore district in Tamil Nadu, some of them irrigated, some diversified through animal husbandry development, and some with rural industry, I had tried to probe which strategy of rural development is more effective in reducing poverty (Nadkarni, 1985). It was found that even more than irrigation and animal husbandry, rural industry was more effective. Prof Radhakrishna seems to support this view when he says that self-employed rural households engaged in non-agricultural activities experienced the highest rate of poverty reduction between 1993–94 and 2011–12 (Radhakrishna, 2019: 20). It does not of course mean that we may give up irrigation and animal husbandry development, but only that we need to realise the rich potential of rural industries. It is heartening that non-agricultural employment has been increasing in importance already, as Radhakrishna has pointed out. He says that while in 1983, only 19% of rural workers were engaged in non-agricultural activities, this proportion rose to 36% in 2010–11 (ibid: 15). This trend needs to accelerate to have an impact on easing the viability problem.

Unfortunately, most of the educational institutions in rural and semi-urban areas do not provide the necessary skills and motivation for entrepreneurship to the agricultural workers. Farmers are not involved in monitoring the educational institutions and improving their quality. Even though the Village Panchayats have the powers to monitor and ensure the quality of rural schools, leaders are more busy with petty politics and rivalries than with the future of children. A community feeling to improve the rural welfare in all aspects through cooperative efforts is missing in many villages, though the rural areas have a better potential for it than urban areas. The rural and semi-urban schools crave for improvement including efforts to monitor regular and sincere teaching by teachers. The quality of education particularly in vernacular medium schools is so poor that many students who are in the 7th Grade are unable to make simple arithmetic calculations, write a few sentences of their own, and read and

understand a textbook of even a lower grade properly. Thus, many children of farmers and agricultural labourers are unable to get employment opportunities outside agriculture and reduce the pressure on agriculture. Gandhi had proposed that apart from providing routine reading, writing and mathematical skills and general knowledge, schools should also promote skills in handicrafts and even stimulate entrepreneurial and management skills to start and run rural industries. Adults also need training in such skills. There are a few institutions working already in rural areas inspired by Gandhian thought, but such institutions should multiply and spread all over the country, and need support.

Agriculture itself needs an institutional overhaul, without creating deprivation and poverty. There are presently many landowners who hang on to their holdings though having good jobs in urban areas. They cultivate their holdings through informal tenancy or by employing labour under so-called personal supervision. Lease markets should be so institutionalised that cultivators of non-viable holdings should be able to formally lease in additional areas particularly from absentee cultivators. Such leases should be formally recognised so that they have no difficulty in getting bank credit either for crop-loans or for investment purposes. At present, though tenants can get crop-loans, they cannot get it for meeting long term investment. They should have a long term stake in the land they cultivate, which means they should have ownership rights. I would even prefer a law by way of new phase of Land Reforms, under which no urban job holders or absentee urban cultivators can own agricultural holdings. They should sell them to the present small holders to convert them into viable holdings. They can, however, play the role of entrepreneurs and start agro-processing units, supplementing farmers' own efforts in this direction.

Professor Radhakrishna has referred to the distorted status of agricultural land markets, with inaccurate and outdated land records creating scope for confusion and disputes. He also has pointed out that some tenancy regulations are counterproductive (Radhakrishna, 2019: 26). Such a situation is not conducive to making the farming business viable and hassle-free and needs to be remedied on a priority basis. Radhakrishna has also drawn attention to the need to promote collective efforts of small farmers, whereby they can overcome the constraints of small-scale operation (ibid: 21). Collective or cooperative efforts will be particularly useful in buying inputs and selling output, sharing information on prices and markets, fighting crop diseases, and enriching and sustainable use of village common lands and tanks. The Farmers' Producer Organisations, many of which have been sponsored by NABARD, aim at providing economies of scale precisely in such tasks, but more research is needed to find out how far they have enabled small and marginal farmers to improve their incomes enough to make their farming viable.

There is still some scope for increasing incomes of marginal and small farmers through diversification of crops, particularly through adoption of high-value crops. For example, some of these farmers around Bengaluru have realised high incomes by growing flowers and medicinal herbs for Ayurvedic companies. Such production, however, needs a good institutional support in technical advice and marketing, particularly when the product is perishable. Moreover, such a solution sounds good from a micro-economic perspective, but not necessarily so as a general solution when the

bulk of the number of holdings and land under them constitutes a major proportion. If for example, a significant proportion of marginal and small farmers start growing flowers, there would a glut in their market, and flowers would cease to be a high-value crop. These micro-solutions are good within a limited way, but will not obviate the need for other solutions suggested above.

Though the goal of doubling farm incomes looks laudable, it is too general. The goal should not be one of merely doubling agricultural part of our GDP, but of increasing the incomes of particularly non-viable farmers to make them viable. The more sensible goal from the point of improving the incomes and welfare of farmers is to make all agricultural holdings commercially viable. I hope that steps suggested above should enable us to reach this goal without too much delay, so that agriculture can fully participate in the task of national economic development.

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Bane of Agriculture: Persistent Slowdown in Public Sector Investment

S. L. Shetty

1 Belated but Perfunctory Recognition of the Agriculture's Neglect

Though there have been occasional bouts of improved growth in agriculture, overall, the sector has been facing persistent crisis situation in many respects for decades. It was not until the *Mid-Term Appraisal of the Tenth Five Year Plan (2002–03 to 2006– 07)—after five decades of planning—that the then Planning Commission consciously recognised the neglect of agriculture in the planning process.* In fact, among different phases (explained below) that agriculture passed through since Independence and after the Green Revolution phenomenon of the 1970s, the year 2004–05 in the middle of the Tenth Plan was a turning point in conferring special attention to agricultural investment and growth.

With a view to correcting the crisis faced by the agricultural sector, the *Mid-Term Appraisal of the Tenth Five Year Plan* proposed multipronged steps to address the malaise: large budgetary allocations for agriculture in July 2004, starting of a National Horticultural Mission, reforming of the agricultural extension system, improving the agricultural terms of trade, reforming the agricultural marketing arrangements through an amendment to the Agricultural Produce Market Committees (APMC) Act in 2003, Bharat Nirman Project to upgrade the rural infrastructure and finally, the policy of doubling of bank credit for agriculture (See Deokar & Shetty, 2014).

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Following the above recognition, the immediately following Eleventh Five Year Plan (2007–08 to 2011–12) introduced a radical departure in the plan objectives in the form of "not just faster growth but also inclusive growth". As part of this new objective, one of the important strategies proposed was to recognise the neglect of agriculture in the planning process and correct it. It aimed at nearly doubling the average agricultural growth from about 2.4% per annum during the then Tenth Plan period (2002–03 to 2006–07) to 4% per annum in the Eleventh Plan period and also similarly to accelerate the growth of public sector capital stock in agriculture from about 2.3% per annum in the Tenth Plan to 4.0% in the Eleventh Plan period. However, giving an account of the progress made in the earlier plan goals, the succeeding 12th Plan document (2012–13 to 2016–17) laments how many of those pious goals enshrined in the Eleventh Plan remained unfulfilled:

> Public investment in agriculture, which was stepped up very substantially in the last three years of the Tenth Plan, stagnated in the Eleventh Plan. This was mainly because of a large shortfall in planned investment in irrigation. As a result, a key part of the Eleventh Plan strategy to achieve 4 per cent agricultural growth which was to increase public investment in agriculture to 4 per cent of agricultural GDP and thereby achieve growth of public sector capital stock in agriculture at least equal to the required 4 per cent growth of total capital stock had not fructified. (Planning Commission, 2013, Vol. II, p. 7)

Pursuing the theme further and enumerating a series of steps required to rejuvenate agriculture, the same plan document writes thus:

> All these growth promoting agents require investment in agriculture. But one of the most disquieting developments in the agricultural sector during the last decade has been the neglect of capital formation in agriculture, especially in public sector. Many of the problems of agriculture sectors, viz., low productivity, low employment opportunities, high intensity of poverty and inadequate infrastructure, are attributed to inadequate and progressive decline in public investment in physical capital (irrigation and electrification, roads, markets, etc.], human capital (health, education and training) and development of non-farm sector. (*ibid,* p. 62)

It is, thus, obvious that the neglect of agricultural investment in the overall economic programmes has persisted for many decades now. No doubt, there have been bouts of recognition of this lacuna in public policies, presenting a picture of chequered history. This paper is devoted to this singular aspect of the vicissitudes in agricultural investment over different phases of the country's development and the relative shares of public and private investment in agriculture. As relevant subjects, the paper also posits such issues as whether agricultural subsidies have crowded out public investment in agriculture, as also the motivation for private investment inspired by improved terms of trade, labour-saving mechanisation and institutional credit flow and such other related issues—the crucial themes that have surfaced in the debate on agricultural investment in India over time.

Some Distinct Phases Discernible in Agricultural Investment Trends

When we survey the agricultural investment scene with a broad brush since Independence, we notice a few distinct phases in its trends. The data used for this purpose relate to the Central Statistical Office (CSO)'s time series on agricultural gross capital

formation (GCF) for all the years since 1950–51; they relate to back series of (i) 1993–94 base year data; (ii) 2004–05 base year data; and (iii) the current 2011–12 series.

Based on a caricature of agricultural investment behaviour separately by public and private sectors, which in turn has been inspired by the prevalent public policies, the long period of 69 years since economic planning began in 1950–51 and until 2017–18 has been classified into the following five phases; the basis of this classification has also been hinted at in the 12th Five Year Plan document (Planning Commission, 2013, pp. 1–10).

First, we have the **pre-Green Revolution period (1951–52 to 1967–68)** when the Government of India initiated as part of the planning process, the emphasis on large-scale irrigation projects consequently resorted to higher public sector investment directed at irrigation during this period, which seems to have lasted a fairly long period of nine years 1950–51 to 1958–59. But, resource constraints compelled a narrow focus on the part of the government in this respect, and as a result, after that initial push, the overall agricultural investment rate stagnated thereafter for another eight years until 1967–68, that is until the beginning of the Green Revolution period.

Second, the **Green Revolution period (1968–69 to 1980–81)** when overall, this was the best period in post-Independent India which saw the highest public sector gross capital formation (GFC) in agriculture as ratio of agricultural GDP (4.2% of agricultural GDP reached in 1970–80, the highest ever reached; see Appendix Table 8—more on it later). This was achieved because the government paid special attention to agriculture, and hence, the period saw a steady improvement in public investment in agriculture, and also, it was accompanied by some noticeable improvement in private investment by farmers themselves. However, in this period, the focus of agricultural investment was concentrated on a few agriculturally advanced states in India.

Third, **the mild liberalisation period and also a period of wider coverage (1981–82 to 1989–90)** when the focus in agriculture got shifted from intensification of Green Revolution in agriculturally high potential areas to its spread in wider areas. This was also the period when the nature and quality of state intervention in the economy slowly began to be weakened, particularly in fiscal, monetary and trade policies. As a result, the period saw a distinct and steady edging down of public investment in agriculture. This was accompanied by a sharp and sudden dip in private investment in 1980–81 and stagnated thereafter throughout period thereafter; the total farm investment rate too stagnated during the period.

Fourth, **the early liberalisation period (1990–91 to 1997–98)** saw a full-throated macro-economic liberalisation with substantial focus on fiscal compression, which contributed to a steady decline in resources earmarked for public investment in agriculture; this in turn also hindered the enthusiasm of farmers from expanding private investment in agriculture. Public sector investment to agricultural GDP touched the lowest levels in history at 1.8/1(7% during 1997–98/1998–99—Appendix Table 8).

Finally, in **the current phase continuing since 1998–99,** there has been a revival of private investment in agriculture due to commodity price boom and terms of trade benefits derived by agriculture, accompanied by flow of institutional credit as a result of the policy of doubling of bank credit for the sector. This period has

also witnessed the emergence of labour-substituting investment in agriculture; the increasing use of tractors, the harvesters, and a number of other agricultural implements became evident in this period. While these factors have provided an impetus to increases in farmers' private investment in agriculture, for the first time, it appeared that such autonomous increases in private investment were possible without it being complemented by public investment. In fact, public investment faced some slowdown during the period both due to resource constraints and the government's preference for pursuing a policy of fiscal compression. Even so, overall, this period has seen an uptrend in total investment in the sector, even as the public sector investment suffered a setback. The private sector's investment to GDP/GVA ratio was in the range of 9.7–11.4% in the preceding eight years 2000–01 to 2007–08, but it increased to a range of 13.4–18.2% subsequently for seven years up to 2014–15 (Appendix Tables 9 and 10). But, there was some setback to this during the next four years 2015–16 to 2018–19 due to persistent fall in agricultural output.

2 Key Data Series Evidencing the Phase-Wise Trends in Farm Investment Depicted Above

Both the measures of investment trends, namely agricultural GCF as percentages of nation-wide GCF and *agricultural GCF to agricultural GDP/GVA ratios, clearly bring out the phases described above.* Appendix Table *5 presents GCF data for agricultural sector and for all sectors and the resultant share of Agriculture GCF in the all sector GCF. These GCF data are based on 1993–94 series of National Accounts Statistics (NAS) for the period 1950–51 to 2003–04. Similarly,* Appendix Tables 5 and 6 *provide corresponding agricultural GCF shares based on NAS 2004–05 and 2011–12 series. In the same manner, we have* Appendix Tables 8, 9 and 10 *presenting GCF as percentage of GDP/GVA for the same sets of years in three NAS series.*

(a)   *Agricultural GCF to Total GCF Ratios*

Appendix Table 5, 6 and 7 present the crude ratios year-wise of agricultural GCF as percentages of nation-wide GCF as per 1993–94 national income series and as per 2004–05 and 2011–12 series, respectively. The results presented for overlapping years do differ somewhat, but the overall trend appears comparable. For 1980–81, for instance the 1993–94 series provides an agricultural GCF to total GCF ratio at current prices of 14.1%, but at the 2004–05 series, the corresponding ratio for the same year works out to 15.7%. For the next year 1981–82, there have occurred sharp declines to 9.7% as per 1993–94 series and to 10.6% as per 2004–05 series, just indicating that the trend appears comparable. In this respect, the results from 2004–05 and 2011–12 NAS series appear to be very close to each other. For 2011–12, for instance the relevant ratio was 8.3% as per 2004–05 series and 8.5% as per 2011–12 series.

The ratios presented in the above two sets of tables and graphs provide some more interesting results. First, while subtle ups and downs in the farm investment are discernible during the five phases identified above, the share of agricultural GCF in total GCF has persistently declined over time both at current and constant prices. The share was hovering around 12% to 23.0% during the first three decades of the 1950s, 1960s and 1970s, but thereafter, it has steeply dipped to lower levels, generally ranging from 7 to 10% and touching as low as less than 7% in some years.

Second, there are some interesting revelations coming out of a comparison of these respective ratios of GCF at current and constant prices. Conceptually, if the current price ratio (Agrl. GCF/total GCF—nominal) is higher than the constant price ratio (Agrl. GCF/total GCF—real), it implies that the relative prices of capital goods— relative to the average prices of capital goods in the economy—that the farmers have to bear in the current period have been higher than those in the base period.

This was the position prevailing during the early 1950s of the pre-Green Revolution period. And, the situation got reversed in the post-Green Revolution period when current price ratios became lower than the constant price ratios, and the farmers faced relatively less of capital goods prices. Interestingly, this trend continued till about the end of the early liberalisation period (1997–98). There was, thus, a long period after the start of the post-Green Revolution period when the farmers paid relatively lower prices for their investment goods than the average prices of capital goods borne by other sectors. Interestingly, after the start of the commodity boom and significant improvement in agricultural terms of trade, there has been a queer behaviour of the agricultural GCF to total GCF ratios between current and constant price estimates. As shown in Table 1, agricultural terms of trade have made a distinct improvement during the recent period, though with fractional decline in the year 2018–19, again to be reversed in 2019–20 (Graphs 1 and 2).

But, the relevant GCF ratios under discussion at current prices appear to be higher even in the latest years, though fractionally, than the constant price estimates indicating that the relative investment costs remain high for the farmers even in the year 2018–19 (see Graph 3). A possible explanation for this is that during the commodity boom period, capital goods prices too seem to have risen at high rate, and hence, the farmers have not received any extra benefit insofar as their relative cost of investment goods is concerned.

(b)   *Trends in Agricultural GCF to Agricultural GDP/GVA Ratios*

We now make an attempt to review the trends in agricultural GCF in relation to agricultural GDP/GVA. Appendix Tables 8, 9 and 10 present the relevant ratios as per 1993–94 series of National Accounts and as per its 2004–05 series and 2011–12 series, respectively. We also present these ratios separately for public and private sectors. Graphs 4, 5, 6, 7, 8 and 9 depict the long-term trends in them.

Slowdown in Public Sector Investment Contributing to Sluggish Overall Investment Until the Commodity Boom Period

The concentrated focus on agricultural investment, referred to above, concerned higher tempo of investment by the public sector. As shown in Appendix Table 8

Table 1 Agricultural terms of trade index based on wholesale price indices (WPI)

Year	Food and non-food articles index	Manufactured products index	Terms of trade index (2/3*100)
(1)	(2)	(3)	(4)
WPI—base year 2004–05 = 100			
2005–06	103.39	102.42	100.95
2006–07	112.49	108.22	103.95
2007–08	121.47	113.39	107.13
2008–09	133.51	120.38	110.90
2009–10	151.00	123.05	122.71
2010–11	176.65	130.07	135.81
2011–12	190.44	139.51	136.51
2012–13	209.55	147.06	142.50
2013–14	232.98	151.46	153.83
2014–15	243.92	155.12	157.25
2015–16	252.32	153.42	164.46
2016–17	265.04	157.38	168.41
WPI—base year 2011–12 = 100			
2012–13	111.41	105.30	105.80
2013–14	123.20	108.50	113.55
2014–15	128.01	111.20	115.12
2015–16	131.35	109.20	120.28
2016–17	136.45	110.70	123.26
2017–18	138.18	113.80	121.43
2018–19	139.32	117.90	118.17
2019–20	150.04	118.30	126.83

Note Column 4 is derived by us
Source Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India

and Graph 7, during the Green Revolution period, public sector investment rate had steadily risen from 1.4% in 1967–68 to 4.2% in 1979–80, the best, as said earlier, in post-Independence history. But, this dynamism on the part of the public sector did not last thereafter. The public sector investment rate slowed down in the 1980s, and after liberalisation in the 1990s, the fall was much steeper. The public sector GCF rate, which had attained the peak of 4.2% in 1979–80, finally ruled at less than 2% in the late 1990s, both as per the 1993–94 and 2004–05 NAS series; as per the 2011–12 series, the public sector investment rate moves up to a little over 3.0% in 2017–18 and 2018–19 (Graph 9).

