

Introduction to the Volume



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1 Background

The world is witnessing major changes that are taking place in the fields of technology, foreign direct investments (FDIs), trade and development strategies. These changes are likely to be different from those that the world experienced during the last few decades in particular, after many countries have adopted globalization of their economies. The rules of the WTO and the onset of the information and communications technologies (ICTs) drastically reduced transaction costs and encouraged locations of manufacturing units based on efficiency rather than tariff jumping investments. One of the consequences of the relocation of manufacturing units across the globe has been the decline of the manufacturing activities in the USA and Europe and the emergence of Asia as the main manufacturing base. This has triggered protectionist tendencies and anti-free trade and protest against WTO rules in several developed countries. Thus while changing technologies are aiding globalization, the political atmosphere in the USA and many European countries is antiglobalization and outsourcing. However, the host developing countries especially China and India, who have been attracting FDI in a number of industries and sectors, are trying to get the best out of the presence of the FDI through multinational corporations (MNCs). One of the immediate benefits that they witnessed in a variety of industries is the shift in technological paradigms. The papers included in the book will concentrate on the process through which technological paradigm and trajectory shifts take place,

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the factors that facilitate such shifts, the changing pattern of FDI and technological efforts, shifting focus of international trade and development strategies, mostly focusing on India.

2 Changing Nature of FDI

Dunning (1979) was one of the early researchers to point out that FDI usually engages in cross-border value-added activities. The nature of FDI flows, however, has changed drastically in recent decades; consequently, the theories are developed earlier during the second half of the twentieth century and the testing procedures are adopted to analyse productivity and technology spillovers from FDI needs to be re-examined. The literature on FDI spillovers was developed in an era when multinational enterprises (MNEs) invested mainly in manufacturing and MNEs from developed countries enjoyed higher productivity levels. In recent times, the share of manufacturing in FDI flows has come down drastically. Currently, most FDI is in services. Furthermore, productivity levels of several Asian enterprises have increased drastically. It is not clear whether theories developed for the manufacturing sector could be used for services. It is difficult to identify intangible assets, ownership advantages and internalization advantage in the case of services in general and non-financial services in particular.

It is widely accepted that FDI generates both direct and indirect benefits in the host countries. Indirect benefits, popularly known as spillover benefits, include greater efficiency of domestic firms as a result of an increase in competition from the entry of foreign firms. Other economic benefits are faster adoption of new technologies by domestic firms and increase in the mobility of domestic resources—financial capital, improvement in the management structure of the domestic economy, net skilled labour migration as a result of centralization of substantive managerial decision-making in the parent firm, etc.

Following Dunning (2001), it could be argued that the internationalization of R&D activities is motivated by two factors, asset-augmenting and asset-exploiting activities. The former, also known as ‘home-based augmenting R&D’ through MNE, aims at increasing the existing knowledge capital advantages created at home country. The asset-exploiting signifies that MNE uses technological and capital knowledge created at home to increase value creation.

In a recent study, Dhrihi (2015) examined the contributions of FDI to an economy by examining the interaction focusing on the role of technological innovation using a simultaneous equation model describing the interrelationship between foreign direct investment, technological innovation and economic growth for 83 developed and developing countries estimated over the period 1990–2012. Their empirical results show that there is a positive and significant effect of foreign direct investment on economic growth only for middle- and high-income countries, whereas for

low-income countries foreign direct investment does not have a positive impact on these economies. Their findings clearly reveal that technological innovation plays an important role in determining the foreign direct investment–economic growth relationship.

Loukil (2016) also argues that a large number of countries have been enacting laws aimed at making it easier for firms to invest in their country. The objective for attracting FDI is not only due to the fact that FDI brings in new investment boosting national income and employment, but also due to the expectation that inward FDI would also provide additional spillover benefits to the local economy that can result in higher productivity growth and increased export growth. Their estimation of a panel threshold model on a sample of 54 developing countries for the 1980–2009 period shows the presence of nonlinear effects in the relationship between FDI and innovation. They find a threshold value of technological development above which FDI has a significant positive impact on innovation. They suggest that it is necessary to support domestic firms to build an absorptive capacity allowing them to enjoy the benefits of multinational firms.

