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Contemporary Issues in Development Economics

Edited by

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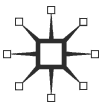

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Preface

These essays were presented at the 17^{th} World Congress of the International Economic Association held in Jordan, June 6–10, 2014. It was organized in partnership with the Columbia Global Centres – Middle East (Amman) and with generous support from a range of sponsors. The 5-day program included 5 plenary sessions, 24 invited sessions, 15 policy sessions and over 90 contributed sessions, with over 600 people in attendance. The selection of papers in this volume gives a flavour of the range of issues that were discussed in the congress sessions that brought together a group of established and younger scholars from all over the world. The IEA is a fine example of international cooperation in the discipline of economics. The success of the congress owed much to the energy and commitment of the IEA President at the time, Joseph Stiglitz.

Timothy Besley, London, May 2015

Notes on Contributors

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1

World Economic Outlook and the Challenges to the UN Development Agenda Beyond 2015

Pingfan Hong[1]

1.1 Strengthening the global recovery

More than five years after the eruption of the global financial crisis, the world economy has not recovered to running at full capacity. According to the latest update of the *World Economic Situation and Prospects* by the United Nations (United Nations, 2014a), the world output is expected to grow in 2014 and 2015 at the rates of 2.8 per cent and 3.2 per cent respectively. These rates are far from sufficient to close the output gap and recuperate the job losses caused by the financial crisis.

Developed countries: a secular stagnation?

On a positive note, for the first time since 2011, all major developed economies in North America, Europe and developed Asia seem to have aligned together on the same upward growth trajectory in 2014–2015. Hopefully, this could generate a virtuous cycle to reinforce the economic recovery in these economies.

In the United States, the growth momentum built in the second half of 2013 faltered in the first quarter of 2014, but mainly because of the extremely cold and prolonged winter. Growth is expected to pick up going forward. Both private consumption and business investment are expected to increase at a stronger pace than in the past two years, along with a continued improvement in the labour market and the housing sector. Despite the phasing out of quantitative easing (QE), monetary policy is expected to remain highly accommodative during 2014 and into 2015. Fiscal policy in 2014–2015 will be less restrictive than in previous

[1] The author is the Director of Development Policy and Analysis Division in UN Department of Economic and Social Affairs. hong@un.org. This chapter is based on the speech delivered at the International Economic Association meeting, June 5, 2014, Jordan. The views expressed here are those of the author, but they do not necessarily represent the views of the United Nations.

years. GDP is expected to grow in the range of about 2.5–3.0 per cent in 2014 and 2015.

In Japan, the fiscal stimulus package introduced in 2013 has supported growth, but this stimulus is set to fade out. In April 2014, the government increased sales tax. Although the government also injected a supplementary budget spending, the magnitude is not enough to offset the negative impact of higher taxes. The QE in Japan has ended deflation by pushing the inflation rate towards 2 per cent. However, wage growth has been limited and may not provide sufficient support to keep inflation close to the target of 2 per cent in future. The QE has also led to a significant depreciation of the Japanese yen *vis-à-vis* other major currencies, but has so far had limited effects on boosting exports. Public debt remains extremely relative to GDP. Japan's economy is expected to grow by 1.4 and 0.9 per cent in 2014 and 2015, respectively.

Western Europe emerged in mid-2013 from a protracted recession. Systemic risks and financial tensions in the region have subsided significantly, but not disappeared completely. A number of countries in the euro area, which were mired in, or on the brink of sovereign debt, have returned to capital markets to issue bonds at the relatively low costs that were present before the crisis. Fiscal austerity programmes have lessened in intensity and become less of a drag on economic growth. However, the recovery remains weak in the euro area, and fragilities remain in both the banking sector and the real economy. The inflation rate is at extremely low level, triggering concerns about the risk of deflation. The unemployment rates remain elevated in many of the euro economies. GDP in Western Europe is expected to grow by 1.5 per cent in 2014 and 1.8 per cent in 2015.

The recovery in the new European Union States' members is also firming against the backdrop of stronger activity in Western Europe. This group of countries is expected to grow by 2.4 per cent in 2014 and by 2.9 per cent in 2015.

Economies in transition: suffering from geopolitical tensions

Among the economies in transition, the growth projections for the Commonwealth of Independent States (CIS) have been reduced notably, mainly because of the political crisis in Ukraine and the associated geopolitical tensions in the region. For example, Ukraine is already in a recession. Growth for the Russian Federation is expected to be less than 1 per cent for 2014.

The economic sanctions the United States and Europe have targeted on the Russian Federation, as well as Russian retaliations, have so far had limited direct impact, but had notable indirect impact through market confidence and capital flows.

Depreciation of the Russian ruble added to inflation, undermining private consumption, and the increases in the policy interest rates further curb private

investment. By contrast, growth in the CIS members in Central Asia is expected to continue at about 5 per cent. For example, in Kazakhstan, high fiscal spending to offset the impact of currency devaluation on household consumption and improved competitiveness should sustain the economic momentum.

For the transition economies in South-Eastern Europe, growth is projected to accelerate to 2.0 per cent in 2014 and to 3.1 per cent in 2015, but these growth rates are still below pre-crisis growth levels and are insufficient to address the region's structural needs of reindustrialization and high unemployment rates, especially among the young.

Developing countries: shifting to a low gear

The economic situation has also deteriorated recently in a number of developing countries. Growth in developing countries is expected to be 4.7 per cent and 5.1 per cent for 2014 and 2015, respectively. Developing countries as a whole will continue to contribute a large proportion of global growth. However, this growth trajectory is lower by 2 percentage points than that registered by the developing countries for a number of years prior to the global financial crisis.

As demonstrated in the two recent episodes of financial turbulence in mid-2013 and early 2014, a number of developing countries are vulnerable not only to the international spillovers from the adjustments made to monetary policies by major developed countries but also to quite a few country-specific challenges, including structural imbalances, infrastructural bottlenecks, increased financial risks, incoherent macroeconomic management and political tensions.

Among developing countries, Africa will continue to see solid growth of 4.2 per cent in 2014, and 5.1 per cent in 2015. But political problems in a number of African countries have led to a downward revision in their growth projections. In Libya, for example, disruptions to oil output and exports will be a major drag on growth, underpinning a significantly lower growth rate for North Africa than previously forecast. Growth in many African countries is insufficient to resolve severe labour market problems, such as high unemployment rates, widespread underemployment, low earnings and gender disparities in earnings and employment opportunities. Export growth is expected to rise after slower growth in 2012 and 2013, while import growth will continue to remain strong, propelled by large infrastructure projects.

East Asia is expected to grow at 6 per cent for 2014 and 2015, still the highest among developing regions. China's growth rate is expected to moderate further over the next few years, with GDP projected to expand by 7.3 per cent in 2014 and 7.1 per cent in 2015, down from 7.7 per cent in 2013, and notably lower than the 10 per cent China registered in the past three decades. A pace of growth at about 7 per cent will become the new norm for China for the medium term. China has entered a new stage of development, facing a number of new challenges for making its economy more inclusive, balanced and sustainable. To do

so, the government has launched a new round of institutional reforms for the next decade, not only in economic, but also in social, political and environmental institutions (Xinhua, 2013). The results of these ongoing reforms remain to be seen. In East Asia, the only economy for which we have recently lowered the growth projection is Thailand, because of the continuing political unrest.

South Asia is expected to grow by 4.6 per cent in 2014 and 5.1 per cent in 2015, after remaining at a near two-decade low in 2013. India's economy is forecast to grow by 5 per cent in 2014 and 5.5 per cent in 2015, slightly up from 4.8 per cent in 2013. The outcome of the latest election has removed some policy uncertainties, but we need to monitor closely the policy and reform initiatives of the new government. Several economies in South Asia, including India, have seen lower inflation, stronger external balances and more stable currencies recently. These are expected to support recovery in business investment and household consumption. The strength of the recovery in South Asia will, however, continue to be restricted by structural impediments, including energy and transport constraints, political unrest and violence. Sri Lanka remains the fastest growing economy in South Asia, with annual growth forecast to stay above 7 per cent in the outlook period.

In Western Asia, internal instabilities and lower oil exports continue to shape the economic outlook. GDP in the region is expected to grow by 3.6 per cent in 2014 and 4.4 per cent in 2015. The member States of the Gulf Cooperation Council have been on a stable growth path, despite weak oil prices and exports. Expansionary fiscal policies in GCC countries will continue to economic activities. In contrast, the economies of Iraq, Jordan, Lebanon, the Syrian Arab Republic and Yemen have been hampered by continuing political instability, social unrest, security incidents and geopolitical tensions. The war in the Syrian Arab Republic has been taking a particularly heavy human toll and has led to the widespread destruction of crucial infrastructure. An extraordinarily large number of refugees pose severe challenges for neighbouring countries. In Turkey, the surge in capital outflows, the depreciation of the currency and the sharp increases in policy interest rates are expected to reduce its GDP growth to about 2 per cent in 2014, before bouncing back in 2015.

Economic growth in Latin America and the Caribbean is expected to continue at a subdued pace in 2014, at about 2.6 per cent. Growth in South America is decelerating markedly. Argentina is experiencing a noticeable slowdown amid decreasing business confidence and persistent inflation pressures, while Venezuela is likely to enter into recession. Brazil's economy continues to expand at a very moderate rate of 1.7 per cent in 2014, with weak prospects for investment demand. Other South American countries, such as the Bolivia, Colombia and Peru, continue on a more solid growth path. Economic growth in Mexico and Central America is strengthening, benefiting from the pickup in activity

in the United States, with Mexico expecting to grow by 3.2 per cent in 2014, accelerating from a growth of 1.1 per cent in 2013.

The least developed countries (LDCs) are expected to strengthen growth in 2014 and 2015. More than one half of the LDCs are forecast to expand by at least 5 per cent in 2014. Several of them have registered robust growth rates above 7.0 per cent since 2012, including Sierra Leone, the Democratic Republic of the Congo, Liberia, Ethiopia, Mozambique and Zambia. Despite the strengthening economic conditions, the development prospects in the LDCs remain severely constrained by many structural factors, such as recurring political conflicts, high vulnerability to adverse weather patterns and commodity price fluctuations, lack of productive diversification and fragile institutions.

For instance, in the Central African Republic, the political situation will continue to depress economic development. In Equatorial Guinea, which is heavily dependent on its oil sector, declining oil production will underpin an economic contraction in both 2014 and 2015; this will further cripple the prospects for any meaningful reduction in the high poverty level that persists despite the country's high per capita income level. In Yemen, despite higher GDP growth in 2013 mainly due to foreign aid, oil and agricultural output has been restricted by internal violence and infrastructure weaknesses.

Addressing these structural issues poses a major challenge for the LDCs. In this context, they also face the need to build and enhance their institutional capacities, which constitutes a precondition for the effective implementation of policies supported by international aid and the provision of public goods and services.

International trade: sluggish

International trade has been growing at a sluggish pace in the past two years, only at 2–3 per cent, compared with the long-term trend of 7 per cent.

A weak import demand from major developed countries can explain part of the sluggishness in trade activity, but the lack of progress in the multilateral trade negotiations over the past decade may have reduced the momentum in creating new trade flows in the world economy.

The successful outcome of the Ninth WTO Ministerial Conference in December 2013 in Bali has to some extent renewed faith in the multilateral trading system (WTO, 2013).[2] However, there remains much unfinished business under the Doha Round.

[2] Update: WTO members failed to sign the trade facilitation protocol by July 31, 2014, as agreed to in the Bali Ministerial.

Meanwhile, the mushrooming of the regional trade agreements may boost regional trade, but can in the long run make the international trading system more uncertain and fragmented, and less able to provide a coherent, development-oriented framework to support development for all.

Unemployment: a key policy challenge

High unemployment remains a key challenge for many countries in the world.

Among developed countries, the unemployment rates remain elevated in a number of European economies. The worst cases are found in Spain and Greece, in which the unemployment rates stand at about 25 per cent, and youth unemployment rates are more than double this rate. The unemployment rate in the United States has continued to improve, but a large portion of the improvement is owing to a drop in labour force participation.

The employment situation is mixed across developing countries. The unemployment rates in East Asia are generally low, but, in contrast, North Africa and Western Asia are challenged by high unemployment rates, particularly among the young.

Inflation: remaining tame

Inflation remains tame worldwide, partly reflecting output gaps, high unemployment and financial deleveraging. Inflation is not an issue in developed economies. In fact, the risk of falling into deflation has become a concern for Europe. Among developing countries and economies in transition, high inflation is found in only a dozen economies mainly in South Asia and Africa, plus a few scattered in other regions.

Uncertainties and risks

The baseline outlook presented above is subject to a number of uncertainties and downside risks:

(1) One major risk is associated with the unwinding of monetary easing by the central banks of major developed countries expected in the next few years. A number of emerging economies are vulnerable to this kind of external shock.
(2) Emerging economies are also faced with challenges in their domestic economies.
(3) The systemic risks in the euro area have abated, but both the banking sector and the real economy in the area are still fragile.
(4) A number of developed countries have gone through a painful fiscal adjustment and managed to reduce their budget deficit, but they have not yet brought their public finance on a sustainable path on the long run.

There are other risks emanating from geopolitical tensions and other factors.

The first two risks are worthy of more elaboration here.

Since the eruption of the global financial crisis in 2008, central banks in major developed countries have implemented the so-called QE – a series of programmes to increasingly purchase large amounts of long-terms assets, so as to expand the monetary base to provide more liquidity to the economy. For instance the US Fed has increased the size of its balance sheet by four times. The Bank of England has increased its by five times. Both the Central European Bank and Bank of Japan have doubled theirs.

The effects of these QE policies are still under debate (Schenkelberga and Watzkab, 2012; Fawley and Neely, 2013). Quantitative easing seems have played a critical role in stabilizing financial markets, injecting liquidity to beleaguered commercial banks, and lowering long-term interest rates to support economic recovery and jobs. On the other hand, QE has repressed the risk premiums for financial assets, and may have led to misallocation in the portfolios of investors. It may have also produced moral hazard for commercial banks by allowing them to delay the necessary clean-up of their balance sheets and other adjustments.

On the international front, many emerging economies have repeatedly complained about the negative effects of QE on their macroeconomic stability as QE led to increased volatility in capital inflows, commodity prices and the exchange rates of many emerging economies (Fratzscher et al., 2013).

With QE, the major central banks are riding on a tiger's back; it is difficult to manage a safe dismounting (Hong, 2013). A premature unwinding of the QE could trigger financial turbulence and derail the economic recovery. But if the central banks keep the QE measures for too long, they are going to heighten the risks of creating asset bubbles and inflation, making a future exit even more difficult to manage.

Since the summer of 2013, when the US Fed announced its intention to taper QE, a number of emerging economies have been suffering from financial turbulence, featuring a reversal of capital inflows, decline in their equity markets, increase in the risk premium for their external financing, and sharp depreciation of their currencies.

The situation has improved most recently, but many emerging economies remain vulnerable. In addition to the external financial shocks, some emerging economies are also faced with other challenges, such as a possible turning point in domestic credit cycles, lower growth prospects (particularly for the BRICS) and other country-specific risks.

For example, after the eruption of the financial crisis, banks in developed countries have been de-leveraging, namely to reduce their lending. In a sharp contrast, bank credit in emerging economies expanded rapidly in the past few years. The ratio of bank credit to GDP in emerging economies has surpassed the ratio in developed countries.

The average growth for the BRICS is expected to be lower than their long-term growth prior to the global financial crisis by about 2 percentage points. A slower

growth in the BRICS will have a negative impact on other emerging economies, through such channels as trade and commodity prices.

There are also country-specific risks for emerging economies, ranging from policy uncertainties associated with elections, political stress and domestic financial problems.

Policy challenges

In order to mitigate downside risks and strengthen global recovery, macroeconomic policies worldwide should continue to support growth and jobs. Developed countries should mitigate international spill-overs when they reduce monetary easing. Developing countries and the economies in transition could combine macroeconomic policies with economic reforms to reduce their vulnerabilities.

International policy coordination needs to be enhanced, to promote financial reforms, reduce tax evasion, and ensure sufficient resources for the least developed countries, so that they could accelerate their achievement to the Millennium Development Goals (MDGs) and build a good foundation for sustainable development beyond 2015.

1.2 Transition from MDGs to Post-2015

In 2000, the member States of the United Nations endorsed the Millennium Declaration (United Nations, 2000), in which they reaffirmed the fundamental values of freedom, equality, solidarity, tolerance, respect for the planet and shared responsibility. To realize these values, the UN adopted the Millennium Development Goals (MDGs) (United Nations, 2001), which consist of eight goals, including: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other disease; ensure environmental sustainability; and develop global partnership for development.

Each goal is attached to a number of quantitative targets for 2015. For example, one target for goal one is to halve between 1990 and 2015 the proportion of people whose income is less than $1.25 a day.

Since the adoption of the MDGs, governments, international organizations and partners around the world have mobilized to tackle the many dimensions of human development. Their efforts have generated significant achievements. For example, the poverty target was achieved at the global level five years ahead of the 2015 deadline (United Nations, 2014b).

However, many goals might be difficult or even impossible to achieve by 2015. In less than two years before the target date of the MDGs, the member States of the UN are determined to redouble their efforts to accelerate progress in the MDGs.

Even if the world could meet all the MDGs, people cannot be satisfied by, for instance, reducing poverty by half: what about the other half?

The time has come to set more ambitious goals for the world beyond 2015, raise the bar set by the MDGs and meet emerging challenges.

In as early as 2010, the member States of the UN launched a global process to advance the UN development agenda beyond 2015. In 2012, the UN Conference on Sustainable Development (Rio+20) (United Nations, 2012) further pushed this process by defining 24 broad issues for global sustainable development, and agreeing to establish an Open Working Group in the General Assembly for developing a set of sustainable development goals (SDGs). In 2013, the member States also set up an Intergovernmental Committee of Experts on Sustainable Development Financing, to focus on financial issues related to the post-2015 development agenda. According to the plan, the UN will hold a Summit in September 2015 for adoption of the post-2015 development agenda.

So far consensus has been reached in the global process on a number of key issues. It has been agreed that the post-2015 development agenda should have sustainable development as its core, and have eradication of poverty as its top priority. The world needs a coherent approach that integrates the three dimensions of sustainable development, namely, economic development, social development and environmental sustainability.

The agenda should also have a set of goals, which should be action-oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries while taking into account different national realities, capacities and levels of development and respecting national policies and priorities.

There have been different proposals for a set of sustainable development goals (HLP Post-2015, 2013; SDSN, 2013). In its most recent meeting, the UN OWG has narrowed its focus to 17 areas.[3]

A number of these areas are the "unfinished business" of the MDGs, such as poverty eradication, health, education and gender equality. Another subset of these areas are defined for environmental sustainability, such as sustainable agriculture, food security and nutrition, water and sanitation, energy, sustainable cities and human settlements, sustainable consumption and production, climate change, marine resources, oceans and seas, and ecosystems and biodiversity.

It is interesting to see that a number of "classic" economic indicators have been included such as economic growth and industrialization. These economic indicators were on the top of the global development agenda in the earlier years before the 1990s. There was a shift around the 1990s in development paradigm away from focusing on these classic economic development indicators towards

[3] For the latest information on the UN OWG progress, see: http://sustainabledevelopment.un.org/

focusing on "human development", as those encompassed in the MDGs. Now, it seems developing countries, particularly African countries, want to put these economic indicators back to the post-2015 development agenda.

It is also interesting to see the area of "peaceful and inclusive societies, rule of law, effective and capable institutions". As in MDG 8 (United Nations, 2013), the current deliberation on post-2015 also has one area focusing on global development partnership, also called "means of implementation".

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2

Fiscal Policy, Income Redistribution and Poverty Reduction in Latin America: Bolivia, Brazil, Chile, Costa Rica, El Salvador, Guatemala, Mexico, Peru and Uruguay

*Nora Lustig**

2.1 Introduction

Although inequality has been falling since 2000, Latin America is still the most unequal region in the world and poverty rates are high for Latin America's GDP per capita.[1] Given these facts, the extent to which governments use fiscal policy to reduce inequality and poverty is of great relevance. This short chapter summarizes the results of applying a standard benefit-tax incidence analysis to estimate the effect of taxes and social spending on inequality and poverty in nine Latin American countries: Bolivia (Paz Arauco et al., 2014), Brazil (Higgins and Pereira, 2014), Chile (Ruiz-Tagle and Contreras, 2013), Costa Rica (Sauma and Trejos, 2014), El Salvador (Beneke et al., 2014), Guatemala (Cabrera et al., 2014), Mexico (Scott, 2014), Peru (Jaramillo, 2014), and Uruguay (Bucheli et al., 2014). Depending on the country, the household surveys utilized in the incidence analysis are for 2009, 2010, and 2011.

The main contribution of this chapter is twofold. First, in contrast to other work, the analysis is comprehensive: it includes the effect of direct taxes, indirect taxes and subsidies, and social spending (that is, cash transfers and the monetized value of public spending on education and health). Second, the nine studies apply a common methodology (Lustig and Higgins, 2013), so results are comparable across countries. As is common in most benefit-tax incidence analyses, the studies do not incorporate behavioral, lifecycle, or general equilibrium effects. These limitations notwithstanding, they are among the most

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[1] Lustig, López-Calva, and Ortiz-Juarez, 2013; Inter-American Development Bank, 2011, p. 43.

detailed, comprehensive, and comparable tax-benefit incidence analyses available for Latin American countries to date. In addition, compared to some of the existing publications, reliance on secondary sources is kept to a minimum.

2.2 Concepts, definitions, and data

Market, net market, disposable, post-fiscal, and final income: definitions and measurement

We use five income concepts in our incidence analyses: market, net market, disposable, post-fiscal, and final income.[2] Market income is total current income before direct taxes, equal to the sum of gross (pre-tax) wages and salaries in the formal and informal sectors (also known as earned income); income from capital (dividends, interest, profits, rents, etc.) in the formal and informal sectors (excludes capital gains and gifts); autoconsumption (except in the case of Bolivia); imputed rent for owner-occupied housing; private transfers (remittances and other private transfers such as alimony); and old-age and other pensions from the contributory social security system.[3] Net market income equals market income minus direct personal income taxes on all income sources (included in market income) that are subject to taxation and all contributions to social security except for the portion going towards pensions.[4] Disposable income is equal to the sum of net market income plus direct government transfers (mainly cash transfers but can include food transfers). Post-fiscal income is defined as disposable income plus indirect subsidies minus indirect taxes (e.g., value added tax, sales tax, etc.). Final income is defined as post-fiscal income plus government in-kind transfers in the form of free or subsidized services in education, health, and housing minus co-payments or user fees.[5]

[2] For more details on concepts and definitions, see Lustig and Higgins (2013).

[3] In the fiscal incidence literature, pensions from contributory systems have been sometimes treated as part of market income and other times as government transfers. Arguments exist both for treating contributory pensions as part of market income because they are deferred income and for treating them as a government transfer, especially in systems with a large subsidized component. Since this is an unresolved issue, the studies summarized here include a benchmark case in which contributory pensions are part of market income and a sensitivity analysis where pensions are classified under government transfers. The results presented here are for the benchmark analysis.

[4] Since here we are treating contributory pensions as part of market income, the portion of the contributions to social security going towards pensions is treated as "saving."

[5] One may also include participation costs such as transportation costs or foregone incomes because of use of time in obtaining benefits. In our study, they were not included.

Tax shifting assumptions

Consistent with other conventional tax incidence analyses, here we assume that the economic burden of direct personal income taxes is borne by the recipient of income. The burden of payroll and social security taxes is assumed to fall entirely on workers. Consumption taxes are assumed to be shifted forward to consumers. These assumptions are strong because, in essence, they imply that labor supply is perfectly inelastic and consumers have perfectly inelastic demands for goods and services. In practice they provide a reasonable approximation.

Incidence of public services

The approach to estimate the incidence of public spending on education and health followed here is the so-called "benefit or expenditure incidence" or "government cost" approach. In essence, we use per beneficiary input costs obtained from administrative data as the measure of average benefits. This approach—also known as the "classic" or "nonbehavioral approach"—amounts to asking the following question: how much would the income of a household have to be increased if it had to pay for the free or subsidized public service at full cost?

Allocating taxes and transfers at the household level

Information on direct and indirect taxes, transfers in cash and in-kind, and subsidies cannot always be obtained directly from household surveys. When it can be obtained, we call this the direct identification method. When the direct method is not feasible, one can use the inference, simulation, or imputation methods, or an alternative source. As a last resort, one can use secondary sources. The methods one can use to allocate taxes and transfers are described in detail in Lustig and Higgins (2013).

The one most frequent method was direct identification, especially for cash transfers. Direct personal income taxes and indirect consumption taxes were simulated (including assumptions for evasion) in all cases except for direct taxes in Brazil. In-kind transfers were imputed using the government cost approach.

2.3 The main results

How much redistribution and poverty reduction is being accomplished in each country through social spending, subsidies, and taxes? The results are shown in Tables 2.1, 2.2 and 2.3.

Of all nine countries and using the Gini coefficient as an indicator, Chile, Brazil, and Uruguay lower income inequality through direct taxes and transfers the most (disposable income vs. market income) (Table 2.3). They are followed by Mexico, Costa Rica, Bolivia, Peru, and El Salvador. Guatemala lowers income inequality the least; this in spite of the fact that it is the third most unequal country of the group. When compared with disposable income inequality, net

Table 2.1 Gini coefficient by income concept

	Bolivia (2009)	Brazil (2009)	Chile (2009)	Costa Rica (2010)	El Salvador (2011)	Guatemala (2010)	Mexico (2010)	Peru (2009)	Uruguay (2009)
Market Income	0.503	0.579	0.564	0.508	0.440	0.551	0.511	0.504	0.492
Net Market Income	0.503	0.565	0.546	0.500	0.436	0.550	0.497	0.498	0.478
Disposable Income	0.493	0.544	0.526	0.489	0.430	0.546	0.488	0.494	0.457
Post-Fiscal Income	0.503	0.546	0.525	0.486	0.429	0.551	0.481	0.492	0.459
Final Income	0.446	0.439	0.438	0.402	0.404	0.523	0.429	0.466	0.393

Sources: Bolivia (Paz Arauco et al., 2014), Brazil (Higgins and Pereira, 2014), Chile (Ruiz-Tagle and Contreras), Costa Rica (Sauma and Trejos), El Salvador (Beneke et al.), Guatemala (Cabrera et al.), Mexico (Scott, 2014), Peru (Jaramillo, 2014), and Uruguay (Bucheli et al., 2014).
Notes: For definition of income concepts see text. Year of survey is in parenthesis.

Table 2.2 Headcount ratio by income concept (Poverty line: US$2.50 day in 2005 purchasing power parity)

	Bolivia (2009)	Brazil (2009)	Chile (2009)	Costa Rica (2010)	El Salvador (2011)	Guatemala (2010)	Mexico (2010)	Peru (2009)	Uruguay (2009)
Market Income	19.6%	15.1%	4.8%	5.4%	14.7%	35.9%	12.6%	15.2%	5.1%
Net Market Income	19.6%	15.7%	4.9%	5.7%	15.1%	36.2%	12.6%	15.2%	5.1%
Disposable Income	17.6%	11.2%	3.2%	3.9%	12.9%	34.6%	10.7%	14.0%	1.5%
Post-Fiscal Income	20.2%	16.3%	3.2%	4.2%	14.4%	36.5%	10.7%	14.5%	2.3%

Sources: Bolivia (Paz Arauco et al., 2014), Brazil (Higgins and Pereira, 2014), Chile (Ruiz-Tagle and Contreras), Costa Rica (Sauma and Trejos), El Salvador (Beneke et al.), Guatemala (Cabrera et al.), Mexico (Scott, 2014), Peru (Jaramillo, 2014), and Uruguay (Bucheli et al., 2014).
Notes: For definition of income concepts see text. Year of survey is in parenthesis.

Table 2.3 Reduction in poverty and inequality in percentage points

	Change in Disposable Income wrt Market Income	Change in Post-Fiscal Income wrt Market Income	Change Final Income Income wrt Market Income
Bolivia (2009)			
Gini	−1.0	0.0	−5.7
Headcount Ratio	−2.0	0.6	not applicable
Brazil (2009)			
Gini	−3.5	−3.3	−14.0
Headcount Ratio	−3.9	1.2	not applicable
Chile (2009)			
Gini	−3.8	−3.9	−12.6
Headcount Ratio	−1.6	−1.6	not applicable
Costa Rica (2010)			
Gini	−1.9	−2.2	−10.6
Headcount index	−1.5	−1.2	not applicable
El Salvador (2011)			
Gini	−1.0	−1.1	−3.6
Headcount Ratio	−1.8	−0.3	not applicable
Guatemala (2010)			
Gini	−0.5	0.0	−2.8
Headcount Ratio	−1.3	0.6	not applicable
Mexico (2010)			
Gini	−2.3	−3.0	−8.2
Headcount Ratio	−1.9	−1.9	not applicable
Peru (2009)			
Gini	−1.0	−1.2	−3.8
Headcount Ratio	−1.2	−0.7	not applicable
Uruguay (2009)			
Gini	−3.5	−3.3	−9.9
Headcount Ratio	−3.6	−2.8	not applicable

Sources: Bolivia (Paz Arauco et al., 2014), Brazil (Higgins and Pereira, 2014), Chile (Ruiz-Tagle and Contreras), Costa Rica (Sauma and Trejos), El Salvador (Beneke et al.), Guatemala (Cabrera et al.), Mexico (Scott, 2014), Peru (Jaramillo, 2014), and Uruguay (Bucheli et al., 2014).
Notes: For definition of income concepts see text. Year of survey is in parenthesis.

(of indirect subsidies) indirect taxes are slightly unequalizing in Bolivia, Brazil, Guatemala, and Uruguay. In Chile, Costa Rica, El Salvador, Mexico, and Peru, they are slightly equalizing. Adding the monetized value of public education and health spending lowers the Gini the most, especially in Brazil, Chile, Costa Rica, and Uruguay. Once again, Guatemala stands out as the least redistributive.

The headcount ratio (with the international extreme poverty line of US$2.50/day in PPP) is used to estimate the impact of taxes and transfers on

poverty. In Table 2.3, one can observe that net (of direct taxes) direct transfers lower poverty the most in Brazil and the least in Peru. However, when one adds the effect of net indirect taxes, the headcount ratio in Brazil is *higher* than the market income headcount ratio. That is, overall, the Brazilian tax and transfers system (excluding public services) increases poverty. The same happens in Bolivia and Guatemala. The country that lowers poverty the most after direct and indirect taxes, cash transfers and indirect subsidies are taken into account, is Uruguay. Again, Guatemala stands out because, although it has the highest poverty rate in the group, fiscal policy slightly increases poverty.

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3

"Small Miracles" – Behavioral Insights to Improve Development Policy: The *World Development Report 2015**

Allison Demeritt[†] *and Karla Hoff*[‡]

3.1 Introduction

Rational actor models dominate much modern economic thinking. But rational choice theory cannot explain the striking effects of the policies discussed in the World Bank's latest *World Development Report* (World Bank Group 2015). In his review of the report in *The New York Times*, David Brooks celebrates the behavioral approach to development because it creates opportunities for policy interventions that produce "small miracles" from the perspective of traditional economics.

> Behavioral economics policies are beautiful because they are small and concrete but powerful. They remind us that when policies are rooted in actual human behavior and specific day-to-day circumstances, even governments can produce small miracles.
>
> Brooks, *The New York Times,* December 12, 2014, A29

Brooks' review focuses on the proven small policy successes of behavioral economics, but the report is meant to do more than showcase small wins. It also aims to show that behavioral insights yield entirely new understandings of the causes of economic underdevelopment and social exclusion, which create scope for new interventions to promote "big" development outcomes. Advancing this work, which is still at an early stage, is a key aim of the *World Development Report* (WDR).

* The authors are grateful to the entire team of the *World Development Report 2015*. These are the views of the authors and do not reflect those of the World Bank, its Executive Directors, or the countries they represent.

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This chapter elaborates on a key contribution of the WDR – an analytical framework for understanding human decision making. Whereas the WDR centered on successful interventions in the developing world, this chapter pays special attention to the sociocultural roots of underdevelopment and the deep consequences of psychological, social, and cultural influences on decision making. It shows how small changes in the choice environment can alter behavior in ways that can have real consequences for individuals' lives and societal outcomes. It thus shows how behaviorally informed interventions may produce both small miracles and big changes in society.

3.2 A brief history of behavioral economics

A focus on the psychological, social, and cultural characteristics of *homo economicus* has been long in the making. For many years, psychologists, sociologists, and other social scientists questioned the dominant economic paradigm based on rational and self-interested actors with fixed preferences. Gradually, armed with experimental methods and new tools for measuring decision making, behavioral economists made inroads into mainstream economics by demonstrating that people are often psychological rather than logical and that their preferences are malleable rather than fixed. The inroads inspired changes in finance, game theory, and macroeconomics (Akerlof 2002; Camerer 2003; Camerer, Loewenstein, and Rabin 2004). Some of Adam Smith's ideas about human nature that were rejected at the onset of the neoclassical revolution have now become widely endorsed (Ashraf, Camerer, and Lowenstein 2005). Economics has thus come full circle—from *homo sapiens* to *homo economicus* and, within the behavioral approaches, back to *homo sapiens* (Thaler 2000).

Yet most definitions of behavioral economics have emphasized what people cannot do. Humans have bounded information-processing power and so might not respond to true probabilities. They have bounded attention and so might not respond to true costs and benefits. They have bounded willpower and so might not act on their intentions. By generating lists of mistakes and biases that people make, behavioral economics insights remained tightly tethered to the rational actor framework. Since behavioral economics did not emphasize alternative foundational elements that drive decision making, it provided limited direction to practitioners interested in creating new instruments to improve development outcomes.

3.3 A new approach – three principles of thinking

The *World Development Report 2015* moves behavioral approaches center stage. It develops three principles of thinking and decision making by synthesizing

evidence from across the social and natural sciences – including psychology, sociology, anthropology, political science, neuroscience, and cognitive science. The principles are:

- *Thinking automatically.* Most human thinking is automatic, not deliberative. It is based on what effortlessly comes to mind. Changing what most easily comes to mind can thus be a powerful means to change behavior.
- *Thinking socially.* Human thinking is socially conditioned. What others are doing and expecting others to do intimately shapes an individual's own preferences. Enhancing the salience of others' actions and expectations can thus shift behavior. Introducing change initiatives at the group rather than the individual level and cueing an aspect of social identity can also shift behavior.
- *Thinking with mental models.* Thinking uses mental models to interpret the environment (Denzau and North 1994; North 1994). Examples are categories, identities, default assumptions, and automatic causal narratives. Many are widely shared social constructions (*cultural schemas).* Most are useful, but some are not. What people take to be common sense may be shaped by the political and economic institutions to which they have been exposed. Exposure to different interpretive ideas and role models may change mental models and so make possible sustained changes in behavior.

The three principles encompass psychological, social, and cultural influences on thinking that fall outside rational actor models. By presenting alternatives to standard economic assumptions about decision making and illustrating their applicability to areas including health, savings, productivity, child development, and climate change, the report demonstrates the broad relevance of behavioral insights and the importance of engaging with them in policy-making.

A central message of the WDR is that the causes of underdevelopment are not limited to the core factors in the standard economic framework—poor technology and resources, distorted incentives, and problems of information. Psychological, social, and cultural factors are also core factors. Although people generally believe that they respond objectively to a situation, culture affects what they attend to and how they interpret the situation. A consequence is that development policy can work both *with* and *around* psychological, social, and cultural drivers of behavior: It can work *with* them by harnessing them to promote development; it can work *around* them with techniques that refocus attention. The new approach to policy making does not replace traditional development tools; it supplements and expands them. The following sections elaborate on the three principles of thinking.

3.4 Principle 1: Thinking automatically

The rational actor in standard economics has remarkable abilities: he processes information costlessly and without bias. But in fact, careful thought is exhausting and is often avoided. Much of human thinking is based on what comes to mind effortlessly and on the use of simple rules of thumb and heuristics. Automatic thinking—intuitive, associative, and impressionistic—is the "secret author of many of the choices and judgments you make," the psychologist Daniel Kahneman (2011) writes in *Thinking, Fast and Slow.* For his work on automatic thinking, he was awarded the Nobel Prize in Economic Sciences in 2002. He demonstrated that automatic thinking led to systematic biases in judgment (Tversky and Kahenman 1974, 1983; Kahneman 2003). This section presents examples of biases caused by automatic thinking. The section also gives examples of policies that improved decision making by changing what came to mind automatically or by reducing the need to think deliberatively in order to make the best decision.

Anchoring

A math exercise demonstrates how automatic thinking can radically shape the judgments individuals arrive at. Consider asking one set of people to estimate in five seconds the product

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$$

and asking another set of people to estimate the product

$$8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1.$$

Tversky and Kahneman (1974) posed the questions to high school students. As shown in Figure 3.1, the first group made a median estimate of 512, and the second group made a median estimate of 2,250. The correct answer is 40,320. The starting value "anchors" the estimation process such that different starting points yield different estimates. The adjustments that individuals make to modify the initial value as they reach for a final answer are typically insufficient. The cognitive bias, called *anchoring*, affects judgment and has been widely demonstrated.

Mental accounting

In rational actor models, money is fungible: money that is raised for one purpose can easily be used for another. Yet researchers find that categorizing 'pots' of money for specific goals affects individuals' willingness to use the sums for other purposes. The consequences of 'mental accounting' for development behaviors can be significant. For instance, consider savings for health expenses. Researchers estimate that over 60 percent of under-five mortality— most of it in low-income

$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 =?$
Median answer is 512

$8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 =?$
Median answer is 2,250

The correct answer is 40,320

Figure 3.1 "Anchoring" a math problem with a high versus low number affects individuals' estimates of the answer

Source: Tversky and Kahnemann

countries— could be averted if households invested in readily available preventative health products (Jones et al. 2003). To find out why people do not save more, Dupas and Robinson (2013) ran an experiment in Kenya in a region with a high incidence of malaria. All subjects in the experiment, who were mostly women, were given information about the value of saving more for health needs. A random subset of the subjects were given three additional things: (1) a lockable box with a deposit slit at the top, similar to a piggy bank, (2) a key to open it, and (3) a passbook in which to designate a savings goal and record savings deposits. The subjects did not have any formal obligations to make deposits or to limit withdrawals. Nonetheless, the intervention had large effects.

Providing the lockable box and passbook increased savings for preventative health care by 66 percent compared to the control group. It also increased households' ability to pay for emergency health needs. Compared to the control group, those who had been given the lockable boxes were 41 percent more likely to reach their health savings goals; see Figure 3.2.

The evidence suggests that the lockable box and passbook were effective not because they increased the security of savings, but because they made more salient the intention to save for health. This mitigated problems of self-control and inattention. As one participant said, "It is easier to say no to money requests and to resist spending on luxuries because my savings are in the box for a specific goal." By facilitating the mental allocation of resources to a specific use, the intervention helped subjects harness the power of mental accounting (Thaler 1990). The intervention is an example of a *labeling effect*, in which assigning something to a category influences how it is perceived. Under the standard rational actor model, this intervention should have had no effect: money is fungible.