The 12th Plan document (Planning Commission, 2013, p. 6) had corroborated with the above; it had brought out how the average annual growth in public sector net fixed capital stock in agriculture had slipped from 3.9% in the 1980s to 2.0%
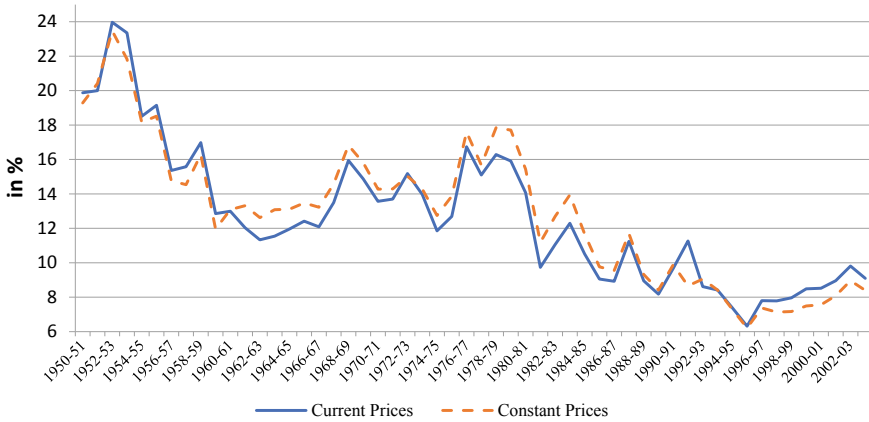
Graph 1 Agricultural GCF as % of aggregate GCF at current and constant prices (based on 1993–94 series): 1950–51 to 2002–03. *Source* See Appendix Table 5
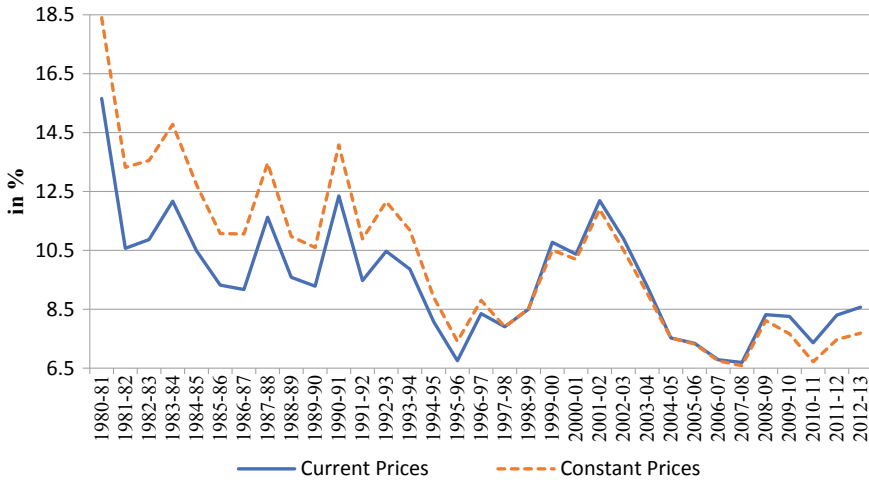
Graph 2 Agricultural GCF as % of aggregate GCF at current and constant prices (based on 2004–05 series): 1980–81 to 2012–13. *Source* See Appendix Table 6

in the early liberalisation period and to 1.4% in the Ninth Plan period (1997–98 to 2001–02).
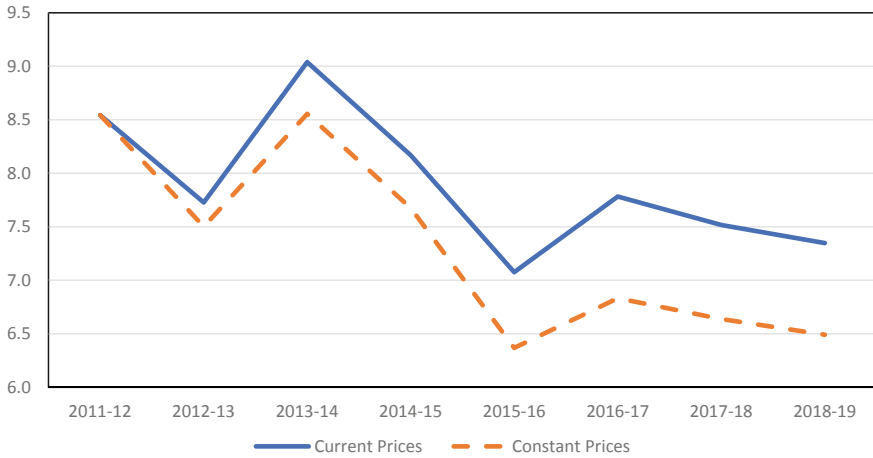
Graph 3 Agricultural GCF as % of aggregate GCF at current and constant prices (based on 2011–12 series): 2011–12 to 2018–19. *Source* See Appendix Table 7
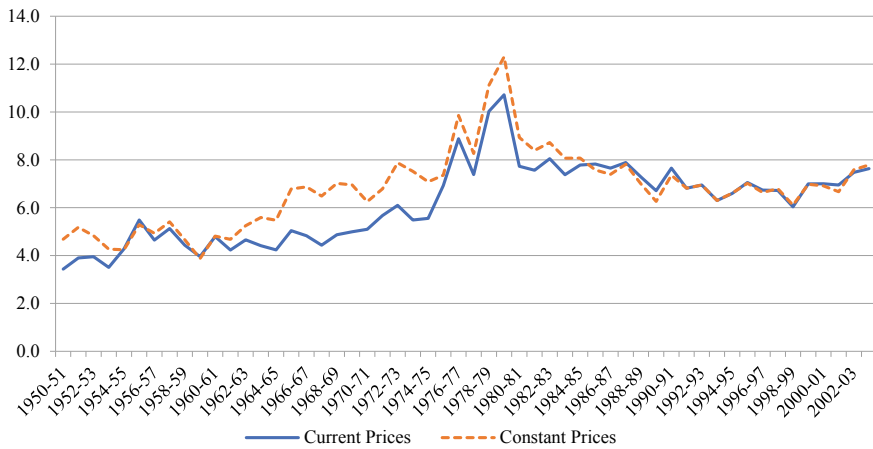
Graph 4 Agricultural GCF as percentage of agricultural GDP at current and constant prices (based on 1993–94 series): 1950–51 to 2001–02. *Source* See Appendix Table 8

3 Private Sector Investment Behaviour—Departure from the Trend After the Commodity Bloom During 2000–01 Onwards

As depicted in Appendix Tables 8 and 9 and Graphs 7 and 8, historically, the private sector investment rate has behaved in a parallel way as the public sector investment rate has behaved for four decades until the end of the 1980s. While we have not
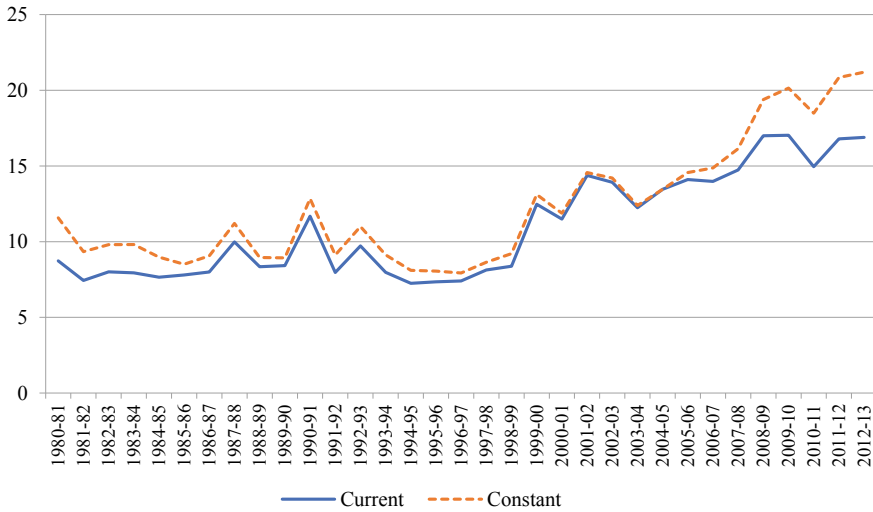
Graph 5 Agricultural GCF as percentage of agricultural GDP at current and constant prices (based on 2004–05 series): 1980–81 to 2012–13. *Source* See Appendix Table 9
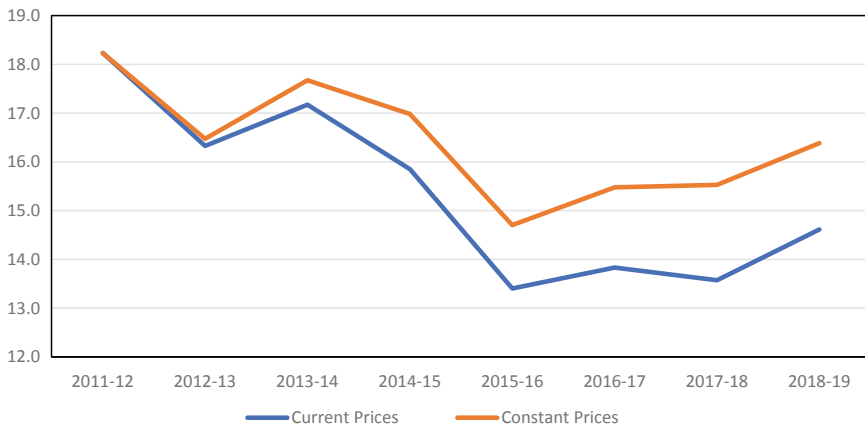
Graph 6 Agricultural GCF as a % of agricultural GVA at current and constant prices (based on 2011–12 series). *Source* See Appendix Table 10

attempted any rigorous econometric exercise here, the broad behaviour of the rates of public and private investment does suggest that public sector investment crowds in private sector investment that increases in private sector investment largely follow the increases in public sector investment.[1]

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[1] This is a profound theme requiring some rigorous econometric excises on causal relationships, which we have not attempted here. Our observation here is based on the visual view of the behaviour of data as depicted in their graphs and also some informed economic logic. A comprehensive
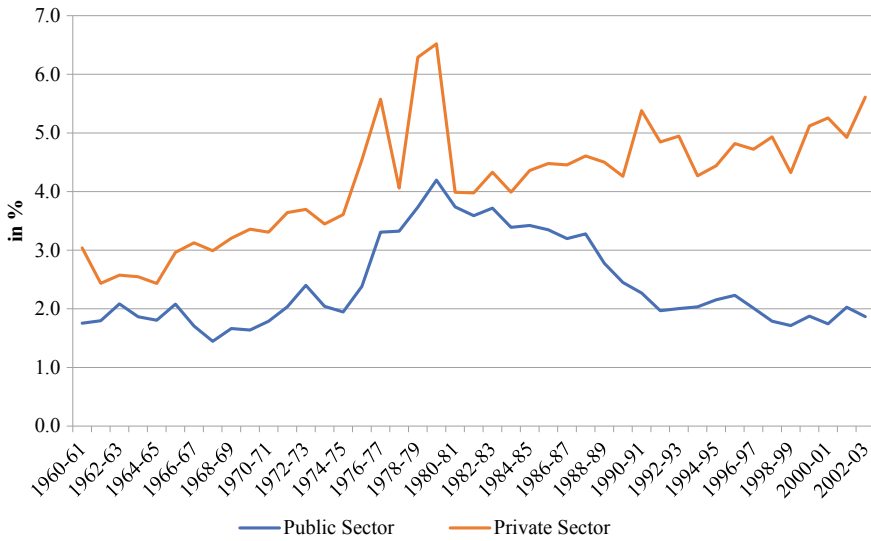
Graph 7 Agricultural GCF as % of agricultural GDP for public and private sectors (based on 1993–94 series). *Source* See Appendix Table 8
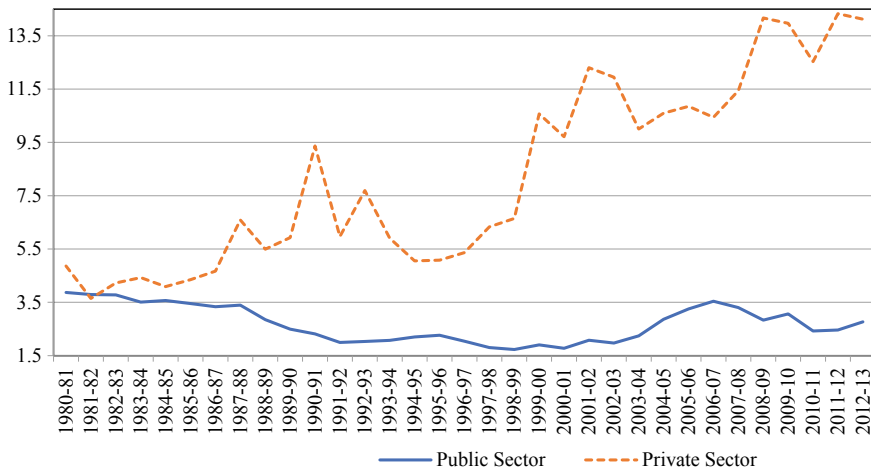
Graph 8 Agricultural GCF as % of agricultural GDP for public and private sectors (based on 2004–05 series). *Source* See Appendix Table 9

As stated above, the public sector investment rate, which was puny at 1.8% of agricultural GDP in 1960–61, steadily increased and reached the peak of 4.2% at the

historical study on this theme has been that of Ashok Gulati and Seema Bathla (EPW, May 19, 2001).
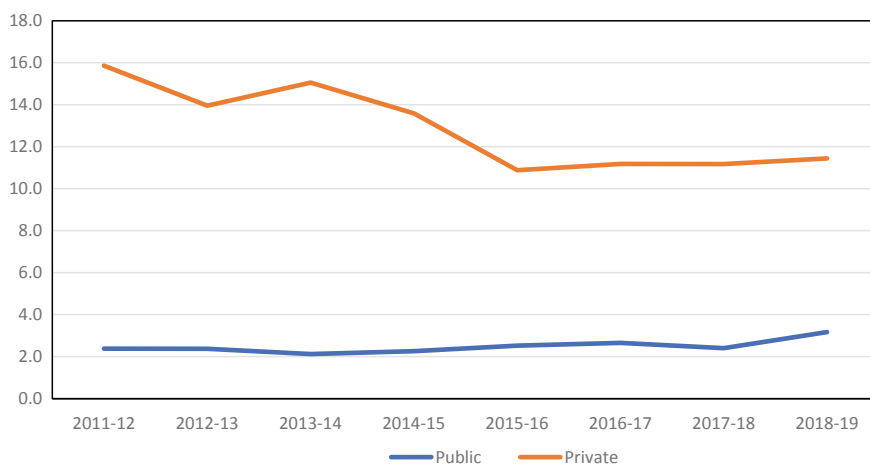
Graph 9 Agricultural GCF as % of agricultural GVA for public and private sector (based on 2011–12 series): 2011–12 to 2018–19.n *Source* See Appendix Table 10

height of the Green Revolution period in 1979–80. Concurrently, the rate of private sector investment similarly rose from 3.0% in 1960–61 to the peak of 6.5% in the same year 1979–80. For the next decade or so, both public and private sector rates of capital formation were lower than those in the preceding period. But, this was the period when both the rates remained firm: a little over 3% in the public sector and a little over 4% for the private sector.

But, after the economic reforms began in the early 1990s, there has emerged a distinct divergence in the behaviour of private sector investment rate in agriculture in comparison with the behaviour of public sector agricultural investment (Graphs 8 and 9).

As per the 2004–05 series of NAS, public sector investment rate in agriculture, which had ruled at 3.9% in 1980–81 and 3.4% in 1987–88, steadily fell thereafter and reached the low level of just 1.8% in 2000–01.Contrariwise, the corresponding private investment rate in agriculture, which was at 4.9% in 1980–81, increased to 6.6% in 1987–88, and thereafter, though the rate fluctuated, overall, it has been on an uptrend, touching the high rates of 10.6% in 1999–2000 and 9.7% in 2000–01.

What have been more noteworthy are the vastly rapid increases in the private sector investment rate after the beginning of the current century following the commodity boom. The rate, which was at 9.7% in 2000–01, steadily increased to 14.1% in 2012–13 as per the 2004–05 series or a range of 13.6% to 15.9% during the years 2011–12 to 2014–15 as per the revised 2011–12 series.[2] It should be noted parenthetically that the CSO's latest data reveal a significant and steady reduction in the private sector investment to GVA ratio from 13.6% in 2014–15 to 11.4% in 2018–19 due to

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[2] CSO has reported a higher revision of 9.4% in the GCF of agricultural and allied activities in the revised 2011–12 series as compared with the earlier estimates of GCF as per 2004–05 series (CSO, 2015, p. 131).

some continuous setback to farm output. Nevertheless, some uptrend in the private investment in agriculture in the latest phase of commodity boom and labour-saving mechanisation in agriculture is self-evident.

The then Planning Commission, which made a detailed study of the phenomenon of acceleration in private investment in agriculture in the recent period (Planning Commission 2013, pp.7–10), has attributed it to two key factors:

(i)   "The main driver of this was a large relative price shift in favour of agriculture, showing that farmers respond to price incentives", and
(ii) "While private investment in irrigation and water-saving devices did increase, the largest increase was in labour-saving mechanisation. This was a natural response to growing labour scarcity which is reflected in rising wages" (ibid. p. 8).

We have identified a third factor in propelling private investment in agriculture, that is, the role of institutional finance to which we allude in a subsequent section.

Making a critical assessment of the implications of these phenomena, the same 12th Plan document further cautions thus:

> Labour saving mechanisation, a significant contributor to the sharp increase of private investment in the Eleventh Plan period, was a natural response to tighter labour markets and rising wages. But, while mechanisation helped farmers to cope with labour scarcity, it exacerbated a decline in capital productivity. Private capital stock in agriculture has increased twice as fast as agricultural GDP since the Ninth Plan and, although mitigated by terms of trade gains and a debt write-off, continued investment with declining capital productivity may not be sustainable. (ibid., p. 9)
>
> While greater private investment in farming is desirable where it reflects both an ability to invest and a desire to increase farm productivity, the same phenomenon can become a source of distress if farmers keep investing to cope with shrinking natural resources, more frequent adverse weather and less assured labour supply, and do not get adequate returns for this investment. (ibid., p. 9)

4   Alleged Trade-offs Between Subsidies, Agricultural Investment and Other Productive Expenditures

There is, thus, enough of empirical evidence to the effect that inadequate and rapidly declining rate of public investment for agriculture has been its bane. This is associated with inadequate attention to institutional changes in agriculture such as tenancy reforms, strengthening of extension agencies, greater attention on agricultural education and research and building up of rural infrastructures—all of these put together have been the cause for the sector's malaise.