Lew and Liu (2016) in the regional context of China examine the extent to which absorptive capacity (ABC) contributes to the host country's utilization of inward foreign direct investment (IFDI) knowledge spillover and innovation. The findings, unlike the other studies, suggest that the presence of IFDI per se exercises a 'crowding-out' effect on local firms' innovation. The absorptive capacity has a significantly robust moderating effect on innovation so that host country firms' gains from IFDI knowledge spillover depend on whether their ABC offsets the negative impact of the IFDI. Such effects are more evident in coastal areas of China, where the economic mode permits more IFDI and also higher levels of ABC, thereby demonstrating the role of absorptive capacity as a moderator of knowledge spillover.

MNEs since the 2000s have rapidly increased foreign direct investment in R&D and related activities. Earlier, FDI in R&D activities was confined only to developed countries. But with increasing globalization, there is a shift in the trend as more and more FDI in R&D is taking place in developing countries like India and China. One of the reasons for this is cost-effectiveness and availability of skilled labourers at a lower cost in and presence of local research institutions in these emerging economies. Empirical studies on FDI in R&D in India suggest that MNE set up R&D units in India to tap the skilled human resources and scientific institutions. Sandhya et al. (2014) studied the pattern of FDI inflow to R&D in India and found that the total number of MNCs invested in R&D is reported at around 706 during this period, and the period for the analysis was 2003–09. Nearly 70% is directed towards select sectors in industrial clusters [88%], indicating that the majority of FDI in R&D is attracted into these clusters only.

The empirical evidence on FDI's role in facilitating technology spillovers in the host country is inconclusive. Blomström and Sjöholm (1999) found evidence for a strong relationship between foreign ownership and labour productivity in the case of Indonesian manufacturing industries. Their finding suggests that there exist intra-industry spillovers from FDI, and labour productivity in domestic firms increases due to increase in competitive pressure from the presence of foreign-owned firms in

the same industry. In contrast, Aitken and Harrison (1999) found that FDI affects the productivity of domestic firms in Venezuela from 1976 to 1989 adversely. They used a sample of 4000 Venezuelan firms for the analysis and classified the firms into three categories based on the degree of ownership. The first category consists of national, with less than 20% foreign ownership, and the second category includes mixed degree with 20–49.9% foreign ownership. The last category grouped foreign firms, with majority of foreign control. To calculate productivity of firms, they regressed changes in output on changes in materials, skilled labour, unskilled labour, capital stock, changes in foreign investment at the plant and sector level. They concluded that domestic plants with higher foreign ownership are significantly less productive as compared to firms with a lower degree of foreign participation. They also highlighted that the difference in their findings and that of the previous finding lies in the fact that former failed to control the differences in the productivity across sectors, which might be correlated.

Apart from R&D and technology spillovers, it has been found that MNE is also responsible for generating knowledge spillovers. This type of spillovers occurs between local firms that are vertically integrated with the affiliates of MNEs. They can also occur between local firms that are in direct competition with foreign affiliates. There could be a number of ways through which knowledge spillovers from foreign affiliates can accrue to local firms. They include competition effect, interaction between foreign affiliates, upstream suppliers and downstream customers, and human capital spillovers arising because of movement of skilled labourers from foreign affiliates to local firms. Local firms also try to imitate high-technological firms introduced by foreign affiliates through the process of reverse engineering and personal contact. In one of the recent studies focusing on gender-based wage differentials between MNCs and local firms, Vahter and Jaan (2019) argued that knowledge transfer takes place through labour mobility from a foreign-owned firm to local firms which in turn explains the differential productivity of Estonian firms between 2006 and 2012. They concluded that hiring high-wage employees with prior work experience at MNEs is associated with increased productivity of the local firm where they are presently employed.

Although the majority of research on FDI spillovers focus on spillovers within the industry or intra-industry spillovers, it has been found that FDI spillovers can also occur to firms operating in other industries, leading to inter-industry or vertical spillovers. These types of spillovers arise mainly due to the customer–supplier relationship between foreign firms and domestic firms and are often attributed to buyer–supplier linkages. They are found to be larger in domestic firms that invest and indulge more in R&D-intensive firms. Also, they depend on the extent of vertical integration between local firms and foreign-owned firms. They operate at both upstream industries (suppliers) and downstream industries (buyers).