The pricing model

Thinking automatically is a universal trait. It is not a problem of only poor countries or only poor people. The next example illustrates the power of the pricing

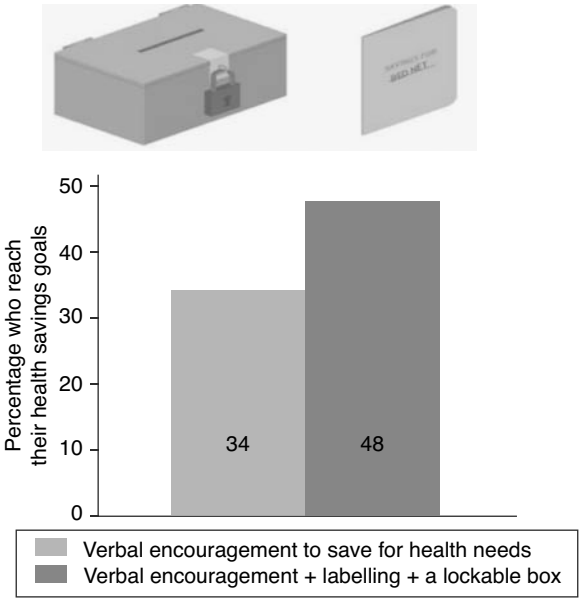

Figure 3.2 Facilitating mental accounting promotes savings for health in Kenya
Source: Dupas and Robinson 2013

model to change the behavior of people in a rich country. In the example, a seemingly trivial change in the pricing model affects the number of colleges that students apply to. It has large effects on the estimated lifetime earnings of students from poor families.

Many colleges in the United States require that applicants take a college readiness exam called the ACT. Before 1998, the ACT administration allowed students to send free score reports to three colleges and charged $6 for each additional report. Most students took the three-score report policy as a guideline for how many colleges to apply to. As Figure 3.3 shows, over 80 percent of ACT-test takers sent their scores to only three colleges; less than 10 percent sent their scores to four colleges. In 1998, the ACT policy changed for about half the students, and it changed for all students after 1998. The new policy allowed students to send free score reports to four colleges. The new policy caused most students to send reports to four colleges. The more colleges that students from low-income families apply to, the more they reach for quality schools. Some were accepted by the more prestigious schools and attended them. The new policy increased the lifetime expected earnings of students from low-income families by an estimated $10,000 (Pallais, forthcoming).

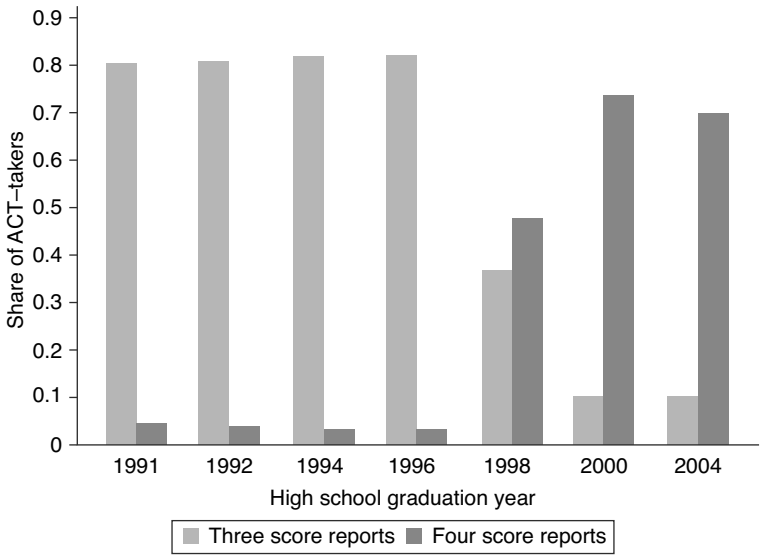

Figure 3.3 Changing the pricing model for sending test scores to colleges radically changed the number of score reports sent

Source: Pallais, forthcoming

The change in the ACT decision format turned out to be a powerful means of improving the number and quality of colleges to which high school students applied. The change in the pricing model affected the number of score reports sent out by children in high-income families as well as in low-income families, which is consistent with the view that the choice did not reflect deliberative thinking. Instead, the change in the ACT pricing model for sending score reports changed the rule-of-thumb that students latched onto to decide how many colleges to apply to. The change would make virtually no difference under a rational actor model.

The *accessibility* of different features of a situation affects automatic thinking (Kahneman 2003, Thaler and Sunstein 2008). As the preceding examples show, seemingly inconsequential features of the context of decision making—(1) the sequencing of the factors in a multiplication problem, (2) the gift of a lock box and passbook, (3) the number of free rather than $6 score reports offered by a pre-college testing service—affect the judgments people make. *Changing the ideas that costlessly come to mind generally changes behavior.* Table 3.1 summarizes examples presented in the WDR (especially chapter 1) in which seemingly inconsequential interventions changed behavior and increased welfare. The examples are "small miracles" within the rational choice framework.

Table 3.1 Policies that work by changing automatic thinking

Problem	Solution
Too little adherence to antiretroviral treatment by AIDS patients in Kenya	Send patients a weekly *reminder* stating "This is your reminder," through a low-cost message service on cell phones. Patients who received a weekly reminder increased adherence to the drug regime by 13 percentage points.
Too little enrollment in post-secondary schools in Colombia	Reduce the bimonthly conditional cash transfer that rewards parents of students with good school attendance, and distribute the savings lump sum at the time of the students' high school graduation. This policy increased enrollment in post-secondary institutions by 49 percentage points. The *change in timing* meant parents did not need to think about saving the money and could instead use it shortly after receipt to make enrollment payments.
Too little teacher effort in the Chicago public schools	Pay teachers a bonus at the *beginning* of the school year, which they will lose if their students do not meet a threshold achievement level at the end of the school year. This policy increased teacher effort and student performance, whereas a policy of paying teachers the bonus at the *end* of the school year conditional on student performance did not increase effort or performance. The psychological *aversion to loss* made the bonus in the former case more salient than in the latter case.
Too much borrowing in the United States from high-cost "payday lenders" by those who cannot obtain a credit card	*Anchor* the costs of borrowing funds.An anchor can be provided on the envelope in which individuals receive borrowed funds. The envelope can show the dollar costs of the payday loan compared with the dollar cost of borrowing that amount on a credit card. Borrowers who received envelopes with the anchor were 11 percent less likely to borrow from payday lenders in the next four months compared to the group that did not.

Source: Pop-Eleches and others 2011; Barrera-Osoria and others 2011; Fryer and others 2012; Bertrand and Morse 2011.

3.5 Principle 2: Thinking socially

The fundamental tenet of "thinking socially" is that individuals are rarely as independent of others in their decision making as the standard economic model

assumes. The neoclassical actor determines his interests on his own and is generally assumed to be selfish. His preferences remain fixed across social settings. However, real humans are deeply social animals. They think and act as members of communities, imitate others, and may favor social patterns of reciprocity, fairness, and norm adherence even when following the patterns lowers their monetary payoffs. Recent evidence shows that many people are more altruistic and cooperative than the standard economic model assumes, as long as other people are behaving fairly and cooperatively (Fehr and Gachter 2000 and WDR 2015, chapter 2).

Social identities and identity dynamics

A key goal of the WDR is to showcase novel interventions that have had demonstrable impact in the developing world. One consequence of this focus is that some concepts did not receive the attention they would deserve in a behavioral approach to development economics. *Social identity* is one such concept. While the chapters briefly discussed identities, the WDR gave short shrift to the *dynamics* of identity processes and the role that psychologists, sociologists, and anthropologists believe the dynamics play in social and economic outcomes.

Identities are the "senses of self" that individuals derive from perceived group memberships. They are categories that carry social meanings and are closely linked with particular sets of behavioral norms. Everyone possesses multiple social identities: a person might take on the social roles of parent, child, employee, and member of a religious or ethnic group at different times. The context at a given time influences which identities are salient to an individual. In part because people are automatic thinkers with limited cognitive bandwidth (principle 1), and in part because people are social animals with an innate tendency to adjust to their social environment (principle 2), people do not process all details of a situation and all possible courses of action. Instead, they tend to see only those details and courses of action that automatic and social thinking suggests are relevant—and this can depend on which identity is activated.

The chameleon-like ability to shift identities helps people adapt to the diverse roles they play in life. But a consequence is that when an identity of an individual that is associated with a stigmatized gender, class, caste, race, ethnicity, or profession is activated, he may fail to recognize and seize opportunities that would benefit him. He may engage in individually or socially harmful actions, or become the target of others' prejudice and exclusionary behaviors. Social identities influence how an individual views a situation and also how others regard and treat him; the concept of social identity helps anchor the reciprocal influences between self and society that can generate self-reinforcing and vicious feedback cycles. In the terminology of economics, social identities can trap people in negative equilibria.

Individual identity acts are micro-phenomena. In the examples provided below, a banker over-reports his earnings; a judge misjudges the validity of a co-ethnic's legal claim in the wake of ethnic conflict; and a student scales back effort when reminded of a marginal social group she belongs to. When such acts occur by enough people or over a long enough period of time or repeatedly over an educational career, the cumulative effect may be a macro-phenomenon: a dishonest business culture, persistent ethnic tensions, and poor educational outcomes for students from particular social groups.

Professional identities and organizational cultures

A compelling example of the influence of identity on behavior comes from the financial industry. Drawing on concerns that a banking culture that tolerates dishonest behavior is to blame for recent scandals, researchers hypothesized that reminding bank employees of their professional identity would cause them to act more dishonestly than they otherwise would (Cohn, Fehr, and Marechal 2014). Some 128 employees from a large international bank were recruited to perform a coin-tossing task with real earnings. Subjects were randomly assigned to either a treatment condition that made their professional identity salient, or a control condition that did not. Before beginning the coin-tossing task, subjects completed a short online survey. Those in the treatment group answered questions that "primed" or "cued" their professional identity (such as "What is your function at this bank?"), while those in the control group answered questions unrelated to their profession. Then everyone was asked to toss a coin 10 times and report the results online. Subjects were told in advance whether heads or tails was the "winning" result for each toss, and that each winning toss could be worth $20. Individuals therefore had the potential to earn $200. Subjects were also told that they would be paid only if the number of their winning tosses was at least as great as the number for a random player from the pilot study. In this way, researchers aimed to mimic the competitive environment of the banking industry. The structure of the game provided anonymity to the subjects, but enabled researchers to measure dishonesty by comparing the fraction of "winning" tosses that the subjects claimed to the expected distribution of winning tosses under honest reporting.

What happened? Employees were significantly more dishonest when their professional identity of bank employee was made salient. A subsequent task provided additional evidence by showing that primed subjects were thinking differently than their unprimed peers: When asked to turn word fragments into meaningful words, primed subjects were more likely to generate bank-related words—for instance, turning the word fragment "__oker" into "broker" as opposed to "smoker"—than those whose professional identities were not made salient. The results suggest that the professional identity of banker is associated with norms of dishonesty, and that dishonest behavior across many employees

can create an environment in which fraud becomes part of the taken-for-granted banking culture. The culture reinforces the acceptability of dishonest behavior, making individuals more likely to commit fraud, and so on, in a self-reinforcing cycle.

Ethnic identities and ethnic conflict

Social identities affect not only how individuals see a situation and what their preferences are, but also how others treat them. Social psychologists theorize that humans have an intrinsic need to maintain positive self-esteem, and that this need can cause people to favor in-group members and denigrate out-group members (Tajfel and others, 1971). The resulting identity dynamics can contribute to prejudice, exclusion, and conflict.

Consider an example from the legal system. Judges are often thought (and trained) to be among the most neutral of arbiters. Yet in small claims courts in Israel, where cases are randomly assigned to Arab or Jewish judges, judges were 17–20 percent more likely to uphold a claim when the judge and plaintiff shared a social identity (Arab or Jewish) (Shayo and Zussman 2011 see Figure 3.4). Judicial bias increased with ethnic conflict: the greater the intensity of terrorism in the vicinity of the court in the year preceding the trial, the more judges favored litigants from their own ethnic group. Perhaps most sobering is that judicial bias persisted even after intense violence had subsided (Shayo and Zussman 2014). The results suggest that ethnic conflicts create legacies that are hard to overcome.

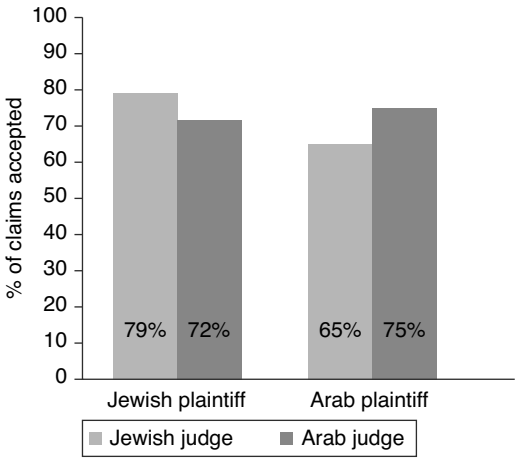

Figure 3.4 Judges in Israeli small claims courts favor litigants from their own ethnic group
Source: Shayo and Zussman 2011

Particularly interesting is the finding that social identity-based legacies seem to become a part of the fabric of society. Exploiting the fact that judges change courts over time, researchers investigated how violence in the vicinity of the courts, as compared to violence that judges encountered personally, played into judicial bias. Violence around the court was more important than personal exposure for explaining bias. This finding suggests identity dynamics in which conflict makes ethnicity socially salient even for individuals who do not experience the conflict first-hand. In a model investigating such dynamics, Sambanis and Shayo (2013) highlight the possibility of vicious cycles in which identity-related acts are endogenously determined and cumulate over time to create a persistent state of ethnic tension.[1] Not only does identification intensify conflict; conflict also breeds social identification.

Racial, social class, and caste identities and educational achievement

Why do some social groups exhibit persistent underachievement in education? Economists generally focus on unequal resources and lower expected wages to explain education gaps between groups in society. However, sociologists and some economists have proposed that identities are a key determinant of the demand for education (Coleman 1961; Akerlof and Kranton 2010). Humans want to feel in most social situations that they "fit in." As a result, students who feel they do not belong in school may reduce their effort and participation, irrespective of the opportunities to participate and the expected monetary benefits of doing so.

The effects of identity on performance in school may reflect not choices but instead self-confidence. When African-American students were asked to answer a demographic question about their race before beginning a test, their performance declined relative to peers who were not reminded of their racial identity (Steele and Aronson 1995). And like the bankers discussed above, students "primed" with a racial question were more likely to complete word fragments in ways relevant to an African-American identity, providing evidence that the priming question activated race-related mental constructs. Primed students were also more likely to create words reflecting self-doubt about competence and ability, for instance, by turning the fragment "__unk" into "flunk." Hoff and Pandey (2006, 2014) produced similar results in India, showing that although high-caste and low-caste schoolboys performed equally well in a maze-solving task when

[1] An analysis of immigrants in France suggests similar cycles of identification and prejudice, in which immigrants expect systematic discrimination and therefore identify with their home rather than the native culture. This practice allows established natives to continue distinguishing themselves from immigrants, and reinforces their distaste for immigrants. The result is an equilibrium in which immigrants remain unassimilated and economically excluded (Adida, Laitin and Valfort 2014).

caste was not salient, publicly revealing their castes in mixed groups created a significant caste gap in performance.

Students' social identities may also affect how others, including teachers, treat them. In a classic study, university students watched a short video of a fourth-grade student named Hannah portrayed either as a poor child living in an urban area (low socioeconomic class) or a wealthy child in a suburban setting (high socioeconomic class) (Darley and Gross 1983). The evaluators judged Hannah's academic abilities similarly regardless of whether they saw her portrayed as a low- or high-class child. However, when students watched one of the "class" videos followed by a second video showing Hannah's performance on an oral test in which she answered some questions correctly and others incorrectly, things changed: those who had first seen Hannah in the wealthy setting believed her to have high ability and recalled that she got most questions correct, whereas those who had first seen her in the poor setting believed her to have low ability and recalled that she answered many questions incorrectly. Researchers explained this result by suggesting that the university students formed initial hypotheses about students' abilities upon watching the "class video" but were able to 'overcome' them when no performance information was available. In contrast, even objectively ambiguous performance data about Hannah's ability caused the subjects to falsely confirm their initial hypotheses, resulting in biased assessments of Hannah's ability. The study shows how subconscious processes (using automatic thinking— principle 1) may play into unequal schooling experiences for student from different social backgrounds.

A modern means of measuring bias is the Implicit Association Test (IAT), which assesses the speeds at which subjects match attributes (such as "good" and "bad") to concepts or identities (such as "female" and "male"). Response times are faster for pairings between concepts and attributes that are closely associated in subjects' minds. Differences in matching speeds are thought to reveal "implicit biases" that underlie automatic thinking. Researchers used IATs to examine the bias of Dutch teachers. They found that although teachers' self-reported measures of prejudiced attitudes were unrelated to their students' achievement, the implicit measures of teacher prejudice—thought to predict behavior arising from automatic thinking (principle 1)— explained differing ethnic achievement gaps across classrooms (van den Bergh et al. 2010). This finding supports the idea that teacher expectations can enlarge social inequalities in educational attainment.[2]

Two distinct identity dynamics may impair the educational outcomes of marginalized groups. In the first, students aware of a stigmatized identity exhibit lower performance, possibly as a result of (1) anxiety that taxes their cognitive functioning, (2) disengagement stemming from a lack of belonging, or both. The

[2] More generally, biased perceptions can change behavior in ways that sustain the biases as "equilibrium fictions" (Hoff and Stiglitz 2010).

resulting poor performance reinforces the perception of inadequacy, and this in turn further increases anxiety and withdrawal, which in turn further reduces performance, creating a vicious downward cycle of decreasing performance and disengagement (Cohen et al. 2009). In the second identity dynamic, teachers respond to students' negative social identities with low expectations and prejudice that may lead them to supply the students with fewer resources—both material (such as textbooks) and nonmaterial (such as encouragement). If both identity dynamics are operating, stigmatized identities may be a more important aspect of educational underachievement than is commonly acknowledged.

Interventions based on social identities

Can interventions based on an awareness of social identity effects shift behavior? Several studies suggest that they can.[3]

"Self-affirmation" exercises in which people with stigmatized identities focus briefly on their personal values or experiences can have surprising effects. For instance, in a randomized, double-blind experiment, students in the United States completed a few 10-minute writing assignments over the course of a year in which they wrote a brief paragraph about values that they selected as being most important to them (the intervention condition) or values that were less important to them but might be important to someone else (the control condition) (Cohen et al. 2006, 2009). African-Americans who completed the values affirmation earned higher GPAs than their non-affirmed peers and continued to do so even two years after the intervention. Students who had the lowest performance at the beginning of the experiment benefitted the most. Researchers argued that the intervention interrupted the recursive cycle in which anxiety, disengagement and poor performance reinforce one another.

In-class value affirmations have also helped students with low socioeconomic backgrounds. First-generation college undergraduates who, like the minority students above, wrote about values that they selected as most important to them as opposed to values that they selected as important to others improved their course grades and were more likely to continue taking a sequence of biology classes than non-affirmed peers. The intervention cut the achievement gap between the first-generation students and their advantaged peers by 50 percent (Harackiewicz et al. 2014). Other intriguing evidence for the trajectory-changing effects of affirmation interventions comes from a study conducted at an inner-city soup kitchen that found that low-income individuals who completed an oral affirmation exhibited better executive control and more interest in social benefit programs than non-affirmed individuals (Hall, Zhao, and Shafir 2014). These studies suggest that brief interventions targeting key psychological processes may

[3] See also the review in Hoff (2015).

have large, long-term effects if they interrupt a damaging self-reinforcing cycle or set in motion a beneficial one.

Interventions can also shift identities related to crime. In Liberia, a group-based cognitive behavioral program helped poor young men with criminal histories adopt new "socially aligned" identities. The program was rooted in the idea that the men were social outcasts who understood norms of appropriate behavior but did not consider themselves "subject to these norms, or worthy of inclusion into the larger social group" (Blattman, Jamison, and Sheridan 2014). In daily sessions for eight weeks, facilitators encouraged men to consider themselves as a member of the group subject to the norms—to see that behaviors associated with one set of circumstances (such as war-time) were unacceptable under another (such as peace-time). They encouraged the men in a number of ways: first, to adopt behaviors (such as cleanliness and managing anger without violence) that signaled to themselves and others that they were operating within societal norms; and second, to develop skills associated with planning and goal-setting. The therapy program was more effective than a cash transfer at changing behavior.

Interventions can also attempt to shift the norms associated with existing identities. For instance, some experts and regulators have proposed that the financial industry would benefit from the development of a professional oath, analogous to the Hippocratic Oath for physicians, that encourages honest banking practices. Ethics training and reminders at key decision points during work routines may also help bring bankers' decision making and the banking business culture in line with social obligations (Cohn, Fehr, and Marechal 2014).

The Hippocratic Oath is by no means a panacea for good outcomes in the medical profession. However, enlisting social pressure may be an effective means of increasing compliance with existing norms. When doctors are visited by other doctors who remind them of best practices and encourage them to improve their performance, the doctors who are visited do so (Jamtvedt et al. 2007; Brock, Lange, and Leonard, forthcoming). Since most people wish to adhere to the norms of their group, giving people more insight into how others are behaving and what others expect from them can be an effective means of changing behavior. In other words, "marketing" socially desirable norms is a means of harnessing social motivations to improve development outcomes (see WDR 2015, chapter 2).

Finally, identity acts can occur outside of conscious awareness and despite good intentions. Since biases are often widespread and go unrecognized by even self-reflective individuals, some believe that hidden biases may be more pernicious than overt forms of prejudice. In Silicon Valley, where concern for women's participation and equality runs high, Google is aiming to fight the "deep-set cultural biases ... that pervade the tech business" (Manjoo, 2014). Google employs Implicit Association Tests, described earlier, to illuminate hidden biases. The

hope is that increasing individuals' awareness of their own "automatic biases" may help them avoid prejudiced behaviors. Tools such as the IAT might also help development practitioners recognize and attend to hidden biases regarding the populations they seek to help.

3.6 Principle 3: Thinking with mental models

Rational actor models assume that individuals respond objectively to stimuli. But in thinking automatically, individuals draw uncritically on mental models to construct mental representations. "Thinking with mental models" is the third principle of decision making emphasized in the WDR. It may lead individuals to ignore information that violates their assumptions and to automatically fill in missing information based on prior beliefs. People may "see" things that are not actually there and apply causal thinking to situations that have no inherent causal meaning.

A classic experiment by the psychologists Heider and Simmel (1944) demonstrates the tendency of humans to assign motive and intention in situations when they are unwarranted. Viewers are shown a brief film in which there is

> a large triangle, a small triangle, and a circle moving around a shape that looks like a house with an open door. Viewers see an aggressive large triangle bullying a smaller triangle, a terrified circle, and the circle and the small triangle joining forces to defeat the bully. The perception of intention and emotion is irresistible; only people afflicted by autism do not experience it. *All this is entirely in your mind, of course* (Kahneman 2011, 76–77, italics added).

The triangles and the circle are not really agents, but are perceived as agents because of the mental models that people use to interpret their experiences.

Power creates legitimacy

Mental models help explain societal rigidity and social change. A powerful cause of development traps are weak constraints on a ruling group. Why do such constraints tend to persist over time? In the rational choice framework, the dominant explanation is that high inequality of wealth leads to the adoption of rules that preserve the initial inequality of wealth.[4] In this explanation, institutions matter only to the degree that they establish and enforce rules. However, sociologists and anthropologists argue that institutions also play a "schematizing role." They shape intuitions and what people believe to be the natural order of things.

[4] The dominant contributors are Engerman and Sokoloff and Acemoglu and colleagues. References and a review are in Hoff 2003.

In this sense, institutions are a way of seeing the world (Douglas 1986; Fourcade 2011).

A study of clientelism in the Indian state of Maharashtra suggests that a mental model may play a role in making oppressive institutions legitimate (Anderson, François, and Kotwal forthcoming). All villages in this state have formal democratic structures but differ, by historical accident, in the extent of the land owned by the traditional elite caste. In villages where the traditional elite owns the majority of land, village leaders manage to control village governance and use it against the interests of the poor majority. Pro-poor programs offered by the national government of India are 75–100 percent less available in villages in which the traditional elite owns the majority of land than in those in which it does not. However, surveys indicate that the poor in the elite-dominated villages view the situation as acceptable and even quite satisfactory. They are 14 percent more likely to trust the large landholders in villages in which the government is dominated by the traditional elite than in villages not dominated by the traditional elite. It seems that in the villages dominated by the traditional elite, individuals expect little from the dominant class as a whole, get more or less what they expect, and so consider themselves fairly treated. "Legitimacy follows power" in part because power shapes the way people see the world.[5]

The culture of honor affects the efficiency of coordination

Coordination problems occur in every society. Consider the well-known example discussed by Schelling (1960): Two individuals independently decide where to try to meet in New York City when no meeting point has been established in advance. The players gain utility only if they choose the same location. Multiple equilibria exist since all that matters is that players make the same choice. It is necessary to bring in sociological and psychological elements to understand which equilibrium is likely to emerge as a convention over time.

Coordination is a key factor in the emergence of institutions. Brooks, Hoff, and Pandey (2015) ran an experiment to better understand the obstacles to efficient coordination in repeated interactions in villages in north India. They recruited 122 men in representative samples of high- and low-caste men from seven villages. In the experimental sessions, which lasted four hours, an individual played the game with one partner, who was in a different location, for 5 periods; and then he was assigned a second partner to play with for 5 periods. The partners were anonymous, but the caste status of each partner was communicated to the player. A messenger ran between the locations to communicate the decisions of the partners to each other. The messengers represented the decisions and payoffs

[5] See Acemoglu, Reed, and Robinson (2013) for a related example.

		Player II's choice: Go it alone	Player II's choice: Try to cooperate
Row player's choice	Go it alone	17% gain	50% loss (the loser's payoff)
	Try to cooperate	17% gain	70% gain

Figure 3.5 Payoffs to the column player, expressed as returns on the period endowment

Note: This game is symmetric. For simplicity, the chart shows the payoffs only to the column player and expresses the payoffs as a percentage gain on the player's endowment in the period game.

Source: Brooks, Hoff, and Pandey 2015

visually in a box held by each partner, so that it would be easy for a player to see the full history of play.

Figure 3.5 shows the period game. A player has a binary choice: go it alone or try to cooperate. If a player tries to cooperate, he earns a 70 percent return on his per-period endowment (15 US cents) if his partner also tries to cooperate, but loses half his endowment if his partner chooses to go it alone. Call the loss *the loser's payoff*. There are two Pareto-ranked Nash equilibria: Both players try to cooperate, or both go it alone. Since the game is symmetric, it suffices to show in the figure the payoffs of only one of the players.

Will players establish a convention of cooperation and thereby obtain the 70 percent return each period? High-caste pairs usually did not, but the low-caste pairs usually did. 73 percent of low caste pairs played the efficient equilibrium in the final (fifth) period of a partnership, compared to 50 percent of mixed (low-high) caste pairs, and only 32 percent of high caste pairs.

Caste status is correlated with many individual characteristics, and one might suspect that it is covariates of caste rather than caste culture that is driving the divergence in outcomes. However, the study observes measures of the subjects' wealth and education. Once caste status is controlled for in regression analysis, the covariates are statistically insignificant.

Why do the high-caste pairs fail to form the Pareto efficient convention? The evidence from the game and from surveys of attitudes to vignettes points to the high caste's culture of honor as the cause. The culture may have given the loser's payoff the meaning of an insult. In the culture of honor, any slight to one's well-being tends to be viewed as an insult that must be avenged, regardless of whether the slight was intended or not: *Cross me and I'll punish you*. Under this view, the

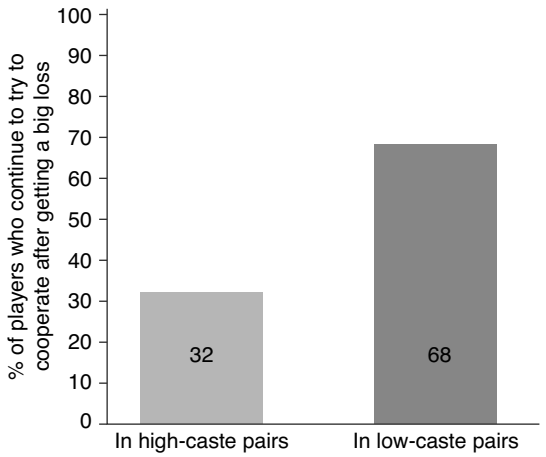

Figure 3.6 Compared to high-caste players, low-caste players are more likely to continue to try to cooperate after receiving the loser's payoff

Source: Brooks, Hoff, and Pandey 2015

loser's payoff would be interpreted as a wrong to be punished.[6] The only means a player has to punish the wrong is not to cooperate in the next period. Figure 3.6 shows that high-caste players with high-caste partners are much less likely than low-caste players with low-caste partners to continue to take the cooperative action after obtaining the loser's payoff. "Punishing"—withdrawing cooperation in one period—can insult high-caste partners and cause even low-caste players to try less often for cooperation. Thus any expectation that each player will try to cooperate can unravel.

In the early American South, a culture of honor held by the elite obliged them to respond to an insult by dueling. Laws that made dueling illegal were generally ineffective because they operated outside the elite's system of social meanings and thus failed to provide sufficient social grounds for a gentleman to decline a duel. A different approach used the law to change the social meaning of dueling (Lessig 1995). It barred duelers from holding public office which, like dueling, was an important social "duty" for members of the elite. By rendering dueling a behavior that made a gentleman unable to hold public office, the law created a conflict of duty within the social elite's system of meaning, weakening the social appropriateness of challenging a person to a duel or accepting the challenge. A

[6] A similar culture of honor is held by men in the US South, but not by men in the US North. Nisbett and Cohen (1996) expose Northern and Southern men to the same insult and find significantly more aggressive responses from the Southerners. On average, the Southern but not the Northern subjects experienced surges in levels of cortisol and testosterone indicative of surges of stress and aggression.

man could appeal to his social duty, rather than just his self-interest, to avoid a duel and could thereby retain his honor. The example shows how law can be used to regulate not only the monetary costs and benefits of actions but also their social meanings.

Creating opportunities for people to have, or to witness, new experiences can also be a means of changing mental models. This is well-known to advertisers. Advertisers can induce people to use products they do not need, or to adopt behaviors that provide no objective benefits, simply by creating associations between a product and a social identity or self-concept. For example, the Marlboro man created an association between rugged masculinity and smoking Marlboro cigarettes. Development practitioners change mental models, too. For example, in India, the government decreed through a constitutional amendment that one-third of the village governments in each state of India must have a female leader. The villages were selected by lottery. An impact evaluation in one Indian state, West Bengal, found that exposure to women leaders ended males' prejudice against women in leadership roles and increased parents' aspirations for their daughters (Beaman et a. 2009, 2012). Even after the reservations ended in a village, more women in the village ran for office and won elections. The mandated legal change spurred changes in villagers' mental models regarding the social role and capabilities of women, and thereby increased their opportunities and aspirations (see WDR 2015, chapter 3).

The exposure to female political leaders in Indian villages produced another change: it greatly increased both the reporting of crimes against women and police responsiveness to such crimes in India (Iyer, Mishra, and Topalova 2012). The increases occurred even though female village leaders had no legal jurisdiction on these matters. The new responsiveness to women's concerns appears, instead, to reflect a cultural shift that changed women's perceptions of the costs—psychic and otherwise—of reporting crimes committed against them and police officers' perceptions of the appropriateness of acting on crimes against women.

A similar chain of events occurred in Pakistan. The government uses a lottery to allocate visas to applicants who seek to participate in the Hajj. At the Hajj, Muslims from over 100 countries gather in Mecca, communally performing rituals. Men and women interact relatively freely, and whites and blacks interact on relatively equal terms. Malcolm X wrote after his pilgrimage, "What I have seen, and experienced, has forced me to rearrange much of my thought-patterns" (X 1965, 346). Utilizing the random choice of Pakistani lottery winners, Clingingsmith, Khwaja, and Kremer (2009) show that participation in the Hajj changed attitudes. Despite the fact that pilgrims' social roles did not change when they returned home, the experience led them to express greater acceptance of female education and employment, a more positive view of women's abilities, and greater concern about crimes against women in Pakistan. The effects were larger

for those travelling in smaller groups, as predicted by the theory that the effects depend on psychological engagement, which the smaller-sized groups facilitated.

The two previous studies are about exposure to real people who are exemplars of different 'ways of being' —women leaders or liberal Muslims. But exposure even to fictional characters can change mental models. Exposure to soap operas that depicted urban families in which women had greater autonomy than actual village women reduced the acceptability of wife-beating, reduced son preference, and increased women's autonomy in India (Jensen and Oster 2009). Exposure to soap operas that depicted women with few or no children led to a decline in fertility in Brazil (La Ferrara, Chong, and Duryea 2012). The effect was stronger if the respondent was within four years of the age of the leading female character in at least one soap opera that aired, consistent with the idea that the mechanism through which the change occurred was psychological engagement that led individuals to reconsider taken-for-granted fertility behaviors. The decline was comparable to an increase of two years in women's education. For women aged 35–44, the decline was an 11 percent decrease in the mean probability of giving birth.

3.7 Conclusion

A criticism of behavioral economics is that its insights have remained scattered and are often summarized by a list of errors, biases and "nots" about behavior—humans do not have unlimited information-processing powers, they do not have unlimited attention, and they do not have the willpower to act on all their intentions. The WDR untethers behavioral insights from the standard economic model by organizing insights from across disciplines into a coherent framework, building up a new edifice for understanding decision making. It lays out three broad principles of human thinking: most human thinking is automatic rather than deliberative; it is socially conditioned; and it is shaped by socially constructed mental models drawn from limited sets of experiences and surroundings. The broad policy implication is that widening the tools of development practitioners can help them achieve many development objectives. Practitioners should focus not only on correcting distorted incentives and fixing problems of information (the implication of traditional economic models), but also on improving the quality of individuals' judgments and decisions (the implication of behavioral economics).

All frameworks lead investigators to ask some questions, while steering them away from others. The WDR aims to help the development community ask new questions about the causes of underdevelopment and to reconceptualize (and broaden) the menu of policy responses. The nature of human thinking has been investigated in behavioral economics, psychology, sociology, cognitive science, anthropology, and neuroscience. Drawing on these fields, the WDR provides

a new framework for the subfield of *behavioral development economics*, with the hope of advancing the design of interventions capable of producing both small and large miracles.

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4
Culture and Collective Action

Gerard Roland and Yang Xie

4.1 Introduction

Are there cultural underpinnings for differences in types of collective action? One may think that countries that have been successful in establishing democracies earlier than other countries had stronger historical traditions of collective action. If this were true, countries that have not yet established democracies are simply lagging in having their population stage a successful revolution to establish democracy. Looking back in human history, things seem, however, quite different from such a simple scheme. Some countries may have had a stronger tradition of collective action than established democracies, but the aims of that collective action may not necessarily have been to establish democracy. In a recent paper, Gorodnichenko and Roland (2013) presented a model and empirical evidence showing that countries with individualist culture would adopt democracy earlier than countries with collectivist culture, *even* if the latter possibly had better traditions of collective action. In this chapter, we would like to take a closer look at this question and look for micro-foundations of different types of collective action in different cultures. We focus on the comparison between individualism and collectivism, so it is useful in such an endeavor to compare Chinese and European history, which are relatively well documented.

If we compare Chinese history with European history, since the times of the Qin and Han dynasty and the Roman Empire, two stylized facts emerge:

First, peasant and popular revolts played very little role in Europe in leadership change compared to China. In the Roman Empire, it was never the case that an Emperor was overthrown by a popular revolt. All such changes happened inside narrow elite circles (Sainte Croix, 1981; see also Finer, 1997). In contrast, in China, there are several well known cases of peasant revolts leading to the Emperor being overthrown or even a change in dynasty. The Han dynasty was founded by Liu Bang who was at the head of an army that started as a rebellion of peasant soldiers. Later, around the end of Western Han, the Green Forest

rebellion brought an end to the Xin dynasty founded by Wang Mang, and one of the Green Forest leaders, Liu Xiu, founded the Eastern Han Dynasty. The Yellow Turban rebellion played a big role in the collapse of the Eastern Han dynasty as its suppression led to the Three Kingdom periods. At the end of the Sui Dynasty, in 611 AD, large scale peasant revolts weakened the power of the Emperor, leading to the foundation of the Tang Dynasty. Around the end of Tang Dynasty, in 875 AD, Huang Chao led a very strong peasant revolt, which was suppressed by warlords, and one of them, Zhu Wen, then assumed the power of Tang. There followed a period of fragmentation until the foundation of the Song dynasty.

The Red Turban revolt overthrew the Yuan dynasty and one of its leaders, Zhu Yuanzhang, founded the Ming dynasty. The Ming dynasty was actually brought down by a big peasant revolt, led by Li Zicheng, which was then defeated by the Manchus who founded the Qing Dynasty.

Many other revolts, such as the Taiping rebellion in the 19th century nearly overthrew the Qing dynasty, during a bloody civil war that cost 20 million lives. Overall, since the Qin dynasty, there were more than 30 large scale peasant revolts, covering large parts of China's territory.

The second striking fact is that peasant revolts in China aimed most often at replacing a bad emperor (dynasty) with a good emperor (dynasty). In contrast, in Europe and the West, after the Middle Ages, the few big revolutions like the Glorious Revolution in England, the American revolution, the French revolution, the numerous European revolutions of the 19th century aimed most often at changing political institutions to limit the power of the executive and introduce more inclusive political institutions, led gradually to the establishment of democracies based on universal suffrage.

We present in this chapter a model proposing to make sense of these differences. It is a model of collective action, whereby people's potential payoff from collective action is augmented by a social payoff that differs across cultures, and that is rooted in modern cross-cultural psychology. We take as starting point the difference made by Markus and Kitayama (1991) between different notions of the self that are the foundations for cross-cultural psychological analysis of individualism and collectivism: the *independent* versus the *interdependent* self where the former is associated more with individualism and the latter more with collectivism.

In the following section, we briefly explain how the notions of independent and interdependent self may affect the social payoffs of collective action in different ways in different cultures. We then present a very simple model incorporating those features to analyze how in a collectivist culture collective action to overthrow an incumbent autocrat and replace him with better ruler is easier, while in an individualist culture collective action to change the existing political institutions and introduce new political institutions is easier. We then extend our model to a multiple player model of collective action, including a global

game component. The particular assumptions we make deliver rich results and contribute to the literature on collective action. In the multiple player case, the social payoff from participating in collective action may help alleviate the collective action problem, leading to a unique equilibrium of joint collective action for a large set of parameters of the model. In the global game setup where there is uncertainty about signals received by other players, it is possible that the collective action equilibrium delivers a negative payoff to both players compared to the status quo. These results are, to our knowledge, all novel in the context of collective action games.

4.2 The independent and the interdependent self and types of collective action

The independent self derives its identity only from the inner attributes of the individual. These attributes are considered to reflect the essence of the individual, to be stable across time and context and the combination of these attributes is seen as unique to the individual. These individual inner attributes are significant for defining, regulating and thus predicting the behavior of an individual. The interdependent self, in contrast, derives its identity essentially from relations with others. The self is not a separate identity but is embedded in a larger social group and can be understood only in relation to that larger group. From the point of view of the interdependent self, individual behavior is derived from one's role in different social contexts and from the perception of others' reaction to one's behavior as well as from the perceived effect of one's own actions on others.

These different notions of self have many different implications that can explain the main differences between individualism and collectivism (see the extensive survey in Gorodnichenko and Roland, 2012). Among the many differences, here are just a few that are relevant in the context of this paper. The independent self seeks to know him/herself through inner search of the introspective type. In contrast, the interdependent self seeks to know him/herself through the evaluation of others. People from individualist cultures have a higher need for "self-enhancement" and have a stronger self-serving bias than people from collectivist cultures. In contrast, the need for self-enhancement is less strong for the interdependent self who views him/herself as much more malleable. The interdependent self is concerned more with interpersonal harmony whereas the independent self is concerned with how events affect the individual and helps him or her stand out. A key motivational difference between individualist and collectivist culture is indeed the need to stick out versus to fit in. Both motivations are present everywhere but the former is stronger in individualist than in collectivist cultures where the motivation to fit in is stronger in the latter relative to the individualist culture.