However, it is alleged that these attentions to agricultural investment and its infrastructural needs have suffered because the politically powerful, rich farmers' lobby, has been able to extract from the government huge amounts of input and other agricultural subsidies. A number of studies (Chand, 2009; Mahendra Dev, 1997) have argued in favour of a strong case for reducing agricultural subsidies and increasing

public investment in agriculture. Varied deleterious effects of agricultural subsidies on groundwater utilisation, in climate change, increasing inequalities in the distribution of benefits, etc. have been highlighted. Even the then Planning Commission in its 12th Plan document had argued thus:

> The imbalance between subsidy expenditure and expenditure on public investment raises the issue whether a shift away from subsidies and towards greater public investment would not be beneficial. (ibid., p. 13)

The above plan document has also produced a telling evidence on this imbalance between agricultural subsidies and funds employed in public investment. Table 2 reproduces these data which provide the latest dependable estimates of agricultural subsidies. It brings out how the size of subsidies has grown more than three-fold in eight years from Rs.35,001 crore in 2002–03 to Rs.116,488 crore in 2010–11; in fact, as per a Parliamentary reply, it rose further to Rs.153,743 crore in 2011–12. It is, thus, obvious that this size of subsidies constitutes more than three-fold of the size of public investment in agriculture.

We, however, wish to take a more cautious view of this issue of the so-called competition between agricultural subsidies and agricultural investment. While we agree that there is some gross inequality in the distribution of agricultural subsidies, withdrawal of input subsidies on agriculture may cause serious disturbances in agricultural prices and, thus, result in unsustainable levels of inflation and other distortions in the economy. Subsidies are no doubt a very inefficient way of resorting to public expenditures for development. They are generally necessitated by the pursuit of a distorted pattern of overall development. But, at the same time, what is to be recognised is that there are many other forms—other than agricultural subsidies—involving inefficient and unequal uses of public expenditures including large amounts of subsidies for the corporate bodies (see J. Dennis Rajakumar and S.L. Shetty, EPW, 7 March 2020) all of which need to be addressed in a wholesome manner and not in a partial and truncated manner, singling out only agricultural subsidies. Above all, the question of growing inequality is more relevant in the context of grossly unequal way that the tax resources are being mobilised in the economy. The best example is the way that marginal tax rate for the urban richer segments was reduced from 40 to 30% some years ago.

Overall, it may be said that there is a strong case for reducing current expenditures in the form of farm subsidies and expanding capital expenditures for agriculture. But, such a change in development strategy cannot be undertaken in isolation. It has to constitute a part of the wider strategy of inclusive development under which intensive focus will be conferred on both the sides of public finance: resource mobilisation as well as more balanced distribution of expenditures. There has been an acute need for public expenditures on social sectors or for physical infrastructures and promotion of manufacturing. This is a question of an ideological position that public policy planners take; if they have been serious about the acute need for public investments in agriculture, more tax mobilisation in an equitable manner is possible. In essence, the planners have shown no creative ideas on public investment in agriculture after the easy flush of enthusiasm in the first two decades of planning on large-scale

Table 2 Public sector capital formation and subsidies to agriculture (centre and states) (in Rs. crore and as per cent to GDP from agriculture and allied activities at current prices)

1	Public GCF agriculture and allied		Budgetary subsidies (CSO)		Food subsidy		Total fertiliser subsidy		Subsidy on indigenous urea		All other agriculture subsidies		Total subsidies other than food subsidy (5 + 6 + 7)	
	2		3		4		5		6		7		8	
Tenth Plan														
2002–03	9563	2	43,597	9	24,176	5	11,015	2.3	7790	1.6	16,196	3.3	35,001	7.2
2003–04	12,218	2.2	43,765	8	25,181	4.6	11,847	2.2	8521	1.6	15,258	2.8	35,626	6.6
2004–05	16,187	2.9	47,655	8.4	25,798	4.6	15,879	2.8	10,243	1.8	16,221	2.9	42,343	7.5
2005–06	20,739	3.3	51,065	8	23,077	3.6	18,460	2.9	10,653	1.7	20,181	3.2	49,294	7.8
2006–07	25,606	3.5	59,510	8.2	24,014	3.3	26,222	3.6	12,650	1.7	21,924	3	60,796	8.3
Eleventh Plan														
2007–08	27,638	3.3	85,698	10.2	31,328	3.7	32,490	3.9	12,950	1.5	34,830	4.2	80,270	9.6
2008–09	26,692	2.8	1,56,823	16.6	43,751	4.6	76,603	8.1	17,969	1.9	54,438	5.8	1,49,010	15.8
2009–10	33,237	3.1	1,39,248	12.9	58,443	5.4	61,264	5.7	17,580	1.6	37,121	3.4	1,15,965	10.7
2010–11	34,548	2.7	1,50,170	11.8	63,844	5	62,301	4.9	15,081	1.2	39,106	3.1	1,16,488	9.2
2011–12	36,887[a]												1,53,743	10.2

[a]The following figures of agricultural subsidies were revealed in a Parliamentary reply dated 8 February 2014 for 2011–12: fertiliser—Rs. 67,199 crore; electricity—Rs.41,823 crore; irrigation—Rs. 34,208 crore; other subsides to marginal farmers—Rs. 10,513 crore

Note As explained in the source, public sector agricultural GCF and agricultural GDP are from CSO, National Accounts Division; budgetary subsidies are also from CSO and are based on the economic and purpose classification of government expenditure. Food and fertiliser subsidies are from budget documents of the central government. "All other agriculture subsidies" in the table are defined as budgetary subsidies (CSO) *plus* subsidy on indigenous urea *minus* food subsidy. This is because CSO classifies food subsidy as subsidy to agriculture but classifies subsidies on indigenous urea as subsidy to industry

Source Planning Commission (2013): Twelfth Five Year Plan (2012–2017): Economic Sectors, Volume II, p. 13

irrigation projects. The next stage of diversification in agriculture called for somewhat different sets of investments in a series of rural and agricultural infrastructures including networks of warehouses, go-downs and commercial refrigerators as well as extension infrastructures. The failure has been, in retrospect, in the absence of inclusive planning and not necessarily in the diversion of resources in favour of subsidies away from agricultural investment. Therefore, in our view, it is wrong to argue that "the main reason for decline in public sector investments is the diversion of resources from capital account to current account i.e. from capital formation to subsidies", as proposed by Chand (2009). This appears to us to be a very narrow view of the management of public finances in a structurally weak economy as that of India; we have explained above as to why we say so.

5 Role of Institutional Credit in Private Investment in Agriculture

While explaining the key drivers of accelerated private investment in agriculture in the recent period, the 12th Plan document had restricted itself two factors, namely relative price shift in favour of agriculture and impetus to labour-saving mechanisation. We, however, find that a major public policy shift in the form of doubling of farm credit under "priority sector" bank credit dispensation, also, seems to have played a key role in facilitating private investment in agriculture.

The "comprehensive credit policy" announced in 2004 envisaged doubling of agricultural credit every three years, or at a rate of 30% every year, starting from 2004 to 05. The policy was carried forward for many blocks of successive three years. Data presented in Table 3 bring out how rapid increases have taken place in the flow of institutional credit, particularly after 2004–05, in favour of the agricultural sector. There was a 103% increase between 2004–05 and 2007–08, a 75% increase between 2007–08 and 2010–11 and so on. The credit flow has been sizeable even in relation to agricultural GDP/GVA estimates. Such credit to GDP ratio has shot up from 16.0% in 2003–04 to 22.2% in 2004–05 and to 35.5% in 2009–10 and 43.0% in 2018–19. Significantly, the ratio of medium and long-term loans to GDP/GVA has shot up from 3.9% to 17.3% during the above period.

It should be conceded that the bulk of institutional credit has been in the form of short-term production credit—generally more than two-thirds of the total credit flow. Even so, the extent of term loans granted has been impressive in relation to the amount of private capital formation achieved in agriculture. As shown in Table 4, term loans as percentage of private GCF in agriculture shot up from 36.0% in 1999–2000 to 108.6% in 2005–6 and 120.5% in 2006–07. Though the proportion fell to an extent thereafter, it has remained high, ranging from 48 to 135%; in fact, it shot up to 150% in the latest year 2018–19.

In this context, it is necessary to admit that the proportions of credit to investment ruling at more than 100% appear very odd indeed. Even credit share coming closer

Table 3 Flow of institutional credit to agricultural credit (Rs. in crore)

Year	Production (short-term) credit	Medium-term/long-term credit	Grand total	Agricultural GDP/GVA	Production (ST) credit	MT/LT credit	Grand total
					As percentage of agricultural GDP/GVA		
(1)	(2)	(3)	4 = (2) + (3)	(5)	(6)	(7)	(8)
1999–2000	28,965	17,903	46,868	455,302	6.4	3.9	10.3
2000–01	33,314	19,513	52,827	460,608	7.2	4.2	11.5
2001–02	40,509	21,536	62,045	498,620	8.1	4.3	12.4
2002–03	45,586	23,974	69,560	485,080	9.4	4.9	14.3
2003–04	54,977	32,004	86,981	544,667	10.1	5.9	16.0
2004–05	76,062	49,247	125,309	565,427	13.5	8.7	22.2
2005–06	105,350	75,136	180,486	637,772	16.5	11.8	28.3
2006–07	138,455	90,945	229,400	722,984	19.2	12.6	31.7
2007–08	181,393	73,265	254,658	836,518	21.7	8.8	30.4
2008–09	210,461	91,447	301,908	943,204	22.3	9.7	32.0
2009–10	276,656	107,858	384,514	1,083,514	25.5	10.0	35.5
2010–11	319,108	127,671	446,779	1,319,686	24.2	9.7	33.9
2011–12	396,158	114,871	511,029	1,501,947	26.4	7.6	34.0
2012–13	473,500	133,875	607,375	1,675,107	28.3	8.0	36.3

(continued)

Table 3 (continued)

Year	Production (short-term) credit	Medium-term/long-term credit	Grand total	Agricultural GDP/GVA	Production (ST) credit	MT/LT credit	Grand total
					As percentage of agricultural GDP/GVA		
(1)	(2)	(3)	4 = (2) + (3)	(5)	(6)	(7)	(8)
2013–14	548,435	181,687	730,122	1,926,372	28.5	9.4	37.9
2014–15	635,412	209,916	845,328	2,093,612	30.4	10.0	40.4
2015–16	665,312	250,197	915,509	2,225,368	29.9	11.2	41.1
2016–17	689,457	376,298	1,065,755	2,518,662	27.4	14.9	42.3
2017–18	754,972	413,531	1,168,503	2,796,908	27.0	14.8	41.8
2018–19	752,209	504,620	1,256,830	2,922,846	25.7	17.3	43.0

Source Agricultural Statistics at a Glance 2014, 2017 and 2019, Ministry of Agriculture and Farmers Welfare, Government of India

Table 4 Agricultural GCF financed by term loans of financial institutions

Year	Term loans (Rs. crore)	GCF—agriculture, forestry and fishing (Rs. crore) (private)	Term loans as % of private GCF (agriculture, forestry and fishing)
1999–2000	17,303	48,126	36.0
2000–01	19,513	44,751	43.6
2001–02	21,536	61,341	35.1
2002–03	23,974	57,959	41.4
2003–04	32,004	54,472	58.8
2004–05	49,247	59,909	82.2
2005–06	75,136	69,204	108.6
2006–07	90,945	75,496	120.5
2007–08	73,265	95,679	76.6
2008–09	91,447	133,655	68.4
2009–10	107,858	151,325	71.3
2010–11	132,741	165,396	80.3
2011–12	114,871	238,174	48.2
2012–13	133,875	233,747	57.3
2013–14	181,687	290,009	62.6
2014–15	209,916	284,544	73.8
2015–16	250,197	242,388	103.2
2016–17	376,298	281,529	133.7
2017–18	413,531	312,487	132.3
2018–19	504,620	334,525	150.8

Source (1) Term Loan figures are compiled from "Agricultural Statistics at a Glance, 2019, 2017 and 2014"
(2) GCF figures have been culled out from various publications of National Account Statistics. Data for base year 2011–12 have been used for the years from 2011–12 to 2016–17, and data for base year 2004–05 have been used for the years from 2004–05 to 2010–11

to 100 appears odd as banks do keep margins in their lendings' against such assets. Such odd data are possibly attributable to estimational issues in credit flows as well as data on farm investment. There is no way of reconciling them here. Nevertheless, the overall trend in the substantial financing of agricultural investment through bank finance appears realistic and reliable, implying that the availability of institutional funds has certainly played a key role in the acceleration of private investment in agriculture year after year after the commodity boom started in the early part of the century. As brought out by the then Planning Commission, this was the period when farm wages had firmed up, and hence, farmers chose to adopt labour-saving mechanisation. Thus, the confluence of three factors, namely better terms of trade, inducement to use labour-saving mechanisation and the liberal availability of institutional loans, have all contributed a noticeable improvement in private investment

in agriculture, interestingly, without any push from public investment. But, it should be emphasised that this situation cannot be sustained for long, and there is vast scope for the public sector to expand its investment in agricultural extension, long-duration infrastructures, education and research—a role which only the public agencies can play.

6 Concluding Observations

(i) The absence of an inclusive planning strategy is reflected rather conspicuously in the persistent neglect of agricultural investment throughout the post-Independence era except for a brief Green Revolution period.

(ii) Restive farm households have extracted concessions from the state, in the form of varied subsidies and increased credit flows from institutional agencies. Growing subsidies arise from a distorted pattern of development. Unless an egalitarian pattern of development is adopted, mere withdrawal of subsidies will give rise to many forms of distortions in the macro-economy.

(iii) Despite the absence of public sector investment support, the farm community has responded to the market forces reflected in high terms of trade for agriculture and higher farm wages, in the form of higher investment through labour-saving mechanisation. This process has been substantially facilitated by the increased availability of institutional credit.

(iv) The recent increases in farmers' investment cannot be sustained for long unless the government steps in and augments its capital stock in agriculture in a variety of ways—extension activities, heavy infrastructures, education and research.

Appendix

See Tables 5, 6, 7, 8, 9 and 10.

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Table 5 Agricultural GCF as percentage of aggregate GCF for all sectors (1993–94 series)

Year	At current prices		Current prices %	At constant prices		Constant prices %
	GCF in agriculture, forestry and fishing	GCF for all sectors		GCF in agriculture, forestry and fishing	GCF for all sectors	
1950–51	187	939	19.9	3798	19,694	19.3
1951–52	219	1094	20.0	4262	20,876	20.4
1952–53	216	902	24.0	4100	17,470	23.5
1953–54	211	904	23.4	3903	17,880	21.8
1954–55	219	1184	18.5	3992	21,983	18.2
1955–56	273	1424	19.1	4934	26,641	18.5
1956–57	293	1909	15.4	4849	32,850	14.8
1957–58	317	2034	15.6	5081	34,946	14.5
1958–59	318	1872	17.0	4820	29,588	16.3
1959–60	285	2217	12.9	3965	33,153	12.0
1960–61	363	2797	13.0	5258	40,179	13.1
1961–62	332	2761	12.0	5115	38,412	13.3
1962–63	373	3295	11.3	5625	44,562	12.6
1963–64	416	3605	11.5	6129	46,851	13.1
1964–65	488	4084	12.0	6559	50,035	13.1
1965–66	580	4669	12.4	7230	53,647	13.5
1966–67	646	5346	12.1	7216	54,546	13.2
1967–68	743	5501	13.5	7830	53,708	14.6
1968–69	840	5268	15.9	8450	50,234	16.8
1969–70	943	6337	14.9	8919	56,407	15.8

Table 5 (continued)

Year	At current prices		Current prices %	At constant prices		Constant prices %
	GCF in agriculture, forestry and fishing	GCF for all sectors		GCF in agriculture, forestry and fishing	GCF for all sectors	
1970–71	992	7306	13.6	8587	60,155	14.3
1971–72	1128	8231	13.7	9147	63,998	14.3
1972–73	1333	8778	15.2	10,077	67,056	15.0
1973–74	1581	11,318	14.0	10,314	72,194	14.3
1974–75	1752	14,784	11.9	9567	75,042	12.7
1975–76	2165	17,064	12.7	11,223	80,916	13.9
1976–77	2838	16,957	16.7	14,165	80,499	17.6
1977–78	2794	18,501	15.1	13,068	83,354	15.7
1978–79	3898	23,933	16.3	17,979	100,757	17.8
1979–80	4310	27,084	15.9	17,358	98,040	17.7
1980–81	3910	27,783	14.1	14,233	92,186	15.4
1981–82	4304	44,206	9.7	14,079	125,859	11.2
1982–83	4899	44,306	11.1	14,529	114,461	12.7
1983–84	5368	43,666	12.3	14,725	105,581	13.9
1984–85	6091	57,970	10.5	14,948	128,063	11.7
1985–86	6586	72,720	9.1	14,132	144,777	9.8
1986–87	6928	77,610	8.9	13,708	143,533	9.6
1987–88	7946	70,673	11.2	14,294	122,274	11.7
1988–89	9019	100,778	8.9	14,762	158,291	9.3
1989–90	9187	112,355	8.2	13,424	159,512	8.4
1990–91	12,224	126,375	9.7	16,416	166,077	9.9
1991–92	12,653	112,355	11.3	14,965	172,863	8.7
1992–93	14,475	167,975	8.6	16,141	178,248	9.1
1993–94	15,249	181,133	8.4	15,249	181,133	8.4
1994–95	18,383	248,740	7.4	16,785	229,879	7.3
1995–96	21,367	338,268	6.3	17,689	284,557	6.2
1996–97	24,415	312,990	7.8	18,326	248,631	7.4
1997–98	26,008	333,976	7.8	18,294	256,551	7.1
1998–99	26,714	335,295	8.0	17,470	243,697	7.2
1999–00	32,308	380,891	8.5	20,024	267,284	7.5
2000–01	32,798	385,000	8.5	19,809	262,146	7.6
2001–02	35,486	396,087	9.0	20,360	251,664	8.1
2002–03	37,972	387,067	9.8	21,500	239,954	9.0
2003–04	43,907	482,744	9.1	24,186	287,944	8.4