The book begins with documentation of the changing pattern of FDI flows and technologies among developed and emerging economies. The pattern of technological paradigm and trajectory changes and their determinants are then identified through specific studies on Indian industries. How do the knowledge spillover mechanisms get operationalized and the implications of internationalization of the IPR

process are elaborated. The role of FDI on technological efforts, exports and productivity improvements is also analysed to make policy recommendations for fostering innovation in an emerging economy context like India.

The growth in international trade is mostly confined to medium- and high-tech industries. Trade in traditional sectors has not been growing. A large part if not most of the trade in high- and medium-tech industries is intra-firm, that is, between the MNE and its affiliates. Studies in intra-firm trade are dated. It is important to formulate appropriate hypothesis and analyse the determinants of intra-firm trade. Technological change has also given a boost to trade in services. Some of the papers included here are dealing with trade in services with emphasis on the role of technology. Some of the paper will discuss the phenomenon of MNEs investing in R&D in the Indian context. Several of these units are located in sectors where the MNE does not have a strong manufacturing base. They will discuss the determinants of FDI in R&D.

Changing patterns of FDI, technology creation and development, location of R&D units, and trade in goods and services would influence development strategies of countries. The earlier debate relating to import substitution versus export-led growth strategies is not very relevant in the current era. New dimensions in approach to development have been triggered with the adoption of Sustainable Development Goals (SDGs). The focus is more towards adoption of an environmentally benign, inclusive and specific target-oriented approach. Some papers would discuss these issues as well.

More specifically, the book will concentrate on the major changes that are taking place in the fields of technology, foreign direct investments (FDIs), trade and development strategies. It will mainly concentrate on issues relating to (1) FDI, productivity and knowledge spillovers, (2) market structure and innovative activities, (3) push and pull factors influencing FDI, (4) impact of FDI on environment, labour and welfare, and (5) the relative importance of demand and technology shocks on aggregate fluctuations. In all these areas, new issues have emerged and they have not been addressed adequately by the existing literature. The volume will fill this gap and give a lead for future research programmes.

3 FDI, Productivity and Knowledge Spillovers

The literature makes a distinction between spillovers and technology transfer against technology payments. There are no payments involved in spillovers. They are virtually free. However, they are not automatic. Some firms benefit by FDI spillovers, and certain others become victims. Several studies have analysed the impact of FDI on productivity and knowledge spillovers (Bitzer et al. 2008; Buckley et al. 2002; Javorcik and Spatareanu 2008) and have more or less established the productivity enhancement of FDI. However, it is not yet established whether the country of origin of FDI makes substantial difference to the spill overs. The volume will address this question. Moreover, there is no agreement on the spillover mechanism (Liu 2008).

The theoretical underpinnings are also not clear. The volume will address the theoretical issues and present case studies. A strict intellectual property regime (IPR) will substantially reduce the spillovers. That is one of the objectives of IPR. Will a strict IPR enhance growth and welfare or will it have an adverse impact? The volume will deal with this issue also.

4 Market Structure and Innovative Activities

The role of market structure in influencing innovative activities, originally postulated by Schumpeter (1942), is now well established. However, the simultaneity in the relationships between the two has not been sufficiently researched. Furthermore, most studies have used mainly concentration ratios to represent market structure. It is well known (Sleuwaegen and Dehandschutter 1986) that the relationship between concentration ratios and H-index is horn-shaped—they do not differ much at low levels of concentration but differ significantly at higher levels of concentration. Hence, they are not useful in the case of highly concentrated industries. Concentration ratios take only the top 4 or 8 firms and do not take into account all the firms. On the other hand, H-index not only takes into account all the firms but also gives higher weightage to larger firms. Thus, H-index is preferable. In this context, this volume takes into account H-index and also Lerner index. In this respect, it is an improvement over the earlier studies.