In this chapter, we focus on some implications of the difference between the interdependent and the independent self related to collective action. We will assume that the interdependent self derives a positive payoff from participating in a collective action when such participation corresponds to an existing social norm. As we explain further, such an assumption has roots in Chinese history. The existence of this social payoff can make collective action easier, but only when the revolt is conducted within existing social norms. This is consistent with both the strong frequency of large-scale peasant revolts in China and with its relatively unchanged focus on replacing a bad emperor with a more legitimate one, generating the so-called *dynastic cycle*.

If the focus of a revolt falls outside existing social norms, however, we will assume that the social payoff for the interdependent self is a risky one. The idea is that participating in a revolt, the purpose of which is not sanctioned by a social norm, can lead to social stigmatization in case of failure. People will be blamed for having participated in actions for "foolish" and "unproven" ideals that have brought repression and misery upon the people. If instead a revolt for a revolutionary ideal, such as democracy, is successful, than we will assume that there can be a positive social payoff of *ex post* social recognition for having followed a just cause. This risky social payoff will create reluctance to engage in collective action for institutional innovation and institutional experimentation. Because of this, collective action in collectivist cultures will tend to be more conservative in its focus, aiming to change existing political leaders but not the existing political institutions.

On the latter dimension, we will assume that the social payoff to the independent self differs radically from the payoff to the interdependent self. Since the independent self finds gratification in standing out, there will be a positive social payoff to participation in collective action aiming at institutional innovation. The idea is that participation in collective action can help the individual stand out relative to those generations and cohorts that did not have that opportunity.

The existence of a social norm for revolting against a bad emperor in China is rooted in the doctrine of the "Mandate of Heaven" introduced by the Zhou Dynasty (c. 1046–256 BC) to justify its right to rule, which was taken from the Shang Dynasty (c. 1600 BC–c. 1046 BC). The main idea is that the right to rule is bestowed by Heaven upon a ruler, but if the ruler performs badly, then the right will be withdrawn and bestowed on another good ruler. Given this doctrine, revolting against a bad emperor amounts to help to realize the "Mandate of Heaven", and is given strong cultural appreciation. Despite its emphasis on hierarchy and order, Confucianist doctrine's idea that the ruler loses legitimacy if he does not correctly embrace his responsibilities, is emphasized in at least two theories.

First, in the *Analects*, Confucius is recorded to have said: "good governance consists in the ruler being a ruler, the minister being a minister, the father being

a father, and the son being a son." This means that everyone must behave in the way they are supposed to behave, given their place in the social relationship, whether senior (a ruler or a father) or junior (a minister or a son). The "Mandate of Heaven" and the norm of revolting against a bad ruler follow from the idea that rulers, despite being on top of the social ladder, have the obligation to behave in a virtuous way.

Second, the Confucianist concept of the "Rectification of Names" states that there should be a close correspondence between names on one hand, and things and actual actions on the other hand; otherwise, social order and stability will be jeopardized. Confucius says that people's behavior should correspond to their name, as senior people like the Emperor have more responsibilities than say a local governor, and the more senior name people carry, the higher their responsibilities. The logic is the same as above.

We are also not alone in noting the "Mandate of Heaven", the norm of revolting against a bad ruler, and their role in Chinese history and political culture. For example, Zhao (2009) writes, "The strong performance aspect of state legitimacy allowed the ancient Chinese people to judge their ruler in performance terms. . . . Although most rebellions were ruthlessly repressed, the idea of rising to rebel against an unfit ruler had a legitimate position in Chinese political culture."

To conclude, the norm of revolting against a bad ruler is consistent with Confucianist culture, and the historical literature mentions its importance in Chinese history and political culture.

Collective action has always been difficult to understand, using standard tools of game theory. Because of the externalities to collective action allow people to free-ride on it, collective action has the structure of a prisoner's dilemma. If the payoffs of public action depend, however, on the number of participants, then collective action has the nature of a coordination problem with multiple equilibria: one where all participate, and one where no one participates (see the seminal paper by Palfrey and Rosenthal, 1984). Ostrom (1990) has analyzed how local institutions and norms emerge to solve collective action problems. Closer to our chapter, Gächter and Fehr (1999) have studied in a laboratory setting how social approval affects people's willingness to contribute to a public good.[1] Our chapter is the first to look at differences in social payoffs to collective action in an individualist and in a collectivist culture. The model gives micro-foundations to the more dynamic model of Gorodnichenko and Roland (2013) analyzing the dynamic of democratization and revolt in an autocratic regime. The main result is that collective action to replace the incumbent leader by a new leader is more present in a collectivist culture, while collective action to change the existing political institutions is more present in an individualist culture.

[1] More generally, Frank (1993) looked at the role of status and status-seeking in economics.

In the next section, we present a very simple model where the people are modeled as a single player. The main purpose is to get simple results to compare typed of collective action in the individualist and the collectivist culture. In the next section, we will introduce the multiple player case, using a game-theoretic setup of collective action.

4.3 The basic model

Assume that the utility of an agent depends on the economic payoff of risky collective action : $+a$ if successful, $-a$ if unsuccessful. On top of the presence of this standard payoff to collective action, we assume, as explained above, two additional social payoffs derived from the cross-cultural psychology literature.

The first additional payoff to collective action is the opportunity to "stand out" by possibly being regarded as an institutional innovator in the revolution, like the revolutionary figures of the American and French revolution. We call this payoff b and assume that it is independent of the result of the collective action. To the extent that individuals crave for fame and standing out, this payoff is assumed to be intrinsic to the collective action itself. This payoff gives a positive expected psychological reward to the independent self and is assumed to be stronger in an individualist culture that rewards standing out relative to conformity.

We assume that there is a possible additional payoff c to collective action that arises from self-satisfaction with conforming to the social norm of revolting in cases when revolting is seen as the "just" social action. We assume that this payoff is also independent of the success of collective action but derives from the positive self-esteem feedback for having conformed to an existing social norm.[2] We assume that this additional payoff rewards the interdependent self for conformity to existing social norms and is thus mainly present in a collectivist culture.

To this positive payoff for following the norm, we add a risky payoff to the interdependent self: in case of institutional innovation, there is a positive payoff c, but in case of failure, there is a negative payoff $-d$. As explained above, since there is no preexisting norm for participation in collective action under institutional innovation, because of its novelty, its success can create a positive

[2] The idea of a social payoff to revolting even in the case of failure can be illustrated by the following well known story in Chinese history. When Chen Sheng and Wu Guang told their men why they had decided to revolt against the Qin dynasty (in 209 BC) because heavy rains prevented them from arriving in time to the Yuyang frontier that they were supposed to guard, Chen Sheng said, to encourage the peasant soldiers to rebel: "Since we'll face death anyway, why don't we die for a grand purpose? If one has to die, one has to die like a man. Are the princes and lords and prime ministers born leaders. . . ?" Note that this famous quote also implies that Chen Sheng and Wu Guang had in mind to replace the existing leaders, not to change the existing governance system.

norm rewarding with social recognition those who have participated. On the other hand, failure of the institutional innovation carries also a social stigma for those who participated in an action not sanctioned by social norms, hence the negative payoff to failure.

Given the game-theoretic difficulties of dealing with joint decisions of collective action, we start by assuming that the decision-making process of the masses is equivalent to the decision-making process of a single agent. We will relax this assumption in the next section.

The expected utility from collective action *EU* can thus be written:

$$EU = EP + \alpha_k E_{IND}(A) + \beta_k E_{INT}(A)$$

Where *EP* is the expected economic payoff, $E_{IND}(A)$ the expected psychological payoff to the independent self of chosen action A for the independent self, $E_{INT}(A)$ the expected social payoff to the interdependent self of chosen action A, and α_k and β_k are respectively the weights attached to social rewards for the independent self and for the interdependent self where $k = I, C$ is a cultural index where index I stands for individualist culture and index C stands for collectivist culture. By assumption, and given our above discussion, $\beta_C > \beta_I$ *and* $\alpha_I > \alpha_C$.

We will assume two types of collective action. The first one is a revolt noted *R*. We define a revolt as a popular uprising to overthrow an existing ruler deemed illegitimate and replacing him by a new ruler deemed more legitimate. We call the other type of collective action institutional innovation, noted *I*. Under institutional innovation, the collective action leads to the establishment of new political institutions. Monarchy can be replaced by a republic, autocracy can be replaced by democracy, etc. At the time of the institutional change, these institutions are assumed to be new and hitherto untested. They thus historically represent an important institutional innovation.

We assume that the agent receives a signal $q \in [0, 1]$ denoting the probability of success of a revolt *R*. Similarly, note $\sigma \in [0, 1]$ the probability of success of *I*.

The status quo has an expected payoff of 0. The decision rule will thus be to choose *R* over the status quo, *I* over the status quo or between *R* and *I* if both have a positive expected payoff.

Table 4.1 summarizes our assumptions so far.

Table 4.1 Payoffs of revolt (R) and institutional innovation (I)

Weight	Successful R	Failed R	Successful I	Failed I
	$(Prob\, q)$	$(Prob\, 1-q)$	$(Prob\, \sigma)$	$(Prob\, 1-\sigma)$
Economic payoff (1)	a	$-a$	a	$-a$
Independent-self payoff (α_k)	0	0	b	b
Interdependent-self payoff (β_k)	c	c	c	$-d$

Given our assumptions, the expected utility of R is

$$EU_R = q(a+\beta_k c) + (1-q)(-a+\beta_k c) = 2qa + \beta_k c - a$$

Similarly, the expected utility of I is

$$\begin{aligned} EU_I &= \sigma(a+\alpha_k b+\beta_k c) + (1-\sigma)(-a+\alpha_k b-\beta_k d) \\ &= \sigma(2a+\beta_k(c+d)) - a + \alpha_k b - \beta_k d \end{aligned}$$

We can then easily define the following thresholds:

$$\underline{q_k} = \frac{1}{2} - \frac{\beta_k c}{2a}, \quad \underline{\sigma_k} = \frac{a - \alpha_k b + \beta_k d}{2a + \beta_k(c+d)}$$

where $\underline{q_k}$ is the minimum threshold for q so that R is preferred to the status quo and $\underline{\sigma_k}$ is the minimum threshold for σ so that I is preferred to the status quo. One sees immediately that $\underline{q_k}$ is decreasing in β_k. This means that the threshold to engage in a revolt is lower in a collectivist culture than in an individualist culture. This is due to the social norm of participating in a just revolt. Note similarly that $\underline{\sigma_k}$ is decreasing in α_k. In other words, the threshold for engaging in institutional innovation is lower in the individualist culture.

Note however that while $\underline{q_k}$ depends on β_k and not on α_k, σ_k depends both on α_k and on β_k. How does $\underline{\sigma_k}$ vary with β_k? Quick calculations show that $\underline{\sigma_k}$ increases with β_k if $d \geq \frac{a-\alpha_k b}{a+\alpha_k b} c$. Note that $\frac{a-\alpha_k b}{a+\alpha_k b} \leq 1$ so that this condition is in general always satisfied as long as $d \geq c$, i.e. as long as the punishment from the stigma to participating in failed institutional innovation is not lower in absolute terms than the social recognition from success. Note that the condition is always strictly satisfied as long as $\alpha_k > 0$. We thus see that the possible risk of failure associated with institutional innovation may raise the threshold for collective action in that direction in a collectivist culture.

These calculations lead us to our first proposition.

Proposition 1

The threshold for R is lower under a collectivist than under an individualistic culture and the threshold for I is lower under an individualist compared to a collectivist culture.

These very simple calculations thus show that there is a greater ease of collective action to replace a bad ruler in a collectivist culture and a greater affinity for collective action for institutional innovation in an individualist culture. These results follow from the assumptions we made giving positive utility to participation in a collective action following an existing social norm under collectivism, but greater reluctance in the absence of a social norm when there is the risk of a social stigma for failure in action for institutional innovation. Conversely, the positive utility from being a participant in collective action for institutional innovation lowers its threshold in an individualist culture.

What are now the conditions to prefer R over I, or vice-versa, in case the threshold for both is satisfied? This is defined in Proposition 2.

Proposition 2

If $q = \sigma$, and if both I and R are preferred to the status quo, in a collectivist culture, R is preferred over Iif $\sigma < 1$ and $\alpha_C - > 0$; in an individualist culture, I is preferred over R if $b > 0$ and $\beta_I - > 0$.

Proof: The expected payoff of R is greater or smaller than I if

$$\beta_k c + 2qa - a \geq \text{ or } \leq \sigma(2a + \beta_k(c+d)) - a - \beta_k d + \alpha_k b$$
$$\leftrightarrow (1-\sigma)\beta_k(c+d) + (q-\sigma)2a \geq \text{ or } \leq \alpha_k b$$

If $q = \sigma$, the RHS goes to 0 as $\alpha_C - > 0$ and the LHS remains positive as long as $\sigma < 1$. Similarly, the LHS goes to 0 as $\beta_I - > 0$ and the RHS remains positive as long as $b > 0$. **QED.**

Proposition 2 shows that under our assumptions, if the likelihood of success of collective action under I and R are the same, then a collectivist culture has a preference for changing leaders but not the regime, in contrast to the individualist culture. Note that if b is large enough, I can be preferred to R in an individualist culture even if $q > \sigma$, i.e. if the probability of success of collective action for R is higher than for I.

To repeat, there are three key assumptions behind these results:

1) R gives a positive social payoff to the interdependent self for following the social norm of revolt, regardless of the success or not of the collective action;
2) I gives a risky payoff to the interdependent self, contingent on the result of the collective action because there is no existing norm (to follow or break) for I.
3) I gives a positive social payoff to the independent self regardless of the success or not of the collective action. This is because of the expected payoff from standing out. Even if everybody participates in the collective action, there is still a benefit from standing out compared to other generations ad cohorts that do not take part in the collective action.

4.4 Extension to multiple players

The above analysis assumed that the people behave as one homogenous group. We now relax this assumption. Without loss of generality, we assume that there are two groups of players modeled as two single players. The gist of the results in this section will be roughly the same as in the one player situation, but the

Table 4.2 Payoff matrix for revolt (R) versus non revolt (NR) in the two player case

Action	R	NR
R	$2qa-a+\beta_k c, 2qa-a+\beta_k c$	$2\gamma qa-a+\beta_k c, 2\gamma qa-a$
NR	$2\gamma qa-a, 2\gamma qa-a+\beta_k c$	0,0

results are much richer and there are interesting insights relative to the literature on collective action.

Let us start with the case of revolt *R*. As we will see, this case can be readily extended to the case of institutional innovation *I*. We denote again by q the probability of success of a revolt *R* if all agents decide to engage in collective action. If only one group decides to engage in collective action, then the probability of success is denoted by γq, where $\gamma < 1$. This seems reasonable as the action is less likely to be successful if only part of the population participates.

Like in the previous section, if both players decide on collective action, they will get an expected utility of

$$EU_R = q(a+\beta_k c)+(1-q)(-a+\beta_k c) = 2qa+\beta_k c-a$$

If only one player decides on collective action, then the expected payoff to that group is $2\gamma qa+\beta_k c-a$. The expected payoff to the other player is assumed to be $2\gamma qa-a$, i.e. that group does not receive the social reward $\beta_k c$ from revolting, but potentially free rides on its benefit, provided $2\gamma qa-a>0$. Note, however, that free-riding is not the only externality present in this model. If γ is sufficiently small, there is a negative externality imposed on the passive player. Indeed, the decision to engage in collective action may yield a negative payoff for the passive player. Indeed, it is quite possible that $2\gamma qa-a<0$ while $2\gamma qa+\beta_k c-a>0$. Table 4.2 shows the payoffs.

As above, we assume that $q \geq \underline{q_k} = \frac{1}{2} - \frac{\beta_k c}{2a}$. Otherwise, not revolting jointly is always a dominant strategy. All the action here will be taken by variation of γ. Assume first that γ is high, close to 1. Let us look at the strategies of player 1. Suppose player 2 decides not to revolt. Player 1 is strictly better off revolting if $2\gamma qa-a+\beta_k c>0$. This inequality give us a lower bound on γ such that as $\gamma > \underline{\gamma_{kR}} = \underline{q_k} q^{-1}$. Suppose player 2 decides to revolt. Then player 1 is strictly better off revolting because of the additional utility $\beta_k c$ from following the social norm of revolt. A symmetric reasoning can be held for player 2 showing that it is also a dominant strategy to revolt. There is thus a unique Nash equilibrium as long as $\gamma > \underline{\gamma_{kR}} = \underline{q_k} q^{-1}$. Note that $\underline{\gamma_{kR}}$ decreases with q.

Below $\underline{\gamma_{kR}}$, it is easy to see that there will be two equilibria: revolting and not revolting. Indeed, if player 2 revolts, player 1 is better off revolting, again because of the additional utility $\beta_k c$ from following the social norm of revolt. However,

Table 4.3 Payoff matrix for institutional innovation (I) or not (NI) in the two player case

Action	I	NI
I	$(2a+\beta_k(c+d))\sigma - a + \alpha_k b - \beta_k d$, $(2a+\beta_k(c+d))\sigma - a + \alpha_k b - \beta_k d$	$(2a+\beta_k(c+d))\gamma\sigma - a + \alpha_k b - \beta_k d$ $2a\gamma\sigma - a$

if player 2 does not revolt, then player 1 is better off not revolting, since by definition of $\underline{\gamma_{kR}}$, the payoff to revolting $2\gamma qa - a + \beta_k c$ will be strictly negative.

Note that in this game while a player may free-ride on the decision by the other player to revolt, the player benefits even more from participating, due 1) to the increased likelihood of success of collective action (q instead of γq) and 2) to the benefit to the interdependent self $\beta_k c$ from doing so.

Note that without the presence of $\beta_k c$, the lower bound on γ to obtain a unique equilibrium is $\frac{1}{2}q^{-1}$, which is always higher than $\underline{\gamma_{kR}}$, which is $\left(\frac{1}{2} - \frac{\beta_k c}{2a}\right)q^{-1}$, as long as $\beta_k c$ is positive. The higher $\beta_k c$, the further away below $\underline{\gamma_{kR}}$ can be from $\frac{1}{2}q^{-1}$. It is thus possible to generate collective action even when $\underline{\gamma_{kR}}$ is relatively low.

Note finally that $\underline{\gamma_{kR}}$ is decreasing with β_k, as it is a positive function of $\underline{q_k}$, which is decreasing with β_k. Given that, $\beta_C > \beta_I$ the threshold $\underline{\gamma_{kR}}$ is lower in the collectivist culture.

We can do a similar analysis for the decision to engage in institutional innovation I. Table 4.3 below shows the different payoffs.

As in the previous section, we assume that $\sigma \geq \sigma_k = \frac{a - \alpha_k b + \beta_k d}{2a + \beta_k(c+d)}$. The condition for I to be a unique equilibrium is that $(2a + \beta_k c + \beta_k d)\gamma\sigma - a + \alpha_k b - \beta_k d > 0$. which is verified if $\gamma > \underline{\gamma_{kI}} = \underline{\sigma_k}\sigma^{-1}$. Below $\underline{\gamma_{kI}}$, there are two equilibria, I and NI. One verifies easily that $\underline{\gamma_{kI}}$ decreases with α_k. By a similar reasoning to that in the previous section, one also verifies that $\underline{\gamma_{kI}}$ increases with β_k as long as $d \geq c$. Given these two conditions, it is thus the case that $\underline{\gamma_{kI}}$ is lower in the individualist compared to the collectivist culture, given d ≥ c.

The results for R and I are summarized in the following proposition.

Proposition 3

There exist thresholds for γ , $\underline{\gamma_{kR}}$ and $\underline{\gamma_{kI}}$ above which there is a unique equilibrium, respectively R and I. Threshold $\underline{\gamma_{kR}}$ is lower in the collectivist culture and threshold $\underline{\gamma_{kI}}$ is lower in the individualist culture.

In what follows, we want to look more carefully at what happens below thresholds $\underline{\gamma_{kR}}$ and $\underline{\gamma_{kI}}$. The above result is a classic one of multiple equilibria in a coordination game, in the spirit of Palfrey and Rosenthal (1984). If we now

assume that there is some uncertainty among players about q, we can use the global game technology and eliminate multiplicity of equilibria. The two player case is the easiest for the sake of exposition and is in the spirit of Carlsson and van Damme (1993), but we will later extend the analysis to multiple players, and indeed to a continuum of players as in Morris and Shin (2003).

Assume thus that variable q is a random variable and that each player (group of players) receives a private signal $q_i (i = 1, 2)$ such that $q_i = q + \varepsilon_i$ where ε_i has normal distribution $N(0, \delta^2)$. We assume that q, ϵ_1, and ϵ_2 are statistically independent from each other.

Let us now derive the equilibrium of this global game, first for the case of R. Having received signal q_1, player 1 forms the view that signal q_2 (conditional on q_1) has distribution $N(q_1, 2\delta^2)$. Indeed, since $q_1 = q + \epsilon_1$, we have that $q \mid q_1 = q_1 - \epsilon_1 \sim N(q_1 \delta^2)$. Since $q_2 = q + \epsilon_2$, we then have

$$q_2 \mid q_1 = q_1 - \epsilon_1 + \epsilon_2 \sim N\left(q_1, 2\delta^2\right).$$

For any x, agent 1 then assigns $P(q_2 \leq x \mid q_1) = \Phi\left(\frac{x - q_1}{\sqrt{2}\delta}\right)$.

Consider now that player 2 has a switching strategy and decides to revolt only if $q_2 \geq \underline{q_2}$. Given this decision rule, player 1's expected payoff of revolting conditional on the signal received is given by

$$E\left[\left(1 - \Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)\right)(2qa - a + \beta_k c) + \Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)(2\gamma qa - a + \beta_k c) \mid q_1\right]$$
$$= 2aq_1\left(1 - (1-\gamma)\Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)\right) - a + \beta_k c \equiv f\left(q_1, \underline{q_2}\right)$$

The expected payoff of not revolting conditional on the signal received is given by

$$E\left[\left(1 - \Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)\right)(2\gamma qa - a) + \Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right) \cdot 0 \mid q_1\right]$$
$$= \left(1 - \Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)\right)(2\gamma q_1 a - a) \equiv g\left(q_1, \underline{q_2}\right)$$

Player 1 should thus revolt if and only if $f\left(q_1, \underline{q_2}\right) - g\left(q_1, \underline{q_2}\right) > 0$.

Note that

$$f\left(q_1, \underline{q_2}\right) - g\left(q_1, \underline{q_2}\right)$$
$$= a\left[2(1-\gamma)q_1\left(1 - \Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)\right) + (2\gamma q_1 - 1)\Phi\left(\frac{\underline{q_2} - q_1}{\sqrt{2}\delta}\right)\right] + \beta_k c$$

is increasing monotonically in q_1 if $\gamma < \frac{1}{2q_1}$. Given that $\underline{\gamma_{kR}} < \frac{1}{2}$, and that the analysis with global games is done for those values of γ for which there are multiple equilibria, i.e. below $\underline{\gamma_{kR}}$, this condition will always be satisfied. Then given $\underline{q_2}$, there will be a threshold level for q_1 solving $f\left(q_1, \underline{q_2}\right) - g\left(q_1, \underline{q_2}\right) = 0$, above which player 1 will prefer to revolt.

We can make a similar reasoning for player 2.

There will then be a Nash equilibrium $(\underline{q_1^*}, \underline{q_2^*})$ that will thus solve

$$f\left(\underline{q_1^*}, \underline{q_2^*}\right) - g\left(\underline{q_1^*}, \underline{q_2^*}\right) = 0,$$
$$f\left(\underline{q_2^*}, \underline{q_1^*}\right) - g\left(\underline{q_2^*}, \underline{q_1^*}\right) = 0.$$

The solution is then calculated to be $\underline{q_1^*} = \underline{q_2^*} = \underline{q^*} = \frac{1}{2} - \frac{\beta_k c}{a}$. Note that this threshold is lower than in the one player case. This is an interesting observation, meaning that players are individually more willing to engage individually in collective action when its probability of success is lower! This seems surprising given that usually free-riding is the externality associated to collective action. As we saw above, free-riding is also present in this model as the passive player benefits from the action of the other player. However, there is also a negative externality associated with the fact that, while participating in the possible upside and downside of collective action, the passive player does not enjoy the social payoff from the collective action, leading thus to prefer switching to participate in the revolt, even when q is relatively low compared to the single player threshold. Let us call this effect the "reluctant revolutionary" effect. This effect is stronger in the collectivist culture as $\underline{q^*}$ decreases with β_k. If $\beta_k = 0$, the threshold is the same as in the one-player game.

An implication of the above reasoning is that the R equilibrium may be inefficient, i.e. deliver a negative expected payoff for both players compared to the status quo! This is because of the "reluctant revolutionary" effect mentioned above. If one player decides on collective action, the other one prefers to participate in the revolt because of the negative externality the other player would otherwise impose. Given that q is low enough, both nevertheless get a negative expected outcome. To our knowledge, this is the first model to deliver the surprising result that the collective action equilibrium can be the unique equilibrium even though both players receive negative payoffs in equilibrium. An intuitive way of seeing it is that even though both suffer under the collective action, deviating is not a profitable action for either player. This result is specific to the global game. With uncertainty about the signal received by the other player, a player may decide to engage in revolt to avoid the even more negative payoff received when remaining passive if the other player decides to revolt.

Looking now at the case of I, we get the corresponding

$$f\left(q_1,\underline{q_2}\right)-g\left(q_1,\underline{q_2}\right)$$
$$=a\left[2(1-\gamma)\sigma_1\left(1-\Phi\left(\frac{\underline{\sigma_2}-\sigma_1}{\frac{\underline{q_2}-q_1}{\sqrt{2}\delta}}\right)\right)+(2\gamma\sigma_1-1)\Phi\left(\frac{\underline{q_2}-q_1}{\frac{\underline{q_2}-q_1}{\sqrt{2}\delta}}\right)\right]$$
$$+\beta_k(c+d)\sigma_1\left[1-(1-\gamma)\Phi\left(\frac{\underline{\sigma_2}-\sigma_1}{\frac{\underline{q_2}-q_1}{\sqrt{2}\delta}}\right)\right]+\alpha_k b-\beta_k d$$

This expression is increasing in σ_1 when $\gamma<\frac{1}{2\sigma_1}$, which is automatically satisfied, using a similar reasoning as above. Then given $\underline{\sigma_2}$, there will be a threshold $\sigma_1$solving $f(\sigma_1,\underline{\sigma})-g(\sigma_1,\underline{\sigma_2})=0$, above which player 1 will prefer to engage in institutional innovation. The Nash equilibrium $(\underline{\sigma_1^*},\underline{\sigma_2^*})$ will thus solve

$$f\left(\underline{\sigma_1^*},\underline{\sigma_2^*}\right)-g\left(\underline{\sigma_1^*},\underline{\sigma_2^*}\right)=0,$$
$$f\left(\underline{\sigma_2^*},\underline{\sigma_1^*}\right)-g\left(\underline{\sigma_2^*},\underline{\sigma_1^*}\right)=0.$$

The solution is then $\underline{\sigma_1^*}=\underline{\sigma_2^*}=\underline{\sigma^*}=\frac{a-2\alpha_k b+2\beta_k d}{2a+(1+\gamma)\beta_k(c+d)}$, which is decreasing in α_k, and increasing in β_k, as long as $d\geq\frac{(1+\gamma)a-2\alpha b(1+\gamma)}{(3-\gamma)a+2\alpha b(1+\gamma)}c$, which is satisfied as soon as $d\geq c$

This reasoning leads us to formulate the following proposition:

Proposition 4

If there is uncertainty over q and σ, and if the noisy signals received by players are statistically independent, for values of γ lower than $\frac{1}{2q_1}$ and $\frac{1}{2\sigma_1}$ then there exists a unique equilibrium threshold $\underline{q^*}=\frac{1}{2}-\frac{\beta_k c}{a}$ and $\underline{\sigma^*}=\frac{a-2\alpha_k b+2\beta_k d}{2a+(1+\gamma)\beta_k(c+d)}$ above which players decide to engage in collective action respectively for R and I. The threshold is lower for R in a collectivist culture and for Iin an individualist culture.

Let us now go a bit deeper in the comparison of thresholds for the collectivist and individualist culture. Given the assumptions of our model, in the individualist culture, β_k is small. We can see that as $\beta_k\to 0$, $\underline{q^*}>\underline{\sigma^*}$. The threshold for I is thus lower than for R. Similarly, for the collectivist culture, as $\alpha_k\to 0$, $\underline{\sigma^*}\to\frac{a-2\beta_k c+2\beta_k(c+d)}{2a+(1+\gamma)\beta_k(c+d)}>\frac{a-2\beta_k c}{2a}=\underline{q^*}$. We thus have the opposite results: the threshold for R is lower than for I.

We saw above that the threshold for q in the case of R is lower in the global game than in the single player game, leading potentially to an inefficient equilibrium under R compared to NR. What about for I? Here the answer is different for individualism and for collectivism. In the individualist culture, as $\beta_k\to 0$, the threshold in the single player game $\underline{\sigma}=\frac{a-\alpha_k b+\beta_k d}{2a+\beta_k(c+d)}\to\frac{a-\alpha_k b}{2a}$ whereas in the global game we have $\underline{\sigma^*}=\frac{a-2\alpha_k b+2\beta_k d}{2a+(1+\gamma)\beta_k(c+d)}\to\frac{a-2\alpha_k b}{2a}$. Given that $\frac{a-2\alpha_k b}{2a}<\frac{a-\alpha_k b}{2a}$, $\underline{\sigma^*}<\underline{\sigma}$.

In other words, the I threshold is lower in the global game than in the single player case in the individualist culture. This is a similar effect as for R. The psychological effect b of participating in I is not reaped when not participating in collective action. The risk of missing out on this, and only getting the expected economic payoff, thus leads a player to engage in collective action, even for low values of σ compared to the single player case. In the collectivist culture, however, as $\alpha_k \to 0$,

$$\underline{\sigma} = \frac{a - \alpha_k b + \beta_k d}{2a + \beta_k (c+d)} \to \frac{a + \beta_k d}{2a + \beta_k (c+d)} \quad \text{and}$$

$$\underline{\sigma^*} = \frac{a - 2\alpha_k b + 2\beta_k d}{2a + (1+\gamma)\beta_k (c+d)} \to \frac{a + 2\beta_k d}{2a + (1+\gamma)\beta_k (c+d)}.$$

Comparing both expressions, we see that $\underline{\sigma^*} > \underline{\sigma}$. The reason is related to the extra risk involved in engaging in I in the collectivist culture. In case of failure, there is the stigma d attached to it, which is at least as high as the benefit c. If d were equal to 0, we would have $\underline{\sigma^*} < \underline{\sigma}$ and get a similar result to the ones above.

These results give us the following proposition.

Proposition 5

In the global game defined in proposition 4, i) in the individualist culture, $\underline{q^*} > \underline{\sigma^*}$, and in the collectivist culture, $\underline{\sigma^*} > \underline{q^*}$; ii) the threshold for R is lower than in the single-player game for both individualism and collectivism, but the threshold for I is higher than in the single-player game for collectivism, but lower for individualism.

To conclude this discussion of two player collective action, the main difference with the one player case is thus the threshold for collective action for both R and I. The results are nevertheless remarkably richer than those of the one player case. We have the "reluctant revolutionary" effect on top of the standard free-riding effect on collective action and the standard coordination problem. Moreover, in the global game the collective action equilibrium may be inefficient and dominated by the status quo.

Coming back to one of the main themes of the chapter, the comparison of types of collective action, an important conclusion that also follows from the whole discussion is that proposition 2, stating that R is preferred over I under collectivism, and vice-versa under individualism, once the thresholds for both R and I are both exceeded, remains completely valid in the two player case once one adjusts for the thresholds.

4.5 Conclusion

We have presented in this chapter a model of different types of collective action to compare the propensity to engage in collective action for a collectivist and

for an individualist culture. We have considered two types of collective action: one where the incumbent leader is replaced by another one, say a bad autocrat replaced by a better one, but without institutional change; and another form of collective action aiming at changing the political institutions. We have introduced social payoffs to participation in collective action for the independent self and for the interdependent self, where the former is mainly present in the individualist culture and the latter mainly present in the collectivist culture. This may shed light on the different histories of collective action in both cultures, as illustrated by the comparison between Chinese and European history since the Qin and Han dynasties and the Roman Empire.

The model also yields new insights on the collective action game, relative to the literature. In the multiple player case, these social payoffs lead to an alleviation of the collective action problem, differentially for the two types of collective action in the individualist and collectivist culture. These social payoffs create a "reluctant revolutionary" effect that can more than offset the traditional free-rider effect and push a player to participate in collective action in order not to lose out on the social payoff. This effect may even lead, in the context of a global game, to a payoff of collective action that is lower than the status quo for all players.

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5

Is Poverty in Africa Overestimated Because of Poor Data?

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5.1 Introduction

Africa's GDP growth rates in the last decade have been averaging about 5 per cent per year, making it second only to East Asia as the fastest growing region. Seven of the 10 fastest growing economies in the last decade are in Africa. Trade with the rest of the world has increased by 200 per cent since 2000, although from a low base. In addition, Africa appears to have recovered from the recent global economic slowdown better than anyone predicted and the region is expected to resume its recent growth trajectory much earlier than envisaged. Further, projections by the World Bank and IMF indicate that on average Africa will have the world's fastest growing economy over the next five years. All of these have led to an upbeat buzz about the future of Africa (see *The Economist*, 2011, 2013; Sachs, 2012; African Development Bank, 2011). Non-income indicators of the Millennium Development Goals (MDGs) such as primary school enrollment, child mortality, gender parity in schooling, and access to water and sanitation services are also improving (Demombynes and Trommlerová, 2012).

But has this decade of growth, which has raised optimism about Africa's future, led to poverty reduction? Young (2010) estimated that real household consumption in SSA has been growing between 3.4 and 3.7 per cent per year. This is three and a half to four times the 0.9–1.1 per cent reported in international data sources, implying that poverty was falling faster than current projections. However, there are several problems that beset data used to assess

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poverty in Africa[2]. First, some countries are using outdated base years for their system of national accounts, SNA (Jerven, 2013), making it difficult to tell how big or small many African economies really are.[3] While some countries now use more recent SNA methodologies (e.g. 2008) many still use the 1968 and 1993 SNA methodologies. To the extent that these methodologies are missing emerging sectors (or industries), they are likely to underestimate the contribution of these sectors to growth, while overestimating the role of traditionally established sectors. Additionally, if these new sectors are growing faster (and the traditional sectors slower) than reflected in officially reported growth rates, then the correlation between growth and poverty will be weaker than the actual situation.

Second, even where household consumption surveys are up-to-date, significant changes in the design of questionnaires may hinder comparison of consumption poverty over time. If data are not comparable it becomes difficult to determine the direction of change in poverty and the Indian poverty debate represents a well-known example of this problem (Deaton and Dreze, 2002; Deaton, 2003; Kijima and Lanjouw, 2003; Tarozzi, 2007). Existing literature proposes creative methodological solutions to this kind of problem. However, these solutions remain second best options, because most researchers would prefer to use actual and true consumption or income data that are comparable and of high quality. Third, even if data are comparable, many household surveys are beset by the problem of large under-reporting of consumption. This is, arguably, a much more daunting problem than many data quality problems that we face, since it has no technical solution.

This chapter focuses on the problem of under-reporting of consumption in African household surveys and what this implies for poverty measurement. The chapter proceeds as follows. Section 5.2 provides a brief visual take of the problem of under-reporting of consumption by reviewing recent trends of household expenditures from a dozen African countries that had conducted year-long expenditure surveys using mostly diaries. Section 5.3 provides a diagnosis of the evidence using detailed knowledge of country specific cases. Section 5.4 discusses the implications of the problem of under-reporting of consumption for estimating poverty rates for countries analysed in this chapter. Section 5.5 concludes, offering some suggestions on how to reduce under-reporting through survey design and implementation.

[2] The extent to which poverty data in Africa are beset by major problems has been recognized in the literature for a long time and by many scholars and institutions. The seriousness of these problems has recently led Shantayanan Devarajan, the former World Bank Chief Economist for Africa, to call attention to the continuing poor quality of Africa's statistics, which he labeled 'Africa's statistical tragedy' (2013).

[3] A similar problem is that of infrequent household surveys, but we do not cover it here because it is not directly related to the quality of data – the focus of this chapter.

5.2 How serious is under-reporting of consumption?

In this section we take a look at the extent of under-reporting of consumption. We focus on year-long surveys, most of which use diaries[4] because the problem appears to be especially prevalent in these kinds of surveys. Diaries have been used for data collection in many different fields of research. For example, in nutrition research (Rush *et al.,* 1988; Anderson *et al.*, 2004; Buhling *et al.*, 2004; Taylor *et al.*, 2004), health research (Reynolds and Anderson, 2004) and research on sexual behaviour of commercial sex workers (Coxon *et al.*, 1993; Fortenberry *et al.*, 1997; Minichiello *et al.*, 2000; Gysels *et al.*, 2002).

Though a recent phenomenon, the use of diaries to collect consumption and expenditure data in African countries is becoming more prevalent, partly due to its methodological appeal. If well executed, diaries can provide accurate measures of the level and composition of consumption of households (through aggregation at the national level). However, obtaining such data requires enormous effort and as we demonstrate below this ideal is not always replicated in actual implementation when so much could go wrong.

Our diagnosis focuses on a select number of African countries which employ diaries for surveys that are used for poverty monitoring. Whenever possible, we present trends to see if the pattern and extent of under-reporting is consistent across surveys. The countries for which we have at least two years of comparable data in the last decade include Ghana, Malawi, Mozambique, Nigeria, Rwanda, Sierra Leone, Swaziland, Tanzania, and Uganda. Where a comparable survey is not available like in the case of Angola, Kenya, and Niger, we present evidence of under-reporting (or lack of) for the single survey.

By design, consumption data in these surveys is collected through a diary households receive at the beginning of an enumerator's visit. Households are expected to record daily purchases and consumption from own production for the duration of the diary – which is a month in most cases. The enumerators visit the households multiple times in the survey month or cycle on a regular basis to collect recorded purchases up to the time of the visit and drop off fresh diaries. During the administration of data collection, fresh and representative households are visited within each month or cycle. By definition the survey is 'representative' by month or cycle[5] if by design the sample of households visited for the survey month or cycle have the same characteristics as the whole sample,

[4] Not all the surveys we report here use diaries. Among the 12 countries in our study, Kenya, Malawi, and Uganda use recall period.

[5] A cycle is a pre-set number of days for data collection, and by design the households visited in each cycle have the same characteristics as the whole sample, which is representative of the overall population. The days and months of surveys in each cycle do not necessarily represent calendar dates.

which is representative of the overall population.[6] Samples for nine of the 22 surveys analysed in this chapter are representative by cycles and the rest by survey month. For example, both Rwanda EICV2 and EICV3 surveys were divided into 10 equal cycles but spread over a 12 month period. Ghana GLSS 1998 and 2005 had 10 cycles and 11 cycles respectively but also spread over 12 survey months. A cycle in GLSS 1998 covered 35 days of data collection and an additional day for travel while in GLSS 2005 it covered 33 days in urban areas which yield a total of 363 days for the survey year and 22 cycles in rural areas.[7] For Nigeria and Sierra Leone, the number of survey days (31 days) is the same both in the month and cycle of survey. To avoid confusion, for the remainder of the chapter we refer to survey month only which could mean survey cycle as appropriate. The sample is drawn so that each monthly sample is representative at the levels of stratification at which the survey is considered representative, which at a minimum means national, urban and rural levels. Annex A shows consumption by month of survey for selected countries. The values are weighted real total spending, total food and non-food spending by households visited during the month. A quick glance at the graphs reveals three noteworthy observations.