Source The original data are from the Central Statistical Office's *National Accounts Statistics*, Various Issues

Table 6 Agricultural GCF as percentage of aggregate GCF for all sectors (2004–05 series)

Year	Agriculture, forestry and fishing		GCF: industry total		GCF—agriculture and allied activities to GCF—industry total (%)	
	Current prices	Constant prices	Current prices	Constant prices	Current prices	Constant prices
1980–81	4228	32,998	27,003	179,291	15.7	18.4
1981–82	4059	27,840	38,403	208,992	10.6	13.3
1982–83	4711	29,139	43,356	215,016	10.9	13.6
1983–84	5574	32,110	45,792	217,263	12.2	14.8
1984–85	5795	29,863	55,269	234,656	10.5	12.7
1985–86	6332	28,396	67,954	256,490	9.3	11.1
1986–87	6971	30,101	76,008	272,223	9.2	11.1
1987–88	9676	36,632	83,223	272,081	11.6	13.5
1988–89	9982	33,857	104,160	308,637	9.6	11.0
1989–90	11,140	34,160	120,007	322,370	9.3	10.6
1990–91	18,033	51,114	146,018	363,028	12.3	14.1
1991–92	14,362	35,578	151,563	326,803	9.5	10.9
1992–93	19,657	45,760	187,768	376,493	10.5	12.2
1993–94	18,708	39,261	189,737	351,032	9.9	11.2
1994–95	19,585	36,503	242,514	409,939	8.1	8.9
1995–96	21,578	36,034	319,603	485,871	6.8	7.4
1996–97	26,145	38,980	313,055	442,800	8.4	8.8
1997–98	30,473	41,376	385,445	523,635	7.9	7.9
1998–99	36,046	46,890	424,046	550,691	8.5	8.5
1999–00	56,793	68,589	527,163	652,862	10.8	10.5
2000–01	52,926	62,109	510,354	608,929	10.4	10.2
2001–02	71,696	80,718	588,269	678,663	12.2	11.9
2002–03	67,522	73,514	619,320	699,219	10.9	10.5
2003–04	66,691	69,921	718,145	772,607	9.3	9.0
2004–05	76,096	76,096	1,011,178	1,011,178	7.5	7.5
2005–06	89,943	86,604	1,224,682	1,183,303	7.3	7.3
2006–07	101,102	92,057	1,490,876	1,364,822	6.8	6.7
2007–08	123,317	105,741	1,843,208	1,606,175	6.7	6.6
2008–09	160,347	127,127	1,927,890	1,566,234	8.3	8.1
2009–10	184,526	133,162	2,234,943	1,737,526	8.3	7.7
2010–11	197,364	132,734	2,680,579	1,976,746	7.4	6.7
2011–12	251,705	157,172	3,031,658	2,103,755	8.3	7.5
2012–13	277,839	162,083	3,242,727	2,108,653	8.6	7.7

Table 7 Agricultural GCF as percentage of aggregate GCF for all sectors (2011–12 series)

Year	2011–12 series					
	GCF—agriculture, forestry and fishing		GCF: industry total		GCF—agriculture and allied activities to GCF—industry total (%)	
	Current prices	Current prices	Current prices	Current prices	Current prices	Current prices
2011–12	273,870	273,870	3,205,716	3,205,716	8.5	8.5
2012–13	273,490	251,094	3,539,498	3,347,322	7.7	7.5
2013–14	330,836	284,424	3,660,242	3,324,683	9.0	8.6
2014–15	331,863	272,663	4,063,089	3,552,847	8.2	7.7
2015–16	298,555	237,648	4,219,570	3,731,740	7.1	6.4
2016–17	348,424	267,153	4,476,754	3,910,207	7.8	6.8
2017–18	379,627	283,922	5,050,201	4,276,990	7.5	6.6
2018–19	427,131	306,749	5,813,396	4,725,381	7.3	6.5

Source The original data are from the Central Statistical Office's National Accounts Statistics, Various Issues

Table 8 Gross capital formation by industry of use—public sector, private sector and total (1993–94 series)

Year	GCF in agriculture, forestry and fishing at current prices						GCF agriculture, forestry and fishing at constant prices					
	Public sector		Private sector		Total		Public sector		Private sector		Total	
	(1)		(2)		(3)		(1)		(2)		(3)	
1950–51					**187**	*3.4*					**3798**	*4.7*
1951–52					219	*3.9*					4262	*5.2*
1952–53					216	*4.0*					4100	*4.8*
1953–54					211	*3.5*					3903	*4.3*
1954–55					219	*4.3*					3992	*4.2*
1955–56					273	*5.5*					4934	*5.3*
1956–57					293	*4.6*					4849	*4.9*
1957–58					317	*5.1*					5081	*5.4*
1958–59					318	*4.4*					4820	*4.7*
1959–60					285	*4.0*					3965	*3.9*
1960–61	**133**	*1.8*	**230**	*3.0*	**363**	*4.8*	**2400**	*2.2*	**2858**	*2.6*	**5258**	*4.8*
1961–62	141	*1.8*	191	*2.4*	332	*4.2*	2440	*2.2*	2675	*2.4*	5115	*4.7*
1962–63	167	*2.1*	206	*2.6*	373	*4.7*	2833	*2.6*	2792	*2.6*	5625	*5.2*
1963–64	176	*1.9*	240	*2.5*	416	*4.4*	2945	*2.7*	3184	*2.9*	6129	*5.6*
1964–65	208	*1.8*	280	*2.4*	488	*4.2*	3119	*2.6*	3440	*2.9*	6559	*5.5*
1965–66	239	*2.1*	341	*3.0*	580	*5.0*	3276	*3.1*	3954	*3.7*	7230	*6.8*
1966–67	228	*1.7*	418	*3.1*	646	*4.8*	2857	*2.7*	4359	*4.1*	7216	*6.9*
1967–68	242	*1.4*	501	*3.0*	743	*4.4*	2849	*2.4*	4981	*4.1*	7830	*6.5*
1968–69	287	*1.7*	553	*3.2*	840	*4.9*	3162	*2.6*	5288	*4.4*	8450	*7.0*
1969–70	309	*1.6*	634	*3.4*	943	*5.0*	3158	*2.5*	5761	*4.5*	8919	*7.0*

Table 8 (continued)

Year	GCF in agriculture, forestry and fishing at current prices						GCF agriculture, forestry and fishing at constant prices					
	Public sector		Private sector		Total		Public sector		Private sector		Total	
	(1)		(2)		(3)		(1)		(2)		(3)	
1970–71	**348**	*1.8*	644	*3.3*	**992**	*5.1*	**3216**	*2.3*	5371	*3.9*	**8587**	*6.3*
1971–72	404	*2.0*	724	*3.6*	1128	*5.7*	3478	*2.6*	5669	*4.2*	9147	*6.8*
1972–73	525	*2.4*	808	*3.7*	1333	*6.1*	4212	*3.3*	5865	*4.6*	10,077	*7.9*
1973–74	588	*2.0*	993	*3.4*	1581	*5.5*	3983	*2.9*	6331	*4.6*	10,314	*7.5*
1974–75	614	*1.9*	1138	*3.6*	1752	*5.6*	3691	*2.7*	5876	*4.3*	9567	*7.1*
1975–76	745	*2.4*	1420	*4.5*	2165	*6.9*	4185	*2.7*	7038	*4.6*	11,223	*7.4*
1976–77	1057	*3.3*	1781	*5.6*	2838	*8.9*	5566	*3.9*	8599	*6.0*	14,165	*9.9*
1977–78	1258	*3.3*	1536	*4.1*	2794	*7.4*	6191	*3.9*	6877	*4.3*	13,068	*8.3*
1978–79	1452	*3.7*	2446	*6.3*	3898	*10.0*	6848	*4.2*	11,131	*6.9*	17,979	*11.1*
1979–80	1687	*4.2*	2623	*6.5*	4310	*10.7*	7141	*5.1*	10,217	*7.2*	17,358	*12.3*
1980–81	**1892**	*3.7*	2018	*4.0*	**3910**	*7.7*	**7301**	*4.6*	6932	*4.4*	**14,233**	*8.9*
1981–82	2041	*3.6*	2263	*4.0*	4304	*7.6*	7130	*4.3*	6949	*4.1*	14,079	*8.4*
1982–83	2263	*3.7*	2636	*4.3*	4899	*8.0*	7092	*4.3*	7437	*4.5*	14,529	*8.7*
1983–84	2466	*3.4*	2902	*4.0*	5368	*7.4*	7196	*3.9*	7529	*4.1*	14,725	*8.1*
1984–85	2678	*3.4*	3413	*4.4*	6091	*7.8*	6921	*3.7*	8027	*4.3*	14,948	*8.1*
1985–86	2818	*3.3*	3768	*4.5*	6586	*7.8*	6213	*3.3*	7919	*4.2*	14,132	*7.6*
1986–87	2895	*3.2*	4033	*4.5*	6928	*7.7*	5864	*3.2*	7844	*4.2*	13,708	*7.4*
1987–88	3304	*3.3*	4642	*4.6*	7946	*7.9*	6045	*3.3*	8249	*4.5*	14,294	*7.8*
1988–89	3442	*2.8*	5577	*4.5*	9019	*7.3*	5699	*2.7*	9063	*4.3*	14,762	*7.0*
1989–90	3354	*2.5*	5833	*4.3*	9187	*6.7*	4972	*2.3*	8452	*3.9*	13,424	*6.3*
1990–91	**3628**	*2.3*	8596	*5.4*	**12,224**	*7.7*	**4992**	*2.2*	11,424	*5.1*	**16,416**	*7.4*
1991–92	3653	*2.0*	9000	*4.8*	12,653	*6.8*	4376	*2.0*	10,589	*4.8*	14,965	*6.8*
1992–93	4175	*2.0*	10,300	*4.9*	14,475	*7.0*	4539	*2.0*	11,602	*5.0*	16,141	*6.9*
1993–94	4918	*2.0*	10,331	*4.3*	15,249	*6.3*	4918	*2.0*	10,331	*4.3*	15,249	*6.3*
1994–95	6002	*2.2*	12,381	*4.4*	18,383	*6.6*	5369	*2.1*	11,416	*4.5*	16,785	*6.6*
1995–96	6762	*2.2*	14,605	*4.8*	21,367	*7.0*	5322	*2.1*	12,367	*4.9*	17,689	*7.0*
1996–97	7296	*2.0*	17,119	*4.7*	24,415	*6.7*	5150	*1.9*	13,176	*4.8*	18,326	*6.6*
1997–98	6921	*1.8*	19,087	*4.9*	26,008	*6.7*	4503	*1.7*	13,791	*5.1*	18,294	*6.8*
1998–99	7583	*1.7*	19,131	*4.3*	26,714	*6.0*	4444	*1.6*	13,026	*4.6*	17,470	*6.1*
1999–00	8662	*1.9*	23,646	*5.1*	32,308	*7.0*	4756	*1.7*	15,268	*5.3*	20,024	*7.0*
2000–01	**8170**	*1.7*	24,628	*5.3*	**32,798**	*7.0*	**4435**	*1.5*	15,374	*5.4*	**19,809**	*6.9*
2001–02	10,348	*2.0*	25,138	*4.9*	35,486	*7.0*	5488	*1.8*	14,872	*4.9*	20,360	*6.7*
2002–03	9476	*1.9*	28,496	*5.6*	37,972	*7.5*	4760	*1.7*	16,740	*5.9*	21,500	*7.6*
2003–04					43,907	*7.6*					24,186	*7.8*

Note Figures in italics are percentages to GDP originating from respective sectors, *Source* CSO: *National Accounts Statistics 2005* (1993–94 series) and *New Series of National Accounts Statistics (base year 1993–94)*

Table 9 Gross capital formation by industry of use—public sector, private sector and total: 2004–05 series and 2011–12 series

Year	Agriculture, forestry and fishing						Current prices	Constant prices
	At current prices			Constant prices			GDP at factor cost—agriculture and allied activities	GDP at factor cost—agriculture and allied activities
	Public	Private	Total	Public	Private	Total		
1980–81	1874	2355	4228	16,240	16,757	32,998	48,426	285,015
1981–82	2069	1990	4059	15,234	12,606	27,840	54,583	298,130
1982–83	2223	2488	4711	14,910	14,229	29,139	58,849	297,293
1983–84	2465	3110	5574	15,434	16,676	32,110	70,228	327,382
1984–85	2700	3095	5795	14,786	15,078	29,863	75,731	332,571
1985–86	2802	3530	6332	13,220	15,176	28,396	81,160	333,616
1986–87	2904	4066	6971	13,175	16,925	30,101	87,111	332,250
1987–88	3291	6385	9676	13,114	23,518	36,632	96,905	326,975
1988–89	3410	6572	9982	12,107	21,750	33,857	119,678	378,113
1989–90	3299	7840	11,140	10,601	23,559	34,160	132,264	382,609
1990–91	3575	14,458	18,033	10,546	40,568	51,114	154,350	397,971
1991–92	3597	10,765	14,362	9239	26,339	35,578	180,313	390,201
1992–93	4105	15,553	19,657	10,048	35,712	45,760	202,219	416,153
1993–94	4862	13,845	18,708	10,593	28,668	39,261	234,566	429,981
1994–95	5940	13,645	19,585	11,389	25,114	36,503	270,107	450,258
1995–96	6654	14,924	21,578	11,349	24,685	36,034	293,701	447,127

(continued)

Table 9 (continued)

| Year | Agriculture, forestry and fishing | | | | | | Current prices | Constant prices |
| | At current prices | | | Constant prices | | | GDP at factor cost—agriculture and allied activities | GDP at factor cost—agriculture and allied activities |
	Public	Private	Total	Public	Private	Total		
1996–97	7196	18,948	26,145	10,872	28,109	38,980	353,142	491,484
1997–98	6759	23,714	30,473	9162	32,214	41,376	374,744	478,933
1998–99	7447	28,598	36,046	9716	37,174	46,890	430,384	509,203
1999–00	8667	48,126	56,793	10,283	58,307	68,589	455,302	522,795
2000–01	8175	44,751	52,926	9457	52,652	62,109	460,608	522,755
2001–02	10,355	61,341	71,696	11,601	69,117	80,718	498,620	554,157
2002–03	9563	57,959	67,522	10,299	63,215	73,514	485,080	517,559
2003–04	12,218	54,472	66,691	12,683	57,238	69,921	544,667	564,391
2004–05	16,187	59,909	76,096	16,187	59,909	76,096	565,427	565,427
2005–06	20,739	69,204	89,943	19,940	66,664	86,604	637,772	594,487
2006–07	25,606	75,496	101,102	22,987	69,070	92,057	722,984	619,190
2007–08	27,638	95,679	123,317	23,257	82,484	105,741	836,518	655,080
2008–09	26,692	133,655	160,347	20,572	106,555	127,127	943,204	655,689
2009–10	33,201	151,325	184,526	22,693	110,469	133,162	1,083,514	660,987
2010–11	31,968	165,396	197,364	19,854	112,880	132,734	1,319,686	717,814
2011–12	36,887	214,818	251,705	21,184	135,988	157,172	1,499,098	753,832
2012–13	45,511	232,328	277,839	23,886	138,197	162,083	1,644,926	764,510

Table 9 (continued)

Year	Ratio (%)					
	At current prices			Constant prices		
	Public to GDP at factor cost—agriculture and allied activities	Private to GDP at factor cost—agriculture and allied activities	Total to GDP at factor cost—agriculture and allied activities	Public to GDP at factor cost—agriculture and allied activities	Private to GDP at factor cost—agriculture and allied activities	Total to GDP at factor Cost—agriculture and allied activities
1980–81	3.9	4.9	8.7	5.7	5.9	11.6
1981–82	3.8	3.6	7.4	5.1	4.2	9.3
1982–83	3.8	4.2	8.0	5.0	4.8	9.8
1983–84	3.5	4.4	7.9	4.7	5.1	9.8
1984–85	3.6	4.1	7.7	4.4	4.5	9.0
1985–86	3.5	4.3	7.8	4.0	4.5	8.5
1986–87	3.3	4.7	8.0	4.0	5.1	9.1
1987–88	3.4	6.6	10.0	4.0	7.2	11.2
1988–89	2.8	5.5	8.3	3.2	5.8	9.0
1989–90	2.5	5.9	8.4	2.8	6.2	8.9
1990–91	2.3	9.4	11.7	2.6	10.2	12.8
1991–92	2.0	6.0	8.0	2.4	6.8	9.1
1992–93	2.0	7.7	9.7	2.4	8.6	11.0
1993–94	2.1	5.9	8.0	2.5	6.7	9.1
1994–95	2.2	5.1	7.3	2.5	5.6	8.1

(continued)

Table 9 (continued)

Year	Ratio (%)					
	At current prices			Constant prices		
	Public to GDP at factor cost—agriculture and allied activities	Private to GDP at factor cost—agriculture and allied activities	Total to GDP at factor cost—agriculture and allied activities	Public to GDP at factor cost—agriculture and allied activities	Private to GDP at factor cost—agriculture and allied activities	Total to GDP at factor Cost—agriculture and allied activities
1995–96	2.3	5.1	7.3	2.5	5.5	8.1
1996–97	2.0	5.4	7.4	2.2	5.7	7.9
1997–98	1.8	6.3	8.1	1.9	6.7	8.6
1998–99	1.7	6.6	8.4	1.9	7.3	9.2
1999–00	1.9	10.6	12.5	2.0	11.2	13.1
2000–01	1.8	9.7	11.5	1.8	10.1	11.9
2001–02	2.1	12.3	14.4	2.1	12.5	14.6
2002–03	2.0	11.9	13.9	2.0	12.2	14.2
2003–04	2.2	10.0	12.2	2.2	10.1	12.4
2004–05	2.9	10.6	13.5	2.9	10.6	13.5
2005–06	3.3	10.9	14.1	3.4	11.2	14.6
2006–07	3.5	10.4	14.0	3.7	11.2	14.9
2007–08	3.3	11.4	14.7	3.6	12.6	16.1
2008–09	2.8	14.2	17.0	3.1	16.3	19.4
2009–10	3.1	14.0	17.0	3.4	16.7	20.1
2010–11	2.4	12.5	15.0	2.8	15.7	18.5
2011–12	2.5	14.3	16.8	2.8	18.0	20.8
2012–13	2.8	14.1	16.9	3.1	18.1	21.2