Under the current WTO regime, characterized by the absence of trade barriers and low tariff rates, the relationship between market structure and innovative activities might not turn out to be the same as predicted and found in the earlier studies. In the current regime, different parts of the goods are produced in different countries and the final product assembled in a different country. The consumer electronics is a case in point. As shown by Chen (2010) in the case of integrated circuits, the designing is done by one country, and integrated circuit itself is manufactured in another country and purchased by a firm manufacturing consumer electronics from a third country. In such cases, the relationship between market structure in a particular country (country A) and innovation activities that are taking place in all the countries and manufacturing activities in country 'A' gets complicated. Empirically, this has not been studied. One of the papers in this volume reports an interesting study.

The main Schumpeterian paradigm is dealt with the determinants of R&D and related it to market structure and size of the firm. In the globalized world, multinational enterprises (MNEs) also perform R&D in the host countries and influence R&D behaviour in the host countries. In such cases, the question arises, namely whether the R&D performed by MNEs in the host countries is different from the R&D performed by domestic firms. This issue is analysed in this volume for Indian data.

5 FDI—Push and Pull Factors

Most studies dealing with the determinants of FDI deal with either pull or push factors and concentrate on either advanced or developing countries (for a survey of an important literature, refer to Caves (2007), Dunning and Lundan (2008), and for a more recent survey, Siddharthan (2016)). They rarely deal with all these aspects in one study. The study in the volume shows that the determinants in all these cases are different and therefore an aggregate analysis encompassing all the countries will not give correct and interpretable results.

6 Impact of FDI on Labour, Welfare and Environment

Do IPR and FDI enhance the welfare of all countries? Or does it influence low-, middle- and high-income countries differently? Within a country also are there beneficiaries and victims? The book will deal with these issues. The impact of FDI on environment is a well-researched area. However, the findings of the research studies are not unambiguous. One of the chapters performs a meta-analysis based on 29 research studies to draw appropriate conclusions and policy inferences. With regard to labour and welfare also, it is not clear whether FDI will have the same impact on high-income countries and the rest. One of the papers included in the book uses a panel data for 64 countries for the period 1991–2015 and draws useful conclusions. Likewise, factors contributing to aggregate fluctuations are also not clear. Are they due to demand shocks and could macro-policies take care of them? Or are they due to technology shocks or both? What is the relative importance of the two factors? The volume attempts to provide an answer to them.

The book will discuss the following issues:

- FDI productivity spillovers and the country of origin
- Knowledge spillover mechanisms
- IPR and growth and welfare of nations
- Market structure, technological capabilities and technology policy
- Interrelationship between innovations and market structure
- R&D by foreign and Indian firms
- Push and pull factors of FDI
- Environmental impact of foreign investments
- FDI, labour market and welfare
- Demand shocks, technology shocks and aggregate fluctuations.

7 Guided Tour of Chapters

The first paper is by Bishwanath Goldar and Karishma Banga. By now, the productivity enhancement effects of FDI have been well established. However, it is not very clear whether the country of origin of FDI makes a substantial difference. The paper based on a sample Indian firm clearly shows that foreign firms operating in India enjoy higher total factor productivity (TFP) levels compared to local firms. However, firms from developed countries and, in particular, from the USA and Europe enjoy much higher productivity levels. FDI from developed countries results in higher productivity spillovers, and this benefits the Indian firms. The paper considers both horizontal and vertical spillovers.

The second paper by Stanley Nollen deals with knowledge spillover mechanisms. Spillovers are different from knowledge transfer for which the receiving firm makes a payment. Spillovers are unintentional, and no payments are made to the firm. They occur mainly by observations of the neighbourhood firms on the production and organizational practices of higher productivity firms in the neighbourhood. It can also happen due to labour mobility and managerial interaction. Spillovers give competitive advantage to firms, and therefore it is important to study the spillover mechanisms. The paper documents the experiences of Vietnamese software companies to demonstrate the dynamics of knowledge spillovers.

Sunil Kumar Ambrammal's paper analyses the impact of strong IPR on the welfare and growth of nations. The study shows that by and large, IPR encourages innovations and increases national welfare. However, the impact is not the same for lower middle-income, upper middle-income and high-income countries. For middle-income countries, IPR affects negatively in the initial stages of development but then becomes positive at later stages—suggesting 'U'-shaped relationship. Furthermore, IPR does not directly influence innovation and growth, and it needs to be supported by domestic investments on innovations.