First, for most of the surveys, reported consumption begins to decline steadily in the later months. There is a sharp fall in expenditures between the first quarters and the last, with expenditure falling to its lowest level in the last month of the field work. We calculate that, by the end of the survey year, total spending (annualized) in Malawi declined by about 46 per cent compared to the first month in 2004. The differences observed in Malawi are partly due to seasonality, since the last month of the survey, especially in 2004, fell in the 'hunger season'. However, there is a steady fall in consumption from around the 5th month of the survey through the end of the survey.

A visual inspection of the graphs in Annex A suggests that under-reporting applies to both food and non-food consumption. This is surprising because the diary is usually used for frequently purchased expenditures, which tend to be mostly food and a few frequently purchased non-food items. Expenditure for most non-food is usually collected through recall. The fact that both food and non-food consumption suffer similar levels of under-reporting suggests that the problem is not just the difficulties of implementing diaries by households but overall survey implementation – an issue we revisit later in the chapter.

[6] As such we use month of survey as the basis for analysis if the data is representative by month and cycle if it is by cycle.

[7] For purposes of consistency we convert two cycles of rural area to one cycle in GLSS 2005. For GLSS 1998, all cycles have the same number (35) of days where visits were administered with an additional day where a team of enumerators will travel to the next enumeration areas.

Second, even within the same country, the pattern and size of under-reporting varies from survey to survey. As noted above, in Malawi, the 2010 under-reporting of consumption appears to be less severe than that observed in 2004. In Uganda the divergence in reported consumption between the early months of the survey and the later months is much more of a problem in 2010 than in 2005. If widespread, such patterns will lead to relatively higher poverty rates in later surveys and therefore significant underestimation of poverty reduction. The opposite would be true for countries where later surveys have no under-reporting in consumption while the previous surveys do. Third, controlling for seasonality (in a regression model reported below), under-reporting tends to be more prevalent for urban sub-samples. This suggests that we are potentially overestimating urban poverty levels and possibly underestimating the inequality between urban and rural areas.

Table 5.1 shows the extent of under-reporting of consumption by survey for each country. For each survey, we calculate the ratio of total consumption in the first to the last month, the first quarter to the last quarter, and the first six months to the last six months. For surveys conducted at the beginning of the decade, only 3 of the 12 countries could claim to have 'no under-reporting' of consumption. Likewise, for the more recent surveys, again only 2 countries would pass our test of no under-reporting. However, note that some countries like Niger may have experienced large under-reporting at the beginning of the survey or the opposite. The table indicates that anomalies in consumption reporting are pervasive and likely to result in misleading conclusions about poverty levels, trends and pace of poverty reduction.

5.3 How do we know there is under-reporting?

An important question that arises is how we can be sure that there is under-reporting of consumption. The visual inspection of reported expenditures by month of survey gives an inconclusive picture at best. In some contexts it is clear that consumption declines throughout the survey period and in others it is not always a steady decline. Furthermore, could the observed changes be explained by seasonality? In the rest of this section we present six pieces of evidence which point to substantial under-reporting throughout the survey period: (a) a record of monthly transactions or purchases; (b) a quasi-experiment; (c) calorie value of transactions; (d) links between month of survey and poverty levels; (e) ratio of national accounts to household surveys by month; and (f) correlation between month of survey and asset index (and other variables).

Number of purchases

One way to assess if there is significant under-reporting is to look at the number of purchases. In reality, purchases by individual households will oscillate

Table 5.1 Real consumption ratios

Country	Base year and comparable latest survey	Base year survey (circa: 2000)			Latest survey (circa: 2010)		
		First month: last month	First quarter: last quarter	First six months: last six months	First month: last month	First quarter: last quarter	First six months: last six months
Angola	2000, 2008	0.52	0.62	0.68	3.07	1.55	1.14
Ghana	1998, 2005	1.39	1.11	1.04	2.25	1.96	1.58
Kenya	N/A, 2005	–	–	–	1.09	1.24	1.23
Malawi	2004, 2010	1.46	1.81	1.58	1.83	1.21	1.18
Mozambique	2003, 2008	1.48	1.22	1.17	1.10	1.06	1.09
Niger	N/A, 2007	–	–	–	1.22	0.90	0.80
Nigeria	2004, 2010	1.55	1.31	1.20	1.60	1.38	1.17
Rwanda	2005, 2011	1.14	1.16	1.12	1.19	1.19	1.20
Sierra Leone	2003, 2011	2.50	2.84	1.65	2.78	1.82	1.39
Swaziland	2001, 2009	1.21	1.35	1.29	1.13	1.03	0.83
Tanzania	2000, 2007	0.45	0.83	0.90	1.23	1.05	1.02
Uganda	2005, 2010	0.92	0.61	0.92	1.10	1.65	1.53

Notes: For Niger and Kenya, only one year-long survey in the decade is available.

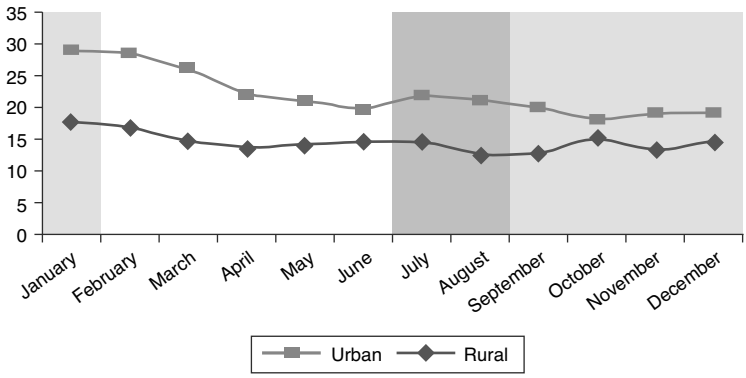

Figure 5.1 Average number of food item expenditures, Sierra Leone, 2011

because incomes are volatile and bulk purchases are common. But if we believe that households deal with volatility through drawing from their savings, borrowing, calling on friends and family and so on, in order to smooth consumption, we should expect a relatively stable consumption pattern from month to month. Even if smoothing consumption does not always happen at the household level, we should expect consumption to be stable at the aggregate (for example, national) level where potential declines in purchases by households with declining incomes are offset by those with rising incomes.

However, in surveys where we have access to diary entries, we find that purchases are not relatively stable from month to month. Figure 5.1 shows the total number of food purchases by urban and rural households in a recent survey in Sierra Leone (SLISS, 2011). The trends clearly show that the average number of food items that were purchased declined over the survey period. The phenomenon is especially noteworthy in urban areas where the average number of purchases at the start of the survey appears to be one-third higher than at the end of the survey. Moreover, the difference is not driven by seasonality. The light grey shades in Figure 5.1 indicate the rice harvest season which is considered a period of 'plenty', while the darker grey shade indicates the 'lean' season when stocks dwindle and hunger becomes a real threat.

In principle we should expect higher purchases in the latter months of the year in rural areas, but less so in urban areas where we expect purchases to remain about the same throughout the year. Yet the evidence suggests that in rural areas the number of purchases appear to be no higher during the time when households should be better off, while in urban areas, the number of purchases is strongly correlated with the month of survey, which suggests that under-reporting, especially in the later months of the survey, is potentially large.

Figure 5.2 shows daily transactions from Tanzania's 2007 Household Budget Survey (HBS 2007), which, again shows that the number of transactions decreases by the month of the survey. Households that filled the diary in January recorded more transactions than those that filled their diary in June or a later month. Whether one looks at the peak of the transactions in each month, or the mean or the trough, the pattern is the same: the number of purchases declines each month of the survey. Notice that the 'peculiar' feature of Figure 5.2 where there is a jump in the number of transactions at the beginning of each month, can be explained by the strategy adopted for the survey where each monthly sub-sample of households (98.5 per cent) are visited at the beginning of each month, and are at first probably careful in recording transactions but then get fatigued and lose interest as the diary period expands. However, while this explains reductions in transactions within each month, it does not explain the progressive decline of transactions in each month, which in our view is a much more serious problem for estimating poverty statistics.

The Tanzania HBS 2007 diary reveals two layers of under-reporting. The first, already evident in Figure 5.2, is one where under-reporting becomes severe throughout the length of the survey period as one compares month to month transactions. However, Figure 5.2 reveals an additional layer of under-reporting. Even within a single month, households are likely to report more transactions at the beginning of the diary than in the middle or towards the end. More transactions could be reported in the first few days or weeks and less thereafter because of the presence of duplicate transactions,[8] where during the first days of receiving the diary households tend to record each and every transaction but then over time tend to aggregate similar transactions into one. We find that duplicates indeed exist (see Figure 5.3a), but it does not change the downward trend of transactions even after duplicate transactions are removed (see Figure 5.3b)[9].

Rather than the number of transactions, we look at the value of the transactions to account for the possibility that households may buy in bulk at the beginning of the month and then do not need to have as many transactions in the subsequent days because of the bulk purchases. To explore this possibility the average weekly household spending is considered for each week of the diary. Figure 5.4 illustrates a steady decline in value of transactions over the weeks.[10]

[8] A duplicate is defined here as a transaction on the same item which is recorded more than one time by a household within the same day. Data (available but not reported here) suggest that out of 2,344,585 transactions, 134,091 (5.7 per cent) are "surplus" or duplicates.

[9] Additional analysis which looks at reported monthly transaction by rural and urban households, and by households in three regions (Dar es Salaam, Dodoma and Kagera) of Tanzania separately confirms this basic finding.

[10] Week 4 contains nine or 10 days depending on the month of interview, which is scaled back to the regular 7 days, with week 5 bar representing the last 2–3 days of the month.

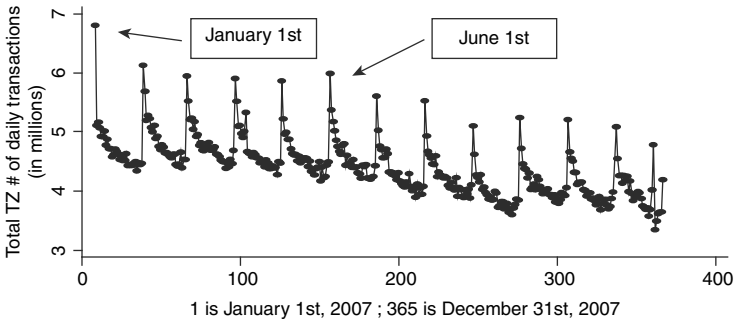

Figure 5.2 Total number of daily transactions in mainland Tanzania (in millions)

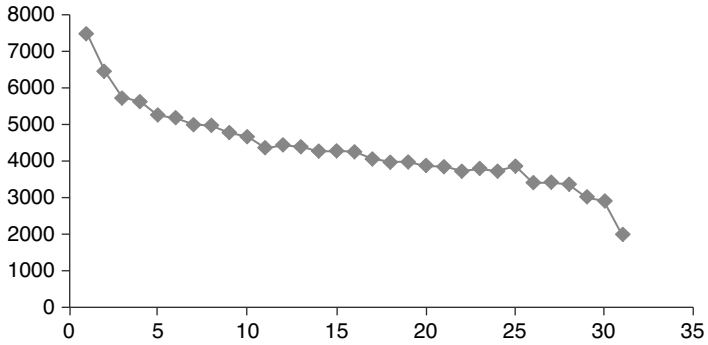

Figure 5.3(a) Evolution of duplicate transactions over time

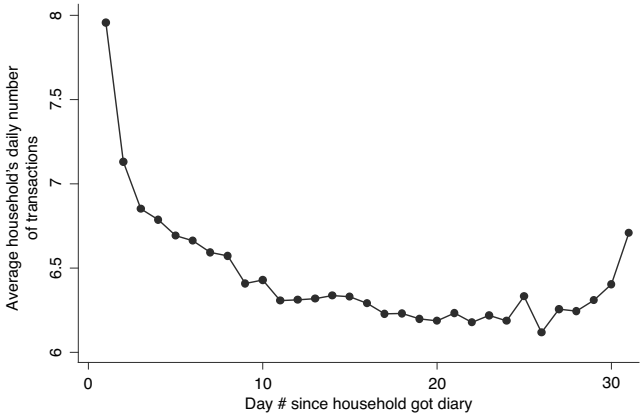

Figure 5.3(b) Daily transactions without duplicates

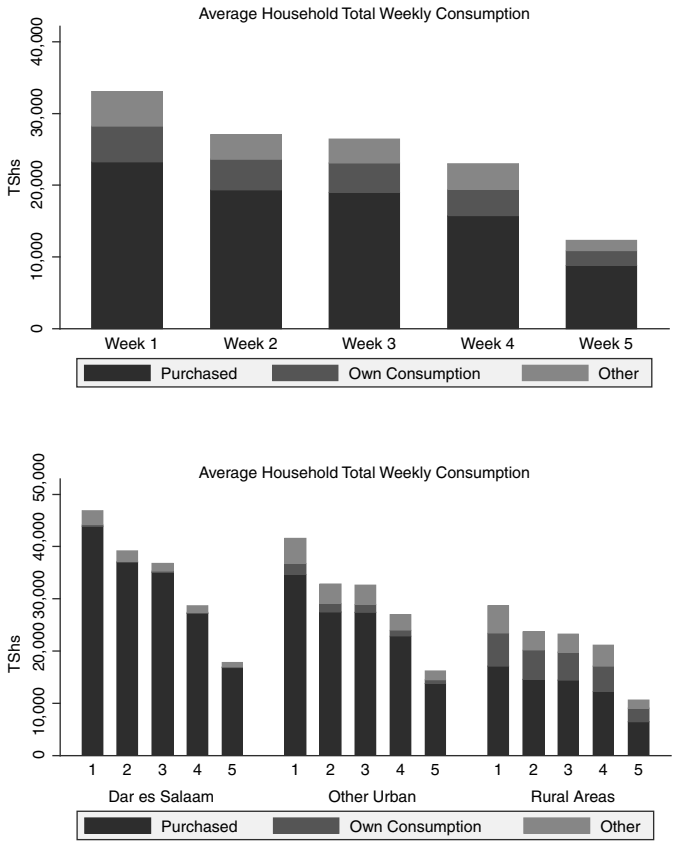

Figure 5.4 Household's total consumption (TShs) by week of diary

Table 5.2 suggests that the differences are statistically significant. The same pattern is observed in the different strata: Dar es Salaam, other urban and rural areas. Food consumption displays the same trend as well. One explanation for these clearly visible under-reporting of consumption is that respondents (and possibly enumerators) simply become fatigued as the month unfolds.

Figure 5.5 shows that the number of households that fill out their diary steadily decreases every week. By the time households reach the last week of diary 7 per cent of them seem to have dropped out of filling the diary. The dropout rate reaches 15 per cent by the 28^{th} day of the month.[11]

[11] The last point (Day 31) should be disregarded because only a few months have 31 days.

Table 5.2 Household cash transactions levels

	Mean purchases (TShs)	Std. error	[95% confidence interval]	
Week 1	23,274.00	843.4	21,616.50	24,931.50
Week 2	19,342.20	645.5	18,073.60	20,610.80
Week 3	19,009.90	691.3	17,651.40	20,368.40
Week 4	23,910.80	1036.1	21,874.50	25,947.20

Source: Authors' calculation from survey data

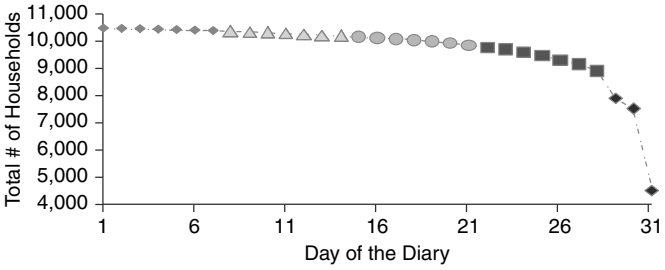

Figure 5.5 Number of households filling diary by day

Evidence from a quasi-experiment

Another evidence of under-reporting of consumption can be seen from a quasi-experiment in Nigeria. The graphs of consumption in Nigeria (Annex A) use the Harmonized Nigeria Living Standard Surveys (HNLSS 2004 and 2010) which is, currently, the survey used for poverty monitoring in the country. As shown in Annex A, there is substantial under-reporting in HNLSS 2004 and 2010. Table 5.1 indicates that consumption in the first month of the HNLSS 2010 survey exceeds consumption in the last month by 60 per cent, while consumption in the first quarter is higher than consumption in the last quarter by 38 per cent. So the question that remains is whether to trust the consumption at the beginning of HNLSS 2010 or the one at the end.

Fortunately, there is a way to check this using another survey that was in the field for part of the time when the HNLSS data collection was going on. The HNLSS 2010 field work ran from November 2009 to October 2010. In the months of September and October 2010, another survey – the General Household Survey (GHS) panel that also collected consumption data from 5000 households – was being implemented by the Nigeria Bureau of Statistics.[12] Consumption data

[12] The GHS initial sample was 22,000 households, but only 5,000 of them which were representative at the national, rural and urban levels were asked to report consumption.

were collected using a seven-day recall, unlike the HNLSS which used a month-long diary. In addition, the GHS panel was in the field for only four months in the year compared to the HNLSS which is a 12-month survey. These differences mean that expenditures from the two surveys are not comparable so that a direct comparison of poverty estimates from the HNLSS and the GHS panel is not recommended. However, the consumption modules for the GHS and the HNLSS had a wide overlap in terms of both food and non-food expenditure items that were included. On food spending, there was about 90 per cent overlap.

Although consumption estimates between HNLSS and GHS panel are not comparable, one can use the results from the latter as a check on the former. We find that recorded total consumption from the GHS panel for September and October 2010 are substantially higher than total consumption for the same months from HNLSS 2010. Total consumption in the GHS panel in these months was almost four times higher than the consumption reported in HNLSS for the same months. Furthermore, for many common food items in Nigeria such as guinea corn, millet, maize, rice, yams, cassava and gari, proportionately higher fractions of GHS panel households report consumption compared to the HNLSS 2010 households

The two datasets provide us with consumption data collected from two samples of households drawn from the same population – they used the same sampling frame and procedure – distributed across the same geographic and economic space. Further, the data were collected at the same time of the year, so seasonality issues are ruled out. To the extent that we see differences, they can be attributed to differences in recall of consumption and/or survey implementation (and possible failures). It is hard to make the case that all the differences – recall that value of consumption in the GHS is about four times larger – can be explained by differences in recall. One conjecture is that a diary, when implemented properly, should more accurately reflect value and composition of consumption. The fact that we see a huge difference in favor of GHS data collected through recall may suggest that consumption in GHS may be subject to measurement errors. Yet, even if we accept that consumption data collected through recall is biased upward, it often does not differ by orders of magnitude we observe between these two surveys.[13] It certainly cannot explain the

[13] The diary method is considered superior in collecting data in many instances, and has become the preferred or the most highly recommended method, especially by international agencies such as the UN Statistical Commission. But this preference and recommendation is done more in theory than in practice. Two experimental studies on diary versus recall in Africa are Beegle *et al.* (2012) who find that recall methods underreport consumption, as do diaries by illiterate people and Backiny-Yetna and Steele (2013) who find that a recall method that mimics a diary (households being visited every day by a trained enumerator to record purchases from a day earlier) reports lower consumption than a longer recall period. In both experiments, consumption from recall and diary differ by no more than 20 per cent.

large difference in the proportion of households that report purchases and consumption of own production. Therefore, we argue that the quasi experimental evidence provides strong support for under-reporting of consumption. Two additional signals of under-reporting are the correlation between month of survey and poverty and nutrition.

Month of survey and poverty levels

There is a strong and systematic correlation between month of survey and proportion of the population in poverty across many countries and surveys. This is probably not surprising. If expenditure data trend downwards (as Annex A shows) then poverty numbers, which are based on those same expenditure data, will trend upwards. In most of the surveys, individuals in households visited at the beginning of the survey are less likely to be in poverty than those visited at the end. In fact, headcount poverty rates at the end of the survey can be up to 10 percentage points higher than those at the beginning. In many of these examples we do not adjust for spatial price differences or even month-to-month inflation within the year of survey. However, chances are that adjusting for month-to-month inflation will just make the case stronger – that is, it is likely to lead to even higher poverty at the end of the survey (since real consumption will be smaller) and lower at the beginning of the survey. There is no justifiable reason why one should observe this kind of correlation between month of interview and poverty rates. This observation therefore reinforces the anomaly in spending that was noted earlier. One plausible explanation for the observed results is simply the breakdown in survey implementation. There have been reported cases where statistical agencies run out of money, field supervision is cut back, enumerators do not get paid and quality of data collection generally deteriorates. This is more likely to happen at the end of a survey than at the beginning.

Month of survey and implied calorie intake

The spending patterns also suggest that caloric intake of some households is far too low and appears to be highly correlated with the month of interview. To our knowledge, almost all the countries in Table 5.1 calculate poverty using the cost of basic needs method. The method usually involves costing a basket of basic food and non-food needs. The food basket usually comprises essential food items that provide a minimum level of calories per person per day, which in practice ranges from 2100–3000 kilocalories (Kcal). Countries like Uganda use a basket that provides about 2200Kcal, while others like Nigeria use a basket that provides 3000 Kcal. Therefore, in Nigeria a household is considered food poor if it does not satisfy a caloric intake of 3000 Kcal per day per member of the household.

Table 5.3 shows the fraction of the Nigerian households with less than 1500 Kcal and 2250 Kcal per capita per day. To get a sense of what these caloric intakes

Table 5.3 Implied caloric intake by month of interview, HNLSS 2010 (Nigeria)

Year	Month of survey	Fraction of households with per capita daily calories of less than 1500 Kcal	Fraction of households with per capita daily calories of less than 2250 Kcal	Average daily calories per capita
2009	11	0.32	0.49	3,885
2009	12	0.32	0.49	3,694
2010	1	0.38	0.58	3,236
2010	2	0.44	0.63	2,568
2010	3	0.42	0.61	2,897
2010	4	0.4	0.61	3,072
2010	5	0.4	0.6	3,200
2010	6	0.4	0.61	3,198
2010	7	0.42	0.61	2,707
2010	8	0.42	0.6	2,963
2010	9	0.46	0.64	2,777
2010	10	0.45	0.64	2,554

Source: Authors' calculation from HNLSS 2010 surveys.

mean in Nigeria, the 1500 Kcal is just half of what is needed to be considered food poor in Nigeria. The 2250 Kcal is three-quarters of what is needed to be considered food poor. According to the reported spending patterns, almost 50 per cent of households in Nigeria would not have satisfied even half of what is needed to be food poor in the last two months of the survey. By comparison, in the first two months of the survey only one-third would have had less than half of the needed calories to be considered food poor. More generally, the reported expenditure patterns suggest that average per capita calories for the population declines with time (something that should not happen under normal circumstances), and moreover, far too many people are predicted to be unable to meet their caloric intake. This is not common to Nigeria. Similarly, unrealistic nutrition outcomes are found for Mozambique HBS 2009 where about 30 per cent of all households reported food consumption level that provided less than 1000 Kcal which is below the minimum standard required for survival by the World Health Organization.[14] Even more remarkably the median calorie intake per person per day in the southern region of Mozambique is below this minimum standard (Alfani *et al.,* 2012).

[14] The Portuguese name of the HBS survey is Inquérito sobre Orçamento Familiar (IOF 2009).

Average monthly final consumption in National Accounts to monthly consumption in Household Surveys

Another way to check for under-reporting witnessed in household survey data is to compare them to data on household final consumption expenditures from the National Accounts (NA) data. We acknowledge that NA has its own issues (as discussed earlier) and is not a 'gold standard' against which accuracy of household consumption from surveys should be judged. For each country once the NA methodology is set up it is used consistently throughout the survey period. Thus, even if there are problems with the methodology, such problems should not affect only the later months of the year, after controlling for seasonality. If data collection is done consistently then NA can be a plausible benchmark; otherwise, there is something wrong. It is still useful to compare household survey data with NA data, including changes over time in how they compare[15]. Figure 5.6 compares the ratio of average monthly final consumption in NA to total monthly consumption in household surveys. We find the trend increasing, lower during the first months of the surveys but higher over the later months of survey. The rates of increase or decrease are however, different from the year of survey as depicted in the Ghana 1998 and 2005 surveys.

From Figure 5.7 the increase in ratios by month of survey is evidently observed in most surveys. Ghana's case further depicts a point we make in the analysis, which might have even greater implication on poverty estimates and the changes over time. That while there is under-reporting in most surveys, surveys in different years for the same country might have different trends and therefore might affect the changes in the estimates of poverty over time. In general, one would expect that the variation will only show the impact of seasonality since the monthly average on total household consumption in the National accounts is constant. But increasing trends is not explained by seasonality alone.

Month of survey and Asset index (and other household characteristics)

One argument that may arise is that data collection in the early months may be in areas that are relatively easily accessible, which are more likely to be better off areas, and in the later months the more remote, and poorer areas may be over-represented. If this is the case, then it may not be surprising to see a decline

[15] The NA data are from the World Bank national accounts data, and OECD National Accounts data files. Household final consumption expenditure is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenditures of nonprofit institutions serving households, even when reported separately by the country. This item also includes any statistical discrepancy in the use of resources relative to the supply of resources. Data are in current local currency.

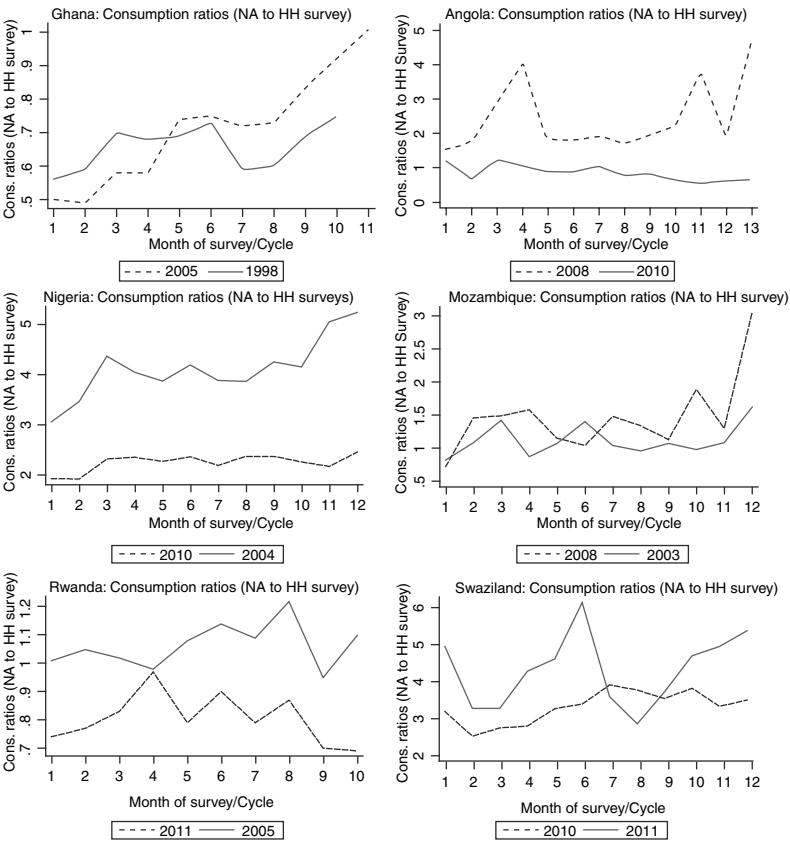

Figure 5.6 Average monthly final consumption in NA to monthly consumption in Household Surveys for selected countries

in recorded consumption over time. We verify that the patterns observed are in surveys that collect representative samples of households in every month of survey by plotting household characteristics (such as the proportion of households which are rural, head of household's age, household average years of education, distances to access to services, household size, and percentage of male headed households) against the month of survey. The results, not reported here, show that household characteristics do not vary across months, meaning that the sample remains representative. In addition, Figure 5.7 compares the poverty headcount ratio at $1.25 a day (PPP) (% of population) by the month of survey to the determined asset index derived from factor analysis. While poverty increases by the month of survey for almost all surveys the asset index is not, confirming once more that the survey samples by month of survey are near representative.

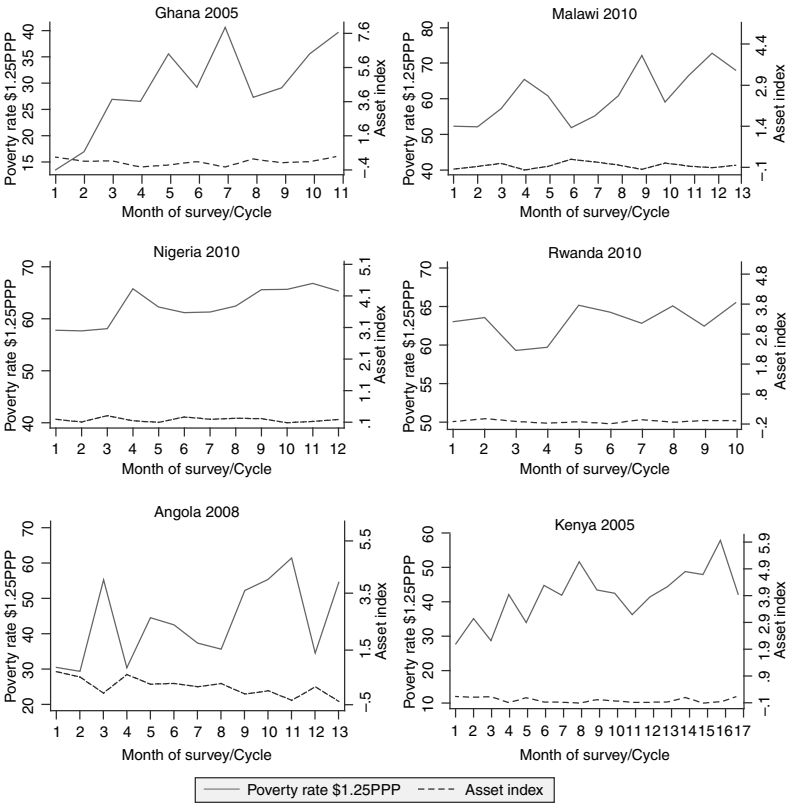

Figure 5.7 Trends in poverty headcount ratio at $1.25 a day (PPP) and household Asset Index for selected countries (latest surveys)

So far, the data checks confirm that for each survey month that data is collected the sample is drawn to be representative of the population. So there is no reason at all that the distribution of the poor and rich should change substantially from month to month. Thus, our main result that measured consumption expenditures often declines over a 12 month period is relevant.

5.4 What does this imply for poverty estimates in Africa? Correcting for under-reporting using doubly robust estimators

Consumption data from household surveys have become the key input to tracking progress made in poverty reduction across countries in Africa. In turn, poverty estimates and statistics are used to make policy, to evaluate programs and allocate resources. The consumption data from the surveys reviewed here and some not reviewed but conducted in a similar manner across Africa are also

often used in monitoring global count of the extreme poor – those living below $1.25 per person per day ($PPP). For instance the recent update of the size of the global poor showed that the extreme poverty rate in SSA has declined, from 58 per cent in 1990 to 48 per cent in 2010, but at a much slower rate than other regions of the world. And because of the slow reduction in poverty, the number of poor people in SSA in 2010 is still higher than it was in 1990.

But given the extent of measurement problems documented above in the consumption data that informs these national and global estimates, it is quite likely that estimated poverty levels are poorly measured. To obtain accurate estimates of poverty in SSA, we need to deal with under-reporting in consumption. Uncovering the size of the deviation from the true levels of poverty and pace of poverty reduction in a country is complicated by the fact that within the same country we could have under-reporting of consumption in one survey and none in the other(s). In such a situation, as we find in a few cases reviewed here, the difficulty one faces is which part of the survey that suffered under-reporting does one pick to compare to the one that was properly done?

As suggested in section 5.3, potential explanations for the systematic under-reporting are respondent and enumerator fatigue and possible breakdown in survey implementation – that is, the statistical agency runs out of money later in the survey period, scales down on supervision, payment of enumerators and so on. What this implies is that the consumption reported in the first few months of the survey are likely to be more accurate than consumption in the later parts of the survey. The detailed analysis of the Tanzania HBS 2007 diary records and the quasi experimental evidence from Nigeria show that the expenditures reported from months towards the end of the survey period are especially prone to substantial under-reporting because this probably results from a combination of the predictable respondent fatigue and survey implementation problems. However, knowledge of large under-reporting in the later stages of the surveys provides little guidance on which months to use: should it be the first three months? Should it be the middle two quarters?

For our purpose, the measurement problem can be considered as a case where the true value of consumption for some households, and by consequence their poverty status, is missing. Therefore, we need to recover the true distribution of consumption – or poverty status – in order to obtain the population average poverty rate. We use the doubly robust estimators (Bang and Robins, 2005; Robins *et al.*, 1994; Rotnitzky *et al.*, 1998; Graham *et al.*, 2013; Emsley *et al.*, 2008; Lunceford and Davidian, 2004) to estimate the "true" poverty rate in each of the countries in the sample. This new count also allows us to project the extent of poverty reduction in SSA.

Suppose that we observe the data $Z = (X, Y)$ for a sample of households of size $N (i = 1, \ldots, n)$ where X is a vector of covariates, Y is an outcome variable (such as consumption or poverty status) whose true value happens to be missing for

some of the households. Let D be an indicator of whether the true Y is missing or not. Then observed data are $Z_{obs} = (DXY)$ when $D = 1$, and $Z_{obs} = (D, X)$ for households for which $D = 0$.

Our interest is to obtain the unconditional mean, μ, of Y based on the random draws of Z The average of the outcome variable can usually be calculated as long as the two groups (the one with missing and the one without missing data) can be exchangeable: that is, have identical distributions of variables (Emsley *et al.*, 2008). However, because data are missing for some groups, exchangeability is not immediately satisfied. Therefore, we have to adjust for this possible source of selection. Assuming that missing data are missing at random,[16] denote $P(D = 1 \mid x) = p(x)$, so that the $P(D = 0 \mid x) = 1 - p(x)$. Let $\widehat{p(x)}$ be the estimated propensity score predicted from a logistic or a probit model. Then the mean, μ can be estimated as

$$\hat{\mu} = N^{-1} \sum_{i=1}^{N} \frac{D_i Y_i}{\hat{p}_i} - N^{-1} \sum_{i=1}^{N} \left\{ \frac{(1 - D_i) Y_i}{1 - \hat{p}_i} \right\} \tag{1}$$

The inverse probability weighted estimators tend to be nearly efficient if the propensity score can be approximated by a linear function of the covariates. This is especially likely if the dimension of the covariates grows with the sample size. However, because researchers are usually able to fit only a smaller dimensional model, the inverse probability weighted estimators tend to be inefficient and the inefficiency is particularly severe if the propensity score model is poorly fit with a linear projection model (Graham *et al.*, 2013). To obtain unbiased estimates and improve efficiency, the statistical literature proposes doubly robust estimators (Bang and Robins, 2005; Lunceford and Davidian, 2004), which can be expressed as,

$$\widehat{\mu_{dr}} = N^{-1} \sum_{i=1}^{N} \frac{D_i Y_i - \left(D_i - \hat{p}_i\right) m_1 (X_i)}{\hat{p}_i} - N^{-1} \sum_{i=1}^{N} \frac{(1 - D_i) Y_i + \left(D_i - \hat{p}_i\right) m_0 (X_i)}{1 - \hat{p}_i} \tag{2}$$

where $m_d (X_i) = E(Y_i | D_i = d, X_i)$, for $d = \{1, 0\}$ is the predicted value from regressions of the outcome variable on the covariates done separately for each of the groups but using the same model. The attraction of the doubly robust model is that it gives us two chances to obtain a consistent estimate of the mean outcome: once, if the model for the propensity score is correctly specified, and again if the model linking the outcome to the covariates is correctly specified even if the propensity score is mis-specified. If both models are correctly specified, the

[16] The missing at random (MAR) assumption is appropriate here because which month a household is interviewed is completely random. Each month/cycle or quarter, a subsample of households is drawn at random for interview and the process continues until the full sample size is achieved.

doubly robust model is the semi-parametric efficient estimator (Bang and Robins, 2005; Emsley *et al.*, 2008; Graham *et al.*, 2013).

As shown above, Table 5.1 provides potentially useful information to measure the impact of measurement error on poverty estimates. First, we use the ratio of consumption in the first three months to the last three months to determine which sub-sample had "true" missing values of the outcome variable. For each country and survey, whenever the total consumption ratio in the first three months to the last three months is within plus or minus 10 per cent, we make no adjustments.[17] Of the 22 surveys, only 5 meet this criterion, where there is little difference between the first and last quarter. Next we apply the doubly robust methods to estimate the potential size of error in poverty estimates. Our "treatment" group is households that were not visited in the first quarter. This is an assumption that only consumption from households visited in the first quarter reflects true consumption. This is obviously a strong assumption, but the visual graphs in Annex A provide some supporting evidence. In any case, the main goal is to show how large the measurement error would be if this were true. We also conducted a more labor intensive exercise combining evidence from Table 5.1 and eyeballing methods to identify the quarters with the highest divergence in reported consumption and then decide whether to make any adjustments or not. The decisions, not presented here due to space constraint, are available upon request.

Table 5.4 provides a sense of the implied error in poverty measurement when there is substantial under-reporting. For example, T*mean* is the estimated treatment effect – indicating what we would have expected as estimated poverty if the distribution of consumption and covariates resembled observed data in quarter 1. By contrast, C*mean* is the counterfactual poverty estimates for the treated, that is, the estimated poverty levels from the comparison group. As shown, these differences are large in far too many instances. In year 1, 5 of the 10 countries' poverty rates may have been over-estimated, and only urban Angola appears to have been underestimated. In year 2, 8 of the 12 countries' rates are predicted to have been overestimated. The fact of the matter is that we should not observe such large deviation in estimated poverty by quarter after we control for seasonality and other covariates.

[17] One could use other cut offs rather than just the first three months. In fact, in some surveys it seems that only the first two months are credible. Although divergence in consumption between the first and last months of the surveys are huge, we use the three month sub-sample to minimize large sampling variability that comes from focusing on only one month. For comparison we also provide results using the first six months. Given the graphical evidence, a six month sub-sample is conservative and is already, possibly, contaminated with sub-samples with significant under-reporting.

Table 5.4 Within survey variation of poverty estimates (doubly robust method)

	Year 1	Year 2	Year 1			Year 2		
			T*mean*	C*mean*	Tmean – Cmean	Tmean	Cmean	Tmean – Cmean
Angola	2000	2008	0.68	0.45	0.23	0.41	0.44	−0.03
Ghana	1998	2005	0.36	0.42	−0.06	0.20	0.31	−0.11
Kenya	N/A	2005	–	–	–	0.38	0.43	−0.04
Malawi	2004	2010	0.70	0.75	−0.05	0.53	0.64	−0.11
Mozambique	2003	2008	0.71	0.74	−0.03	0.59	0.60	0.00
Niger	N/A	2007	–	–	–	0.46	0.44	0.02
Nigeria	2004	2010	0.63	0.65	−0.02	0.57	0.64	−0.07
Rwanda	2005	2011	0.73	0.71	0.02	0.51	0.65	−0.13
Sierra Leone	2003	2011	0.54	0.54	0.00	0.49	0.53	−0.04
Swaziland	2001	2009	0.56	0.63	−0.07	0.39	0.42	−0.03
Tanzania	2000	2007	0.84	0.83	0.01	0.70	0.67	0.03
Uganda	2005	2010	0.52	0.51	0.01	0.39	0.36	0.03

Notes: (1) T*mean* is assuming that the distribution of consumption and covariates is as in quarter 1, C*mean* assumes that the distribution of consumption and covariates is as in the other quarters. (2) Implied overestimation or underestimation of poverty is the difference between T*mean* and C*mean* for each year. For some countries the overestimation is in double digits.