Table 10 Gross capital formation by industry of use – public sector, private sector and total: 2011–12 series. Note: In this table, the below part contains current price and constant price twice, keep the bottom one and remove the top one

Year	2011–12 series							
	At current prices			Constant prices			GVA—agriculture and allied activities	
	Public	Private	Total	Public	Private	Total	Current prices	Contact prices
2011–12	35,696	238,174	273,870	35,696	238,174	273,870	1,501,947	1,501,947
2012–13	39,743	233,747	273,490	36,019	215,075	251,094	1,675,107	1,524,288
2013–14	40,827	290,009	330,836	33,925	250,499	284,424	1,926,372	1,609,198
2014–15	47,319	284,544	331,863	37,172	235,491	272,663	2,093,612	1,605,715
2015–16	56,167	242,388	298,555	42,522	195,126	237,648	2,227,533	1,616,146
2016–17	66,895	281,529	348,424	47,767	219,386	267,153	2,518,662	1,726,004
2017–18	67,140	312,487	379,627	46,185	237,737	283,922	2,796,908	1,828,329
2018–19	92,606	334,525	427,131	61,628	245,121	306,749	2,922,846	1,872,339

Year	2011–12 series					
	At current prices			Constant prices		
	Public to GVA—agriculture and allied activities	Private to GVA—agriculture and allied activities	Total to GVA—agriculture and allied activities	Public to GVA—agriculture and allied activities	Private to GVA—agriculture and allied activities	Total to GVA—agriculture and allied activities
2011–12	2.4	15.9	18.2	2.4	15.9	18.2
2012–13	2.4	14.0	16.3	2.4	14.1	16.5
2013–14	2.1	15.1	17.2	2.1	15.6	17.7
2014–15	2.3	13.6	15.9	2.3	14.7	17.0

(continued)

Table 10 (continued)

Year	2011–12 series					
	At current prices			Constant prices		
	Public to GVA—agriculture and allied activities	Private to GVA—agriculture and allied activities	Total to GVA—agriculture and allied activities	Public to GVA—agriculture and allied activities	Private to GVA—agriculture and allied activities	Total to GVA—agriculture and allied activities
	At current prices			Constant prices		
2015–16	2.5	10.9	13.4	2.6	12.1	14.7
2016–17	2.7	11.2	13.8	2.8	12.7	15.5
2017–18	2.4	11.2	13.6	2.5	13.0	15.5
2018–19	3.2	11.4	14.6	3.3	13.1	16.4

(1) GCF of economy (public sector) is the sum of GCF of public non-financial corporations, public financial corporations and general government

(2) GCF of economy (private sector) is the sum of GCF of private non-financial corporations, private financial corporations and households

Source Central Statistics Office (CSO), National Accounts Statistics (Various Issues)

Oil Palm for Edible Oil Security in India

Parmod Kumar

1 Introduction

The increasing gap between demand and supply of vegetable oils as well as its nutritional requirement for rising population is taking a shape of crisis in India which is absorbing country's crucial foreign exchange in importing edible oils especially the oil palm for meeting the rising demand for edible oils. In our country, the availability of edible oils is only 7 kg per capita which is far below the world average of 15 kg per capita, and more importantly, it is difficult to leapfrog production of oilseeds with the given area of major nine oilseeds that are all annual crops with limited scope of increasing productivity in a shorter period of time. To overcome the existing gap as well as to manage the future demand of edible oils, there is a dire need to promote high oil yielding crop that too in a short span of the coming decade. Oil palm being a perennial and high oil yielding crop (4–6 tonnes/ha/year) fits well in the process of augmenting the vegetable oil production in the country (Sahahra, 2017). Moreover, after achieving security in food grains, the country is now concentrating on nutritional security for which the oil palm with its high beta carotene (the pro-vitamin A) and vitamin E, tocopherol, tocotrienol and high calorific value can play a vital role (Nagendran et al., 2000).

Consumption of oil palm in India is the highest compared to that of other edible oils, followed by soybean, rapeseed-mustard and groundnut oil (GoI, 2019). India has been mainly depending on import of oil from other countries to meet its vegetable oil requirements. During 2018–19, India imported 15 million tonnes of vegetable oil of which oil palm accounted for about 8.81 million tonnes (around 60% of total import), which implies that the country is dependent on oil palm imports to a great extent for its annual edible oil requirement. In addition, the total demand for edible

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oils is expected to increase further. India will continue to depend on imports to the extent of about 40% of its consumption requirement. At present, Indonesia and Malaysia are the leading producers and exporters of oil palm followed by Ivory Coast and Papua New Guinea. In India, a detailed study made by Chadha Committee in 2006 identified 10.4 lakh hectares as potential area for oil palm growing in the identified states (Chadha & Rethinam, 1991). Out of this identified potential area, 2.8 lakh ha has already been covered by 2015–16. Andhra Pradesh ranks first in the area coverage followed by Karnataka, Mizoram and Tamil Nadu. The Oil Palm Development Programme under ISOPOM provides assistance to encourage oil palm. In addition to the Oil Palm Development Programme, a special programme of Oil Palm Area Expansion Programmme (OPAE) under Rashtriya Krishi Vikas Yojana (RKVY) is under implementation from 2011 to 12 onwards with the focus to bring 60,000 ha per annum additional area under oil palm.

This paper makes a field-level assessment of oil palm production by the selected farmers in Karnataka, Andhra Pradesh and Tamil Nadu. The study provides comparison of productivity, cost and profitability among the oil palm growing farmers across three major oil palm growing states. The study also provides a snapshot of subsidy provisions made by the state governments. The study is based on filed data collected through random sampling. Primary survey was carried out based on an outlined questionnaire prepared for the purpose of this study. Two highest area districts were selected from each selected state, namely Karnataka, Andhra Pradesh and Tamil Nadu. From the selected districts, one taluk was selected having highest area under oil palm. From each selected taluk, an appropriate number of villages were selected having significant area under exotic and indigenous varieties. In this way from each selected district/taluk, 50 households were selected who grow indigenous variety and 50 households were selected who grow exotic variety of oil palm. Thus, a total number of 100 indigenous farmers and 100 exotic farmers were surveyed in details in each selected state. The aggregate sample is 600 households with 300 each growing indigenous and exotic varieties of oil palm.[1] In addition to collection of information from the households, the state, district and village/taluk officials were also interviewed and information relevant for the study was sought.

1.1   Oil Palm Area Expansion (OPAE) Programme in India

The Committees constituted by Department of Agriculture, Cooperation and Farmers Welfare (DAC&FW) have identified 19.33 lakh ha area suitable for oil palm cultivation in 19 states of the country including 2.18 lakh ha area in North Eastern States (Oilseeds Division, GoI) This assessment was made by Dr. Rethinam Committee during the year 2012. Out of 19.33 lakh ha area, the potential states are Andhra

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[1] The survey in Andhra Pradesh and Tamil Nadu states was carried out by the respective Agro Economic Research Centres for the coordinated study conducted by the author of this paper. Their data contribution is thankfully acknowledged.

Pradesh (4.69 lakh ha), Gujarat and Karnataka with 2.60 lakh ha and Tamil Nadu and Bihar with 2.00 lakh ha area (Table 1). In view of the importance and significance of oil palm cultivation, DAC&FW Ministry of Agriculture took up Technology Mission on Oilseeds and Pulses (TMOP) in 1991–92 in the potential states (Oilseeds Division, GoI). A comprehensive Centrally Sponsored Scheme Oil Palm Development Programme (OPDP) was taken up during 8th and 9th Plan. During the 10th and 11th Plan, Government of India had provided support for oil palm cultivation under Centrally Sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) (Oilseeds Division, GoI). To boost oil palm cultivation, Government of India had implemented a Special Programme on Oil Palm Area Expansion (OPAE) under Rashtriya Krishi Vikas Yojana (RKVY) with an objective to bring 60,000 ha

Table 1 Total potential area for oil palm cultivation in India

Sr. no.	State	Area identified (ha)			
		DAC committee	Reassessed by committee	Additional potential area	Reassessed total potential area
		1988	2006	2012	2012
1	Andaman Nicobar	–	–	3000	3000
2	Andhra Pradesh	250,000	400,000	69,500	469,500
3	Arunachal Pradesh	–	–	25,000	25,000
4	Assam	10,000	–	15,000	25,000
5	Bihar	–	–	200,000	200,000
6	Chhattisgarh	–	40,000	8000	48,000
7	Goa	–	2000	–	2000
8	Gujarat	–	90,000	170,250	260,250
9	Karnataka	250,000	250,000	10,000	260,000
10	Kerala	5000	6500	–	6500
11	Maharashtra	10,000	–	170,000	180,000
12	Meghalaya	–	–	50,000	50,000
13	Mizoram	–	61,000	–	61,000
14	Nagaland	–	–	50,000	50,000
15	Odisha	10,000	25,000	31,000	56,000
16	Tamil Nadu	25,000	162,000	43,000	205,000
17	Tripura	5000	–	2000	7000
18	West Bengal	10,000	–	15,000	25,000
	Total	575,000	1,036,500	861,750	1,933,250

Source Status paper on Oil Palm, DOA and FW, Government of India

area under oil palm cultivation during the year 2011–12. It was continued till March, 2014 (Oilseeds Division, GoI).

During the 12th Five-Year Plan, a new National Mission on Oilseeds and Oil Palm (NMOOP) has been launched under which Mini Mission-II (MM-II) is dedicated to oil palm area expansion and productivity increases (Oilseeds Division, GoI). MM-II of NMOOP is being implemented in 12 states, viz. Andhra Pradesh, Telangana, Chhattisgarh, Tamil Nadu, Kerala, Gujarat, Karnataka, Odisha, Mizoram, Nagaland, Assam and Arunachal Pradesh with effect from the financial year 2014–15. Under the Mission, financial assistance is being provided to the farmers @ 85% cost of the planting material and @ 50% cost of the other components like maintenance cost of new plantations for four years, installation of drip-irrigation systems, diesel/electric pump-sets, bore-well/water harvesting structures/ponds, inputs for intercropping in oil palm (during gestation period), construction of vermi-compost units and purchasing of machinery and tools, etc. (Oilseeds Division, GoI).

These developmental efforts have resulted in area expansion under oil palm from 8585 ha in 1991–92 to 3,00,510 ha by the end of 2015–16. Similarly, the fresh fruit bunches (FFBs) production and crude palm oil (CPO) production have increased from 21,233 metric tonnes and 1134 metric tonnes, respectively, in 1992–93 to 12,82,823 and 2,17,258 metric tonnes, respectively, during the year 2015–16 (Oilseeds Division, GoI). At present, Andhra Pradesh, Karnataka, Tamil Nadu, Odisha and Mizoram are major oil palm-growing states. State-wise details of area achieved under oil palm cultivation and production of FFBs and CPO up to the year 2015–16 are given in Table 2. The highest area was realized in Andhra Pradesh followed by Karnataka, Tamil Nadu, Mizoram, Odisha and Telangana, while other states had only small share. On the other hand, the production of FFB and CPO was highest in Andhra Pradesh followed by Telangana, Kerala, Karnataka and Tamil Nadu. The ordering of area and production indicates huge differences in productivity of oil palm in different states. The productivity is presented in the last two columns. Andhra Pradesh shows highest productivity, followed by Kerala, Telangana and Goa.

2 Findings from the Primary Survey

Following this introduction, rest of the paper compares productivity, resource use and profitability among the indigenous and exotic varieties of oil palm in three highest producing states, viz. Andhra Pradesh, Karnataka and Tamil Nadu, based on household survey data of 200 households from two districts in each state. The data is analysed with respect to net operational area of each of the sample households. For this purpose, the sample farmers are grouped as marginal, small, medium and large farmers. Net operational area was taken as basis for this classification. The sample farmers whose net operational holding was equal to or less than 2.5 acres were categorized as marginal farmers. The net operated holdings of small farmers ranged between 2.51 and 5.0 acres. The sample farmers with net operational holdings above 5.0 acres and less than or equal to 10.0 acres were grouped as medium farmers.

Table 2 State-wise total area and production of oil palm in 2015–16

Sr. no.	State	Total area coverage (ha)	Production in metric tonnes		Productivity (tonnes/ha)	
			FFBs	CPO	FFBs	CPO
1	Andhra Pradesh	1,50,530	1,144,092	193,562	7.60	1.29
2	Telangana	16,239	63,508	11,289	3.91	0.70
3	Karnataka	41,431	14,740	2538	0.36	0.06
4	Tamil Nadu	29,510	7810	1222	0.26	0.04
5	Gujarat	5054	523	0	0.10	0.00
6	Goa[a]	953	3217	581	3.38	0.61
7	Odisha	18,484	4569	618	0.25	0.03
8	Tripura[a]	530	0	0	0.00	0.00
9	Assam	570	0	0	0.00	0.00
10	Kerala	5769	40,611	7016	7.04	1.22
11	Maharashtra[a]	1474	0	0	0.00	0.00
12	Mizoram	25,741	3753	432	0.15	0.02
13	Chhattisgarh	2162	0	0	0.00	0.00
14	Andaman Nicobar	1593	0	0	0.00	0.00
15	Arunachal Pradesh	330	0	0	0.00	0.00
16	Nagaland	140	0	0	0.00	0.00
	Total	3,00,510	12,82,823	2,17,258	4.27	0.72

Source Status paper on Oil Palm, DOA and FW, Government of India
Note [a]NMOOP is not being implemented

Rest of all the sample farmers having operational holdings above 10.0 acres were classified as large farmers.

2.1 Profitability Differences Between Exotic and Indigenous Varieties

The average area planted under indigenous varieties was by and large higher than that of exotic varieties among all our selected households with only exception of medium and large farmers in Karnataka and small farmers in Andhra Pradesh. On average, area planted per household (variety-wise) was highest in Andhra Pradesh, followed by Tamil Nadu and it was least in Karnataka. Per household area under indigenous and exotic varieties in Andhra Pradesh was 7.3 and 4.9 acres, respectively. It was 3.2 and 2.8 acres, respectively in Tamil Nadu and 2.9 and 4.2 acres in Karnataka under indigenous and exotic varieties, respectively. Production of fresh fruit bunches (FFBs) varied among the two varieties across size of holdings and there was huge variation

in productivity across the three selected states (Table 3). The average production of FFBs for exotic varieties was around 3 tonnes per acre, whereas it was slightly above 4 tonnes per acre in the indigenous varieties in Karnataka. In Andhra Pradesh, average productivity of exotic variety was higher compared to indigenous variety among the selected households and in both the cases productivity in Andhra Pradesh was double or more than double as compared to that of Karnataka. On average, productivity of exotic variety in Andhra Pradesh was 10.4 tonnes per acre compared with 9.6 tonnes per acre for indigenous variety. In contrast, average productivity of exotic variety in Tamil Nadu lied between that of Karnataka and Andhra Pradesh, while productivity of indigenous variety in Tamil Nadu was much above compared to both Karnataka as well as Andhra Pradesh. Average productivity of exotic variety in Tamil Nadu was 7.7 tonnes per acre whereas indigenous variety averaged at 15 tonnes per acre.

According to our field data, per tonne price received by our selected households averaged at Rs. 6571 per tonne for exotic varieties and Rs. 6713 for the indigenous variety in Karnataka, whereas the declared minimum support price was Rs. 9500 per tonne. In Andhra Pradesh, a uniform price of Rs. 6500 per tonne was obtained by all the selected farmers, whereas in Tamil Nadu, average price obtained was Rs. 5380 for exotic variety and Rs. 5412 per tonne for indigenous variety. In Karnataka, the value of output per acre of indigenous variety was Rs. 41 thousand in comparison to exotic variety of Rs. 29 thousand. In Andhra Pradesh, productivity per acre of exotic variety was Rs. 67 thousand compared to Rs. 62 thousand in the case of indigenous variety. In Tamil Nadu, productivity of indigenous variety was almost double, Rs. 81 thousand per acre compared to exotic variety which averaged at Rs. 41 thousand per acre.

The cost incurred consists of two components, fixed cost and variable cost. In the case of exotic variety, out of total cost, variable cost consisted 86 percent and fixed cost (amortized into the life period of the plant) was 14 percent in Karnataka, 85 and 15%, respectively in Andhra Pradesh and 88 and 12 percent, respectively in Tamil Nadu. On average, total variable cost per acre was measured at Rs. 23.5 thousand in Karnataka, Rs. 34 thousand in Andhra Pradesh and Rs. 32.5 thousand in Tamil Nadu. In the case of indigenous variety in Karnataka, out of total cost, variable cost consisted of 92 percent and fixed cost (amortized into the life period of the plant) was only 8 percent. On average, total variable cost was measured at Rs. 34 thousand. The overall cost of cultivation of indigenous oil palm in Karnataka was measured at Rs. 37.5 thousand per acre. In Andhra Pradesh, the variable and fixed costs were in the ratio of 87 and 13 and the total cost aggregated at Rs. 37 thousand per acre. In Tamil Nadu, total variable cost for indigenous variety was estimated at Rs. 33 thousand per acre. Fixed cost amortized over the life time consisted of Rs. 4.5 thousand per acre and aggregate cost including variable and fixed cost was measured at Rs. 37 thousand per acre.