The paper by Madan Dhanora and Ruchi Sharma deals with interrelationships between innovations and market structure. Most studies mainly deal with the impact of market structure on innovative activities of firms. Very few focus on the impact of innovations on market structure and the simultaneities involved. The paper bridges this gap in the literature and deals with medium- and high-tech Indian industries. Needless to say, this relationship is more relevant to high-tech industries. They use HHI and Lerner index as the measures of market structure and firm's patenting activities as the measure of innovation. With regard to market structure, they did not find it important in influencing innovative activities; however, innovative activities influenced market structure. The relationship was one of inverted 'U'. Furthermore, strengthening of patent protection had a positive influence on innovative activities.

The next paper by Bino Paul and Manasi Awasthi analyses the interplay of market structure and technological capabilities in the Indian consumer electronics industries. They conclude that while the market has been expanding in India, its growth has not translated to technological capabilities for the domestic industry. This is partly

because changes in technologies have not resulted in increases in labour productivities. Furthermore, the industry is being dominated by imports. The paper advocates changes in technology policies to address this problem.

Are the determinants of R&D performed by foreign firms in India different from those of the local firms? The paper by Savita Bhat shows that they are not very different. If the research environment is good in India, then both sets of firms, namely foreign and domestic, will take advantage of the research climate and perform R&D. In addition to factors that are common to domestic firms, factors like outsourcing and distribution influence foreign firms R&D performed in India. Thus, foreign firms that outsourced manufacturing jobs performed more R&D in India. Furthermore, the analyses reveal that other factors like labour intensity, sales and distribution intensity, and outsourcing intensity are also relevant in determining R&D activities of the foreign firms.

The paper by Indrajit Roy and Narayanan brings out another important aspect of FDI flows. They consider FDI flows from (1) advanced economies to developing economies, (2) advanced economies to advanced economies, (3) developing economies to advanced economies and (4) developing economies to developing economies. Their study showed that the determinants of FDI flows were very different for different sets of countries. Some of the variables even showed opposite signs. Under these conditions, estimating one model across countries would not give useful and meaningful results. With regard to OFDI from developing countries, apart from various macroeconomic indicators, perception-based indicators on control of corruption, governance aspects and climate of ease of doing business which are much weaker in developing economies than that of advanced economies also act as push factors of OFDI from developing countries. The paper also finds the pull and push factors different for the four sets of FDI flows.

The next paper by Santosh Kumar Sahu and Unmesh Patnaik deals with another important aspect of the impact of FDI, namely the environmental impact of foreign investments. They do a meta-analysis based on 29 studies containing 700 estimates, undertaken between 1994 and 2018. It is widely feared that due to differences in environmental standards and differences in the capacity and ability of governments to implement the standards, pollution-intensive industries could shift to developing countries. Most of the papers test pollution haven hypothesis (PHH) which states that pollution-intensive production activities move to lenient countries through FDI. Their results suggest that the use of *pollution intensity or firms' spending* on environment-related expenses does not support PHH. On the other hand, government expenditure on environment-related measures supports PHH better. Hence, they advocate macro-level intervention on environment-related issues in preference to what they call micro-level interventions at firm/industry level. Consequently, they advocate a top-down approach.

The paper by Arfat Ahmad Sofi and Subash Sasidharan deals with the impact of FDI on the labour market and welfare. For this purpose, it uses a panel data of 64 countries for the period 1991–92 to 2014–15. The results reveal that FDI has a positive impact on the labour market for both developed and developing countries. However, in the long run they result in uneven outcome for different sectors. In the

case of welfare loss, they find a substantial loss of welfare in income and labour market outcomes with a higher magnitude in middle- and high-income countries.

The paper by Sunil Paul, Santosh Kumar Sahu and Tinu Iype Jacob deals with the relative importance demand and technology shocks in explaining aggregate fluctuations. They show that technology shocks are much more important and long-lasting than demand and other market shocks. Their results indicate that the percentage of variance explained by aggregate demand shocks is larger at lower lag and decreasing. However, the share of technology shock shows an increasing trend over the period of time. By and large, the study indicates the transitory nature of aggregate demand shocks compared to technology shocks. Thus, technology shocks are much more important and policy should concentrate on dealing with them.

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