Table 5.5 reports implied poverty reduction using doubly robust estimates. Our outcome variable is the poverty status of the household (which takes on values 1 or 0). We also estimate a propensity score, where the dependent variable takes values 1 for the first quarter of the survey and zero otherwise. In the event that our model uses the first six months, the dependent variable for the outcome and propensity score models takes the value 1 for those months, and zero otherwise. Similar formulation applies to the specification implied by Table 5.4. The controls for the outcome variable and the propensity score models differ, but are drawn from a rich set of covariates which include household composition (household size, number of children younger than 15, number of active household members between 15 and 64, etc.), characteristics of the household head (age, gender, education), asset holding and employment status, housing characteristics (materials for roof, walls, floor, number of rooms, etc.), and controls for regional, rural and urban dummies, regional dummies, and control for seasonality.[18]

Columns 3 and 4 (Table 5.5), report existing poverty estimates for these countries using the international poverty line of $1.25/per day per person. The next

[18] The complete specification for the outcome and propensity score models can be obtained from the authors upon request.

Table 5.5 Poverty headcount ratio at national poverty line (% of population)

Country	Base year and comparable latest survey	International poverty line ($1.25PPP)		Estimates of correcting missing data (doubly robust estimates)			
		Year 1	Year 2	Quarter 1 of Year 1	Quarter 1 of Year 2	Half 1 of Year 1	Half 1 of Year 2
Angola	2000, 2008	54	43	68	41	66	44
Ghana	1998, 2005	39	29	36	20	37	25
Kenya	N/A, 2005	–	43	–	38	–	41
Malawi	2004, 2010	74	62	70	53	71	56
Mozambique	2003, 2008	75	60	71	59	71	58
Niger	N/A, 2007	–	44	–	46	–	47
Nigeria	2004, 2010	63	63	63	57	63	61
Rwanda	2005, 2011	72	63	73	51	75	63
Sierra Leone	2003, 2011	53	52	54	49	56	51
Swaziland	2001, 2009	63	41	56	39	60	41
Tanzania	2000, 2007	85	68	84	70	84	70
Uganda	2005, 2010	52	38	52	39	52	37
Implied poverty reduction		2.5		3.8		2.9	

Notes: Quarter 1 denotes first 3 months of the survey cycle, and Half 1 means first half or first six months of the survey. Population below PPP$1.25 a day is the percentage of the population living on less than $1.25 a day at 2005 international prices. The last row is weighted by population share of the countries. It excludes Angola because the 2000 survey covers only urban households and also excludes Kenya and Niger because there is only one survey for each of them. The countries that are included together account for 33 per cent (approximately 292.9 million) of the estimated population of SSA (2011).

two columns (5 and 6) provide estimates of poverty using the same international line and the doubly robust method, assuming that the first quarter of each survey is the correct measure of "true" consumption. For example, the poverty estimates under the column (Quarter 1 of Year 1), tells us what the average headcount poverty would be if the first quarter of consumption is assumed to be the true measure of consumption in a population with the distribution of covariates that are observed in year 1 data. Columns 7 and 8 show results when we assume that the first 6 months are, instead, the true consumption distribution in the country. As indicated in the table, for several countries, there is a significant divergence between existing poverty estimates and the doubly robust estimates. For instance, substantial divergences between the existing poverty and those obtained from doubly robust estimates for year 1 are evident for Malawi, Mozambique, and Swaziland, while for year 2, the countries that are most affected are Ghana, Malawi, Nigeria, and Rwanda.

So how much poverty reduction does this imply? The last row of Table 5.5 shows possible magnitudes of poverty reduction implied by our proposed method for correcting for under-reporting. The calculation excludes Angola because the 2000 survey covered only urban areas, and Kenya and Niger, which have one survey each and therefore we could not estimate poverty reduction. The remaining nine countries accounted for 33 per cent of the population of Sub-Saharan Africa in 2011. According to the table, between the first and second half of the 2000s, poverty reduction is estimated at 2.5 percentage points for these nine countries. However, our proposed measure suggests that the estimates could be 3.8 (or 1.3 percentage points higher; i.e. approximately 3.8 million people).

5.5 Conclusion and suggestions for future surveys

Although survey data collection in Africa has improved substantially in volume and quality in the past two decades, pockets of data quality problems have remained relatively stubborn. In this chapter we focus on one source of data quality concerns for poverty measurement – the problem of under-reporting of consumption data in household surveys. In particular, we argue that under-reporting is particularly prevalent in surveys that (i) use a diary to collect large parts of the consumption data, and (ii) are conducted over 12 months, although the problem may not be exclusive to such surveys.

The chapter analyses household surveys from a dozen African countries that had conducted year-long household expenditure surveys using mostly, but not only, diaries to document evidence of under-reporting of consumption. We demonstrate an unusual and until now unnoticed trend in many household surveys in Africa, which is that the value of measured consumption in household surveys declines over the time period that those surveys are being carried out.

This evidence suggests that poverty in Africa may be overestimated because of poor data. Therefore, poverty estimates and the size of poverty reduction (or lack of) in Africa should be interpreted with caution.

One possible explanation for observed under-reporting of consumption within the survey month is respondent fatigue, from requiring recorded expenditures in diaries. We also argue that in the context of Africa – high levels of illiteracy, underfunding of surveys, and poor quality infrastructure to support surveys – diaries may not be suitable instruments for data collection as currently organized. Maintaining diaries can be a resource-intensive process (Verbrugge, 1980). Inadequate training, less supervision or funds would result in poor overall quality of the data recorded in diaries. The duration of the diary (for example, whether it should be for 12 days or a month, and so forth) and the length of the survey can lead to both respondent and enumerator fatigue.

These problems become amplified in an African context where literacy is low and infrastructure for data collection is poor. For literate respondents in households who dutifully complete the diaries, how often they get visited by enumerators may not matter. However, it does matter for illiterate respondents and for the literates who do not fill their diaries until visited. This is because for the illiterate and the non-compliant literates, the diary data becomes, effectively, retrospective and subject to many of the well-known recall biases. Experimental evidence on methods of household data collection – with special focus on consumption – show that diaries are more likely to be subjected to measurement error where the respondents are illiterate, which is often the case in rural areas of developing countries (Beegle *et al.,* 2012; Bowling, 2002).[19] In this regard, it may not be surprising that the majority of studies using diaries are in developed countries (Grosh and Glewwe, 2000), although the experience of implementing Household Budget Surveys (HBS) in European countries casts doubt on the presumed suitability of the diary even in these contexts (Crossley and Winter, 2012; Attanasio, 2006). Similarly, for a U.S. consumption expenditure survey using two approaches – the Interview Survey and the Diary Survey – Bee *et al.* (2012) found that diary respondents are much more likely to report zero spending for a consumption category. The authors concluded that using diary data to assess inequality trends and other distributional outcomes is likely to lead to biased and misleading results.

The evidence from at least a dozen countries analysed in this chapter suggests that problems arising from potential respondent and enumerator fatigue at keeping diary records and conducting year-long surveys would trump any problems that arise due to seasonality. This is consistent with findings of consumption

[19] Using data from a production diary, administered concurrently with a standard household survey in Uganda, Deininger *et al.* (2012) found that the diary-based estimates of output value consistently exceeded that from the recall-based production survey.

under-reporting from Living Standard Measurement Studies in Armenia and Belarus (Martini and Ivanova, 1996; Blaizeau, 1998).

To remedy the problem, we suggest that household surveys in Africa rethink the use of diaries. There may be a case for using diaries if sufficient resources in financing, supervision effort, and organizational efficiency are brought to bear in a context of high literacy. It is difficult to have a diary with perfect compliance and we are skeptical that the confluence of factors needed to make diary implementation successful can be easily mobilized in most statistical agencies in Africa. Sticking to diaries will require a system intensive in management and supervision (that is, a fail-proof system) be put in place. Even if such a system is in place, it will still make sense to have a shorter duration diary (say no more than 12 days)[20] and a shorter duration survey period in order to reduce under-reporting of consumption – a survey that lasts a few months, with one or two revisits to account for seasonality.

We recognize that this suggestion is controversial because the long held belief is that diaries and year-long surveys provide better quality consumption data since they are believed to reduce recall bias and minimize seasonality effect (Coxon *et al.,*1993; Wiseman *et al.,* 2005). However, to minimize potential seasonality effect, it is possible to design the surveys so that the same household is visited twice a year or however many seasons there are for a country (they are usually at most two in many African countries). This may actually be a better way to deal with seasonality than the current year-long surveys that visit completely different households in different seasons. To understand better how to reduce measurement error in consumption may require more methodological experiments in developing countries. Such experiments have already began (Beegle *et al.,* 2012; Backiny-Yetna and Steele, 2012), but more are definitely needed. We also recommend rethinking technology of data production by calling for wider use of mobile devices to collect data and thereby reduce field work errors, speed up processing of data and improve the quality of supervision at less cost.

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[20] South Africa, one of the more capable statistical agencies in SSA has recently abandoned month-long diaries and moved to a two-week diary. The analysis of this switch has not yet been released.

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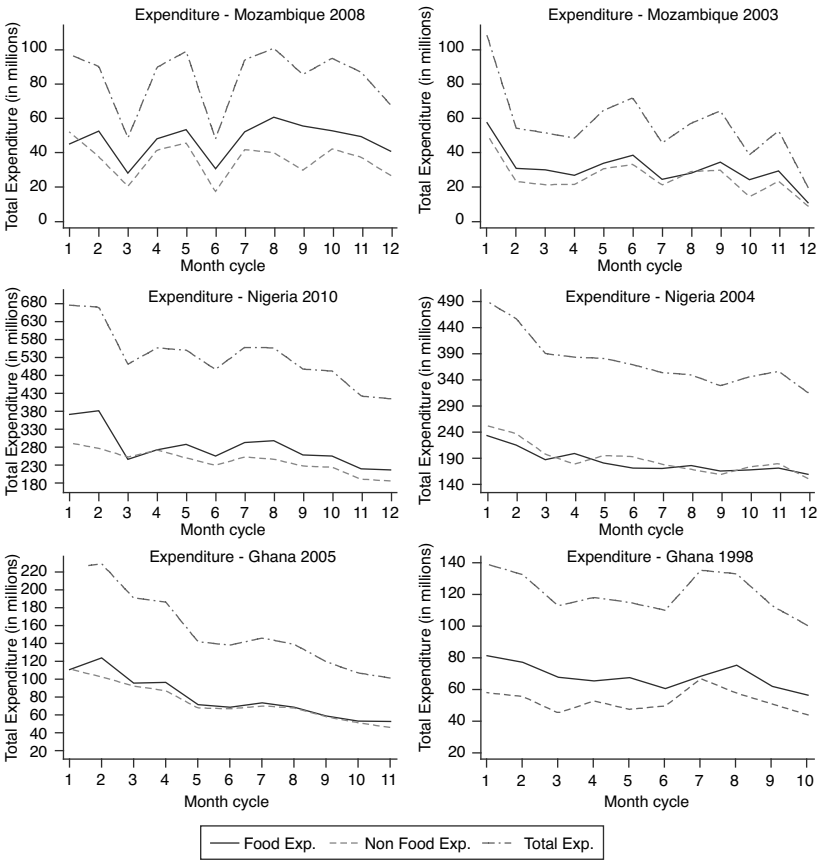
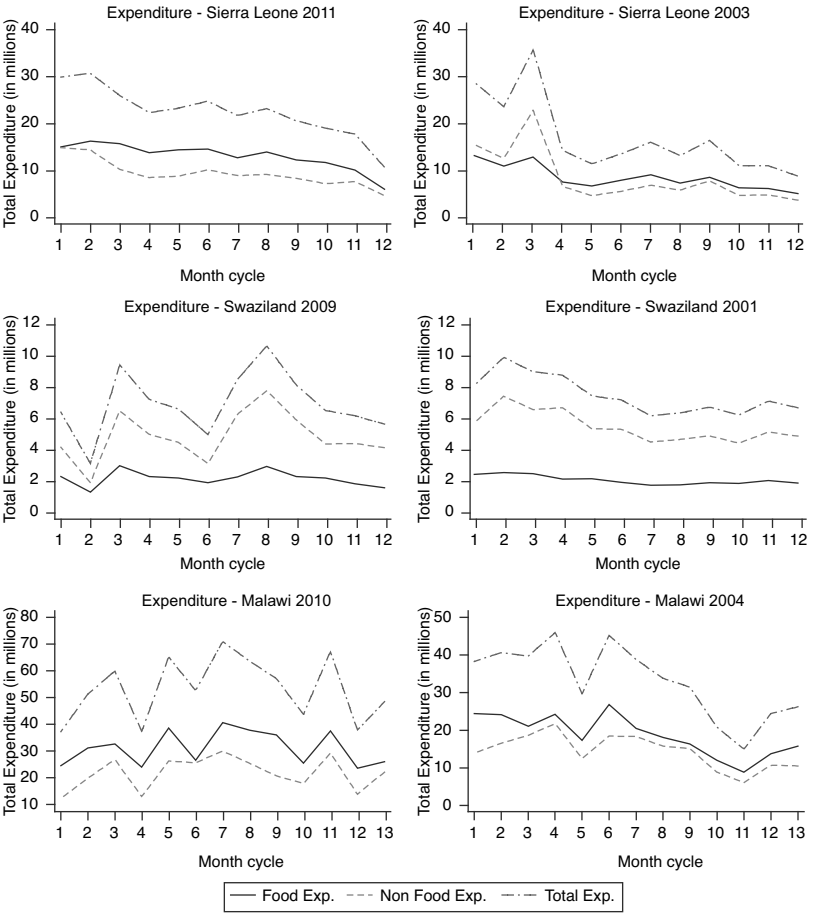
Annex A: Total monthly/cycle expenditures for selected surveys




Expenditure - Sierra Leone 2011
Expenditure - Sierra Leone 2003
Expenditure - Swaziland 2009
Expenditure - Swaziland 2001
Expenditure - Malawi 2010
Expenditure - Malawi 2004
Total Expenditure (in millions)
Month cycle
Food Exp.
Non Food Exp.
Total Exp.

6

Filling Gaps when Poverty Data are Missing: Updating Poverty Estimates Frequently with Different Data Sources in Jordan

*Hai-Anh H. Dang, Peter F. Lanjouw and Umar Serajuddin**

6.1 Introduction

Tracking poverty trends can help us understand which policies work and which do not, and how efficient they are. Producing reliable poverty estimates by conducting household expenditure (consumption) or income surveys, however, requires significant financial and technical resources. Consequently, consumption surveys are typically conducted every few years by statistical agencies, and poverty estimates are not available in the intervening years during which surveys have not been implemented. Though policymakers often have a strong interest in monitoring poverty trends over time, they typically have little or no information on such trends during the years when consumption data are unavailable. Another challenge to tracking poverty trends is that survey design may change over time, thus making consumption data and poverty estimates not comparable between different rounds. Both of these challenges can be broadly characterized as a missing data situation.

Jordan faces a similar missing data problem, where little is known about poverty trends since Jordan's Department of Statistics (DOS) last conducted its Household Expenditure and Income Survey (HEIS) in 2010. In the meantime, Jordan has implemented a Poverty Reduction Strategy (PRS), undergone economic reforms such as reduction in petroleum subsidies, and experienced economic shocks due to factors such as higher energy prices, change and unrest in neighboring Egypt, and the recent large influx of Syrian refugees. With the fast evolving context in which policymakers operate, there is a keen interest to know about poverty and wellbeing at shorter intervals.

* This is a synopsis of World Bank Policy Research working paper # 7043 (Dang, Lanjouw, and Serajuddin, 2014). Interested readers are encouraged to refer to this paper for more detailed discussion and results.

With this type of situation being quite common, the topic of imputing missing consumption data from one survey to another or survey-to-survey imputation has been receiving increased attention in the economics literature. In this technique, a statistical model of household consumption is developed based on household characteristics in the survey when consumption data are available. Using this model, consumption is then predicted for households in other (typically more recent) surveys lacking consumption data. In contrast with the HEIS survey which was last conducted in 2010, Jordan's DOS administers on a quarterly basis the Employment-Unemployment Survey, a labor force survey (LFS) with wide geographical coverage. We exploit the LFS, which does not collect consumption data and has a different design from the HEIS, to fill the missing poverty data problem in Jordan for the years the HEIS is not implemented.

Reassuringly, estimation results show that our imputed poverty estimates from the LFS are close to the true rates based on the actual consumption data from 2008 and 2010 (these are the years when HEIS was conducted), and our imputed rates for the HEIS in 2010 (using only the 2008 HEIS) are also close to the actual rate in this year. Having passed these validation tests, we then impute estimates for more recent years using the LFS data when the HEIS consumption data are not available.

Our estimation results point to a steadily decreasing trend in poverty over time for Jordan during the period 2008–2013. While the decline in poverty was quite sharp between 2008 and 2010, the subsequent reduction has been modest.

6.2 Estimation framework

The poverty estimation framework utilized by most existing survey-to-survey imputation studies are largely based on the study on survey-to-census imputation by Elbers, Lanjouw, and Lanjouw (ELL) (2003). Applying the estimated model parameters of consumption from a household expenditure survey onto overlapping variables with the census, ELL can predict consumption data into the latter, and predict poverty at lower administrative levels than possible using the household survey alone. This method is also known as the "poverty-mapping" approach.

Building on this approach, Kijima and Lanjouw (2003) apply this method to provide survey-to-survey imputation-based poverty estimates for India. In another subsequent empirical application, Stifel and Christiaensen (2007) combine household expenditure survey data with more recent rounds of the Demographic and Health Survey (DHS) in Kenya to impute household consumption into the DHS. In the same spirit, another approach is to combine a household expenditure survey and a more recent labor force survey to provide imputation-based estimates of poverty. This approach has been implemented for Mozambique by Mathiassen (2009). More recently, Douidich, Ezzrari, van

der Weide, and Verme (2013) take advantage of the almost identical designs between the household expenditure survey and the LFSs in Morocco to impute poverty rates in the latter. An advantage of the LFS is that it is typically conducted frequently and thus can produce poverty estimates frequently as well.

Certain limits exist with current survey-to-survey imputation studies. For example, a key implicit assumption that is commonly, if not universally, used is that the relationship between consumption and its correlates remains stable across survey rounds (or equivalently, over time). This assumption of constant parameters may not hold in practice. Another issue is that, since significant statistical issues exist between survey-to-census imputation and survey-to-survey imputation methods, the original technique developed by ELL may best be suited for survey-to-census application. In particular, survey-to-census imputation focuses on intra-temporal (i.e., same point in time) imputation for producing poverty estimates at lower administrative levels than a survey would reasonably allow, while survey-to-survey imputation focuses on inter-temporal imputation for poverty estimates at more aggregated population groups. These differences clearly raise distinct modeling issues for each method.

We make several contributions in our paper, which attempts to elevate survey imputation techniques into a formal framework beyond the largely *ad-hoc* efforts in the existing empirical studies. First, we show that the assumption of constant parameters is not a prerequisite for survey-to-survey imputation. Second, we develop a more simple formula for the variance of the estimated poverty rate (and this formula accords with the one commonly used in the statistics literature). Third, our framework also allows us to provide more insights into the selection of control variables for model building and testing.

Finally, another assumption implicitly used in existing studies is that the two surveys—one with and the other without consumption data—have comparable designs. Using surveys of different designs can, however, remarkably expand the application of the imputation method. The challenge is that the sample statistics estimated from surveys of different designs would likely be different due to various reasons, which would in turn render imputation-based estimates incomparable. We develop standardization procedures to harmonize the different surveys and show that employing these procedures can produce estimates that are statistically indistinguishable from the actual poverty rates.

6.3 Country background: poverty estimates in Jordan

The official poverty line in Jordan is constructed based on a "cost of basic needs" approach with a common food and non-food basket for all households. The national annual poverty line for 2010 is set at 813.7 JD per individual, yielding a poverty rate of 14.4 percent for this year. This poverty line is then fixed for 2010 and is adjusted for changes in the cost of living using official CPI deflators to

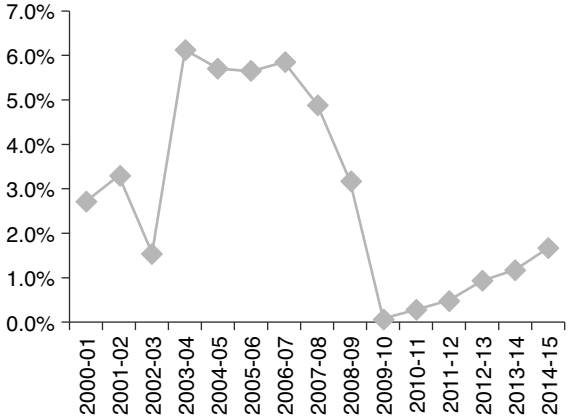


Figure 6.1 Growth rate of real per capita GDP
Source: IMF, World Economic Outlook Database, April 2014. Estimates start after 2010.

obtain a comparable poverty line in 2008 and its associated poverty rate of 19.5 percent (World Bank, 2012).

Macroeconomic trends shown in Figure 6.1 appear to corroborate the poverty decline revealed by the micro household consumption data, with growth in real GDP per capita being consistent with the downward sloping poverty trend. The period between 2002 and 2007 saw rapid growth, which, however, slowed down in the subsequent period between 2008 and 2010. Real GDP per capita grew by 3 percent and poverty was estimated to fall by about 5 percentage points in this latter period.

No consumption data exists after 2010 to monitor poverty trends. Macroeconomic projections show per capita GDP growth to be weak, but this alone does not provide conclusive evidence on poverty trends. The recent subsidy reforms and the associated cash transfer could well impact poverty, as could the various economic stresses including a continued weak labor market, increased energy prices, and a large influx of war refugees from Syria. Against a background of infrequent collection of consumption data, the country's economically uncertain atmosphere provides an even stronger impetus for policymakers to track poverty with alternative methods like imputation-based estimates.

6.4 Data description: HEIS and LFS

For consumption surveys, we work with the most recent two rounds of Jordan's Household Expenditure and Income Survey (HEIS) in 2008 and 2010. These nationally representative surveys are used to produce official poverty statistics. In addition to household expenditures, HEIS collects data on other household

characteristics including demographics, employment, assets, and incomes. The survey follows a two-stage sampling design where census enumeration areas serve as primary sampling units (PSUs). For the 2010 survey round, 1,736 PSUs were selected in the first stage using a systematic probability proportionate to size (PPS) sampling method. Within each selected PSU or cluster, eight households were randomly selected at the second stage. The 2008 and 2010 rounds of the HEIS collected consumption data respectively for 10,961 and 11,223 households. The questionnaire design of these two survey rounds remains essentially the same.

The Employment-Unemployment Survey (LFS) is the official source of employment and unemployment data in Jordan. While it shares certain similarities with the HEIS such as a two-stage cluster stratified sampling design and a common sample frame based on the Population and Housing Census of 2004, its design is different. The LFS collects data on employment status, occupation, and economic activities for between 11,000 and 12,500 households on a quarterly basis, and these data are representative of the population for each quarter. We analyze all 24 quarterly rounds of the LFSs from 2008 to 2013.

6.5 Estimation results

It would be important for validation purposes to see how well the imputation-based estimates compare with the actual (true) poverty rates based on the HEIS before tackling the main task of this chapter, which is to provide poverty estimates for the years when the HEIS is not available. We provide two types of validation tests: one is to impute from an earlier round of the HEIS into the more recent round, and the other is to impute from an earlier round of the HEIS into a more recent round of the LFS that overlaps with the more recent round of the HEIS. Put differently, the first type of validation is within-survey imputation, and the second type across-survey imputation. The earlier survey round is in 2008, and the more recent rounds of the HEIS and the LFS are in 2010.

Our estimation results are overall quite encouraging. Estimates for each quarter in both 2008 and 2010 are roughly within the 95 percent confidence interval of the true rates, and estimates for 2008 even fall within one standard error of the latter. Furthermore, results are rather stable with estimates being almost identical for each quarter in the same year.

We then provide imputation-based estimates of poverty for more recent years when the HEIS are not available, and graphically show these estimates in Figure 6.2. Figure 6.2 indicates that the decreasing trend in poverty is steady, even though it is less steep during the years 2010–2013 compared to the previous period 2008–2010. This can perhaps be explained by various events taking place in the economy during this time period such as subsidy reforms, a continued weak labor market, increased energy prices, and a large influx of war

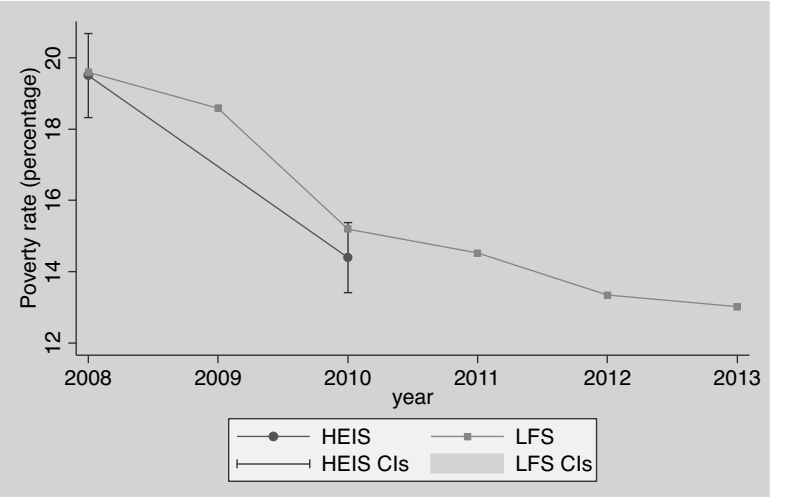


Figure 6.2 Predicted poverty trends combining the HEIS and LFS, Jordan 2008–2013
Source: Figure 2 in Dang, Lanjouw, and Serajuddin (2014).

refugees from Syria. These events clearly could have impacted poverty in potentially different directions. As a side note, estimated poverty rates based on the non-standardized variables provide a qualitatively similar decreasing trend over time.

The estimated poverty rates at the national level are encouraging. To further investigate whether this result holds at more disaggregated levels, we estimate poverty rates broken down by urban and rural areas. Estimation results (not shown) are rather encouraging for urban areas with estimated poverty rates falling within the 95 percent confidence interval of the true rates in both years. The same is true for estimates for rural areas for 2008 but not in 2010. One possible reason for this is that the Jordanian population is predominantly urban (83 percent), thus it can be harder to predict poverty rates in rural areas which account for a smaller share of the population.

6.6 Conclusion

In this chapter we develop a framework of survey-to-survey imputation for poverty estimates that can potentially be applied in various contexts, including where both surveys do not necessarily share the same design. Our estimation results combining the HEISs and the HEISs with the LFSs are quite encouraging, with imputation-based poverty estimates not showing statistically significant differences from the true poverty rates. Even though we use data from a middle-income country like Jordan, our method can be implemented in other contexts

where household consumption surveys are not frequently or consistently collected, while other surveys that can be benchmarked to these household surveys exist. Our work provides support to the growing assessment that survey-to-survey imputation methods can comprise a valuable tool for poverty tracking purposes in developing countries where financial and technical constraints on fielding consumption surveys can be particularly binding.

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7

The Social Pension and Time Allocation in Poor South African Households

Vimal Ranchhod and Martin Wittenberg

7.1 Introduction

How do adult household members in developing countries respond to an exogenous increase in non-market income? In particular, how does it affect their choices regarding time allocation to various activities? We explore this question using nationally representative time use data from South Africa. We make use of the age of resident elderly members, in conjunction with pension eligibility rules to identify the aforementioned income effects.

Time is one of the most valuable resources available to individuals and families. Through employment and wages, the financial budget constraint and time budget constraints are intrinsically related. Thus, a relaxing of the household's financial constraints is likely to affect the goods purchased by the household, the quantity and types of home production activities, as well as the consumption of leisure by various household members. It is also likely to create incentives for non-resident family members to move in to the household.

Several researchers have explored the relationship between income transfers and various measures of social and economic wellbeing. These include poverty, nutrition and health, adult labor, child labor, schooling enrollment, intra-household bargaining outcomes, and pooling of resources across households. In the South African context, effects on time allocation have been restricted to crude measures of schooling enrollment and labor force participation. To date, the impact on specific time allocation choices in recipient households has been ignored. Given that households do indeed share resources, and that multi-generational households are common, we obtain an incomplete understanding of the impacts of such policies if our analyses exclude the impacts on time allocation.

What complicates the analysis is that the increase in income is anticipated by the household and, indeed, non-resident family members. We show that there is some evidence that household composition changes around the time that a

pension is received. This recomposition effect is one of the channels through which the impact of the policy is felt more broadly than among the primary intended recipients. Previous studies have also raised the issue of household recomposition. It has been speculated that pension-eligible "grannies" may help to meet a child-care constraint for prime-age women (Ardington *et al* 2009). We show that the pattern of time allocation is only partially consistent with this hypothesis.

Policy implications notwithstanding, simply knowing the responsiveness of people's time with respect to income is an economically interesting query. Revealed preferences suggest that any observed changes will reflect the optimal allocation of the income transfer to a new set of time allocation and consumption bundles. Observing these allows us to gauge some element of household preferences, even if not very cleanly.

In this chapter, we use data from the South African Time Use Surveys of 2010 and 2000 (Statistics South Africa 2000, 2010). Both surveys are large, nationally representative datasets which report respondents' activities the previous day. In the 2000 survey we also have a household roster with each member's demographic information. To identify income effects, we make use of the age eligibility rules that govern the South African Old Age Pension (OAP). The OAP is a relatively generous means tested income transfer, which is universally available, non-contributory and highly anticipated. Our investigation involves comparing the time allocation of prime aged adults who live with an elderly person who is not yet of pensionable age, with similar individuals who live with an elderly person who is pension age-eligible. We also look for breaks in time allocation at the point at which individuals become eligible for the pension. In a nutshell, we observe that adults in the household respond in several dimensions of time allocation, including market work, informal sector work, child care and time spent socializing. In the 2000 data we can also observe household recomposition which seems to be driven at least in part by young girls moving into households with female pensioners.

7.2 Literature: Some theory and background on the pension

The broad theoretical background for this paper is provided by Becker's seminal paper "A Theory of the Allocation of Time" (1965), which argues that the "primary commodities" that feature in the household's utility function require both time and material inputs. This allows Becker to link the income and time constraints of the household and to consider how changes in either would alter the household's bundle of activities. In this framework changes in exogenous income have predictable effects. Since they do not change the relative price of commodities or of the opportunity cost of time, changes in consumption

should be positive for all normal primary commodities (activities) and negative for inferior ones. In our context we would expect, for instance, a reduction in time devoted to labor and an increase in leisure activities with an increase in exogenous income.

Two important qualifications must be made. Firstly, the income must really be exogenous, i.e. unrelated to the activities engaged in by members of the household. Secondly, Becker assumes that the household itself is exogenous, i.e. that it does not itself change in relation to the activities or income of its members. The literature on the South African pension has reflected on both of these questions.

The institutional background to the OAP is discussed in Lund (1993). The pension is means tested, and provides a relatively generous cash transfer to recipients. Eligibility depends only on age, nationality and satisfying the means test. The age-eligibility threshold was 60 for women and 65 for men in 2000, but by 2010 the threshold was 60 for both. The level of the means test is set fairly high, so that most of the elderly receive the grant. Ranchhod (2006) notes that the distribution of observed wages amongst the elderly is such that most of the elderly could continue to work while still satisfying the requirements to receive the pension.

Moreover, the means test is based on individual income for the unmarried elderly, or joint spousal income for married couples. Hence, it should not have direct distortionary "implicit taxation" effects for other non-elderly household members.

The value of the pension is adjusted periodically, usually on an annual basis, to adjust for inflation. As Case and Deaton (1998) note, the OAP is very generous when compared to median South African incomes. In short, the way in which the OAP has evolved in post-apartheid South Africa there is little to suggest that it is not exogenous from the standpoint of most recipients.

Several researchers have investigated the effects of receiving a pension on various dimensions of household welfare. Case and Deaton (1998) were the first to note the redistributive consequences of the OAP, and found that the OAP is an effective transfer to the poor. Duflo (2000), Case (2004) and Duflo (2003) all find that the health of household members is improved as a result of the pension. These papers also note that the impact of the pension spills over to co-resident household members.

These spill-overs are noted in other papers as well. Bertrand *et al* (2003) find that having a pension eligible person in the household has a statistically significant and negative impact on the labor supply of prime aged individuals in the household. Edmonds (2006) finds that when a household member who is male becomes pension eligible, there is a sizable decline in child labor, coupled with an increase in schooling attendance and attainment. Ranchhod (2006) finds that the pension induces sharp levels of labor force withdrawal amongst the elderly

themselves. All of these suggest that we might reasonably expect that the pension may cause changes in the time allocation of non-pensioner adult household members as well.

Jensen (2003) estimates that crowding out of remittances by pensions is large and significant. On average, every rand of pension income received by the elderly is met with a 0.25 to 0.30 rand decrease in remittances received from the pensioner's children. Pension income is thus *de facto* shared with non-resident family members as well.

Indeed there is an argument in the literature that co-residency is itself affected by the receipt of the pension. Edmonds *et al* (2005), for instance, find a decrease in the number of prime working-age women, and an increase in the number of children younger than five and young women of childbearing age. This is supported by Ardington *et al* (2009).

To the extent to which pension income leads to such recomposition of households, this will mitigate the clean predictions from a Beckerian time allocation model.

7.3 Data

The data for our study come from two nationally representative time use surveys conducted ten years apart. The first of these was conducted in 2000, with a sample size of around 14 000 individuals. The 2010 survey, by contrast, had a sample size of 39 000. In both cases the individuals were selected in a three-stage sampling process. In the first stage a set of primary sampling units (enumeration areas) were selected. In the second, a set of households were identified within the PSUs. Within each household up to two individuals were selected to complete the detailed time diary.

There are some notable differences between the 2000 and 2010 surveys. In the earlier survey the sample was stratified into three "tranches" to take possible seasonal variation in activities into account. Consequently information was collected in February, June and October. Within each tranche an attempt was made to spread the survey schedules over the month and over the week. The information in the 2010 survey, by contrast, was collected only in the fourth quarter, since the data gathering was linked to the Quarterly Labour Force Survey. Within this quarter the information was collected in the last week of each month, although surveys were again staggered over the week.

In both surveys the information was collected through three instruments:

- A **household questionnaire**, which included some basic socio-economic information on the entire household, such as access to services and total household income. A roster of household members provided the basis from which to select the individuals to be interviewed further. In 2010, this roster

was not released with the data. Consequently we have very little information about household composition for that dataset. It also means that the variable "living with a pensioner" is defined in 2010 as "living in a household that records receiving an old age pension".

- A **personal questionnaire** which was administered to the selected individuals. This captured information such as educational attainment, marital status, labour market participation and personal income.
- The **time diary**.

Individuals were interviewed about their use of time during the previous twenty-four hours. The activities were recorded within half-hour time slots according to an "activity classification system". Frequently reported categories included "sleep", various forms of "work", "cooking", "cleaning", "watching TV", "listening to the radio", various forms of "socializing", "childcare" and "doing nothing". Provision was made for up to three activities in each slot. In order to convert slots into actual time use, the thirty minutes were divided equally between the activities recorded in that time.

Our investigation focusses on the changes in activities amongst adult African South Africans.[1] The race restriction was imposed in order to keep our study comparable to the existing OAP literature. It is also beneficial because our proxy for the pension is age, and a majority of age-eligible Africans receive the pension. We additionally pay specific attention to "prime aged" adults, who we categorized as adults aged 25– to 50 inclusive.

We make two additional sample restrictions. We exclude one person households, since we are interested in the impact of pensions on non-recipient members of the household. In regressions where we focus on formal and informal work we restrict the sample to week days, since there is very little work happening on weekends.

7.4 Empirical strategy

We use a "regression discontinuity" approach, i.e. we estimate multiple regressions on some of the time allocation variables to separate out two effects: firstly the impact on time allocation of the person as he or she transits from not being pension eligible to pension eligibility; and secondly the impact on non-recipients of having a pensioner present, with corresponding standard errors. We control for the individual demographic characteristics of the respondents, such as their age and education, as well as their geographic and household composition

[1] Despite the end of apartheid, it is difficult to talk about social processes without reference to the four broad groups defined by apartheid legislation, viz. Whites, Indians, Coloureds and Africans.

attributes. We estimate each regression for both genders combined, as well as separately for men and women. Our estimation samples include all adults (including pensioners), all adult women, all adult men, prime aged women and prime aged men.

The specific equation we estimate for person *i* in household *j* is:

$$y_{ij} = \alpha_0 + \beta x_{ij} + \gamma z_j + \delta Pensioner_{ij} + \phi Lives\,with\,pensioner_{ij} + \varepsilon_{ij}$$

where

- y_{ij} is the dependent variable, measured in minutes. The outcomes we consider are time spent in wage work, informal employment, care giving, sleeping, watching TV, socializing with non-family members, cooking and eating.
- x_{ij} are person specific attributes; gender, a quartic in age, education, and indicators for marital status.
- z_j are household level variables; household size, the type of area the residence is based, e.g. urban, rural, farm etc., the tranche in which they were interviewed (in 2000), and the day of the week that the response pertained to.
- Our first coefficient of interest is δ. $Pensioner_{ij}$ is an indicator variable that takes on a value of one if the person is pension eligible and zero if the person is not. It is therefore the size of the change in time allocation that occurs at the point where the individual becomes pension eligible.
- The second coefficient of interest is φ. The variable "Lives with $pensioner_{ij}$" is a dummy variable equal to one if there is at least one pensioner among the other members of the household (in 2000) or if the household records receiving an OAP (in 2010). Thus φ provides us with the mean difference in time allocation between the group of respondents who reside with a pensioner and those who do not.

In all cases, robust standard errors were estimated and clustered at the primary sampling unit level.

In order to investigate to what extent the changes that we observe are due to changes in household composition, we also estimate linear probability models. In this case the dependent variable is the proportion of the household that falls into a particular age group (e.g. females aged zero to five). We calculate these proportions over members of the household other than the individual that we are contemplating. We are therefore interested in the composition of the people that the respondent is co-resident with. Again we are interested in changes in composition that occur as the individual transits from being non-eligible to becoming eligible for the pension. We can do this analysis only for the 2000 data, as we do not have the full household roster in 2010.

7.5 Results

Before discussing the regression estimates it is useful to place them in the context of some descriptive trends. Figure 7.1 shows how the 1440 minutes (24 hours) of the average day are divided between the ten major categories of the activity classification system used by Statistics South Africa. The results are for 2010. The figure should be read like a stacked bar graph, i.e. the area between the x-axis and the first line ("wage work") corresponds to the time dedicated to working for a wage. The next "slice", i.e. the area between the "wage work" line and the "produce" one, corresponds to time spent in primary production. Then we have time spent on service work (for gain); household maintenance (cooking, cleaning); care for children, the sick or the aged; community work (including religious practices); learning; socializing; media use (e.g. TV/radio); and finally personal care (mainly sleep, but also personal hygiene and eating).