Looking at the profitability per acre for exotic and indigenous varieties, total revenue obtained by the farmers by selling their crop exceeded total variable cost among all categories of farmers without any exception in all the three states (Fig. 1). However, if one adds up the fixed cost also, the total cost exceeded total revenue

Table 3 Area and production under oil palm—variety-wise

Farm size	Area under oil palm (acres per hh)	Area under oil palm as % of NOA	No of plants per acre	Production of FFB per acre (tonnes)	Value of output per acre (Rs.)	Value of output per hh (Rs.)	Recommended MSP (Rs. per tonne)	[a]Actual price obtained Rs. per tonne
Karnataka								
Exotic variety								
Marginal	1.00	22.42	53	3.50	33,250	33,250	9500	6500
Small	2.02	16.98	54	3.26	31,012	62,542	9500	6469
Medium	3.40	16.05	57	2.60	24,681	83,917	9500	6344
Large	4.97	9.49	55	3.11	29,535	146,790	9500	6621
Total	4.21	10.51	55	3.03	28,814	121,206	9500	6571
Indigenous variety								
Marginal	2.25	50.45	56	4.00	38,000	85,500	9500	6500
Small	2.43	35.84	56	4.69	44,525	108,345	9500	6529
Medium	2.44	20.86	55	4.32	41,051	100,250	9500	6542
Large	3.67	4.20	56	4.14	39,345	144,264	9500	6910
Total	2.91	7.28	56	4.29	40,776	118,820	9500	6713
Andhra Pradesh								
Exotic variety								
Marginal	1.78	98.34	57	10.59	68,865	122,500	6500	6500
Small	3.68	92.69	57	10.61	68,980	253,500	6500	6500
Medium	5.89	73.54	55	9.80	63,702	374,969	6500	6500
Large	10.89	51.93	57	10.78	70,072	763,296	6500	6500
Total	4.90	56.25	56	10.35	67,280	329,680	6500	6500
Indigenous variety								
Marginal	1.86	100.00	57	10.38	67,461	125,794	6500	6500
Small	3.29	82.87	57	11.21	72,845	222,368	6500	6500
Medium	6.06	75.65	57	9.82	63,827	386,750	6500	6500
Large	13.67	65.19	57	9.29	60,365	825,297	6500	6500
Total	7.26	83.35	57	9.57	62,223	451,490	6500	6500
Tamil Nadu								
Exotic variety								
Marginal	1.05	47.80	56	8.36	42,442	44,563	5503	5077
Small	2.07	20.83	55	7.60	38,451	79,594	5477	5059
Medium	3.43	12.23	56	7.77	40,696	139,588	5685	5238
Large	4.79	18.28	56	7.07	43,455	208,150	5615	6146

Table 3 (continued)

Farm size	Area under oil palm (acres per hh)	Area under oil palm as % of NOA	No of plants per acre	Production of FFB per acre (tonnes)	Value of output per acre (Rs.)	Value of output per hh (Rs.)	Recommended MSP (Rs. per tonne)	[a]Actual price obtained Rs. per tonne
Total	2.84	24.79	56	7.70	41,261	117,974	5820	5380
Indigenous variety								
Marginal	1.14	16.08	56	15.95	89,480	102,007	5069	5610
Small	2.36	30.33	56	16.52	88,002	207,685	5774	5327
Medium	3.59	29.81	56	16.24	87,426	313,861	5838	5383
Large	5.60	19.37	56	11.40	60,726	340,063	5780	5327
Total	3.17	23.90	56	15.02	81,285	240,904	5865	5412

Source Field survey

Note [a]The actual price obtained by farmers at the time of harvest, while balance of recommended MSP was paid later on
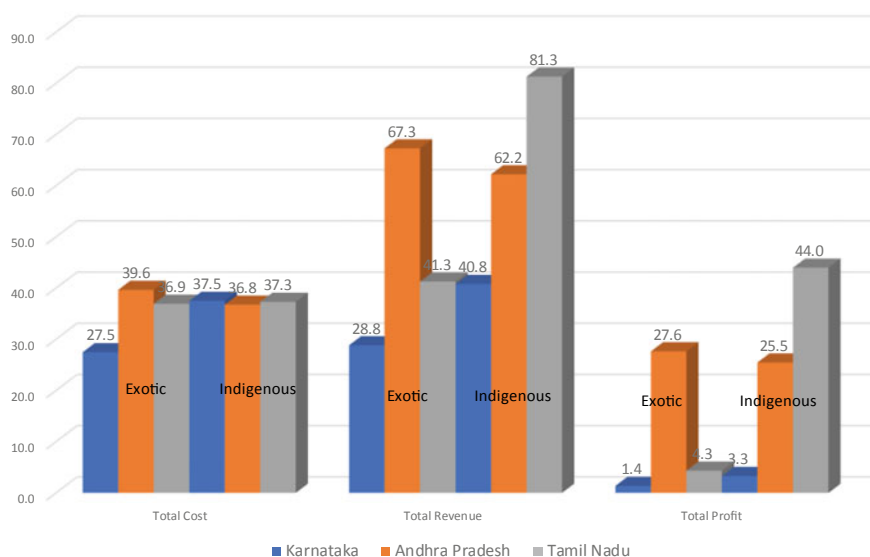

Fig. 1 Cost, revenue and profit from oil palm—(Rs. thousand per acre)

in the case of marginal farmers of exotic variety and medium farmers in the case of indigenous variety in Karnataka while they incurred losses albeit loss was only nominal. In other two states, all category of farmers had revenue that exceeded total cost and thereby all categories earned profits, albeit the amount of profit varied widely

across categories. Per acre net profit (over total cost) was as low as Rs. 1.3 thousand for exotic variety in Karnataka to as high as Rs. 44 thousand in indigenous variety in Tamil Nadu. Comparing the two varieties across the three states, net profit for indigenous variety was Rs. 3.3 thousand in Karnataka, Rs. 25 thousand in Andhra Pradesh and Rs. 44 thousand in Tamil Nadu. In the case of exotic variety, net profit was Rs. 1.3 thousand in Karnataka, Rs. 28 thousand in Andhra Pradesh and Rs. 4 thousand in Tamil Nadu. There were mainly two reasons for almost nil profit in the case of exotic variety and lower than expected profit in indigenous variety in Karnataka. On the one hand, the productivity realized by Karnataka sample farmers was less than that of other states, and on the other hand, there was difference between the price obtained and the declared Minimum Support Price. The farmers pointed out that the MSP was not only low but it was also not being protected at the time of harvest. Only a part of the MSP was paid to the farmers at the time of harvest, and balance was cleared almost six months later. The MSP was not sufficient to cover appropriately the cost of cultivation which was on rise because of increasing wage rate.

2.2 Subsidy Provision and Capacity Building Under Oil Palm Development

On average, all sample households irrespective of the size of the holding received subsidy for planting material, establishment of drip irrigation and Inputs for intercropping like seed, fertilizer etc. The amount of subsidy received per household was Rs. 87 thousand in Karnataka, Rs. 55.5 thousand in Andhra Pradesh and Rs. 34 thousand in Tamil Nadu. In Karnataka, subsidy amount was highest Rs. 31 thousand for installation of bore well, followed by drip irrigation Rs. 17 thousand, planting material and inputs for intercropping, Rs. 9 thousand each and installation of pump set Rs. 5 thousand. In Andhra Pradesh, per household subsidy amount varied from Rs. 22.5 thousand for provision of seed, etc., Rs. 16 thousand for inputs for intercropping, Rs. 10 thousand for drip irrigation and Rs. 7 thousand for machinery and other tools. In Tamil Nadu, per household subsidy was highest Rs. 18 thousand for seed and planting material, Rs. 5 thousand for gestation period and machinery, each and around Rs. 4 thousand for intercropping seed and fertilizer and Rs. 2 thousand for vermi-compost (Fig. 2).

Subsidy per acre averaged at Rs. 24 thousand in Karnataka, Rs. 10 thousand in Tamil Nadu and Rs. 9 thousand in Andhra Pradesh. Unlike per household, subsidy per acre in Karnataka was highest for medium farmers Rs. 27 thousand, followed by small farmers Rs. 25 thousand, large farmers Rs. 24 thousand and marginal farmers Rs. 11 thousand. In Andhra Pradesh, highest subsidy was recorded by marginal farmers Rs. 15 thousand per acre, followed by small farmers Rs. 12 thousand, medium farmers Rs. 9 thousand and large farmers Rs. 7.5 thousand. In Tamil Nadu, unlike other two states subsidy amount was not much different across various farm size holdings. The
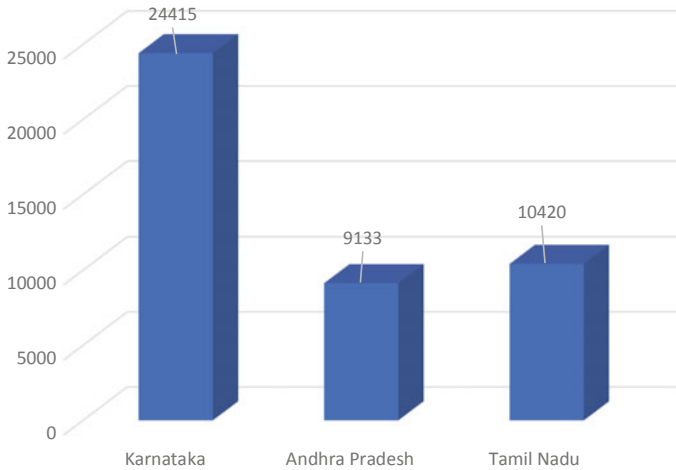
Fig. 2 Subsidy amount for oil palm (Rs. per acre). *Source* Own Field Survey

subsidy was slightly less than Rs. 10 thousand in the case of marginal farmers and Rs. 10.5 thousand in the case of small, medium and large farmers.

The oil palm is a new crop, and the technical details about its planting, caring, harvesting and transportation require requisite knowledge and thereby farmers' capacity building is principal component of Oil Palm Development Programme. Among our selected sample farmers, majority of palm grower sample farmers obtained some training sessions. It may be noted that the training was provided to the sample farmers by various departments. Highest 50% farmers pointed out that they obtained training organized from the company/agency which provided them buy back facility of their produce or in other words the registered company operating in oil palm in their district. Around 11% households indicated having obtained training through State Horticulture Department. Similarly, few others obtained training through agricultural universities, cooperatives and other local bodies and through NGOs. Trainings were mostly held within or nearby village, town or in the nearest district headquarters. The number of days of training was mostly for 1–2 days, and it was held once or twice in a year's time.

2.3 Farmers' Perception About Oil Palm Development Programme

The perceptions of the farmers about their experiences in cultivating oil palm crop are very helpful in reviewing the performance of oil palm programme. Inquiring about how government helped them to bring their area under oil palm crop, almost three-fourths majority of the households opined that government provided them

seedling/nursery, material inputs and buy back facility though the registered agencies in their operational area. Around 40% households indicated that they were provided with requisite training facility. Among selected farm size holdings, there was no much difference in the resource provision for area expansion of oil palm, albeit marginal farmers indicated that they were not provided with the appropriate capacity building activities. About two-thirds majority of the selected farmers agreed that financial assistance through oil palm, capacity building as well as subsidy provision in terms of direct payment was a good point of the oil palm programme. Absolute majority of the households agreed that subsidy provision was completely effective and they obtained the subsidy under various heads. Among the farm size holdings, the proportion of farmers obtaining financial assistance or subsidy was more or less even among all size classes.

On our question, what changes farmers suggested to increase acreage under oil palm cultivation: a clear majority of the farmers (57% in Karnataka and 54% in Andhra Pradesh) called for increasing minimum support price of oil palm as the present price structure was not providing enough incentives to grow this crop? Another 23% in Karnataka and 10% in Andhra Pradesh demanded help for modern equipment for harvesting the fresh fruit bunches as it was a tedious job especially with the increase in age, the height of the plants grows and it becomes difficult to reach to the fruit for harvesting. The other major suggestion was increasing awareness about oil palm cultivation as very few farmers were ready to shift to oil palm despite government help available for this crop. Increase in awareness could also improve productivity with better knowledge dissemination on what to do and what not to do in cultivation of this crop. Timely payment was another requirement from the farmers as they were paid only a part of the total value of their crop that was causing liquidity crunch among the growers. Across various farm size holdings, enhancement in price and harvesting equipment was the requirement from both small and large farmers.

3   Conclusions and Policy Suggestions

Oil palm is comparatively a new crop in India and is the highest vegetable oil yielding perennial crop. With quality planting materials, irrigation and proper management, there is a potential of achieving 20–30 MT fresh fruit bunches (FFBs) per ha after attaining the age of 5 years. Therefore, there is an urgent need to intensify efforts for area expansion under oil palm to enhance oil palm production in the country. Technology Mission on Oil Seeds was started by the Ministry of Agriculture Government of India way back in 1986 to address the problem of edible oil (Rethinam, 1992). Since then the Government of India has been running several programmes to promote oil palm, the latest being the National Mission of Oilseeds and Oil Palm (NMOOP) from 2014–15. The developmental efforts have resulted in area expansion under oil palm from 8585 ha in-1991–92 to around 3 lakh ha by the end of 2015–16 (Oilseeds Division, GoI). Similarly, production of fresh fruit bunches (FFBs) and crude palm oil (CPO) has increased from 21,233 tonne and 1,134 tonne, respectively (1992–93)

to 11,50,000 tonne and 1,98,000 tonne during the year 2014–15 (Oilseeds Division, GoI).

Among the surveyed villages, around 16% of the cultivated area by the selected farmers was under oil palm in Karnataka, 69% in Andhra Pradesh and 45% in Tamil Nadu. Among exotic and indigenous varieties, the marginal and small farmers devoted more area under indigenous varieties, whereas medium and large farmers devoted higher area under exotic varieties. Productivity of exotic variety was highest in Andhra Pradesh and indigenous variety in Tamil Nadu, while Karnataka was lowest in productivity in both the varieties. Not only the average production was lowest in Karnataka, it was lowest for across all size of holdings in both the varieties. Per tonne price received by our selected households averaged at Rs. 6571 per tonne for exotic varieties and Rs. 6713 for the indigenous variety, whereas the declared minimum support price was Rs. 9500 per tonne in Karnataka. In Andhra Pradesh, average price for both the varieties was Rs. 6500, and the realized price was equal to the MSP price, while in Tamil Nadu, realized price was Rs. 5380 per tonne for exotic variety and Rs. 5412 for indigenous variety and in both the varieties realized price was way below the declared minimum support price.

Productivity value was higher for indigenous variety both in Karnataka and Tamil Nadu, while the reverse was the case in Andhra Pradesh. Among our selected households, the productivity was still increasing with their age and the peak was yet to be achieved. Total revenue obtained by the farmers by selling their crop exceeded total variable cost in all the states among all categories of farmers without any exception. However, if one adds up the fixed cost also, the total cost exceeded total revenue in few cases, especially in Karnataka. Per acre net profits (over total cost) ranged between Rs. 39 and Rs. 4 thousand in exotic variety and between Rs. 3 thousand and Rs. 14 thousand in the case of indigenous variety in Karnataka. Thus, profit on both the varieties was not very encouraging for the farmers in Karnataka. In Andhra Pradesh, range of profitability was Rs. 25–28 thousand for exotic and indigenous varieties. In Tamil Nadu, it was between Rs. 4 and 44 thousand per acre for exotic and indigenous varieties, respectively.

Under Oil Palm Development Program farmers are being encouraged to take up oil palm cultivation by extending various kinds of assistance and input subsidies. Among the selected farmers subsidy was provided for short- and long-term investment on the farm including drip/sprinkler irrigation, installation of pump set/bore well, among long-term investment and planting material, inputs for inter cropping like seed, fertilizer, farmers' training, etc., among the short-term investment. On average, all sample households irrespective of the size of the holding received subsidy for planting material, establishment of drip irrigation and inputs for intercropping like seed, fertilizer, etc. On our question, what changes farmers suggested to increase acreage under oil palm cultivation: a clear majority of the farmers called for increasing minimum support price of oil palm as the present price structure was not providing enough incentives to grow this crop.

Based on the research findings of the paper, the following policy implications are drawn.

- As the fixed cost for establishing oil palm plantation is relatively high, farmers need to be supported either by the entrepreneur/agency processing in the region or through subsidy and or low interest rate loan facility by the union/state governments.
- The processors and farmers are not aware of benefits given by the government; therefore, efforts need to be initiated to disseminate the features of this policy to facilitate wider participation of both farmers and processors.
- Promotion of oil palm cultivation will help the government to save valuable foreign exchange, long-term food security sustainability and self-reliance of edible oils. Therefore, union and state governments need to take up this programme on Mission Mode.
- Our discussion with Ruchi Soya pointed out that the oil palm processors are facing the problem of availability of trained workforce. The state government should speedily implement the policy of establishing training programmes to scientifically handle post-harvest practices of fruit bunches.
- There is a wide fluctuation in the procurement price of raw palm (FFB) as indicated by the price received by the farmers in Karnataka, Andhra Pradesh and Tamil Nadu which is not motivating the farmers to take up this profitable venture. There is an urgent need to find an appropriate solution to fix pre-harvest price by including all the players of this industry under the leadership of Oil Palm Development Programme.
- The Minimum Support Price Programme (MSP) is not working well. After selling to the procurement agency, farmers had to wait for a long time to receive the balance payment over and above the proportion received at the time of harvest. Besides, the MSP fixation also had flaws as it was not appropriately covering the cost of production and normal profits. Farmers' opined for fixation of price for the future in advance to enable farmers to make appropriate arrangements in their cropping pattern accordingly.
- Not only the harvesting of FFBs is a tedious job for which appropriate harvesting machinery along with other implements like ladder, etc., need to be provided to the farmers at subsidized rate. The harvest produce is highly perishable and thereby need to be disposed of the same day. The transport is a big problem especially for the small and marginal farmers who need to be supported by providing appropriate means either by the processing agency or through state government.
- The productivity of fresh fruit bunch (FFB) is relatively low especially in Karnataka. There is scope for improving the palm yield. This calls for effective extension and training programmes by Oil Palm Development Programme and the processing industry.

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Accelerating Farm Income Growth: Opportunities and Challenges

A. Narayanamoorthy

1   Introduction

India's agricultural sector stands as one of the biggest sectors in the world with the production of 275 million tonnes (mt) of food grains, 299 mt of fruits and vegetables and 176 mt of milk as late as 2017–18 (GOI, 2019). Some estimates indicate that India's gross production of agricultural commodities is more than one billion tonnes today. But, this spectacular achievement has not reflected in the earning of farming community, as the average monthly income of the agricultural household was only Rs. 6,426 in 2012–13 as per the estimate of Situation Assessment Survey of farmers in India (NSSO-SAS, 2014). Various studies carried out using the data from Cost of Cultivation Survey (CoCS) published by the Commission for Agricultural Costs and Prices (CACP) also revealed that the income realized by the farmers from the cultivation of different crops is very low as well as fluctuating over time (Rao, 2001; Narayanamoorthy, 2006, 2013, 2017).

The impact of reduced farm income was manifested in the form of wide spread farmers' suicides and increased indebtedness over the last two decades or so. Farmers committing suicides were not perceptible before the early 1990s, but it became a widespread phenomenon in the 2000s in many States in India. Estimates show that over three lakh farmers have committed suicides in India between 1990–91 and 2009–10 and the proportion is alarmingly high in States like Maharashtra, Andhra Pradesh and Karnataka (Sainath, 2010). Farm indebtedness is not only widespread but also increasing in the recent years (GOI, 2007; NSSO-SAS, 2005). A nationwide survey

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carried out to understand the State of farmers in India underlined that close to 40% of the farmers are willing to quit the agriculture because of poor profitability from crop cultivation (NSSO-SAS, 2005). The National Commission on Farmers (NCF, 2006) has reported that the young farmers are not willing to take up agriculture as profession because it is not profitable to them.