Several points emerge from this diagram. It is evident that employment ("wage work") declines markedly between the age of 50 and 63. In the case of women the decline is steady over this entire range, while in the case of men it is more clearly concentrated around the pensionable age of 60. In the case of men there seems to be some substitution towards "primary production" (which includes

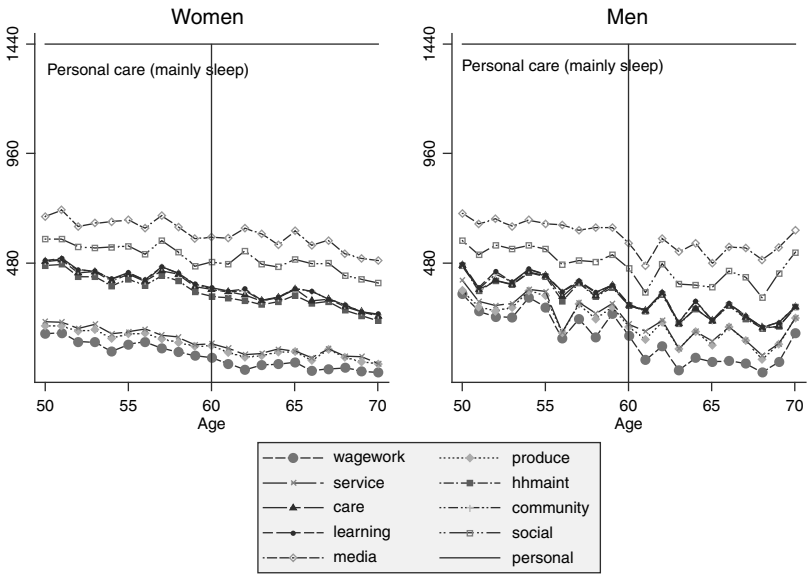

Figure 7.1 How the time is spent during an average day during the working week in 2010, by age of the respondent

food gardening), but not enough to offset the overall decline in hours worked. It is also evident that there is a noticeable increase of time devoted to personal care as individuals cross the threshold of 60.

The results of our first parametric regressions (shown in Table 7.1) confirm the decline in economic activity. We report δ, i.e. the coefficient on the pensioner variable, and φ, i.e. the coefficient on the "living with a pensioner" variable. The former captures the mean difference in the dependent variable between the activities of an individual prior to receiving the pension and afterwards – controlling for a quartic in age and other individual characteristics. In essence we are forcing a continuous curve through the time allocation data and are looking for a break in the levels around the pensionable age. The relatively smooth adjustments suggested by Figure 7.1 (particularly for women) will militate against finding such shifts.

By contrast, φ represents the mean difference in the dependent variable between the two groups defined by those who live with a pensioner and those who do not, conditional on the other characteristics included in the regression. Figure 7.1, of course, does not speak to what happens to the time allocation of other individuals in the household (particularly prime age ones) when another household member becomes pension eligible. Again the anticipated nature of the change is likely to make the adjustment smoother than the regression discontinuity approach requires.

The results shown in Table 7.1 suggest that there is, in fact, a discontinuity at the pension age in the time allocated to paid work. The point estimates in both 2000 and 2010 are large and negative, and they are significant, particularly in 2010, where we have a larger sample. Overall the results suggest that men and women reduce their time by around an hour. There also seems to be some increase in time on informal production at age 60 among men. The point estimates for 2000 and 2010 are both around 40 minutes per day, but only the 2010 coefficient is statistically significant. The size of these effects is, however, not large enough to offset the decline in paid work.

As far as co-resident prime age individuals are concerned, the evidence is clear: there is an overall reduction in economic activity when there is a pensioner in the household. While the point estimates for 2010 (particularly for paid work) are larger than those for 2000, in most cases the estimates for 2000 and 2010 are not statistically different, given the higher level of noise in the 2000 estimates.

Where does the saved time go? Table 7.2 shows how time allocations on certain other activities changes. Household maintenance (cooking, cleaning, shopping) is a strongly gendered activity, with women performing the bulk of these roles. The 2010 data suggests that prime-age women spend even more time on household maintenance tasks if co-resident with a pensioner. Although the 2000 estimates are not statistically significant, the point estimate for prime age

Table 7.1 Minutes spent on economic activities

	2000					2010				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	All	women	women 25–50	men	men 25–50	All	women	women 25–50	men	men 25–50
Work for wages										
pensioner	−44.39	−64.50**		−66.93		−41.19**	−17.55		−76.29**	
	[27.76]	[22.10]		[64.39]		[14.93]	[15.67]		[26.28]	
lives with pensioner	−31.42**	−23.00*	−34.23*	−28.31	−12.88	−71.01**	−51.03**	−46.46**	−84.56**	−52.74**
	[11.73]	[10.60]	[15.20]	[21.96]	[27.62]	[9.107]	[8.830]	[11.36]	[15.76]	[18.63]
R-squared	0.19	0.15	0.12	0.21	0.19	0.198	0.144	0.115	0.211	0.152
Primary production										
pensioner	−4.585	−25.77		44.07		19.02*	3.070		35.93*	
	[15.39]	[17.95]		[33.96]		[7.417]	[6.880]		[14.28]	
lives with pensioner	−0.815	−4.292	−0.374	3.007	2.458	0.911	2.859	2.743	−0.109	0.187
	[6.427]	[7.527]	[6.858]	[10.53]	[11.77]	[2.860]	[3.350]	[4.062]	[4.572]	[4.788]
R-squared	0.18	0.21	0.23	0.18	0.18	0.153	0.162	0.144	0.166	0.110
Service work (for gain)										
pensioner	−2.355	−9.556		13.98		−0.863	−5.496		5.694	
	[9.275]	[12.83]		[22.36]		[5.142]	[5.339]		[9.380]	
lives with pensioner	−6.796	−5.715	−14.96+	−8.325	−8.561	−7.503**	−2.519	−0.836	−14.71**	−19.50**
	[6.593]	[8.410]	[8.571]	[10.46]	[15.12]	[2.657]	[3.183]	[4.231]	[4.666]	[6.154]
R-squared	0.023	0.022	0.037	0.055	0.072	0.013	0.005	0.007	0.025	0.033
Observations	3829	2245	1679	1584	1245	12278	7488	4929	4790	3386

** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

All regressions include a quartic in age, controls for education, marital status, household size, province, stratum and day of week. The 2000 regressions also control for season (tranche). The regression is estimated over the working week and excludes one person households. Regressions are weighted with the person weights released by Statistics South Africa and the standard errors are corrected for clustering.

Table 7.2 Minutes spent on household maintenance, care of children and socialising with non-family

	2000					2010				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	All	women	women 25–50	men	men 25–50	All	women	women 25–50	men	men 25–50
Household maintenance										
pensioner	18.19	30.21		3.349		7.480	0.803		16.15	
	[22.69]	[30.43]		[31.36]		[9.741]	[13.75]		[12.59]	
lives with pensioner	4.748	4.407	16.56	2.805	2.981	20.21**	23.78**	25.14**	11.69+	1.752
	[10.45]	[16.09]	[17.65]	[13.49]	[13.62]	[4.732]	[6.804]	[8.100]	[6.177]	[6.779]
R-squared	0.230	0.069	0.090	0.068	0.091	0.223	0.059	0.058	0.043	0.050
Care for kids										
pensioner	−6.926	−1.482		−7.280		3.090	4.972		−0.836	
	[6.491]	[10.27]		[6.867]		[2.983]	[5.036]		[1.501]	
lives with pensioner	−8.866**	−20.35**	−20.38**	4.513	5.712	−0.293	−0.433	−0.915	−0.454	−0.915
	[2.935]	[4.428]	[6.123]	[3.066]	[3.743]	[1.582]	[2.677]	[3.408]	[0.806]	[1.061]
R-squared	0.129	0.081	0.086	0.054	0.057	0.123	0.087	0.080	0.012	0.014
Socializing, games, recreation										
Pensioner	42.13*	38.16+		35.45		9.142	14.05		4.904	
	[21.43]	[21.00]		[56.88]		[10.11]	[11.70]		[17.29]	
lives with pensioner	8.364	22.92*	11.64	−17.87	−2.635	18.62**	11.93+	13.86+	24.21**	23.13*
	[9.996]	[10.96]	[11.97]	[19.75]	[25.14]	[4.964]	[6.425]	[7.519]	[8.214]	[9.734]
R-squared	0.098	0.109	0.081	0.095	0.097	0.066	0.059	0.048	0.075	0.085
Observations	3,829	2,245	1,679	1,584	1,245	12,278	7,488	4,929	4,790	3,386

** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

All regressions include a quartic in age, controls for education, marital status, household size, province, stratum and day of week. The 2000 regressions also control for season (tranche). The regression is estimated over the working week and excludes one person households. Regressions are weighted with the person weights released by Statistics South Africa and the standard errors are corrected for clustering.

women (in column 3) is in the same ballpark as the 2010 one, suggesting a real, if moderate, increase in activity.

Despite some suggestions in the literature that a pension accruing to a female pensioner might relieve a child-care constraint for her daughters (Ardington *et al*. 2009), there is little evidence that there is more child-care occurring in these households. Table 7.2 does suggest (at least in 2000) that prime-age women living with pensioners do less child-care, but there is little evidence that the "granny" is stepping up to take up the slack. If the pension relieves a child-care constraint it seems likely to be in regard to money and not so much with respect to time.

The final panel in Table 7.2 deals with socialising, playing games and recreational activities. There is evidence in 2000 that the pensioner him/herself was spending more time in these activities, but this evidence is much weaker in 2010. There is sufficient noise in the estimates that they could be statistically equal. There is much better evidence (at least in 2010) that co-residents of pensioners spend more time on these activities.

It is worth noting that there was no discernible change in time allocated to "community work" and "learning" related to pension eligibility or living with a pensioner. A final part of the picture is shown in Table 7.3. This suggests that there may be some increased consumption of the mass media (in particular TV) among prime-age male co-residents of pensioners. It also suggests that prime-age individuals in households with a pensioner spend more time sleeping. The point estimates for the pensioners themselves are noisy and for men in 2000 seem to be of the "wrong" sign.

The overall picture from these tables seems fairly clear: there is a reduction in wage work, with some substitution towards primary production (e.g. gardening) among men and household maintenance among women. There are increases in time allocated to socialising, sleep and, in the case of men, media use (e.g. TV).

The final piece of evidence is shown in Table 7.4. We report the δ coefficients, i.e. the changes in household composition that happen as the person crosses the pension eligibility threshold. Looking at the first column, it appears that whether the person is male or female, becoming pension eligible seems to coincide with getting more prime-age female co-residents. In the case of females (column 2) there also seems to be an increase in co-resident young girls. A simple explanation for this is that these could have migrated in, in order for "granny" to take care of them, as suggested by Ardington *et al* (2009). Interestingly there is also evidence that slightly older boys seem to migrate in to male pensioner households. This type of gender asymmetry is not unique (Thomas 1994).

Table 7.3 Minutes spent on media use and sleep

	2000					2010				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	All	women	women 25–50	men	men 25–50	All	women	women 25–50	men	men 25–50
Mass media use										
pensioner	1.959	−1.152		27.42		0.222	3.333		−2.549	
	[14.51]	[19.57]		[31.60]		[8.010]	[9.942]		[12.90]	
lives with pensioner	4.184	4.473	5.026	4.646	8.505	10.26**	2.159	−1.415	17.62**	13.48+
	[8.003]	[9.526]	[12.09]	[14.08]	[19.63]	[3.945]	[4.673]	[5.426]	[6.370]	[7.838]
R-squared	0.127	0.142	0.154	0.119	0.107	0.084	0.089	0.079	0.079	0.067
TV										
pensioner	−2.150	−12.71		32.82		5.549	9.441		1.012	
	[12.78]	[15.72]		[24.38]		[7.502]	[9.378]		[11.89]	
lives with pensioner	1.912	2.564	4.084	1.922	6.307	5.054	−0.883	−2.049	10.06+	7.681
	[6.560]	[7.801]	[9.378]	[11.60]	[15.99]	[3.680]	[4.515]	[5.141]	[5.774]	[7.204]
R-squared	0.148	0.178	0.189	0.138	0.136	0.085	0.099	0.087	0.076	0.064
Sleep										
pensioner	5.450	34.95		−36.91		10.24	4.900		19.97	
	[22.83]	[25.11]		[46.86]		[7.979]	[10.13]		[12.64]	
lives with pensioner	7.156	2.126	16.18	9.111	3.185	16.42**	9.292*	7.010	23.67**	17.27*
	[8.508]	[10.93]	[12.22]	[12.95]	[15.43]	[3.731]	[4.395]	[5.142]	[6.246]	[7.179]
R-squared	0.164	0.164	0.109	0.196	0.146	0.118	0.114	0.057	0.140	0.093
Observations	3,829	2,245	1,679	1,584	1,245	12,278	7,488	4,929	4,790	3,386

** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

All regressions include a quartic in age, controls for education, marital status, household size, province, stratum and day of week. The 2000 regressions also control for season (tranche). The regression is estimated over the working week and excludes one person households. Regressions are weighted with the person weights released by Statistics South Africa and the standard errors are corrected for clustering.

7.6 Discussion

The results are broadly in keeping with what a Beckerian time-allocation story might predict. The need to devote time to wage work is reduced and the time freed up can be allocated to activities that provide utility. Nevertheless the results have to be interpreted with some caution, given the suggestions in the literature and the evidence in Table 7.4 that households change in response to the receipt of the pension. It is possible, for instance, that the receipt of the pension is associated with the arrival of unemployed individuals looking for support (Klasen and Woolard 2009). To rule out such explanations we would need to look at time allocation with panel data. Unfortunately the only time use information available is in the cross-sectional studies we have used in this chapter.

We also need to note that the pension is fully anticipated. Provided that households are not liquidity constrained or highly risk averse, they can smooth their consumption and time allocations, prior to the receipt of the pension. The time allocation patterns shown in Figure 7.1 suggest that there is indeed some pre-pension adjustment occurring.

It is also possible that employers might have a compulsory retirement age. This would confound our analysis, since the shift in time allocation would be enforced by the employer and not reflect a choice of the household. Nevertheless we saw in Figure 7.1 that there is little evidence that the retirement age is a binding constraint. If anything, there is evidence of sharp discontinuities in the

Table 7.4 Household changes associated with becoming pension eligible

	(1)		(2)		(3)	
	All		Females		Males	
	Pensioner		pensioner		pensioner	
Female 0–5	0.014	[0.011]	0.032	[0.014]*	−0.006	[0.022]
Male 0–5	−0.007	[0.011]	−0.01	[0.016]	−0.005	[0.019]
Female 6–15	−0.006	[0.017]	−0.001	[0.024]	0.026	[0.029]
Male 6–15	0.007	[0.017]	0.007	[0.024]	0.063	[0.029]*
Female 16–24	0.032	[0.016]+	0.003	[0.019]	0.04	[0.038]
Male 16–24	−0.018	[0.017]	−0.019	[0.022]	−0.015	[0.034]
Female 25–50	0.1	[0.020]**	0.015	[0.019]	0.055	[0.048]
Male 25–50	−0.02	[0.021]	0.06	[0.028]*	−0.044	[0.030]

Notes: Each row represents three separate regressions:

(1) All Africans 25 years and older (2) African women 25 years and older (3) African men 25 years and older

Each regression also contains province, stratum and season dummies, a quartic in age, and household size, as well as an indicator whether the person lives with a pensioner.

Robust standard errors in brackets + significant at 10%; * significant at 5%; ** significant at 1%

Standard errors corrected for clustering. Results weighted with Stats SA household weights.

willingness to take up an "acceptable offer" at the respective pensionable ages (Ranchhod 2006). Moreover, relatively few of the African elderly are employed in formal sector, and the proportion that receive any form of employer related pension is tiny (see Ranchhod (2006)).

7.7 Conclusion

We began this research by asking what income effects the cash transfer that the OAP involves has on the time allocation of adult household members. Using the nationally representative time use data from South Africa, and the pension rules for identification, we observed a number of shifts in the time allocation of prime aged residents.

What have we learnt? We observe large decreases in time worked for both genders amongst prime aged adults. Our descriptive results also indicated that prime aged adults smooth their transition out of the labor force in anticipation of the pension.

Prime aged females spend less time on child care when they live with a pensioner, but there is little support for the idea that the "granny" takes up the slack. This is despite the fact that we have also shown (in Table 7.4) that there seems to be an increase in the presence of young girls in these households. Such intra- and inter-household adjustments make it difficult to think of pension receipts as exogenous treatments.

The time saved on work activities seems to be spent a little on household maintenance (among women) and primary production (men), but mainly on sleep and recreation.

From a policy perspective, this implies that the OAP impacts on the household and its members in multiple ways. Adult non-recipients also benefit from the pension, allowing them to work less, both in informal service work and in the market, and enjoy more sleep and leisure. While this may or may not be desirable depending on the social welfare function, it is clear that such cash transfers impact on the household not only financially, but also in terms of its allocation of time. Policy evaluations that ignore such time allocation considerations within households are likely to draw erroneous conclusions.

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8

Assessing the Impact of Social Grants on Inequality: A South African Case Study

Reinhard Schiel, Murray Leibbrandt and David Lam

8.1 Introduction

The purpose of this chapter is to investigate the role of social grants in reducing income inequality during the first 15 years of democracy in South Africa. Since the transition to democracy in 1994, the South African government has dramatically expanded this system of social grants. Building on an existing but racially biased social security system developed by the apartheid government, the social grant system was expanded to include all races and then, through the 1990s, additional social transfers were instituted.

The reform of the social safety net coupled with increases in per capita household income associated with modest economic growth has reduced poverty levels in the country. However, the very high levels of inequality that were bequeathed as a legacy of apartheid have remained stubbornly high and static income source decomposition work in South Africa suggests that these grants do not and have not reduced inequality. Given the magnitude and apparently effective targeting of these social grants, this seems incongruous and has to raise the question of whether this result may be more a consequence of the technique rather than the actual operation of the grant system itself. The chapter uses the South African situation over the post-apartheid period for a side-by-side assessment of a variety of income source decomposition techniques. It interrogates what insights can be gleaned from each technique about the impact of the extensive and growing social grant system on inequality over this recent period.

Section 8.2 outlines the relevant survey data employed. Drawing on the rich datasets from 1993 and 2008, a detailed picture is obtained of household income sources and their changes over time. We begin in section 8.3 by applying a static, within period decomposition of per capita household income for both periods. This replicates the established result that social grants seem to have a limited impact on the distribution of income. This discussion is followed in section 8.4 by the application of a dynamic income decomposition technique, which

directly captures the effect of *changes* in the composition of income sources on changes in inequality. With the decomposition framed in this way, we find that changes to some of the social grants do indeed appear to have reduced inequality but others do not. In section 8.5 we apply a dynamic decomposition to simulate the role of different income components in the changing real income distribution. Again we find that changes to some of the social grants appear to have reduced inequality but others do not. These dynamic simulations allow us to disentangle the effect of changes in household composition on inequality from the impacts of social grants on inequality. However, changes in household composition are shown to notably lower the direct impact of the social grants on inequality.

In the concluding section (8.6) we look across these techniques. It seems that the large State Old Age Pension scheme, which has played a large poverty reduction role, has not had an equalizing effect on income inequality. On the other hand a large new program of social grants directed at caregivers of poor children has had an equalizing effect.

8.2 Data

To sufficiently assess the impact of government transfers on welfare measures of inequality and poverty adequate data containing comprehensive income measures for all components and for both periods are crucial. For the apartheid period the choice is limited to the Project for Statistic on Living Standards and Development (PSLSD) dataset conducted by South Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town. The PSLSD, was conducted in 1993 in an attempt to overcome the lack of national data collected by the apartheid government as, no nationally representative dataset including all races existed (Wilson, 1995, PSLSD 1994). A complex survey design was implemented with sampling executed as a two stage self-weighting approach with Census Sub Enumeration Districts and household as first and second stage units respectively, which can be weighted to be national representative. In contrast the post-apartheid period contains plethora of potential datasets thanks to the data gathering efforts of the strong national statistical office, Statistics South Africa, as well as various academic and private research units. The National Income Dynamics Study (NIDS) is the preferred dataset of choice as it is conducted in a similar fashion to the PSLSD. A two stage clustering design was implemented in 2008 by first selecting on enumeration level before randomly selecting households within the selected Enumeration Areas (EA) (Leibbrandt et al., 2009). By taking into account the complex survey designs, nationally representative statistics can be obtained.

Household income can be desegregated into various components such as labour, interest, remittances, agricultural income, State Old Age Pension, child support and other government transfer income. As the focus of this investigation is primarily concerned with the effects of social assistance from government on income inequality, we place income into four components, labour, State Old Age Pension, other government transfers and other income. Labour income is selected as a separate category due to its dominant share of total income and its effects on inequality as reported by various previous studies (see Leibbrandt et al. 1996). It includes all labour market income earned by members of a particular household. Income obtained through the provision of the State Old Age Pension is categorized as pension income. Other government transfer income includes grants such as disability grants, foster care grants, poor relief (in 1993) unemployment insurance and child support. It should be noted that despite its prominence in 2008, the child support grant (CSG) was only introduced in 1998 and, by 2007, reached more than 8 million beneficiaries, making the CSG the largest social assistance program in terms of the number of beneficiaries reached (UNICEF, 2008). Despite the CSG's prominence it cannot be included as a separate income component as, in 1993, the CSG was not in place and the mean of the CSG will be zero resulting in any welfare indicator's calculation based on the mean intractable. Consequently the CSG is pooled together with other government transfers excluding the State Old Age Pension into the other government transfer category. The share of income from other government transfers excluding the CSG remained fairly stable during the period reporting 0.0306 in 1993 and 0.0331 in 2008. In 2008 the CSG comprised two-thirds (66.40%) of other government income and thus any change attributed to the other government transfer component is mainly driven by the introduction and coverage of the CSG. Income not classified into any of these three categories is aggregated into the other income category.

Figure 8.1 charts the densities of log of total household income per capita with and without government transfers in both 1993 and 2008. The graphs capture the essence of the impact of increased targeting and additional grants on the income distribution in South Africa. In the apartheid period, the addition of government transfers on the income distribution is significant but small. The density of total household income without government transfers lies close to the total household income with government transfers densities. In contrast the post-apartheid period density indicates the effect of government transfers on the income distribution with various discrepancies particularly in mean and the bulge in the left tail. The left most corner of the density indicates the effect of government transfer on poverty with the density of household income including transfer lying to the right of the density, excluding transfers suggesting that the lowest ranked household according to household income with transfers is better off than the lowest ranked household according to household income without

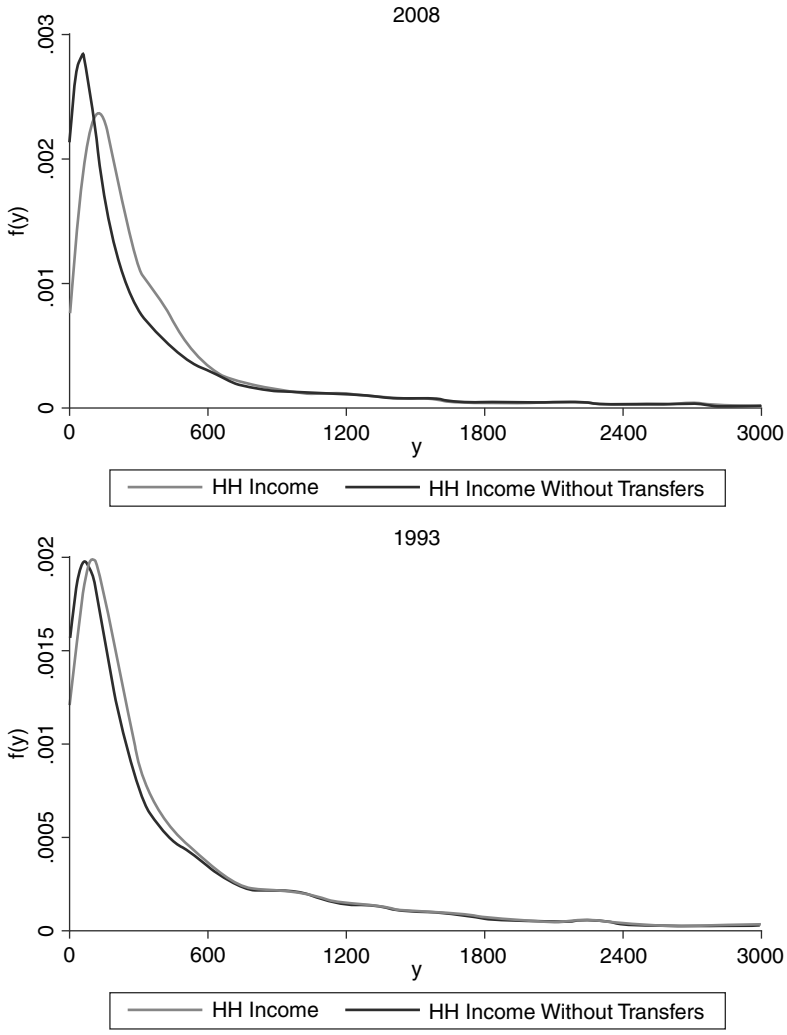

Figure 8.1 Density of household per capita income
Source: NIDS and PSLSD data weighted.

transfers. The contribution of the State Old Age Pension has remained fairly constant over time and therefore the majority of the expansion of the social system is due to the introduction of the CSG.[1]

[1] There is an historical review of these grants in Woolard and Leibbrandt (2010) the evolution and impact of unconditional cash transfers.

Table 8.1 The components of household income for 1993 and 2008

	1993	2008
Household Income per Capita		
Mean	329.271	442.052
SD	4.383	10.889
Share	1	1
Correlation with Total Income	1	1
Proportion of HH with Component	1	1
Gini coefficient	.666	.671
Household Labour Income per Capita		
Mean	195.065	285.648
SD	2.082	7.867
Share	.592	.6146
Correlation with Total Income	.581	.906
Proportion of HH with Component	.605	.707
Gini coefficient	.767	.794
State Old Age Pension Income per Capita		
Mean	17.218	13.114
SD	.18	.232
Share	.052	.030
Correlation with Total Income	−.051	−.023
Proportion of HH with Component	.241	.202
Gini coefficient	.807	.816
Other Government Transfer Income per Capita		
Mean	3.543	28.71
SD	.091	.309
Share	.011	.065
Correlation with Total Income	−.015	−.128
Proportion of HH with Component	.056	.552
Gini coefficient	.955	.601
Other Income Per Capita		
Mean	113.445	114.581
SD	3.654	4.752
Share	.345	.259
Correlation with Total Income	.871	.721
Proportion of HH with Component	.888	.900
Gini coefficient	.83	.794
$N_{unweighted}$	39067	28212
$N_{weighted}$	42 781 962	49 493 702

Source: Authors' calculations using NIDS and PSLSD weighted.

To assess the change in each chosen component between the periods our attention is directed to Table 8.1 which provides the initial descriptive statistics for total household income per capita and, separately, for all four components of per capita income.[2] We present the share of the component in total income, the correlation of each component with total income and two inequality measures for that component. For the total household income, the mean income across the period 1993 and 2008 has increased from 329.7 to 442.1 coupled with an increase in the standard deviation implying a leftward shift in the income distribution between the period accompanied by stretching of the distribution. Income inequality has remained stubbornly high with slight increases as captured by the Gini coefficient from 0.666 to 0.671.

Labour income comprises the largest share of household income in both periods at a share of 59.2% in 1993 increasing to 61.5% in 2008, and consequently reports a high correlation with household income of 0.581 in 1993 increasing to 0.906 in 2008. Inequality in labour income is rife obtaining a Gini coefficient for the labour component of 0.767 in 1993 and increasing to 0.794. Considering the large share of labour income in total income, the dramatic increase in inequality within the labour income component alludes to the driver of changes in aggregate income inequality. Over the period pension income decreased slightly from an average of R17.20 per capita per month in 1993 to R13.10 in 2008 coupled with a decrease in the share of total income from 0.052 to 0.030.

Other government income has increased from R3.50 per capita per month to R28.71 over the period accompanied by a dramatic increase in the share of total household income from 0.011 to 0.065 most likely attributed to the introduction of CSG. The role of the CSG is apparent from the share of households with income from other government sources increasing from 0.056 in 1993 to 0.552 in 2008. The pension and other government transfer components are the only components reporting negative correlation coefficients across both periods indicative of the progressive nature of government social assistance. The other income component comprises 34.5% of income in 1993 decreasing to 25.9% in 2008. A positive and large correlation coefficient of the other income component in both periods is obtained.

Changing household sizes are important to changing per capita incomes. Also, government transfers are granted to particular individuals in households such as the elderly or the primary care giver of a child. Thus changes to these demographic variables are a potentially important part of changing contributions from each income source to household income and household income inequality.

[2] From this point on, for ease of exposition we speak of incomes even though all incomes in this paper are per capita incomes. All results are calculated attributing the relevant per capita household income to each member of that household and to weight up to national population totals using individual design weights.

Table 8.2 Household composition in 1993 and 2008

	1993	2008
Household Size	4.387	3.572
	(2.936)	(2.523)
Number of Adults in HH	2.718	2.346
	(1.645)	(1.438)
Number of Employed in HH	.368	.251
	(.352)	(.347)
Adults Share of HH	.717	.755
	(.255)	(.248)
Employed as Share of Adults	.478	.309
	(.385)	(.387)

Notes: Standard errors in parentheses.
Source: Authors' calculations using NIDS and PSLSD weighted.

Descriptive statistics for household composition in each period are provided in Table 8.2. Across the period household size decreased from 4.38 to 3.57 with a corresponding change in number of adults in a household from 2.7 to 2.1. However, the number of employed adults in a household has decreased with the average share of employed adults decreasing from 0.37 to 0.25.

Thus, as described, both the 1993 and 2008 data sets allow for a disaggregation of total household income into a consistently defined set of income components including the State Old Age Pension and other social grants. This allows for the investigation of the impact of social grants on income inequality. The rest of this chapter proceeds to interrogate this question making use of a series of income source decompositions. Our particular focus is on what each of these different decompositions tells us about this relationship and how it changes over time.

8.3 Static income inequality decompositions by source

Building on the Shorrocks' (1982) source contribution decomposition, a Gini coefficient decomposition by source was derived by Lerman and Yitzhaki (1985) and Stark et al. (1986). This provides a static decomposition within period with inter-temporal comparison achieved only by contrasting the results from 1993 to 2008. The effect of a change in an income source on the Gini coefficient within period can be obtained by taking the derivative of the Lerman and Yitzhak approach as derived by Stark et al. (1986). The first application of this income decomposition technique on South African data was conducted by Leibbrandt et al. (1996).

A condensed overview of the derivation of the Lerman and Yitzhaki decomposition and the extension by Stark et al. (1986) is provided in order to ground the interpretation of the decomposition for both 1993 and 2008.

In a sample of n households deriving income from K distinct sources or components, let y_i represent the total income of household i where $i = 1, 2, .., n$. Thus $y_i = \sum_{k=1}^{K} y_{ik}$ where y_{ik} denotes the income of household i from source k, where $k = 1, 2, .., K$. $y_i^{pc} = \frac{1}{n} \sum_{k=1}^{K} y_k$ provides the per capita household income where n is the number of household members. The distribution of income component k is given by $Y_k = (y_{1k}, y_{2k}, .., y_{Nk})$ and similarly the distribution for the total household income per capita is given by $Y = (y_1^{pc}, y_2^{pc}, .., y_N^{pc})$. Let the Gini's mean difference[3] (A) be defined as:

$$A = \int_a^b F(Y)[1 - F(Y)]\, dy \tag{1}$$

as per Lerman and Yitzhaki (1985), where a represents the lowest income and b the highest income in the population. Using integration by parts it follows that:

$$A = \int_a^b Y \left[F(Y) - \frac{1}{2} \right] f(Y)\, dy$$

As F is uniformly distributed with mean $\frac{1}{2}$ we obtain

$$A = 2cov[Y, F(Y)] \tag{2}$$

As $y_i = \sum_{k=1}^{K} y_{ik}$, equation 2 can be rewritten as:

$$A = 2 \sum_{k=1}^{K} cov[y_k, F(Y)] \tag{3}$$

The $cov(y_k, F)$ is the covariance of income component K with the cumulative distribution of income. Dividing (3) by the mean of y the Gini coefficient is obtained:

$$G = \frac{2}{\mu} \sum_{k=1}^{K} cov[Y_k, F(Y)]$$

By multiplying and dividing each component k by $cov(y_k, F_k)$ and by μ_k as per Lerman and Yitzhaki (1985) and denoting $F(Y_k)$ as the cumulative rank distribution of income source k, yields the decomposition by source:

$$G = \sum_{k=1}^{K} \left(\frac{cov[Y_k, F(Y)]}{cov[Y_k, F(Y_k)]} \right) \left(\frac{2}{\mu_k} cov[Y_k, F(Y_k)] \right) \left(\frac{\mu_k}{\mu} \right)$$

Which yields:

$$G = \sum_{k=1}^{K} R_k G_k S_k \tag{4}$$

[3] The Gini mean difference, also know as the mean difference, is the absolute difference between independent points drawn from a probability distribution.

where S_k is the share of component k of total income ($S_k = \frac{\mu_k}{\mu}$), G_k is the Gini of component k and thus captures inequality within income component k, R_k is the Gini correlation between income component k and total income, similar to the Pearson's correlation, and defined as:

$$R_k = \frac{cov[Y_k, F(Y)]}{cov[Y_k, F(Y_k)]}$$

R_k will thus be positive when an income component is an increasing function of total income and negative when an income component is a decreasing function of total income and thus lowers the overall Gini coefficient for total income. Thus the effect of income component k on total income inequality is decomposed into the share of the component in total income, the inequality in the component and a measure for the correlation between the component and total income.

The effect of a change in an income source on the Gini coefficient using the Lerman and Yitzhaki approach was developed by Stark et al. (1986).

Let φ represent a percentage change in income source k such that $y_k(\varphi) = (1+\varphi)y_k$. Then:

$$\frac{\partial G}{\partial \varphi} = S_k(R_k G_k - G)$$

Dividing by G:

$$\frac{\partial G/\partial \varphi}{G} = \frac{R_k G_k S_k}{G} - S_k$$

The percentage change in inequality due to a change in component k is equal to the initial share of component k in inequality less the share of component k in total income (Stark et al., 1986). As a result if component k has a negative or zero Gini correlation, R_k, a positive change in component k will have an equalizing effect on inequality. However, if $G_k > G$ and R_k is positive then $R_k G_k - G$ is negative resulting in an increase in inequality associated with component k. This is due to $R_k \leq 1$ (Stark et al., 1986).

The major disadvantage of this approach is its one dimensionality as it provides a snapshot of drivers of income inequality in a particular period and so is limited in assessing how changes in the components of income have resulted in an aggregate change in equality.

Table 8.3 provides the results for the Lerman and Yitzhaki decompositions in 1993 and 2008. As per equation 4 above, the contribution of each income component to the aggregate Gini coefficient is the product of (a) the share of that component in total income, (b) the inequality in its distribution and (c) the correlation with the distribution of total income. Before we analyse social grants in detail it is worth noting that the main driver of income inequality in both periods is labour income. In 1993 labour income contributed 64% of total income

inequality increasing to 73% in 2008. Income from other sources also contributed substantially to total income inequality at 35% and 26% respectively, for 1993 and 2008. Within each period both labour income and income from other sources have strong disequalizing effects.

With regard to social grants, the decompositions suggest that these grants have either a negligible effect or small equalizing effect on total income inequality. In 1993 the pension reports a relative contribution of −0.001 increasing slightly to 0.002 in 2008. Other government transfers report a small negligible effect of −0.0001 in 1993 becoming more equalizing in 2008, reporting a relative contribution of −0.001. Despite the large inequality within the distribution of the government transfer components which should favour the less fortunate, the small share of total income of these sources results in a small effect on total income inequality. Government transfers appear to reverse some of the disequalizing effects of labour income. However, their impact is quite small.

The small shares of government income characterizing the 1993 period are attributed to the modest social assistance system present in South Africa at the time. In 2008 the State Old Age Pension reports a smaller share of total income (0.052). However, the expansion of the social assistance mainly through the CSG is captured by the increase of the share of other government income's share in total income increasing to 0.065. The importance of income from government assistance with respect to total income has increased between the periods due to an increase in other government transfer income while the significance of labour income has also increased between the periods.

With regard to the Gini coefficient of each source (G_k), both forms of government assistance report high levels of inequality in both periods. The State Old Age Pension reports a Gini coefficient of 0.8 in 1993 and 0.81 in 2008. Other government income reports a Gini coefficient of 0.955 in 1993 decreasing dramatically to 0.601 in 2008. The high inequality in the distribution of government grants is understandable, as many individuals do not receive government assistance, reporting zero income from such sources resulting in an unequal distribution of the component. In line with this, it is most likely the expansion of the social assistance system through the CSG that brought down the Gini coefficient for this component.

Then, with regard to the correlation of grant income to the distribution of total income (R_k), Table 8.3 reports that these correlations are low or negative for income from social grants. The Old Age Pension reports a correlation of −0.008 in 1993 and 0.06 in 2008, while other government income reports a correlation in −0.09 and −0.014 in 2008 respectively. As grant income is means-tested and supposed to target the poor, the negative coefficient is a good thing. A priori we would expect these income sources to be strongly negative. We do not find this strong negative relationship.

Table 8.3 Static decomposition of the Gini index by income sources for 1993 and 2008

Source	Income Share (S_k)	Gini Correlation (R_k)	Gini Index (G_k)	Absolute Contribution ($S_k.R_k.G_k$)	Relative Contribution ($\frac{S_k.R_k.G_k}{G}$)	Change $\frac{\partial G/\partial \varphi}{G}$
			1993			
Labour	0.592	0.939	0.767	0.427	0.641	0.049
	(0.007)	(0.001)	(0.002)	(0.005)	(0.011)	
Old Age Pension	0.052	−0.008	0.807	−0.001	−0.001	−0.052
	(0.001)	(0.007)	(0.002)	(0.001)	(0.001)	
Other Gov Transfer	0.011	−0.091	0.955	−0.001	−0.001	−0.009
	(0.000)	(0.014)	(0.001)	(0.000)	(0.000)	
Other Income	0.345	0.832	0.830	0.238	0.357	0.012
	(0.007)	(0.007)	(0.005)	(0.008)	(0.011)	
Total	1.000	–	–	0.667	1.000	
	0.000	–	–	(0.004)	0.000	
			2008			
Labour	0.646	0.956	0.794	0.491	0.731	0.085
	(0.007)	(0.002)	(0.004)	(0.007)	(0.010)	
Old Age Pension	0.030	0.066	0.816	0.002	0.002	−0.027
	(0.001)	(0.015)	(0.004)	(0.000)	(0.001)	
Other Gov Transfer	0.065	−0.014	0.601	−0.001	−0.001	−0.066
	(0.002)	(0.011)	(0.004)	(0.001)	(0.001)	
Other Income	0.259	0.871	0.794	0.179	0.267	0.007
	(0.007)	(0.007)	(0.006)	(0.007)	(0.010)	
Total	1.000	–	–	0.671	1.000	
	0.000	–	–	(0.011)	0.000	

Notes: Standard errors in parentheses.
Source: Authors' calculations using NIDS and PSLSD weighted.

Applying the Stark et al. (1986) extension, the impact of a 1% increase in an income component on total income inequality can be assessed. In both 1993 and 2008 small increases in social assistance lead to decreases in income inequality as measured by the Gini coefficient. Both the pension and other government income have such negative results for a 1% increase in the particular component for 1993 and 2008. In 1993 a 1% increase in the pension would lead to a −0.052 decrease in income inequality as measured by the Gini with a corresponding −0.027 decrease in 2008 while, other government transfer income has values of −0.009 and −0.066 in 1993 and 2008 respectively. These findings are driven by the negative correlation (R_k) coefficient obtained for these income sources.

Thus, this marginal change analysis does reveal a stronger redistributive impact of the social grants than the static decompositions. However, a note of caution about this approach is in order. This analysis hinges on the assumption that all other components remain unchanged. The validity of this assumption is questionable as an increase in labour income might disqualify an individual from obtaining means tested government assistance.

The most important limitation of this static decomposition is that it does not directly explore the impact of actual changes in state transfers on actual changes in inequality. This makes the analysis usefully suggestive but not more than this. We now go on to look at some more recent decomposition approaches that focus directly on the changes in inequality that result from changes in income sources including social grants.

8.4 Dynamic decompositions

The Lerman and Yitzhaki (1985) decompositions fall short of providing insights into changes in welfare indicators over time due to changes in an income component. The expansion of the South African government social assistance system from 1993 to 2008 resulted in changes in sources. In order to capture the impact of the extension of the social assistance on inequality a different approach is required. Wan (2001) derives a framework that decomposes the change in the Gini coefficient by income components allowing for dynamic changes to be assessed.

Following Wan (2001) let the discrete Gini be denoted as G_d, and given by the decomposition:

$$G_d = PQI \tag{5}$$

where P is a $1 \times N$ row vector of shares of income receiving units, I is a $N \times 1$ column vector of income shares and Q is a $N \times N$ matrix with zero on the diagonal, $+1$ in the upper triangular region ($i < j$) and -1 on the lower triangular region ($j > i$) as per Silber (1989). The decomposition in equation 5 can be

applied to component $k's$ Gini coefficient, G_k, as follows:

$$G_k = P_k Q I_k$$

where P_k is a $1 \times N$ row vector of shares of y_k receiving units and I_k is a $N \times 1$ column vector of k^{th} income shares. Rankings within P_k and I_k are determined by ascending values of y_k. The concentration index C_k of component k, can be similarly obtained and given by:

$$C_k = P_k^* Q I_k^*$$

where P_k^* and I_k^* is defined in a similar fashion as P_k and I_k except that rankings within P_k^* and I_k^* are determined by household per capita income as opposed to y_k. The relation between C_k and G_d is given by:

$$G_d = \sum_{k=1}^{K} \left(\frac{\mu_k}{\mu} \right) C_k$$

where μ_k is the mean of component k and μ is the mean of total household per capita income, and thus the Gini can be interpreted as the weighted concentration index of each components with the share of each component acting as weights. For simplicity let $S_k = \frac{\mu_k}{\mu}$ and thus:

$$G_d = \sum_{k=1}^{K} S_k C_k \tag{6}$$

Using subscripts t and $t+1$ to indicate the two time periods, the change in G_d can be obtained from equation 6:

$$G_{d,t+1} - G_{d,t+1} = \sum_{k=1}^{K} (S_{k,t+1} C_{k,t+1} - S_{k,t} C_{k,t})$$

Allowing delta, Δ, to specify the difference between two periods we obtain:

$$\Delta G = \sum_{k=1}^{K} (\Delta S_k + S_{k,t})(\Delta C_k + C_{k,t}) - S_{k,t} C_{k,t}$$

Which can be rewritten as:

$$\Delta G = \sum_{k=1}^{K} \Delta S_k C_{k,t} + \sum_{k=1}^{K} \Delta C_k, S_{k,t} + \sum_{k=1}^{K} \Delta C_k \Delta S_k \tag{7}$$

Equation 7 decomposes changes in the Gini into three unique terms: changes in income shares, $\Delta S_k C_{k,t}$, changes in concentration index, $\Delta C_k, S_{k,t}$ and the interaction of these two effects, $\Delta C_k \Delta S_k$ labeled as the Structural Effect, Real Inequality Effect and Interactive Effect respectively (Wan, 2001).

Table 8.4 Wan's dynamic decomposition of the Gini index by income sources

	Structural Effect	Real Inequality Effect	Interactive Effect	Full Contribution
Labour	.024	.138	−.011	.152
Old Age Pension	−0.001	−.016	.005	−.011
Other Gov Transfer	−.016	−.003	−.023	−.043
Other	.075	.159	−.046	.189

Source: Authors' calculations using NIDS and PSLSD weighted.

Table 8.4 provides the results of the Wan (2001) dynamic decomposition approach of income components for the Gini coefficient for the period spanning 1993 to 2008. The table presents the structural effects due to changes in income shares ($\Delta S_k C_{k,t}$), the real inequality effects due to changes in income concentration indices ($\Delta C_k, S_{k,t}$) and the interaction effects ($\Delta C_k \Delta S_k$) as outlined in equation 7.

The structural effects are driven by the change of a component's share of total income(ΔS_k) and the baseline inequality within the income component captured by the concentration index of the component in question (C_k) in the initial period. Over the period pension and other government transfers have had an equalizing structural effect. However, these effects are small at −0.001 and −0.016 respectively. The structural effects are dominated by labour and other income effects both in magnitude and signs. Both of these sources are found to have disequalising structural effects while the income from both government transfers have equalizing structural effects. Over the period 1993 to 2008 the change in labour income has lead to a disequalizing (positive) structural effect of 0.024 while income from other sources has had a similar disequalizing structural effect of 0.075. As previously mentioned, Table 8.1 provides the shares and Gini coefficients of the various components. Both labour income and income from other sources report high levels of within source inequality. Unlike labour income whose share of total income has increased during the period, the share of income from other sources has decreased during the period.

The real income inequality effect, which is driven by changes in within-component inequality and the share of the component of total income, indicate similar trends to the structural effects. Labour income and income from other sources are found to be disequalizing while the pensions and other government transfers are found to be equalizing. Pensions and other government income report equalizing effects of −0.016 and −0.003 respectively. However, similar to the structural effects, the real inequality effects are overwhelmed both in magnitude and sign by income from other sources and labour income. On the other hand changes in the labour income component across the period lead to a real

income inequality effect of 0.138 while other income reported a real income inequality effect of 0.159.

Finally the interaction of the two effects indicates equalizing effects for labour income, other government transfers and other income. Interestingly the interaction of pension income indicates a small disequalizing effect on total income during the period.

The full contribution of changes in an income component during the period is obtained by summing the above mentioned effects. Importantly, changes in both pension income and income from other government transfers during the period are shown to have had equalizing effects on total income of −0.011 and −0.043 respectively. The equalizing effect obtained from changes in social assistance during the period is undone by the large disequalizing effect from changes in labour income and income from other sources. The change in labour income during the period has had a disequalizing effect on total income inequality of 0.152. Similarly changes in income from other sources have also had a disequalizing effect on total income of 0.189.

The application of the Wan (2001) approach has allowed us to assess the effects of changes of income components across the period on changes in total income inequality. Labour income and income from other sources dominate the aggregate effect. Their disequalizing effects result in an increase in overall income inequality. The changes in social grants are found to have equalizing effects on total income. Also the decomposition adds some relevant detail in showing that both the increasing shares of income from social grants and their narrowing inequality were responsible for their equalizing contributions. However,, this is not as clean as one would like it to be as the interaction term involves some element of both.

Thus, at the end of the day, while the aggregate impacts of each source is useful, we are left with the problem of disentangling the impact of the important components of the changes in social grant income within a dynamic decomposition. Besides the changing shares of grants and the intra-component inequality there are two other important components. The first is the change in the targeting of grants. The static decomposition highlighted the importance of the correlation between grant income and total income as a signal for whether grants are effectively targeted at the bottom of the distribution. Grants can become more equalizing if they become more tightly targeted at the bottom of the distribution. Second, as we are measuring the inequality of per capita incomes, changes in inequality could be due to changes in household size and composition. This possibility is important in its own right. In the context of this chapter, it is especially important to net out these demographic effects from the effects of the income components. Up to this point, the techniques have not allowed for this possibility, thereby implicitly attributing these demographic effects to the

income sources. In the next section we introduce more recent simulation-based work that shows some promise in terms of unravelling these components.

8.5 Dynamic decompositions using simulations

Despite the dynamic nature of the Wan (2001) approach, which decomposes the changes in the Gini coefficient during the period by accounting for the changes in the various income sources, it does not isolate the impact of a change in an income source on inequality. In an ideal situation, the impact of the extension of the social grant system in South Africa between 1993 and 2008 would be assessed against a counterfactual of an unchanged 1993 system operating in 2008. A novel approach by Barros et al. (2006) investigates the determinants of inequality across a period based on a series of counterfactual simulations in an attempt to quantify the contribution of changes in demographics, social assistance and labour income.

In order to assess the drivers affecting the change in wellbeing as measured by inequality, we follow the approach outlined by Barros et al. (2006), Azevedo et al. (2013a) and Azevedo et al. (2013b). Following the notation from the previous sections, $y_i = \sum_{k=1}^{K} y_{ik}$ and $y_i^{pc} = \frac{1}{n}\sum_{k=1}^{K} y_{ik}$ which can be rewritten as:

$$y^{pc} = \sum_{k=1}^{K} y_{ik}^{pc} \tag{8}$$

where y_{ik}^{pc} is the household per capita income of component k. For simplicity sake we decompose income (y_i) into only two sources and name these sources grants (G) and non-grants (NG) income thus letting $k = G, NG$. Equation 8 can thus be rewritten as

$$y^{pc} = \sum_{i=1}^{n} y_{i,G}^{pc} + \sum_{i=1}^{n} y_{i,NG}^{pc} \tag{9}$$

The cumulative density function of household income per capita, F(.) is thus dependent on the factors outlined in equation 9, namely government income ($y_{i,G}$) and non-government income ($y_{i,NG}$). Let ϑ be any welfare indicator of inequality which is dependent on the distribution of income and thus the factors outlined. ϑ is now given by:

$$\vartheta = \Psi\left(F\left(Y^{pc}\left(\sum_{i=1}^{n} y_{i,G}^{pc}, \sum_{i=1}^{n} y_{i,NG}^{pc}\right)\right)\right) \tag{10}$$

In order to assess the impact of a change in a component (k) of the income distribution F(.), between two periods, on a particular welfare indicator of inequality, a counterfactual income distribution is required for the second period

where the component in question is left unchanged. However, as no such distribution exists, Barros et al. (2006) construct counterfactual distributions for the second period given that the distributions of per capita income are known in both periods. For a change in a particular component, say $y_{i,NG}$, the indicator is calculated for the first and second period based on the income distribution F(.). In addition, the 1993 real values of the component, $y^{pc}_{,NG}$, are substituted into the income distribution of the second period resulting in:

$$\hat{\vartheta} = \Phi\left(F\left(Y^{pc}\left(\sum_{i=1}^{n} y^{pc}_{i,G}, \sum_{i=1}^{n} \hat{y^{pc}}_{i,NG}\right)\right)\right) \tag{11}$$

$\vartheta - \hat{\vartheta}$ simulates the impact of the change in that component on inequality. It is the simulation equivalent of the total effect from Wan's decomposition. However, as y^{pc}_{ik} is the household per capita income of component k, the effect to household compositional changes on welfare indicators has not been explicitly taken into account. One benefit of this simulation approach is that the impact of changes in household composition can be simulated too. To account for this, equation 8 can be written as:

$$y^{pc}_i = \frac{n_a}{n}\left(\frac{1}{n_a}\sum_{k=1}^{K} y_{ik}\right) \tag{12}$$

where n_a is the number of adults in household i. Consequently equation 12 is now defined as:

$$y^{pc}_i = \frac{n_a}{n}\left(\frac{1}{n_a}\sum_{k=1}^{K} y_{i,G} + \frac{1}{n_a}\sum_{k=1}^{K} y_{i,NG}\right)$$

Which can be further extended by letting n_o denote the number of employed adults in household i:

$$y^{pc}_i = \frac{n_a}{n}\left[\frac{n_o}{n_a}\left(\frac{1}{n_o}\sum_{k=1}^{K} y_{i,G}\right) + \frac{1}{n_a}\sum_{k=1}^{K} y_{i,NG}\right] \tag{13}$$

The factors affecting the cumulative density function of household income per capita, F(.), is now government income ($y_{i,G}$) and non-government income ($y_{i,NG}$) as well as the number of adults per household (n_a), number of employed adults per household (n_o), and number of household members (n). ϑ, which is dependent on the distribution of income and thus the factors outlined, is now given by:

$$\vartheta = \Phi\left(F\left(Y^{pc}\left(n, \frac{n_a}{n}, \frac{n_o}{n}, \frac{1}{n_o}\sum_{k=1}^{K} y_{i,G}, \frac{1}{n_a}\sum_{k=1}^{K} y_{i,NG}\right)\right)\right) \tag{14}$$

For a change in a particular component, say $y_{i,NL}$, the indicator is calculated for the first and second period based on the income distribution F(.) resulting in equation 14 being written as:

$$\hat{\vartheta} = \Phi\left(F\left(Y^{pc}\left(n, \frac{n_a}{n}, \frac{n_o}{n}, \frac{1}{n_o}\sum_{k=1}^{K} y_{i,G}, \frac{1}{n_a}\sum_{k=1}^{K} \hat{y}_{i,NG}\right)\right)\right) \tag{15}$$

The contribution of a change in non-grant income of household *i* is given by the difference between the actual observed welfare indicator ϑ in period 2 and the estimated welfare indicator $\hat{\vartheta}$ in period 1 as captured by equations 10 and 11 or equations 14 and 15 depending on the treatment of household compositional factors.

In the absence of panel data, substitution of a particular component between periods becomes complex as the same households are not observed in subsequent periods. Following Azevedo et al. (2013a) a rank-preserving transformation to assign first-period characteristics to the second period is employed by ordering households by per capita household income and dividing the population into quantiles. The mean of each component listed for each quantile can then be substituted by its corresponding quantile in the previous period. Thus, to assess the impact of a change in grant income, households are ranked in both periods according to household income per capita and placed into quantiles. The value of grant income in period 1 is then substituted for the value of grant income in period 2 across corresponding quantiles in order to obtain equation 15. So, for example, by inserting 1993 real values one would be removing the values embodying the roll out and implementation of the CSG from 2008 data. It is the comparison of inequality measured with these simulated data with the actual 2008 inequality that then provides the estimate of the impact that this income source has had on inequality. Households may also be ranked by the components themselves in order to provide insights into the impact that a change in distribution of the particular component has on a welfare indicator. If a component is highly correlated with total household income per capita the rankings of households may not differ when ordered according to the component as opposed to total household income per capita. However, as is likely with the roll out of the CSG, there will be changes to which parts of the distribution are receiving the income from these sources. This re-ordering process enables us to separate out the changes in the real value of the income from this source from changes in targeting of this income within the distribution.

As it is unlikely that only one component has changed between periods, all components should be substituted across periods in a successive manner such that first component 1 is substituted and the indicator calculated, followed by the additional substitution of the second component and so on. However, the

Table 8.5 Dynamic decomposition using simulations

	Gini	% Change
Labour	.011	1.7
Old Age Pension	.026	3.90
Other Gov Transfer	−.044	−6.6
Other	.008	1.2

Notes: Standard errors in parentheses. % change calcuated by source's contribution over the 1993 Gini coefficient.
Source: Authors' calculations using Barros et al. 2006, NIDS and PSLSD weighted.

choice of order of indicators to be substituted impacts the results. Several remedies for this path dependence have been proposed in the micro-decomposition literature (see Essama-Nssah 2012 and Ferreira 2010). Following Azevedo et al. (2013a) the Shapley solution is followed; that is, the effect is calculated across all possible paths. Thus all decomposition paths in every possible order are calculated and the effect per component is averaged across paths.

The implementation of equations 10 and 11, which allows for straightforward application of the Barros et al. (2006) method without explicitly accounting for household compositional factors can be used as a benchmark for additional output. Table 8.5 presents the results of the Barros et al. (2006) approach for the period 1993 to 2008.

Similar to the findings of the Lerman and Yitzhaki (1985) and Wan (2001) approach, labour income is found to have a disequalizing effect. Between the period 1993 to 2008 labour income has resulted in an increase in total income inequality by increasing the Gini coefficient by .011 units (1.7%). Interestingly, income from the State Old Age Pension is shown to have a disequalizing effect resulting in an increasing Gini coefficient of .026 units (3.9%). On the other hand, income from other government transfers has an equalizing effect, decreasing the Gini coefficient by −.044 (−6.6%). The total impact of government transfers on income inequality during the period is thus equalizing as the net effect of the two income components is −0.014 (−2.1%). Similar to Lerman and Yitzhaki (1985) and Wan (2001), income from other sources is found to have a disequalizing effect reporting a positive contribution to increasing the Gini coefficient by .008 units. Despite the equalizing effects of other government transfers and income from other sources the large disequalizing effect of labour income results in a small net increase during the period. At this stage of the application of the Barros et al. (2006) approach it is comparable to the Wan (2001) approach. Both approaches indicate that labour income is disequalizing while transfers from other government income is found to be equalizing. However, where the Wan (2001) approach found the pension to be equalizing and other

income to be disequalizing, the Barros et al. (2006) approach finds the opposite effects for the two components.

The Barros et al. (2006) approach allows us to delve into these aggregate changes and separate out the contribution of demographics. In addition we can re-rank the observations by a component's distribution as opposed to the distribution of total income in order to evaluate the impact of changes in the distribution of each component. For social grants, the re-ranking according to the grants' distribution allows us to gauge the impact of changes in targeting of social grants on total income inequality. Table 8.6 provides the results from implementing all of these changes; in other words, equations 14 and 15.

Early in the paper we presented Table 8.1 to provide key demographic statistics for both 1993 and 2008. To recap, household size decreased slightly from mean size of 4.87 to 3.57. Alarmingly, the number of employed adults in a household decreased from 0.36 in 1993 to 0.25 in 2008. Table 8.6 shows that this change in the number of employed adults has had a disequalizing effect on income inequality contributing to an increase in the Gini of .034 units. Despite the slight decrease in the number of adults in a household the share of adults in a household decreased from 4.4 in 1993 to 3.6 in 2008. As per Table 8.6 this has had a small disequalizing effect on total income inequality of .002. Table 8.5 indicated that the share of employed adults decreased from 0.479 in 1993 to 0.309 in 2008. This had a small disequalizing effect on income inequality as indicated in Table 8.6. Collectively, the impact of these demographic changes on total income inequality has been equalizing; reporting a net effect of -0.011 $(-0.01 - 0.02 + 0.011 + 0.008)$.

Having netted out these demographic effects, we now go back to look at the income components. Once accounting for the changes in demographics, the disequalizing effect of labour income is slightly reduced to only $-.012$ units (1.8%). Incomes from other sources are found to be disequalizing; increasing the Gini by .003 units (0.4%). Interestingly income from the State Old Age Pension remains slightly disequalizing increasing the Gini by .016 units (2.4%).

When conducting the simulations by re-ranking the distribution by their position in the pension distribution the State Old Age Pension is still disequalizing but this effect is greatly reduced. The impact of the change in the State Old Age Pension's distribution on total inequality alludes to the impact that changes in targeting had on total income inequality. The changes in targeting, as captured by changes in the State Old Age Pension's distribution, occurring between 1993 and 2008, have led to an increase in the Gini by .004.

Income from other government transfers had an equalizing effect on total income inequality. Changes in income from other government transfers during the period 1993 to 2008 resulted in a decrease in the Gini of $-.035$ units. The changes in targeting, as expressed by changes in the distribution of income from

Table 8.6 Household compositions and targeting in dynamic decompositions using simulations

	Gini	% Change
Household Composition		
Share of Adults in HH	.002	0.3
Share of Employed of Adults	−.023	−03.4
One over employed	.034	5.10
One over adults	.014	2.10
Labour		
Ranked by Total HH Income	−.012	−1.8
Ranked by Labour Income	−.008	−1.2
Old Age Pension		
Ranked by Total HH Income	.016	2.4
Ranked by Pension Income	.004	0.6
Other Gov Transfer		
Ranked by Total HH Income	−.035	−5.2
Ranked by Other Gov Trans Income	−.027	−4.0
Other		
Ranked by Total HH Income	.003	0.4
Ranked by Other Income	−.015	−2.2

Notes: % change calcuated by source's contribution over the 1993 Gini coefficient. Standard errors in parentheses
Source: Authors' calculations using Barros et al. 2006, NIDS and PSLSD weighted.

other government income, occurring during 1993 and 2008 decreased the Gini by −.027 (−4%). The impact of changes in social grants on inequality during 1993 to 2008 has been equalizing with a negative net effect decreasing the Gini coefficient by −0.019 (−.035 + 0.016) (−2.8%).

The application of the Barros et al. (2006) approach has allowed for a more nuanced approach to evaluating the impact of changes to social grant income on changes to income inequality. In sum, the approach aims to isolate the direct impact of a change in an income source on the total income inequality by providing a simulated counterfactual thus accounting for both the dynamic nature and need for a counterfactual. One of the novelties of Barros et al. (2006) is in its ability to tease out the impact of demographical changes on income inequality. Demographical changes in South Africa, such as the number of adults and employed adults in a household, have had a small disequalizing effect on income inequality in South Africa. Once this effect is netted out, the income component is then ascertained, net of this effect. Similar to Lerman and Yitzhaki (1985) and Wan (2001), labour income is found to have a disequalizing effect on income

inequality while social grants have an equalizing effect. Re-ranking the distributions by income components themselves has indicated the equalizing effect an increase in target of grants has had on income inequality.

8.6 Conclusion

The introduction and expansion of social grants by the democratic government in South Africa has led to a decrease in poverty. However,, until now the effect of this expansion on inequality has remained elusive. Given the positive poverty reduction impact and the fact that the expansion of social grants has been large, there is a prior assumption that these cash transfers have been equalizing. This prior view is strengthened by density plots of total household per capita income with and without social grants that show a substantial income contribution at the bottom of the income distribution.

We have applied a variety of decomposition techniques which assess the contribution to inequality of each component of total per capita income. The development of such techniques has taken into account dynamic changes as well as the need for a suitable counterfactual constructed through simulations. In addition allowance has been made for demographical changes and the ability to analyze changes in the targeting of grants resulting in a rich decomposition of income inequality.

Looking across the results it appears that social assistance awarded to the elderly has had little effect on equality. Changes in the targeting of the state pension have lead to a small disequalizing effect. However, additional social protection programs initiated in the post-apartheid period have had an equalizing effect. Part of this effect is due to the fact that these grants are well targeted. Disentangling the demographic effects lowers the direct impact of social grants and all income sources on inequality.

Social grants have made contributions to reducing South Africa's stubbornly high inequality. However, with income inequality still relatively high a greater effort to reduce inequality is required.

In terms of methodology, advances in decomposition analysis have taken us quite far down the road of answering questions about the effects of the ambitious post-apartheid policy on social grants. We could deduce that, in line with priors, the roll out of these grants has been equalizing. We could go further and net out the impacts of changes in household size and household composition from the impacts of changes to the income sources. Then, within each income source we were able to separately ascertain the portion of the aggregate impact that is due to the changing size of the grant and the targeting of the grant. Through this we learn that even though the child support grant makes a small contribution to total income this contribution has increased substantially

over the post-apartheid period and when this is combined with the fact that it is well targeted at the bottom of the income distribution, leads to a notable impact on reducing inequality. In contrast the very large State Old Age Pension has not had a big impact on reducing inequality. A version of this program was in place at the start of the post-apartheid period. Thus, its changing importance as an income source was unspectacular and, in fact, mildly negative in real terms. Then, the changes in its targeting reveal a slight worsening. Thus, it is assessed as worsening inequality by a small amount.

This is an appropriate concluding point as it draws attention to a remaining limitation in both old and new income source decomposition techniques. Given the striking before and after densities, it is hard to believe that the State Old Age Pension really makes very little difference. However, these techniques are not equipped to handle before and after scenarios. In the static case, the decomposition really examines the impact of the pension in an ex post sense; i.e., only after it has already made many of the poor better off. In the dynamic case, the fact that some version of state pension policy was already in place in the base year is crucial to the analysis of changes. At the same time, if the policy is not there at all, it is impossible to do an analysis of changes. Thus, none of the decompositions are assessments of the before and after comparisons naively pictured in the densities. Moreover, these decompositions need to be imbedded in a good deal of complementary analysis to really add value.

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9

Speculative Capital Flows, Exchange Rate Volatility and Monetary Policy: South African Experience*

Shakill Hassan

9.1 Introduction

The South African currency (the rand) is volatile. The first chart in Figure 9.1 shows the three-month historical volatility (standard deviation, annualized) of the rand per dollar exchange rate since 1993. From the early 2000s, rand volatility consistently exceeds that of the Mexican and South Korean currencies, and moves very closely with that of the Brazilian and Turkish currencies.

One of the immediate determinants of rand exchange-rate movements is the volume of portfolio capital flowing to and from the country. Of particular concern is the increasing volume of portfolio debt inflows – notoriously volatile, primarily driven by global factors (risk and liquidity), and the long-term economic benefits of which, remain elusive.[1]

Debt inflows into relatively high-interest economies (emerging and advanced) are at least partly, and often largely, driven by the currency carry trade – a class of currency speculation strategies designed to profit from a favorable interest-rate differential, when the high-interest currency does not depreciate substantially (as to erode the interest 'carry') relative to the low-interest currency. The evidence

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[1] See Hassan (2013, 2014) on the evolution of bond inflows (non-resident purchases of South African debt).

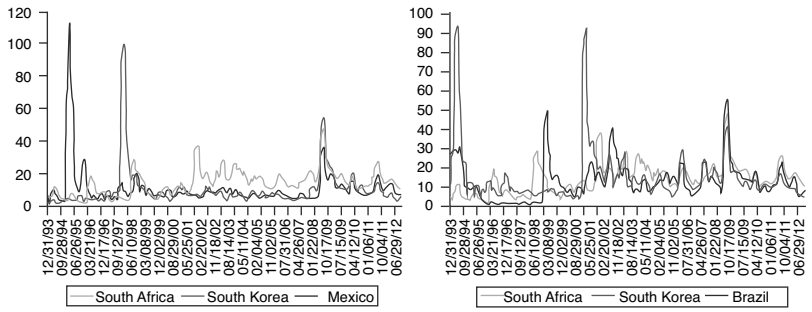

Figure 9.1 Three-month exchange-rate volatility
Source: Bloomberg

is that in the short term and on average, it does not. If it appreciates, as it often does, the speculator gains on both the exchange rate and the yield differential.[2]

Complications

The interaction between currency speculation and monetary policy can be destabilizing and lead to policy ineffectiveness – especially in inflation targeting regimes. In brief, the mechanism is as follows. Debt inflows tend to be expansionary, either by reducing yields, or by fueling credit extension, or both. The expansionary impetus can cause the economy to 'over-heat'. The associated increase in the inflation forecast, if beyond target, requires the central bank to tighten the monetary stance. But increasing the policy rate raises market rates, at least across short and medium term maturities, which increases the yield differential, and attracts further carry inflows, generating a 'vicious cycle'. The erosion in the effectiveness of monetary policy in containing inflation follows from the tension between the (intended) contractionary effect on demand from an increase in the policy rate; and the expansionary effect of more inflows due to the same rate increase.

This feedback loop leads to an accumulation of debt inflows, and exchange rate appreciation. If the currency is misaligned (and overvalued), the central

[2] The profitability of carry trades is evidence that uncovered interest-rate parity does not hold in the short to medium term. The simplest way to implement the carry trade is to borrow in the low-interest currency (the "funding currency"), buy the high-interest currency (the "target currency") in the spot market, deposit the proceeds or buy fixed-income securities denominated in the target currency, and finally convert the terminal payoff back into the funding currency – facing the exchange rate risk. This is the conventional (textbook) understanding of the carry trade. But it can also be implemented through the derivatives market, for example selling the currency forward when it is at a significant forward premium, or using currency options to hedge the exchange rate risk component.

bank may be impelled to intervene in the currency market, to mitigate possible losses in export competitiveness. Sterilized purchases of foreign currency, funded by issuance of domestic currency securities, both raises the appetite (by exerting upward pressure on yields), and feeds (by increasing the supply of bonds) carry traders. Moreover, if the intervention succeeds in halting exchange rate appreciation, the stability of the exchange rate reduces exchange rate risk, and traders may anticipate eventual appreciation once sterilized intervention becomes too costly. Again, the policy response (in the currency market) attracts further inflows.

Capital may move in slowly, due to the opportunity cost of holding 'standby capital', so target currencies appreciate gradually, which attracts momentum trading, in turn fueling further appreciation.[3] The further this process goes, the greater the degree of currency misalignment; and the greater the eventual abrupt fall in the value of the currency, when the carry trade unwinds and capital inflows reverse.[4] The process leads to unstable currency dynamics: the 'up the stairs, down the elevator' pattern in exchange rate behavior.

Note that central to the preceding argument is the effect of debt inflows on credit – the main channel through which inflows cause overheating. In the absence of such a causal effect, the precise channel through which inflows induced by the currency's carry appeal are destabilizing is not clear. Note also that it is not entirely clear what form of currency volatility is induced by the instability caused by carry trades: high-frequency short-lived oscillations, or short-term stability coupled with sporadic large adjustments?

Outline of the chapter

The remainder of the chapter is organized as follows. I start with a brief discussion of indirect indications of rand-targeting carry activity; the rand's carry appeal; and the effect of short-term volatility on the carry trade. At the monthly frequency, the relationship between carry trade returns and portfolio debt inflows, seems quite strong when the Japanese yen is used as funding currency. The same applies for the relationship between carry and rand swaps turnover.

From a policy-maker's viewpoint, it is useful to distinguish long-term currency volatility from short-term volatility. Long-term volatility has distortionary effects. It raises the risks associated with investment in the tradable sector, and it is detrimental to long-term economic growth. Short-term exchange-rate volatility matters for currency speculators – it encourages derivatives traders, and

[3] The existence and magnitude of carry returns are likely to be due to a combination of reasons, including compensation for crash risk (e.g., Brunnermeier, Nagel, and Pedersen (2009)), infrequent portfolio adjustments (Bachetta and van Wincoop (2010)), and the interaction between carry trades and monetary policy (Plantin and Shin (2014)).

[4] Gagnon and Chaboud (2007) document the exchange rate effects of unwinding carry trades.

discourages carry traders for example. But there is no evidence of, nor compelling theoretic arguments for, a negative relationship between high-frequency short-term nominal exchange rate volatility and measures of economic welfare. Indeed, I argue that a moderate level of short-term nominal exchange rate volatility has some benefits, and may help reduce the distortionary effects of volatile inflows. There is however substantial international evidence showing a negative relationship between long-term real exchange rate misalignment (and its volatility), and economic growth. The section on exchange rate volatility (section 9.3) is organized into two sub-sections reflecting this distinction.

The first sub-section shows the high-frequency effect of non-resident inflows on the currency; and the relationship between bond inflows and exchange rate movements. The second sub-section turns to long-term volatility. It draws on evidence showing that long-run low-frequency rand volatility can be (but it is generally not) 'excessive' once we use a defensible benchmark for normal volatility. At lower frequency and considering long-term statistics, the relationship between capital flow levels and exchange rate volatility is weak. There appears to be a strong relationship however between the variability (second moment) of net purchases of domestic securities by non-residents, and long-run currency volatility. Gross outflows (net purchases of foreign securities by residents) tend to move in the opposite direction, so although of lower magnitude (and subject to regulatory quantitative limits), these gross outflows help reduce the volatility caused by gross inflow variability.

Section 9.4 turns to the effects of carry driven inflows on monetary policy – its effectiveness in an inflation targeting framework, and the scope for independence from monetary conditions in global financial centres. I argue that US and global monetary conditions restrict, but do not determine, the scope of domestic monetary policy; and recently the effect of capital inflows on credit growth is weak in South Africa. Section 9.5 is a discussion of the potential benefits of allowing a moderate degree of short-term currency volatility. Section 9.6 contains concluding remarks on policy responses to high long-term capital flow and exchange rate volatility. It contains a comment on the case for capital controls; the scope for currency market intervention to build reserves which help buffer the currency against sudden and large movements in capital; discusses macro-prudential tools; and presents a counter-speculative case for low inflation.

9.2 The rand as a carry trade target

Carry trade flows are fungible. There is no exact information on the extent of targeting on any specific currency. The are numerous ways to implement the trade, including through over-the-counter derivative contracts (which in turn give rise to hedging trades by counter-parties); participants include unregulated non-bank financial institutions (especially hedge funds and commodity trading

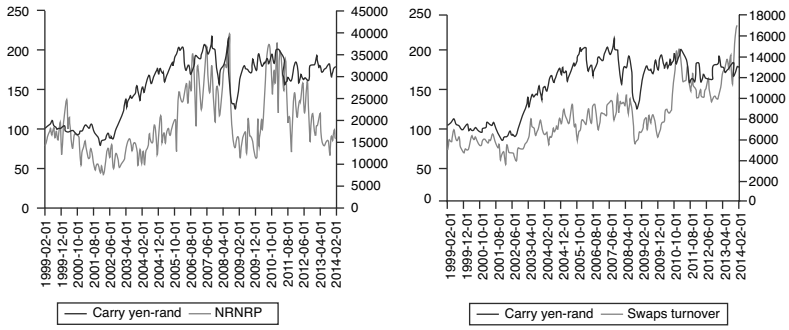

Figure 9.2 Carry returns, bond inflows and currency-swap turnover
Source: Bloomberg

advisors); and target currencies are heavily traded offshore. Moreover, the scale of positioning on any currency will vary over time. Evidence on the extent of rand targeting is therefore indirect and merely indicative.

The carry-to-risk ratio, defined as the ratio of the interest-rate differential to expected exchange rate volatility, is a standard measure of a currency's carry appeal. Periods of high correlation between foreign exchage turnover and the carry-to-risk ratio, suggests that turnover is likely to be related to carry trade implementation. Galati, Heath, and McGuire (2007) report a low-frequency correlation of 0,36 for the rand, the third highest after the Norwegian krone and the Autralian dollar.[5]

Charts in Figure 9.2 contrast the Bloomberg carry index (short yen, long rand, three month trade horizon) with, first, monthly net bond inflows, and second, the swaps (dominant) component of rand FX turnover (US dollars, millions). The sample correlation between yen-funded rand-targeting carry returns and net purchases of South African bonds is approximately 0,5 (50%); with currency swap turnover it is approximately 0,6.

[5] More tentatively, rand foreign exchange derivative transactions (especially swaps) far outweigh spot transactions; and the former are often linked to non-resident activity in the domestic bond market. (See the appendix to this chapter, and Hassan and Smith (2011).) The evidence from Turkey suggests that hedge funds and investment banks implementing carry trades are the main swap counterparties. As of June 2010, portfolio fixed-income flows to South Africa were primarily intermediated through a set of financial centres comprising Luxembourg, Jersey, Cayman, British Virgin Islands, Bermuda, Bahamas, and Liechtenstein (IMF, 2011): jurisdictions where hedge funds (and off balance-sheet structured investment vehicles until recently) are typically domiciled. Interestingly, the largest net flows of yen between 2002 and 2007, were from Japan to the Caribbean financial centres, according to Bank for International Settlements data (see Galati, Heath and McGuire, 2007).

These observations suggest that the return from Japanese yen-funded rand-targeting carry might be an important driver of net purchases of South African bonds, and of rand swap turnover, suggesting carry implementation through a combination of spot and derivative transactions.

Attractiveness of rand-targeting

Currency speculators targeting the rand and other high-interest currencies through the carry trade were exposed to very large losses between 2007 and 2008. The appeal of the rand as a carry target, as well as that of other emerging market currencies, was firmly restored from 2009. The annualized average return from targeting the rand through Japanese yen-funded speculation, using the forward currency market and trading at the weekly frequency, between January and December 2010, was approximately 32% (before transaction costs), with a ratio of mean return to volatility of 1,89.[6] This large return-to-volatility figure is close to the historic average performance of the rand as a (yen-funded) carry trade target over the last decade. The high returns from multi-target international carry trade portfolio strategies are well documented.[7]

Hassan and Smith (2011) and Hassan (2014) show that the average cumulative returns from Japanese yen-funded rand-targeting speculation through the forward market are volatile but high, though highly sensitive to trade initiation date; and with a particularly attractive risk-return profile after crashes in the rand.[8]

Interest differentials and currency volatility

Carry returns depend positively on the interest differential, and negatively on exchange rate volatility – specifically, depreciation of the target currency erodes carry returns. Low exchange rate volatility coupled by a favorable interest differential (and an under-valued target currency) induces currency carry speculation.[9]

This observation is important in understanding to what extent high domestic interest rates drive bond portfolio flows. To the extent that such inflows

[6] The ratio of mean return (in excess of a risk-free rate when applicable) to the standard deviation of returns, commonly known as the Sharpe ratio, is a widely used (albeit imperfect) measure of 'reward-for-risk.' The average Sharpe ratio for buy-and-hold investment in the JSE is around 0.5, and anything above 1 is generally regarded as highly attractive.

[7] See Burnside, Eichenbaum, and Rebelo (2007, 2008), Brunnermeier, Nagel, and Pedersen (2009), and Lustig and Verdelhan (2009). Carry trade payoffs are uncorrelated with stock market returns, and cannot be easily explained by standard risk factors. (See Burnside (2011)).

[8] Note that the payoffs from rand-targeting vary, and are of course often negative. The documented average returns from rand-targeting are strongly influenced by the extraordinarily high gains in the period following the 2001 rand crisis.

[9] These inflows in turn tend to lead to currency crashes.

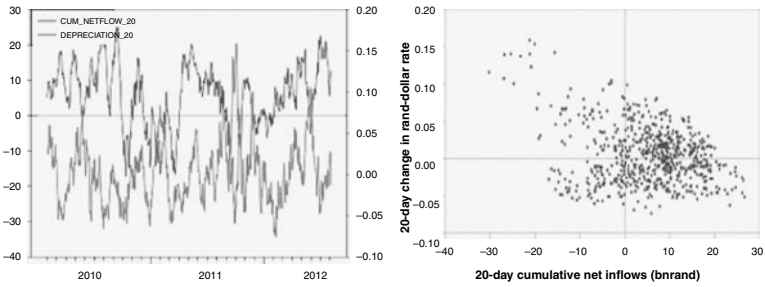

Figure 9.3 Twenty-day cumulative net inflows and rand depreciation
Source: JSE, SARB and author's calculations

are driven by the carry trade, the interest differential (domestic versus funding currency), only drives inflows when volatility is low. The rand's attractiveness depends on volatility being low (and its covariance contribution to the mean-variance profile of carry trade portfolios).

9.3 Capital flows and exchange rate volatility

Short-term volatility

Portfolio flows and exchange-rate behavior

Portfolio inflows reflect foreign demand for domestic securities and naturally have an effect on exchange rate levels. High-frequency (daily) cumulative net purchases of domestic securities (stocks and bonds) by non-residents are negatively associated with rand depreciation (i.e. positively associated with the dollar value of the rand). This is immediately apparent for the recent past, for cumulative net inflows over twenty days, from the first chart in Figure 9.3; and confirmed by the scatter plot, as well as simple regression analysis.[10]

The relationship is strong for large (positive or negative) flows. For net purchases above 20 billion accumulated over 20 days, there is no single event (day) of currency depreciation over the same 20-day period (between January 2010 and August 2012) – the currency always appreciates, though not necessarily by the same magnitude. Conversely, for negative inflows: each day recording cumulative net sales over the preceding 20 days above 20 billion rand is associated with rand depreciation over the same 20-day period.

[10] Net inflows (non-resident purchases of bonds and equities) are measured in billions of rand; rand depreciation is measured in log change, so for example 0.05 corresponds to 5% depreciation, −0.05 corresponds to 5% appreciation, over n days (in this figure $n = 20$).