Sufficient income from crop cultivation is essential not only for the survival of the farmers but also facilitates to reinvest in agriculture for the next season (Dev and Rao, 2010). If the flow of income from crop cultivation is inadequate, farmers may not be able to repay their debts which would obviously lead to increased indebtedness (Deshpande, 2002; Vaidyanathan, 2006; Deshpande & Arora, 2010; GOI, 2007; Reddy & Mishra, 2009). The National Commission on Farmers (NCF) has also underlined that inadequate return from the crop cultivation is the main reason for present agrarian crisis and farm suicides (NCF, 2006).

Many initiatives were taken to solve the farm crisis and to increase the farmers' income. For instance, during 2008, Prime Minister Manmohan Singh-led UPA government had announced the biggest farm loan waiver with a cost of Rs. 52,260 crore. Between 2014 and 2018, a total of Rs. 1,82,802 crore were reportedly announced as loan waiver by seven States namely Andhra Pradesh, Uttar Pradesh, Maharashtra, Karnataka, Rajasthan, Punjab and Tamil Nadu (Narayanamoorthy & Alli, 2019).[1] However, even after such massive loan waiver, there are no evidences to prove that the loan waiver has improved the income of farmers. In fact, Sainath (2010), who studied extensively the phenomenon of farm suicides in India, wrote that farm suicides increased in most States after the announcement of loan waiver scheme. This was probably because the one time support programme (loan waiver) would alone not be sufficient to solve the problem of farmers who require increased income from crop cultivation. In fact, the indebtedness and other related problems occur mainly due to poor returns from crop cultivation (Narayanamoorthy 2007, 2013).

Why are our farmers not able to realize increased income despite significant increase in productivity and production of different crops? One of the prominent reasons for realization of low income by farmers is due to more emphasis given for production centric policies by successive governments. Farmers were treated as mere agents of production and their well-being has taken a back seat in most of the policy decisions over the years. Focus on post-production activities namely strengthening of market facilities/infrastructures and procurement by State agencies was given less importance. The poor State of agricultural markets is vividly highlighted in the recently released NITI Aayog (2015) report on "Raising Agricultural Productivity and Making Farming Remunerative for Farmers". It surmises "…Agricultural markets in India have witnessed at best limited reforms during the last three decades and the mandi system is characterised by inefficient physical operations, excessive

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[1] Indebtedness among the farm households and its impact on farm suicides are discussed in detail by many scholars. However, not many have tried to study as to what would have been the scenario of farm suicides if the loan waiver scheme was not introduced in different States. A field level study on this issue may reveal very interesting facts. I am thankful to an anonymous referee of this paper for highlighting this point.

crowding of intermediaries, long and fragmented market chains and low scale. This is depriving farmers of fair share of the price paid by the final consumer. Consequently farmers are seeking MSP for almost all crops and everywhere, which is not feasible. There is a need for paradigm shift from price centric direct intervention to non-price policy instruments. The aim should be to create enabling market environment for produce for higher price realization for farmers. Many of the steps necessary to achieve this are related to the reform of the Agricultural Produce Marketing Committees Acts in the States. The farmer must be given the full right to sell her produce to whomsoever she wants in virtually all products. This would allow the farmer to minimize the number of intermediaries and receive a higher fraction of the price paid by the ultimate consumer" (p. 43).

The market plays a big role in getting the remunerative prices for the commodities sold by the farmers that ultimately helps them to augment the income from the source of crop husbandry. In many instances, the farmers sell their crops to intermediaries at a low price straight away after harvesting because of poor post-harvesting facilities, including poor arrangements for procurement of crops, poor road connectivity which puts break on transport facility, etc. The poor post-harvesting facility does even help the consumers. Because of long supply chains and high level of marketing charges (which happen due to innumerable intermediaries), the costs of produce increase considerably. All these results in very low producer's share in consumer's rupee in most agricultural commodities (for details see, MoAWF, 2017). The root cause for the widespread farm suicides and indebtedness, which started in India sometime during early part of 2000s, is the reduced margin realized by the farmers for their crops from the market. Some estimate suggests that 30–50% of wastages in the production of crops especially in fruits and vegetables occur because of poor post-harvesting infrastructure facilities.

Though a renewed thrust has been given for strengthening post-harvest infrastructure facilities in the context of doubling farm income by 2022–23 by the present Union Government, still considerable focus is given for production related activities to increase the farm income despite knowing the fact that the production is not the issue to augment the farm income. For instance, after carefully studying the State of farm income, the NITI Aayog's recent policy paper on "*Doubling Farmers' Income*" has identified seven sources of growth (Chand, 2017). They are; (i) increase in productivity of crops, (ii) raise in production of livestock, (iii) improvement in efficiency of input use (cost saving), (iv) increase in crop intensity, (v) diversification towards high value crops, (vi) improved price realization by farmers, and (vii) shift of cultivators to non-farm jobs (Chand, 2017). Most suggestions are again focusing on production side, which will have very little impact on doubling farm income. It is high time to recognize that the conventional production centric approach will no longer be useful to increase the farm income unless it is connected with the post-production related activities. Increased cost of cultivation and un-remunerative prices for produces are the two major factors affecting growth of farm income. Therefore, our future policies and strategies must focus on these two factors to achieve the goal of doubling farmers' income. In this paper, while analysing the State of farm income,

an attempt is made to provide strategies and policy options that can double farmers' income from crops cultivation.

The rest of the paper is structured as follows. Section two presents the analysis on the State of farm income in India. Section three provides detailed discussions on various strategies that can be followed to double the farmers' income. Concluding remarks are provided in section four.

2   State of Farm Income in India

Without studying the present State of farm income, it is difficult to provide strategies and policy options that can make ways to double it. Therefore, let us briefly understand the State of farm income in India.[2] Data on farm income were not available in India till the publication of Situation Assessment Survey (SAS) of farmers conducted by NSSO for the year 2002–03 (NSSO-SAS, 2005). In a similar fashion, another survey was conducted by NSSO to assess the farm income for the year 2012–13 (NSSO-SAS, 2014). Very recently, NABARD has also released data on farm income for the year 2015–16 generated from a nationwide survey which is known as NABARD All India Rural Financial Inclusion Survey (NABARD, 2018). I have used data from these three sources to assess the State of farm income. It is evident from Table 1 that the average annual farm income per household for the whole of India at current prices was only Rs. 25,380 for the year 2002–03, which also varied widely from State to State. This income increased to Rs. 77,112 per household for the year 2012–13 and further to Rs. 1,07,172 per household for the year 2015–16. During the 14 years period from 2002–03 to 2015–16, the farm income per household is estimated to have increased by about 4.22 times, which is an increase of 0.30 times per annum. The annual increase in farm income was relatively higher (0.35 times) between 2012–13 and 2015–16 as compared to the period from 2002–03 and 2012–13, which is about 0.28 times per annum.

It should be noted here that the growth in farm income would go down considerably if the income data is converted into real prices. Be that as it may, what is to be studied here is whether the goal of doubling farm income can be achieved by 2022–23 with business as usual scenario. The goal of doubling farm income was originally announced in the year 2015–16. This means that the farm income should be made double in seven years period. We have data on farm income for the year 2015–16 and 2012–13 from which an assessment can be made on the progress of farm income. As reported earlier, the average annual farm income per household was Rs. 1,07,172 for the year 2015–16, which is also the base year fixed for doubling farm income. Going by this, the farm income per household should reach Rs. 2,14,344 by the agriculture

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[2] The major aim of this paper is to discuss the opportunities and challenges on accelerating the farm income growth and not on studying the trends and development of farm income. Therefore, a detailed analysis on farm income by crop, region and agro-ecological (irrigation) condition is not attempted here. A detailed treatment on farm income under different dimensions can be seen from Narayanamoorthy (2020).

Table 1 Trends in annual income of farm households in major States in India

States	Income/hh/year (Rs in current prices)			Increase in time			Average increase in income/annum (Rs)		
	2002–03	2012–13	2015–16	2012–13 over 2002–03	2015–16 over 2012–13	2015–16 over 2002–03	2002–03 to 2012–13	2012–13 to 2015–16	2002–03 to 2015–16
Andhra Pradesh	19,608	71,748	83,040	3.66	1.16	4.24	4740	2823	4531
Assam	37,932	80,340	118,536	2.12	1.48	3.12	3855	9549	5757
Bihar	21,720	42,696	86,100	1.97	2.02	3.96	1907	10,851	4599
Chhattisgarh	19,416	62,124	102,960	3.20	1.66	5.30	3883	10,209	5967
Gujarat	32,208	95,112	142,788	2.95	1.50	4.43	5719	11,919	7899
Haryana	34,584	173,208	221,952	5.01	1.28	6.42	12,602	12,186	13,383
Jammu & Kashmir	65,856	152,196	112,260	2.31	0.74	1.70	7849	-9984	3315
Jharkhand	24,828	56,652	83,892	2.28	1.48	3.38	2893	6810	4219
Karnataka	31,392	105,984	127,236	3.38	1.20	4.05	6781	5313	6846
Kerala	48,048	142,656	203,124	2.97	1.42	4.23	8601	15,117	11,077
Madhya Pradesh	17,160	74,520	95,028	4.34	1.28	5.54	5215	5127	5562
Maharashtra	29,556	88,632	123,216	3.00	1.39	4.17	5371	8646	6690
Orissa	12,744	59,712	92,772	4.69	1.55	7.28	4270	8265	5716
Punjab	59,520	216,708	277,596	3.64	1.28	4.66	14,290	15,222	15,577
Rajasthan	17,976	88,200	108,156	4.91	1.23	6.02	6384	4989	6441
Tamil Nadu	24,864	83,760	117,300	3.37	1.40	4.72	5354	8385	6603
Uttar Pradesh	19,596	59,076	80,016	3.01	1.35	4.08	3589	5235	4316
West Bengal	24,948	47,760	93,072	1.91	1.95	3.73	2074	11,328	4866

(continued)

Table 1 (continued)

States	Income/hh/year (Rs in current prices)			Increase in time			Average increase in income/annum (Rs)		
	2002–03	2012–13	2015–16	2012–13 over 2002–03	2015–16 over 2012–13	2015–16 over 2002–03	2002–03 to 2012–13	2012–13 to 2015–16	2002–03 to 2015–16
All India	25,380	77,112	107,172	3.04	1.39	4.22	4703	7515	5842

Sources Estimated using data from NSSO-SAS (2005, 2014), NABARD (2018)

Table 2 Estimate on Doubling Farm Income by 2022–23, with business as usual scenario

Sl. No.	Particulars	Rs/household
(1)	Actual Annual farm income in 2015–16 in current prices	1,07,172
(2)	Double amount of farm income to be achieved by 2022–23	2,14,344
(3)	Annual farm income in 2012–13	77,112
(4)	Income increase needed per annum to double farm income by 2022–23	15,310
(5)	Average increase in farm income per annum between 2012–13 and 2015–16 [(1)– (3)/4]	7515
(6)	As per the present rate of increase, the additional farm income increase in 7 years (7 × Rs. 7515)	52,605
(7)	Annual farm income expected to reach with present rate of increase by 2022–23 [(1) + (6)]	1,59,777
(8)	Deficit from the goal of doubling farm income by 2022–23 [(2)– (7)]	54,567

Sources Estimated using data from NSSO-SAS (2014) and NABARD (2018)

year 2022–23. In order to achieve this income level, the average farm income per annum should increase to Rs. 15,310 over a period of seven years from 2015–16 to 2022–23. But, the farm income per household has increased only to about Rs. 7515 per annum between 2012–13 and 2015–16 (see, Table 2). That is, if this trends in income growth continues, then the annual farm income per household would reach only to Rs. 1,59,777 by the agricultural year 2022–23, which is way below the mark of doubling farm income.[3] All these go to suggest that doubling farm income will be difficult to achieve with the present practice of production centric approach.

3 Strategies for Doubling Farm Income

It is clear from the past experience that production centric approach helps food security of the country and not the farmers in terms of enhancing their income. This has been clearly underlined through an estimate by Gulati (2019) in his article on "Over Rs. 45 lakh crore plundered from farmers". Farmers have been facing two big impediments on enhancing their income which are poor market support and increased cost of cultivation. While the poor market supports are not helping the farmers to get remunerative prices for the crops, the increased cost of cultivation due to escalating cost of inputs (such as labour and irrigation) reduces the profit margin of the crops. Therefore, it is very much necessary to introduce strategies that can assure better prices for crops from the market and simultaneously reduce the cost of cultivation. Some of the important strategies for doubling the farm income are discussed below.

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[3] This analysis is done specifically to show whether doubling farm income is possible by 2022–23 even with use of current prices data. No doubt that the gap between the doubling farm income targeted (Rs. 2,14,344) and the farm income to be reached with its present growth (Rs.1,59,777) will be widened further, if the entire calculation is made using constant prices.

3.1 Enhanced Procurement by State Agencies

Without adequate procurement of commodities by State agencies, farmers may not be able to avail MSP announced periodically by the government. Procurement of crops is generally very low and it is also concentrated mainly on a few food grain crops like paddy and wheat. In fact, the level of procurement in pulses and oilseed crops is abysmally low in India over the years. Of the total production of food grains (minus pulses), only about 75.28 millions were procured during 2018–19, which is only about 29% of the total production (MoF, 2019). Similarly, data published by CACP (2019) shows that the procurement of tur, groundnut and soya bean has declined sharply in 2018–19 as compared to the year 2017–18. As a result of reduced procurement, market prices were ruling below the MSP in most States even in paddy crop, where procurement is considered to be relatively better than other crops (see, Table 3).

Increased procurement of crops brings two important benefits: (1) it helps the farmers to get the MSP for different crops, and (2) increased procurement will also suck the surplus of commodities available in the market that ultimately helps the farmers to get better prices for crops in the open market. Therefore, the governments (both Centre and State) must make take all possible efforts to strengthen the procurement system. Now, the procurement in most crops are concentrated only with a few States, which should be expanded to across States so that farmers from different States will get better prices for the crops. The Situation Assessment Survey (SAS) on farmers households shows that the awareness about the procurement system and MSP among the farmers is very low (NSSO-SAS, 2005). Therefore, arrangements should be made to provide the details about the duration of procurement of crops and its prices (MSP) on a regular basis. As and when MSPs are ruling below the market price, the government should make arrangements to increase the quantity of procurement and also extend the period of procurement of crops.[4]

3.2 Improved Market Infrastructure

The State of agriculture market infrastructure is very pathetic in India. Most markets do not have the basic facilities such as storage and weighing machines. Because of poor market infrastructure, farmers are often forced to sell their produces at throw away prices, which do not help to increase their farm income. Over the last few years, many initiatives were introduced to strengthen market infrastructure. For instance, in the Union Budget 2017–18, big announcements were made to "strengthening of e-NAM and to expand coverage of e-NAM to 585 APMCs". Since more than 86%

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[4] There is a feeling in some quarters that the universal procurement of crops at MSPs can help increase the farm income considerably across different regions in India. A feasibility study on this issue needs to be carried out to understand the expected cost for implementing such scheme and the farm income that is expected to increase across different farm size groups.

Table 3 Market prices and MSP of paddy in major producing States in kharif 2018–19

States	No. of days market prices reported				No. of days market prices were below MSP				Days (%) when market prices were below MSP
	Oct 2018	Nov 2018	Dec 2018	Jan 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2018	
Andhra Pradesh	28	30	30	31	4	7	8	2	17.6
Assam	19	17	21	20	16	17	15	20	88.3
Chhattisgarh	31	30	31	31	27	30	30	31	95.9
Tamil Nadu	29	26	29	30	24	21	19	17	71.1
Telangana	27	0	21	31	25	0	13	13	64.6
Punjab	24	30	2	0	1	0	0	0	1.8
Uttar Pradesh	31	30	31	31	31	27	26	30	92.7
West Bengal	31	30	31	31	31	30	30	27	95.9

Source CACP (2019)

of farmers are marginal and small, they are not in a position to directly transact at APMC or in other wholesale markets. Considering this, in the Union Budget 2018–19, it was announced to "… develop and upgrade existing 22,000 rural haats into Gramin Agricultural Markets (GrAMs). In these GrAMs, physical infrastructure will be strengthened using MGNREGA and other Government Schemes. These GrAMs, electronically linked to e-NAM and exempted from regulations of APMCs, will provide farmers facility to make direct sale to consumers and bulk purchasers. An Agri-Market Infrastructure Fund with a corpus of Rs. 2000 crore will be set up for developing and upgrading agricultural marketing infrastructure in the 22,000 Grameen Agricultural Markets (GrAMs) and 585 APMCs" (MoF, 2018).

Despite efforts from the Government of India, it appears that no big changes have taken place in the level of market infrastructure in most States in India. NITI Aayog constructed an index known as "Agricultural Marketing and Farmer Friendly Reforms Index" (AMFFRI) to reflect the "…ease of doing agribusiness as well as opportunities for famers to benefit from modern trade and commerce and have wider option for her/his produce" (MoF, 2019). This index shows that most of the States/UTs could not reach even halfway marks of reform score. Because of poor implementation of market reforms, even the agriculturally well-developed State of Punjab could get only 14th rank in the composite index (see, Fig. 1). How can we double farmers' income with this kind of poor marketing infrastructure? There is a feeling in some quarters that the agricultural market is a State subject where the Centre cannot interfere; some States even blindly oppose any agri-market reform introduced by the Centre. This thinking will take the farmers nowhere. If the Centre's directives on agricultural market reforms are beneficial to farmers, there is nothing wrong in implementing it in the State. Therefore, both the Centre and States must take planned effort to improve the agricultural market infrastructure to create ease of agribusiness for farmers.
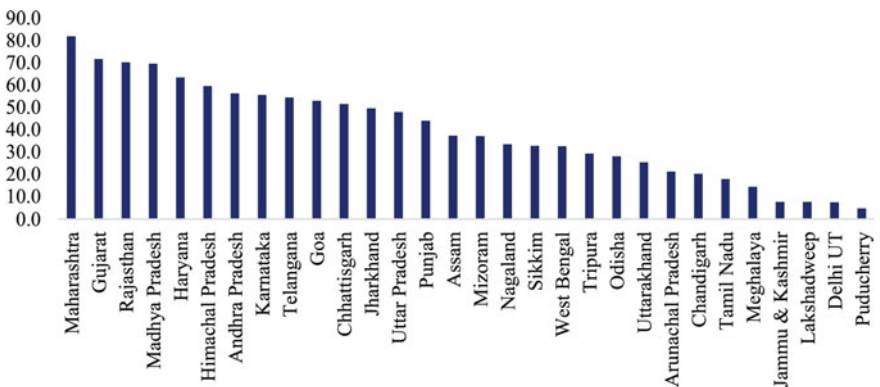

Fig. 1 Ranking of States in terms of implementation of marketing and other farmer friendly reforms. *Source* MoF (2019)

3.3 MSP Be Fixed Based on Cost C2 + 50% Formula

Providing assured and remunerative prices for crops is very important to enhance farm income. In order to support the farmers, Minimum Support Prices (MSPs) are presently provided for 23 crops. Considerable advancement has taken place in the fixation of MSPs over the years. Attention was not given for non-cereal crops like pulses and oilseeds while deciding the prices for crops till very recently, which is completely changed now. While the MSPs were fixed based on the formula of A2 cost of production during the seventies and eighties, A2 + FL cost of production were followed throughout nineties and up to 2018–19. For the first time, MSPs were fixed at least one half times of the cost of production (A2 + FL plus 50% formula) since the kharif season 2018. No doubt that "… this historic decision will prove an important step towards doubling the income of our farmers" in future, as mentioned in the Budget Speech of 2018–19 (MoF, 2018). But even after announcing the MSPs over and above 50% of cost of production, there are no evidences to show that this price hike has made any big impact on the income of farmers.[5] An unabated increase in cost of production particularly after 2000–01 has been offsetting any increase in income from crops cultivation. Farmers have been demanding for C2 cost + 50% formula for fixing the MSPs for different crops, citing the recommendation of M. S. Swaminathan led National Commission on Farmers (NCF, 2006). Our estimate also suggests a vast gap between the MSPs announced by the government and the one suggested by the National Commission on Farmers (see, Table 4). Therefore, there is a need to fix MSPs based on the formula of cost C2 plus 50% to enhance the income of farmers.[6]

3.4 Need to Implement PM-AASHA with Full Spirit[7]

For the first time in the history of Indian agriculture, a new scheme called "Pradhan Mantri Annadata Aay SanraksHan Abhiyan" (PM-AASHA) has been introduced during 2018–19 by the Union Government to improve the procurement system and address the gaps in the Minimum Support Price (MSP) scheme. The new scheme

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[5] As pointed by the referees of the paper, one needs to wait and see as to what kind of long-term impacts this new pricing formula (A2 + FL plus 50%) will have on the income of farmers. We also need to carry out analytical study on the impact of these new pricing formula in increasing the income of farmers using more disaggregated data or field level survey data to have definite conclusion about the effectiveness of the this intervention.

[6] There are apprehensions that fixing MSPs at cost C2 + 50% formula may create inflationary pressure that will have a big impact on consumers and exchequer. Given the low level procurement of 23 mandated crops, how far this is true? A detailed investigation is needed to assess the implications of such pricing formula on inflation.

[7] This section is heavily drawn from the author's (written jointly with P. Alli) own article on "Will PM-AASHA benefit the farmers", *Business Line*, May 28, 2019, p. 6. I thank my coauthor P. Alli for permitting to use the content of the article in this chapter.

Table 4 Projected cost of production of selected crops and actual MSP for 2019–20

Crops	Projected Cost of Production (Rs/qtl)			Actual MSP 2019–20	C2 + 50% based MSP	Difference between actual MSP and C2 + 50% MSP
	A_2	A_2 + FL	C_2			
Paddy	894	1208	1619	1815	2527	−712
Jowar	1263	1698	2324	2550	3599	−1049
Bajra	617	1083	1463	2000	2463	−463
Maize	844	1171	1570	1760	2450	−690
Ragi	1583	2100	2672	3150	4247	−1097
Arhar (Tur)	2677	3636	5417	5800	8317	−2517
Moong	2884	4699	6359	7050	9884	−2834
Urad	2605	3477	5460	5700	8310	−2610
Groundnut	2769	3394	4352	5090	6897	−1807
Soybean	2027	2473	3422	3710	5277	−1567
Sunflower	3139	3767	4957	5650	7782	−2132
Sesamum	2767	4322	6125	6485	9368	−2883
Nigerseed	1736	3960	5913	5940	8883	−2943
Cotton	2781	3501	4678	5255	7306	−2051

Source Estimated using CACP (2019)

consists of three sub-schemes namely (1) Price Support Scheme (PSS), (2) Price Deficiency Payment Scheme (PDPS) and (3) Private Procurement Stockist Scheme (PPSS). The historic scheme appears to be a robust mechanism that would enable farmers across the States to realize MSPs in fuller measure.

The Price Support Scheme (PSS) promises to provide assured price for farmers and protect them from making distress sale during bumper harvest. The scheme proposes to strengthen physical procurement of pulses, oilseeds and copra. The State governments will be entrusted with the responsibility in deciding the type and quantity of the crop to be procured, when wholesale prices fall below MSP. Besides, the State governments will also procure 25% of the marketable surplus of farmers for eligible crops. Maharashtra government at the beginning of 2018, reportedly procured around 4.5 lakh tonnes of tur under PSS, when its farmers were getting only Rs. 4200–4400 per quintal against the MSP of Rs. 5450. Under the new scheme, the Central government will compensate the States for any losses capped at 30% of procurement cost.

The Price Deficiency Payment Scheme (PDPS) has been formulated on the lines of Madhya Pradesh government's Bhavantar Bhugtan Yojana (BBY). It promises to hedge price risks wherein farmers will be compensated for distress sale at prices below MSP. This scheme proposes to cover all oilseeds for which MSP is notified. Under this, the direct payment of the difference between MSP and the modal price of market will be made to farmers. This scheme does not involve any physical procurement of crops by the State agencies, as farmers are paid the difference between MSP

and modal price on disposal in the notified market. PDPS will create win–win situation for both farmers and government. While assuring MSP for farmers, it will reduce the accumulation of unwanted food grains and oilseeds stocks and the fiscal costs of procurement and storage will also reduce significantly.

Under the Private Procurement Stockiest Scheme (PPSS), the government is mulling to allow the entry of private players in the procurement of oilseeds on a pilot basis. The private players can procure oilseeds at the State-mandated MSP for which they would be paid a service charge not exceeding 15% of the notified support price. While some private players are already engaged in procurement of wheat, this initiative got a fresh impetus as it is expected to increase the outreach of MSP operations among all crop growers, which is essential to increase farmers' income.

The issue is that unless procurement is strengthened by various means, any hike in MSP will not proportionately benefit farmers. When markets have failed miserably to pull out farmers from the perpetual indebtedness over the years, the PM-AASHA is expected to bring a new face in the market architecture.[8] While the pace of procurement increased in the recent years, the data released by NAFED for the year 2018–19 indicates lack of coordination of State governments with procuring agencies has resulted in poor procurement of kharif and rabi pulses and oilseeds in many growing States. It is high time to realize that unless State governments work in harmony with the procuring agencies, all concerted efforts that are being taken towards making a robust and efficient procurement mechanism will fail to bring about a paradigm shift in farmers' income.

3.5   Right to Sell at MSP

Because of significant policy changes that have taken place with regard to procurement and the announcement of MSPs for crops in the recent years, number of paddy farmers benefitted from MSP at all-India level have increased from 7.42 million in 2016–17 to 7.76 million in 2018–19. States such as West Bengal, Chhattisgarh, Uttar Pradesh, Madhya Pradesh and Haryana registered a significant increase in number of beneficiary farmers (CACP, 2019). But the share of farmers benefitted from MSPs and the quantity of produce sold through State managed procurement centres are very less in different crops even today (see, Table 5). Non-availability of procurement centres are often reported as the main reason by the agricultural households for not able to avail the MSPs announced by the government (NSSO-SAS, 2014). Fixing enhanced MSPs alone will not help to increase the farm income unless assured

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[8] The PM-AASHA scheme was introduced only during 2018–19. Therefore, detailed studies are not available on its overall impact on procurement of crops and the prices received for the same by the farmers in different States. Studies need to be carried out on its impacts using data from different States which will not only help to understand the reach of this scheme but also help to scale up such scheme for more crops.

Table 5 Number per 1000 of agricultural households having awareness about MSP for selected crops during January 2013–June 2013

Crop	Number per 1000 of households reporting sale of crops			Of the households sold to procurement agency		Estd. no. of households reporting sale of crop (00)
	aware of MSP	aware of procurement agency	sold to procurement agency household	% of sale at MSP to total sale	avg. sale rate received at MSP (Rs)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Paddy	315	187	100	14	13.15	54,578
Jowar	213	207	192	36	13.83	4565
Maize	118	61	29	4	11.45	19,581
Wheat	392	345	162	35	13.99	129,991
Barley	110	105	16	1	40.75	1432
Gram	126	97	39	5	29.96	33,190
Arhar (tur)	142	131	47	1	47	3517
Moong	91	37	19	2	58	6893
Masoor	181	155	20	0	36	7352
Sugarcane	454	407	366	33	3.25	20,558
Potato	121	90	6	2	8.83	24,679
Onion	153	98	6	1	17.5	5955
Groundnut	89	82	13	1	37.62	6770
Rapeseed/Mustard	155	128	29	14	30.84	36,155
Coconut	215	110	17	0	9.34	11,084
Cotton	226	177	84	3	34.15	10,753

Source NSSO-SAS (2014)

procurement arrangements are provided to farmers. Therefore, it is very much necessary to enact an act on "right to sell at MSP" so that farmers will be able to avail the MSPs across the States which will help to increase their farm income.

3.6 Changes Needed in Restrictive Policies

For many years, farmers have been exploited and penalized by imposing extremely harsh policies such as Essential Commodities Act (ECA) and Minimum Export Prices (MEP). Gulati (2019) underlines that the agricultural marketing and trade policies in India are highly distorted, restrictive and pro-consumer, often at the cost of farmers. He surmises that "Indian farmers have been "implicitly taxed' through restrictive

marketing and trade policies that have an in-built consumer bias of controlling agri-prices. If one calculates the sums involved of this 'implicit taxation", it amounts to Rs.2.65 trillion (lakh crore) per annum, at 2017–18 prices, for 2000–01 to 2016–17. Cumulatively, for 17 years, this comes to roughly Rs. 45 trillion at 2017–18 prices. No country in the world has taxed its farmers so heavily as India has done during this period. This is nothing short of plundering of the farmers' incomes by Rs.45 trillion! Until India reforms its agri-marketing laws, and frees agri-markets, it is time to atone through a structured and stable income policy for farmers for at least the next five years". Though some commodities have been dropped from the list of ECA during 2000s, a large number of commodities are still under its control which does not allow free trade, storage and movement (Chand, 2017). Similarly, in order to support the domestic consumers, MEP is imposed as and when prices of certain commodities go up sharply. These kinds of age old draconian policies are continuously hurting the farmers on realizing increased income from their harvest. Therefore, both ECA and MEP should be scratched to benefit the farmers.

3.7 Measures to Reduce Cost of Cultivation

While addressing the issues relating to agricultural market infrastructures, there is also a need to introduce measures that can reduce the cost of cultivation which has been increasing at a faster pace in the recent years, leading to reduced income from crops cultivation (for details see, Narayanamoorthy, 2016). Analysis based on the data of cost of cultivation survey shows that human labour cost required for cultivating various crops has increased considerably after the implementation of MGNREGS (see, Gulati, et al., 2013). Similarly, the irrigation cost has increased continuously over the years because of increased use of groundwater, which is cost-intensive (see, Narayanamoorthy, 2015a; b). By introducing certain policy changes, the cost of these two inputs can be reduced. First, the coverage of surface sources of irrigation water such as canal and tanks should be expanded as these sources are less cost. But, the canal irrigation development is almost stagnant starting from the late-nineties in India and this has forced the farmers to heavily rely on groundwater irrigation. Because of cost-intensive nature of groundwater irrigation, the requirement of cost for cultivating crops under groundwater irrigation is very high. There are about 437 large dams under various stages of construction besides several thousands of small dams in India (Harsha, 2019). Due to paucity of funds, the work progress of these dams is very slow. With increased allocation of fund, these dams can be completed speedily that would help increase surface irrigated area, which will ultimately reduce cost of irrigation. As suggested in the report of the Working Group on Major and Medium Irrigation for the 12th Plan (see, Planning Commission, 2012), there is also a need to increase allocation of funds required for the ongoing irrigation projects (with better monitoring by State agencies) to increase the canal irrigated area.

Increased cost of cultivation required for cultivating crops is one of the biggest problems encountered by the farmers in the recent years. While the labour cost has

been increasing over time, the implementation of the world's biggest rural employment programme namely MGNREGS during the mid-2000s has completely altered the rural labour market which also skyrocketed the cost of labour. Gulati and et al. (2013) surmise that "… MGNREGA has "pushed" up the average wage of casual workers, distorted the rural labour markets by diverting them to non-farm rural jobs, thus creating an artificial labour shortage and raising the cost of production of agricultural commodities" (p. 9). It is reported further that between 2008 and 2011, the labour cost has registered an increase of about 74% at the all-India level, 88% in Andhra Pradesh and 94% in Tamil Nadu. Since the labour cost accounts for about one-third of cost of cultivation per acre in most crops, the increased cost of labour pulls down the profitability of crops considerably. Therefore, as demanded by the farmers organizations, there is need to link MGNREGS with farm operations with some riders to reduce the cost of cultivation.[9]

4   Concluding Remarks

This paper underlines that if the government really wants to double farmer's income by 2022–23, it must move away from production centric approach to market centric approach. Past experience shows that increased production of agricultural commodities does not guarantee enhanced income for farmers even in the highly assured irrigated area. Mere announcement of MSP would not help the farmers unless procurement infrastructure is strengthened. Procurement arrangements are very poor in most crops and particularly so in the case of non-food grain crops such as oilseeds, pulses, which is clearly evident from SAS data as well. Therefore, procurement as well as State managed market infrastructures must be strengthened across India for all the important crops. NSSO-SAS (2014) data shows that because of non-availability of procurement centres, farmers are not able to avail the MSPs announced by the government. Except a few regions and in a few crops, this has been happening across India over the years. Therefore, it is necessary to enact an act on "right to sell at MSP" to benefit the farmers, after carefully studying the implications of it on inflation and common consumers. Through PM-AASHA, the Central government provides incentives to State governments for three schemes namely (1) Price Support Scheme (which promises to provide assured price for farmers and protect them from making distress sale during bumper harvest), (2) Price Deficiency Payment Scheme (which provides compensation when market prices go below MSP) and (3) Private Procurement Stockiest Scheme (which allows the entry of private players in the procurement of oilseeds on a pilot basis). State governments must come forward and implement

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[9] Alternatively, the workers from non-agricultural activities under MGNREGS can be withdrawn during peak agricultural season to enhance the supply of labour for crops cultivation. This may dampen the wage rate which is rising unabatedly since the introduction of this new employment scheme. Whether this is acceptable to the farm labourers who are getting job under the employment is a big question.

these schemes with full spirit to benefit the farmers. While fixing MSP in conso-
nance with cost of cultivation, abolition of minimum export price for agricultural
commodities, removing the age old essential commodities act will many ways help
the farmers to realize higher income from farming.

The functioning of Agricultural Produce Marketing Committee (APMC) needs to
be restructured completely. As rightly mentioned in the 16th Report of Committee on
Agriculture on 'Pricing on Agricultural Produce', APMC "advocates inter alia provi-
sion for private markets and E-markets, contract farming, direct purchase of agricul-
tural produce from farmers by processors/bulk retailers/wholesalers/ exporters nearer
to the production centre, direct sale of produce by farmers to the consumers, etc.
Such multiple options will enable the farmer to sell the produce for optimum returns
without being compelled to make distress sale in local mandis" (GOI, 2014). The
role of farmers in deciding the price should be promoted by directly involving them
in the market activities extensively. Farmers' managed markets in States like Tamil
Nadu and Andhra Pradesh have proved to be beneficial to them (see, Kallummal &
Srinivasan, 2007). Therefore, producers' markets on the lines of *Ryatu Bazars* should
be encouraged across every part of the country to improve the farm income and to
eliminate middlemen as underlined in the National Agricultural Policy of 2000 (GOI,
2000).

In order to protect the farmers from the distress sale during the glut periods, the
price behaviour of sensitive commodities needs to be monitored closely for making
swift intervention through the **"**Market Intervention Scheme" (MIS), as suggested by
Expert Group Committee on Indebtedness led by Prof. Radhakrishna (GoI, 2007).[10]
Besides price and market related interventions, efforts are also needed to reduce the
cost of cultivation which reduces the growth of farm income. Analysis based on the
data of cost of cultivation survey shows that human labour cost required for cultivating
various crops has increased considerably after the implementation of MGNREGS.
Similarly, the irrigation cost has increased continuously over the years because of
increased use of groundwater, which is cost-intensive (see, Narayanamoorthy, 2015a;
b). Therefore, the coverage of surface sources (canals and tanks) of irrigation water
should be expanded as these sources are less cost. The canal irrigation development is
almost stagnant starting from the late-nineties in India, which has forced the farmers
to heavily rely on groundwater irrigation (Narayanamoorthy, 2011). Therefore, as
suggested in the report of the Working Group on Major and Medium Irrigation for the
12th Plan (see, Planning Commission, 2012), there is a need to increase allocation
of funds required for the ongoing irrigation projects (with better monitoring by State
agencies) to increase the canal irrigated area.

Many still hold the myth that the income of the farmers can be increased by
augmenting the productivity of the crops. There is no doubt that any increase in

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[10] It is worth mentioning here that the 'Commission on Inclusive and Sustainable Agricultural
Development of Andhra Pradesh' (2016) headed by Prof. Radhakrishna has provided a number of
innovative market and non-market (production and value addition) interventions with the aim to
increase the farm income and empower the farming community. The recommendations are pan-India
in nature and therefore, the other States can also think of implementing those recommendations to
improve the overall livelihood conditions of the farming community.

productivity of crops would definitely benefit the farmers (Vyas, 2004; Chand, et al. 2015). However, augmenting productivity of crops is only a necessary condition but not a sufficient condition to increase or to double farm income. Without adopting new technologies in crops cultivation, productivity of crops cannot be increased significantly. Farmers would hesitate to adopt the new technologies unless they are capable of generating increased income with reduced cost. Increased cost of cultivation has been the major issue encountered by the farmers in the recent years, which needs to be controlled by all means. Even if MSP is announced in consonance with the cost of cultivation (cost C2) for crops, it would not guarantee better income for farmers unless procurement infrastructures are strengthened sufficiently. Therefore, along with remunerative MSPs for different crops, government should strengthen farmers' friendly market infrastructure to enhance or to double farm income.

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