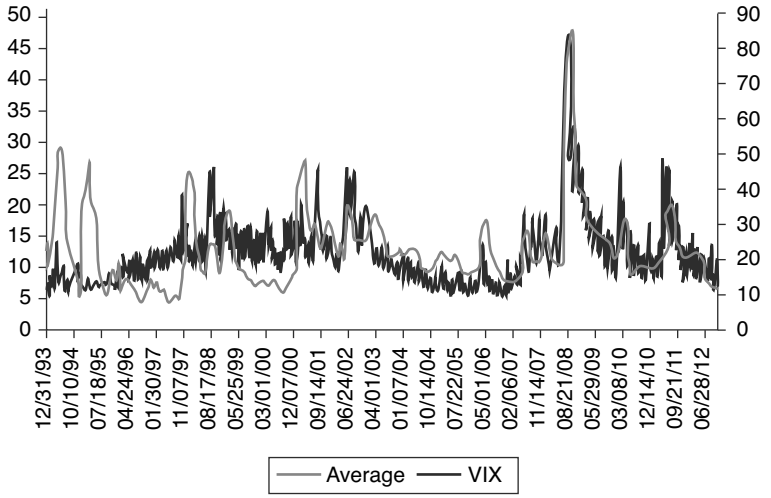

Figure 9.4 Cross-country average FX volatility and VIX

The relationship is indeterminate for smaller net flows, with a wide range of currency movements consistent with any given level of portfolio flows, including net flows close to zero. When inflows are very large, they represent a significant share of rand turnover, and become a dominant determinant of the direction of rand movements. When not, the range of currency outcomes associated with either inflows or outflows is wide: 'anything goes'.

Figure 9.4 shows how the VIX drives short-term currency volatility (average of Brazilian, Mexican, South African, South Korean, and Turkish currencies' volatilities) since the 2007 US sub-prime crisis.

In this note we are particularly interested in bond flows, which are affected by currency speculation strategies based on the carry trade. Although bond inflows affect the value of the currency, as expected, the historical relationship between bond inflows and currency *volatility* (the second moment) seems weak (see Figure 9.5).

The relationship between capital flows and rand volatility requires accounting for foreign initiated transactions, as well as domestically initiated transactions. Data on the latter are available at lower frequency, and this relationship is discussed below.

Long-term volatility

Evolution in South Africa

Figure 9.6 shows the evolution of the rand per dollar exchange rate. There is an upward shift in the long-run average level, which coincides with the adoption

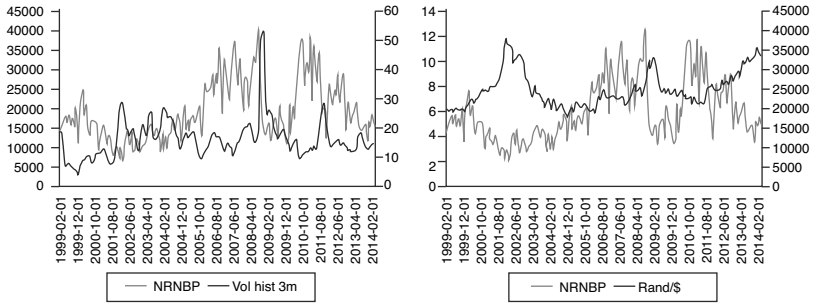

Figure 9.5 Bond inflow (levels) have little effect on the second moment
Source: JSE, SARB

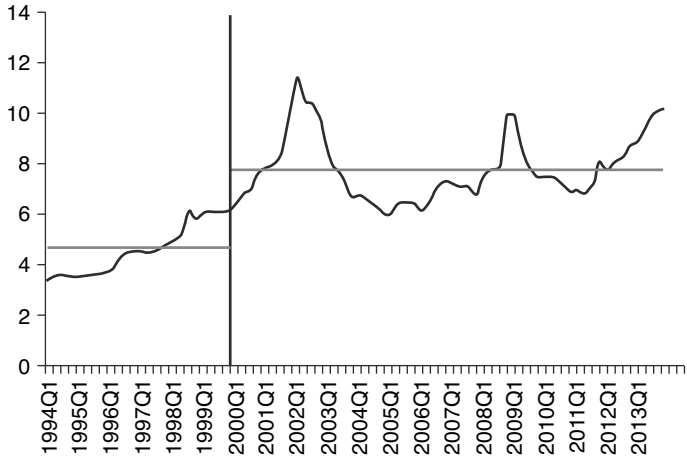

Figure 9.6 Rand per US dollar

of a flexible exchange rate regime and inflation targeting as the monetary policy framework.

Figure 9.7 shows the standard deviation of the exchange rate over four-year intervals, as a measure of medium to long-run volatility, based on the average length of the business cycle in South Africa. There is a marked increase between 1994 and the early 2000s. Examining the quarterly series shows that long-run volatility peaks at nearly 30 percent in 2003; but is on a declining trend since then – interrupted by the global financial crisis in 2007–08.

The last two bars show that long-run volatility is down to pre-inflation targeting levels, despite less restrictions on capital movements and far larger capital flows, as shown below. But it remains high.

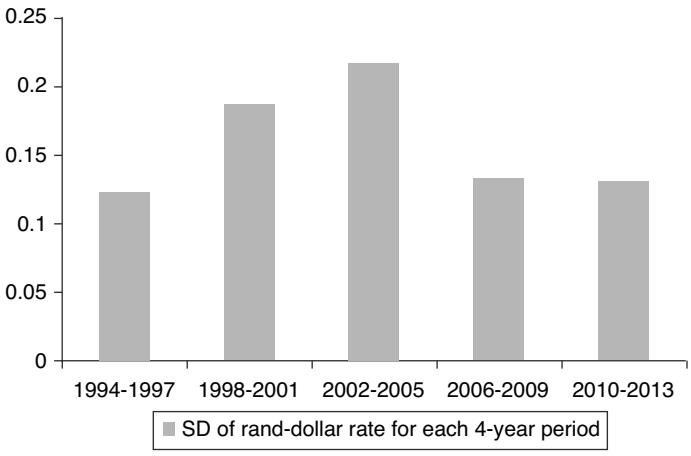

Figure 9.7 Rand volatility over four-year intervals

Have larger capital flows led to more volatility?

No low-frequency relationship is evident between low-frequency long-term means (i.e., averages taken over four-year intervals of quarterly data) of portfolio flows, and long-term exchange-rate volatility (standard deviation of quarterly observations over the same four-year periods). This applies to net capital inflows by non-resident or foreign agents (CIF, first chart in Figure 9.8), net capital outflows by domestic agents (COD, second chart), and net capital flows (i.e., the difference between CIF and COD, third chart).

The closest visual relationship between measures of portfolio flows, and of the long-run volatility of the nominal exchange rate at low frequency, is with the volatility (measured by the coefficient of variation)[11] of gross inflows (net capital inflows by non-residents) – this is shown in the fourth chart in Figure 9.8. The relationship between the variability in net capital flows (CIF minus COD) and exchange rate volatility is much weaker. Note the implication: restrictions on the level of capital inflows may have no effect on the long-term volatility of the exchange rate, if they do not reduce the volatility of flows.

CIF and COD may be driven by different factors. Periods of outflows or lower inflows by non-residents, might be associated with reduced outflows, or retrenchments, by residents. In South Africa, regulations restrict foreign holdings by domestic agents to 25 per cent of investment assets. Large outflows cause the currency to depreciate, which pushes the rand value of foreign holdings up,

[11] The coefficient of variation is the ratio of the standard deviation to the mean. The adjustment of the standard deviation is due to the mean level of total gross flows increasing significantly over the sample.

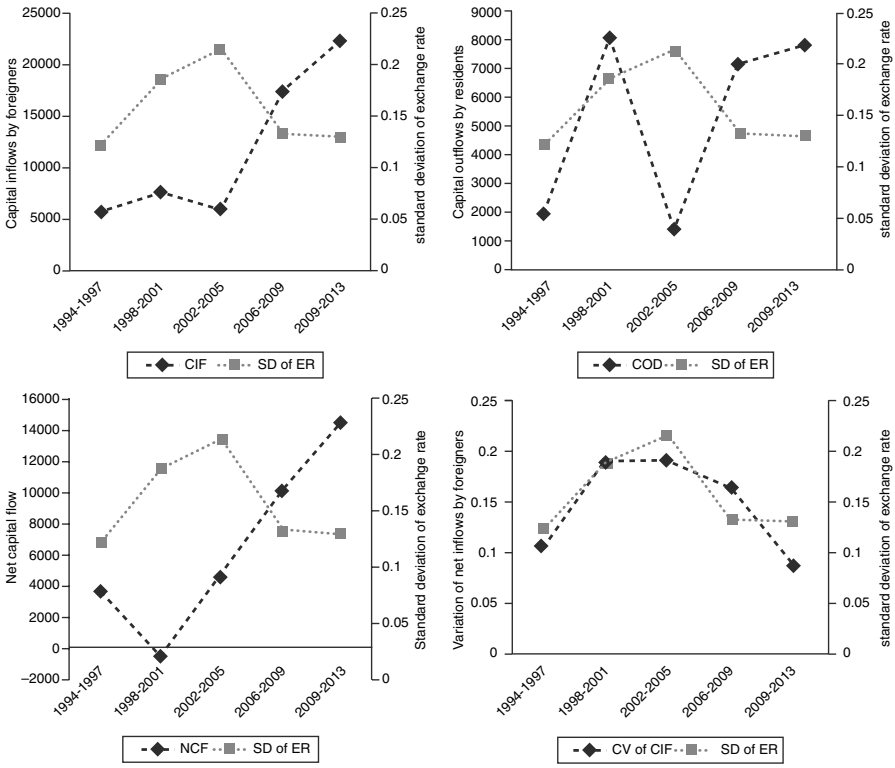

Figure 9.8 Capital flow mean levels, coefficient of variation, and currency volatility
Source: SARB, author's calculations

beyond the regulatory limit for any agent initially at or near the limit. Such agents are obliged to retrench the portion above the limit, acting as a partial buffer. Domestic agents have however one year to retrench in order to obey the regulatory limit, so CIF and COD transactions, even when associated, can be asynchronous. The evolution of CIF and COD (four year quarterly averages) is shown in Figure 9.9. COD flows tend to partly buffer the volatility generated by CIF volatility.

Is the rand excessively volatile?

The preceding observations do not tell us whether the rand is 'excessively volatile'. Any such claim requires a benchmark for normal volatility. Standard exchange-rate models imply upper bounds for the 'fundamentally justified' long-run variance of the exchange rate, determined by the change in monetary model fundamentals (growth, money and inflation differentials), and the discount factor which translates the expected future path of fundamentals to the current value of the currency.

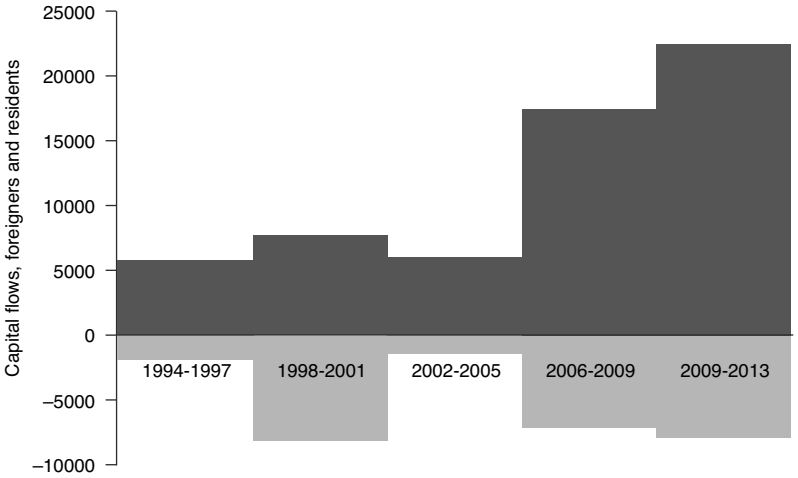

Figure 9.9 Capital inflows by foreigners and outflows by residents (net)

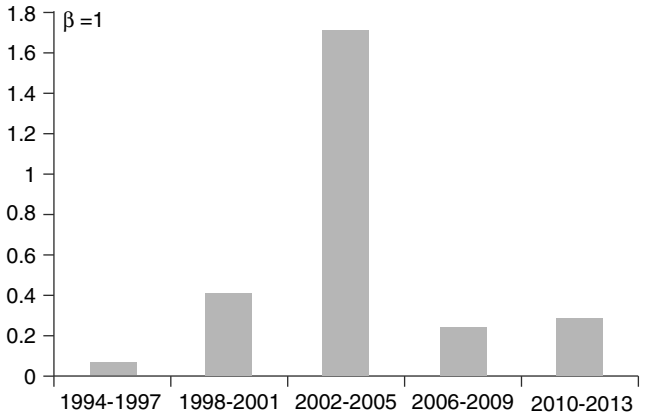

Figure 9.10 Is the rand too volatile?

If, or when, the variance of the currency exceeds this bound, the currency can be regarded as 'excessively volatile' in a meaningful manner. The method used to compute the upper variance bound is presented and discussed in detail in Amod and Hassan (2014).

Figure 9.10 shows (highly) excessive volatility in the early 2000s (when the currency crashed). For the remaining four-year blocks, long-run volatility is not excessive. Note however that short-term volatility may often have been very

high. The economic costs of long-run real exchange rate volatility and misalignment are well established; those associated with short-term high-frequency movements in the exchange rate are not, however – this issue is discussed further below.

The empirical performance, in terms of out-of-sample forecasting ability, of monetary exchange rate models is notoriously weak at short to medium term horizons. Variance bounds based on such models are not applicable at such horizons.

Remark: do macro fundamentals matter?

The most important insight of classic exchange rate models is that of the exchange rate as an asset price, responsive to changes in expectations of future macro fundamentals (domestic and international). Despite their poor out-of-sample forecasting performance, currency analysts and the financial press routinely attribute movements in currencies to changes in fundamantals. In Hassan and Paul (2014), we use rand movements at the per (half) second frequency during a statement by the monetary authority, as an illustration of how the currency responds at very high frequency to information on macro fundamentals (growth and inflation), but its movements may appear inconsistent with fundamentals at lower frequencies.

Has inflation targeting led to excess volatility?

Amod and Hassan (2014) compare the observed long-run variance of the exchange rate to the respective variance bound, for a set of floating emerging currencies, for which Gagnon and Hinterschweiger (2011) document the highest long-term volatilities. The main finding is summarized in Figure 9.11, which shows, for each country, the ratio of the long-term variance of the exchange rate (deviations from fundamentals) to the maximum long run variance justified by the variability of the respective country's fundamentals – before and after the adoption of inflation targeting. The bound is clearly breached only for Brazil in the period after adoption of inflation-targeting. It increases substantially for Chile and South Africa, but stays below one.

9.4 Capital flows and monetary policy effectiveness

I now turn to the relationship between capital flows driven by carry trades (i.e., portfolio debt and direct cross-border credit), the effectiveness of monetary policy, and the scope for carry target economies to conduct monetary policy independently of global (specifically US) monetary policy.

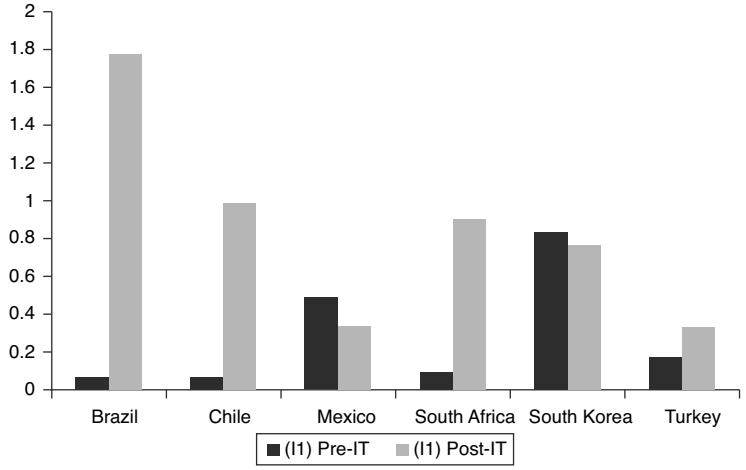

Figure 9.11 Variance ratios, pre- and post-IT

Capital flows and credit growth

Capital inflow surges reduce the effectiveness of monetary policy by stimulating excessive credit growth. This causal link seems to be weak for South Africa, compared to other emerging economies (e.g., Brazil and Turkey) – see Figure 9.12. This channel plays a central role in the modern case for capital controls (e.g., Ostry (2011), Rey (2014)). If inflows do not cause credit booms and domestic overheating (in turn causing pressure to raise interest rates and attracting more inflows), the constraints imposed on monetary policy and threat to financial stability are limited.

There are two likely reasons, in addition to possible institutional peculiarities, behind different credit responses to capital inflows.[12] First, reliance on non-core funding from abroad (to finance domestic credit extension) depends on the availability of domestic retail and wholesale funding.[13] South African banks have access to a large deposit base, and above all, ample access to domestic non-core liabilities – large and liquid domestic bond and money markets. The threshold level of credit growth which triggers the need for non-core funding from abroad is therefore relatively high. Second, the expansionary effect of inflows is likely to be an increasing function of the degree of currency market intervention:[14] purchases of foreign currency may help in halting exchange

[12] These are tentative thoughts, based on current work in progress.
[13] See Hahm, Shin, and Shin (2013) on the role of non-core liabilities (sources of funding other than retail deposits) in financial intermediation.
[14] See Magud, Reinhart, and Vesperoni (2014) for empirical evidence.

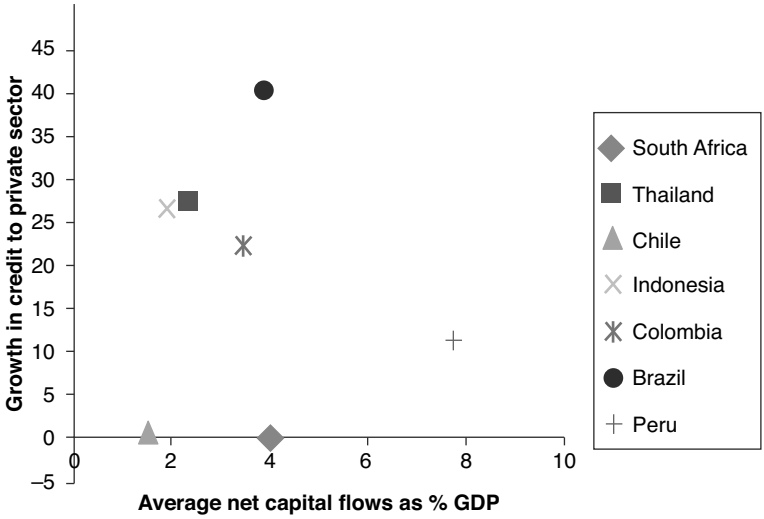

Figure 9.12 Domestic credit growth and capital flows, averages for 2009–12

rate over-valuation and the associated loss of export competitiveness; but they accentuates the carry cycle. If the intervention succeeds in halting exchange rate appreciation, the stability of the exchange rate reduces currency risk, and traders (or foreign lenders) anticipate eventual appreciation once intervention becomes too costly. Again, the policy response (in the currency market) attracts further inflows. Observe that Brazil and Turkey intervened significantly in response to inflow surges; and experienced exceptional growth in cross-border credit. These are economies where the relationship between capital flows and domestic credit growth is strong. South Africa has allowed more exchange rate flexibility, since the adoption of inflation targeting in 2000; and experienced comparatively lower direct cross-border credit flows.[15]

Bond yields and monetary autonomy

I estimate the following regression equation (following Obstfeld (2014)) to examine the extent to which global capital flows, which are largely driven by monetary conditions in the US, constrain the scope for independent monetary

[15] The Bank for International Settlement's figure for direct cross-border credit to the banking sector (all instruments, amounts outstanding, billions of US dollars) to South Africa, between 2009 and 2012, averages approximately 35. The amount for Turkey is between 150 and 200; and for Brazil, close to 300.

Table 9.1 Simple test of monetary independence

	Parameter	*3m*	*10y*
South Africa	$\widehat{\beta}$	±0	0.6
Sweden	$\widehat{\beta}$	±0	0.7

policy in carry target economies,

$$\Delta i_t = \alpha + \beta \Delta i_t^w + \gamma' \mathbf{x}_t + \epsilon_t, \tag{1}$$

where t is the time subscript, i is the interest rate in the domestic economy, i^w is the 'world' interest rate for the same term to maturity, and $\mathbf{x}$ is a vector of domestic variables that monetary policy responds to. Δ converts the variable to its one period change. All variables are measured in log differences to avoid spurious regressions. Monetary conditions in the United States represent global conditions. The equation is estimated using three-month and ten-year interest rates; using quarterly data from 2000 to 2014. For the results in Table 9.1, the components of $\mathbf{x}$ are simply the changes in the domestic rates of inflation and economic growth.

The larger the estimated value of parameter β, the greater the dependence on US monetary conditions, with total loss of monetary policy independence if $\widehat{\beta} = 1$. Instead, I find that for short-term interest rates, $\widehat{\beta} \cong 0$ and is not statistically significant; while $\widehat{\gamma}$ is statistically significant. For long-term yields however, $\widehat{\beta}$ is far larger though strictly lower than one. Obstfeld (2014) finds on average higher monetary policy dependence on US monetary conditions in advanced economies, than emerging economies. Sweden is an advanced economy which is also a common carry target, and I performed the same exercise for Swedish rates. The short-term rate is not systematically tied to US monetary policy and responds significantly to domestic conditions, but long yields are more tightly dependent on US long yields than South Africa's.

This finding is inconsistent with the view that global capital does not 'interfere in any substantial way with the ability of domestic monetary policy to maintain control over dynamics of inflation' (Woodford (2010), written before the 2007 crisis). The high dependence of domestic long rates on US long rates shows that it does. But it is also *not* consistent with the view that 'independent monetary policies are possible if and only if the capital account is managed', as argued by Rey (2014). This, in turn, is evinced by the lack of a systematic dependence of (South African on US) interest rates towards the short end of the yield curve, when we control for domestic factors which affect the policy stance. US and global monetary conditions significantly restrict the policy scope domestically; but do not determine it.

9.5 Benefits of moderate short-term exchange rate volatility, or 'I love the smell of volatility in the morning'

In economies with reasonably developed financial systems, which is the South African case, short-term volatility can be hedged.[16] Less evidently, a moderate degree of short-term volatility has non-trivial benefits.

Volatility reduces attractiveness (and increases cost) of carry trades

Rising volatility discourages carry trade speculators from targeting the currency. Carry trades benefit from high interest differentials (or large forward discounts/premia) and either target currency appreciation relative to the funding currency, or low volatility in the rate of exchange between the target and funding currencies. Periods of high volatility, in the currency and financial markets generally (domestic or international, usually reflected in the VIX index), are empirically associated with capital flow reversals, away from high-interest/target currencies like the rand, and into low-interest/funding currencies. Such reversals lead to carry trade losses for speculators who maintain long positions in high-interest currencies, and short positions in low-interest currencies.[17]

There is substantial international evidence of a strong and systematic inverse relationship between exchange rate volatility and carry trade returns.[18] Observations on the rand indicate consistency with the international evidence. Peaks in exchange rate volatility coincide with sharp carry trade losses; and the period producing the largest and most persistent gains to the rand-targeting speculator (circa 2002–03), is accompanied by a sharp decrease in *short-term* exchange rate volatility (see Figure 9.13, from Hassan and Smith (2011)).

In addition, carry traders can buy currency options to hedge the exchange rate exposure component (i.e. buy protection against unfavorable exchange rate movements). When volatility decreases, the price of these options, and hence the cost of hedging against unfavorable exchange rate movements, decreases – making the carry trade more attractive, for a given yield differential.

Conclusion: attempts to reduce *high-frequency*/*short-term* exchange rate volatility (which could be desirable on other grounds), will not be counter-speculative. On the contrary: options-hedged targeting becomes cheaper; and un-hedged targeting becomes less risky. Both forms of carry trades become more attractive.

[16] Access to hedging instruments by SMEs is perhaps more limited however. And for all firms, hedging long-term exchange rate risk is complicated if not impossible. But in the long term, exchange rates are influenced by macroeconomic stability.

[17] A *long* (respectively, *short*) position in an asset reflects the expectation of an increase (resp., decrease) in the price of the asset.

[18] See Clarida, Davis, and Pedersen (2009), and Brunnermeier, Nagel, and Pedersen (2009).

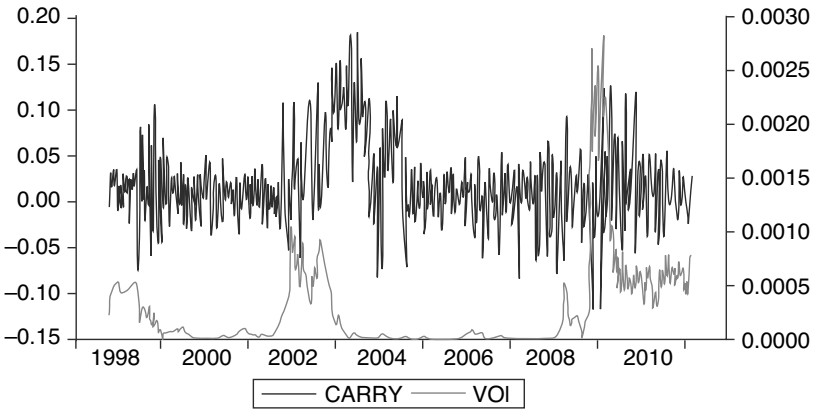

Figure 9.13 Rand carry returns and conditional exchange rate volatility

Volatility induces caution: disincentive to currency mismatch

Capital flow reversals led to severe contractions in economic output in South East Asia in the aftermath of the 1997 crisis. Private sector firms had accumulated large foreign currency liabilities, but earned revenue mainly in domestic currency. Currency mismatch in corporate balance sheets generates a high degree of financial vulnerably; and a 'fear of floating' by the authorities (in anticipation of distress in the event of a large depreciation). When currencies crashed in 1997, firms found it difficult to meet foreign currency obligations, and net worth reduced, in turn reducing ability to refinance. The IMF-led response then (criticized at the time by Furman and Stiglitz (1998), and Krugman (1999)), which involved severe tightening of monetary policy, aggravated the problem, by also raising the cost of domestic currency funding.

The accumulation of un-hedged foreign currency liabilities, in economies where borrowers face high interest rates on domestic currency debt, is very tempting and can be perfectly rational – if the probability of exchange rate depreciation over the term of the loan is low. The East-Asian economies most affected by the 1997 crisis were characterised by attractive interest spreads, yet lower exchange rate volatility, between 1991 and 1997, than the Japanese and German currencies – see Eichengreen and Hausmann (1999).

Volatility induces caution against the build-up of large foreign currency exposures (by non-exporters). Given the high interest rate differentials offered by carry target economies, low currency volatility increases the attractiveness of foreign currency liabilities, by reducing the perceived probability of large adverse movements in the currency. Volatility induces caution against the build-up of large foreign currency exposures.

Volatility helps maintain the scope for independent monetary policy

Volatility may increase the scope for independent monetary policy. If the currency of an emerging economy becomes consistently as stable as that of low-interest advanced economies, its yields will have to converge with the latter. The same applies, with greater force, to carry target advanced economies (e.g., Australia, Canada, Norway, Sweden), due to similar risk premia to lower interest advanced economies. Exchange rate volatility prevents perfect substitutability between domestic and foreign assets, which helps maintain scope for independent monetary policy despite the fluidity of international capital – a point made in Eichengreen, Tobin and Wyplosz (1995).[19]

Consider the standard link between domestic and foreign interest rates, exchange rate movements, and risk,

$$i_t = i_t^w + E_t(e_{t+1} - e_t) + \zeta_t, \tag{2}$$

where e represents the exchange rate and ζ the currency risk premium. If volatility is zero, there is no uncertainty about the exchange rate path and no risk premium, so $i_t = i_t^w + (e_{t+1} - e_t)$. That is, domestic yields become deterministically tied to yields in the global financial centre.

Short volatility can reduce long-term misalignment and volatility

High frequency but temporary up and down movements in the currency can help prevent the exchange rate from deviating too far and/or for too long from intrinsic value (i.e., may help prevent large and/or prolonged misalignment), thereby reducing the magnitude of crashes when there is an eventual correction. In this sense, some short-term volatility can help reduce the long-term instability which is detrimental to economic growth.[20] Consider the charts in Figure 9.14 for illustration. The quarterly movements in the rand and the Swedish krona were remarkably similar for 2014. At this frequency, the krona was the more volatile of the two currencies (with about twice the coefficient of variation). Yet, the daily movements in the rand were far more erratic; the variation within each quarter far higher.

9.6 Concluding remarks: policy options

Capital controls

There are situations where a degree of capital account regulation (e.g. capital controls) is desirable – see for example Stiglitz (2010), IMF (2012), Rey (2014) for comprehensive and thoughtful discussions. As observed in the extensive Pardee

[19] See also Obstfeld (2014).

[20] See for example Eichengreen (2008), Aghion et al. (2009), Guzman, Ocampo, and Stiglitz (2014).

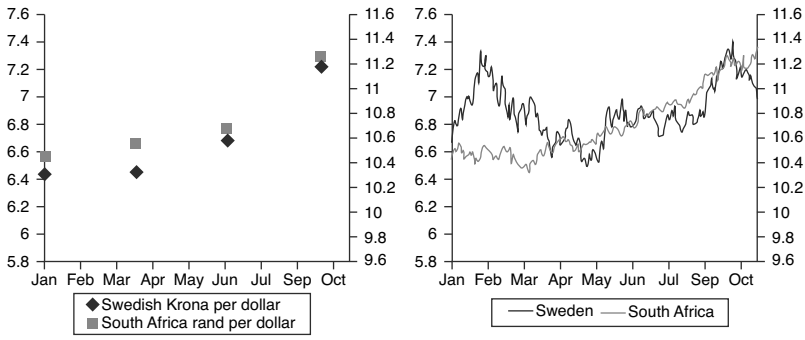

Figure 9.14 Swedish krona and South African rand: quarterly and daily, 2014
Source: Datastream, author's calculations

Center Task Force Report (p.2), '(...) the design and monitoring of such regulations is essential for their effectiveness' (Gallagher, Griffith-Jones, and Ocampo (2012)). The design of capital flow regulation in South Africa (and the desirability of prudence before adopting measures that may be distortionary), beyond existing restrictions on outflows (by residents), needs to address facts about the South African economy which limit the threat to financial stability due to capital flow volatility and/or limit the effectiveness of standard capital account regulation measures.

First, the critical causal link between inflows and credit growth is historically weak, compared to, e.g., Brazil and Turkey. If inflows do not cause credit booms and domestic overheating (in turn causing pressure to raise interest rates and attracting more inflows), the constraints imposed on monetary policy and threat to financial stability are limited.

Second, the threat to financial stability is weakened further (though not eliminated) by the fact that government and private sector firms borrow mainly in domestic currency in South Africa, and issue securities (to a domestic and international clientele) locally. The comparatively low degree of foreign exchange indebtedness means that sudden stops in inflows, and the associated currency depreciation, need not cause sudden un-hedged increases in the rand value of domestic liabilities.

Third, it is estimated that approximately three-quarters of total rand trading is offshore. There is also a secondary market for SA treasuries offshore. Domestically imposed capital account restrictions might move rand trading further offshore. Moreover, the derivatives market, especially for FX and interest rate products traded over-the-counter, is substantial. (See the charts in the appendix to this chapter.) These can, and normally are, used to circumvent capital flow management restrictions.

Take for example taxes on portfolio debt inflows (and later on certain derivatives), implemented in 2009 in Brazil. The speculative carry trade is one of the main drivers of portfolio debt flows, as noted in the report. The payoff from borrowing in low-yield currencies to invest in high-yield currencies can be replicated by trading forward currency contracts (the 'forward bias' trade) – i.e. without access to the bond markets of either the funding or the target currency. Speculators can use the OTC derivatives market, domestically and offshore, to circumvent any taxes on bond inflows. Long-term bond investors might not do so, but passive long-term investment is beneficial. It is impossible to know exactly how effective the Brazilian taxes have been, and I do not wish to claim that they were ineffective – because we cannot know what the situation would have been without them. But the real reached a twelve-year high in 2011; and perhaps not coincidentally, OTC turnover in Brazilian real FX derivatives increased five-fold between 2007 and 2010.[21] OTC foreign exchange derivatives turnover in South Africa was about twice Brazilian turnover in 2010.

Without addressing the issues above, neither the need for further capital controls in South Africa, nor their appropriate design, are entirely clear. The case for more reserve accumulation, and prudential measures targeting the channels through which capital flows can be destabilizing (e.g., adjustable capital buffers, credit market regulations, domestic currency borrowing incentives) seems more compelling.

Scope for more aggressive reserve accumulation

There is no contradiction between pursuing a flexible inflation targeting framework, and adopting a degree of foreign exchange market intervention required to minimize long run real exchange rate instability and misalignment. (See for example Fisher (2010), IMF (2012), Ostry, Ghosh and Chamon (2012).)

Foreign exchange reserves, which are costly to accumulate in high-interest countries, are quite large in some emerging economies (see Gallagher, Griffith-Jones, and Ocampo (2012)). But this is not the case for South Africa, where reserves pale in comparison to numerous other emerging economies. There is still ample scope to accumulate reserves to absorb large inflows, when the exchange rate is highly likely to be overvalued and contributing to a loss of competitiveness. There is an interest cost to reserve accumulation, and valuation losses when the rand appreciates; but there will be valuation gains when the rand depreciates.

As an indication of the space left for further reserve accumulation, and the likely benefits in buffering the currency against sudden large movements in capital, consider exchange rate behavior in response to tapering (talk and action) by the US Federal Reserve between 2013 and 2014. The charts in Figure 9.15 show,

[21] BIS Quarterly Review, December 2012.

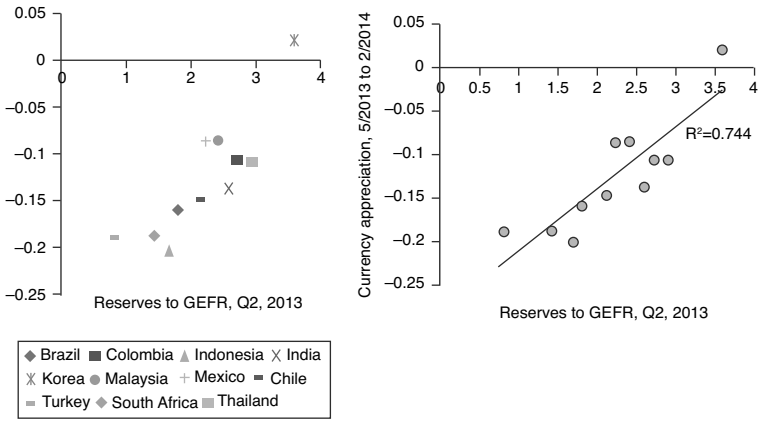

Figure 9.15 Exchange-rate appreciation and reserves to GEFR
Source: BIS, IMF, World Bank: author's calculations

along the vertical axis, currency appreciation (negative numbers denote depreciation) between 1 May 2013 and 1 February 2014. Along the horizontal axis is the ratio of foreign exchange reserves to a measure of the gross external financing requirement (the sum of the current account deficit and short-term external debt), for the first half of 2013. There is a strong relationship between a country's ratio of reserves to external financing requirement, and the extent of the sell-off of its currency over this period. South Africa ranks quite poorly. Reducing its vulnerability requires moving it in the North-Eastern direction: reducing the deficits or/and increasing reserves. Of the three variables that constitute this indicator of external vulnerability, one is more amenable to 'engineering', and that is the stock of foreign exchange reserves.

Role of macro-prudential tools

Since excessive credit growth is the main channel through which capital inflows lead to instability, there is little doubt about the desirability of designing appropriate prudential tools aimed directly at this channel – see IMF (2012), Rey (2014); and Stiglitz and Greenwald (2003) for a discussion of the centrality of credit that predates the 2007 crisis. But the merits of monitoring the credit channel and preventing excessive leverage and credit growth, apply irrespective of the economy's exposure to capital flow volatility.

In addition, South Africa retains restrictions on capital outflows by residents. This tool could be made more effective by varying (judiciously and infrequently) the quantitative limits depending on the size and direction of capital

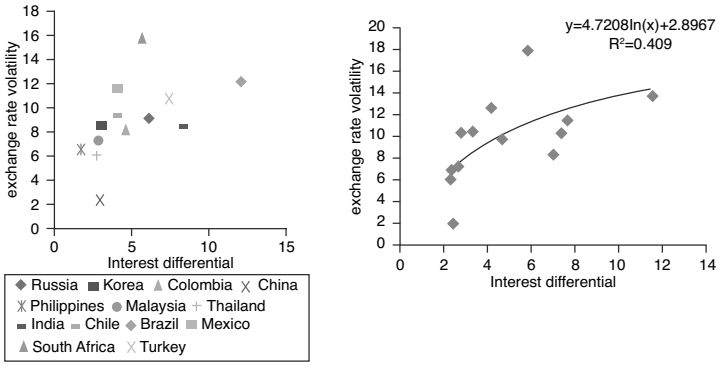

Figure 9.16 Average three-month volatility and interest-rate differentials
Source: Bloomberg; author's calculations

flows: relaxing the limit in response to excessive inflows, and contracting the limit in response to excessive outflows.[22]

The counter-speculative case for low inflation

The tentative evidence of a weak relationship between capital inflows and credit growth in South Africa may be sample specific. It is probable that there will be periods when South Africa faces the same tension as other emerging economies have (e.g., Brazil and Turkey), where inflows lead to rapid credit growth and overheating, and the interaction between monetary policy (under inflation targeting) and currency speculation generates a vicious cycle.

A natural long-term solution is to aim at low and stable inflation, so that nominal interest rates can stay low–which reduces the currency's speculative appeal, and the cost of reserve accumulation–while allowing for positive real interest rates, which are necessary (but not sufficient) to stimulate saving and investment.[23] Lower carry-driven portfolio debt and credit inflows mean less scope for destabilizing debt inflows, and for excessive credit growth while the monetary authority tries to restrict demand. The associated increase in the ratio of equity liabilities to total liabilities would also help reduce exposure to financial instability.

Figure 9.16 shows a positive relationship between nominal interest rate differentials and nominal exchange rate volatility (three month horizons).[24] It

[22] See the discussion with Raghuram Rajan on varying foreign exchange limits as a macro prudential tool, in Jeffery (2014).

[23] Note, in interpreting 'low inflation', that the target band for inflation in South Africa is from three to six percentage points –'low' need not mean anywhere near the zero lower bound.

[24] See also Alvarez, Atkeson, and Kehoe (2007).

suggests, tentatively, that if the low nominal rate corresponds to a low interest rate differential, relative to funding currencies, such a policy will help reduce exchange rate volatility.

Plantin and Shin (2014) model the interest differential as a coordination device, turning carry trade positions into strategic complements for speculators, i.e. high yields help coordinate low-interest capital supply.[25] Their analysis implies that all policy responses designed to repel carry trades 'amount to sufficiently reducing the official rate in response to carry trade activity(...),' and '(...) a decrease in the official rate is the appropriate response when foreign speculative inflows bid up domestic asset prices'. Stiglitz (2012) advocates the same interest rate response, in conjuction with raising reserve requirements (and capital inflow restrictions). Such a policy response is less of a threat to macroeconomic stability in a low inflation environment.

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[25] Of course, in practice, co-ordination devices might be somewhat more prosaic – see 'Traders' forex chatroom banter exposed', *Financial Times*, 12 November 2014.

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Appendix

Table 9.A1 Foreign exchange turnover, 2013[26]

Rank	*Currency*	*Total*	*Spot*	*Domestic*	*Offshore %*[27]
3	Japan	1231	612	374	70
5	Australia	462	196	182	61
6	Switzerland	275	84	216	21
7	Canada	244	93	65	73
8	Mexico	135	57	32	76
10	New Zealand	105	39	12	89
16	Turkey	70	16	27	61
17	South Korea	64	19	48	25
18	**South Africa**	**60**	**19**	**21**	**65**
19	Brazil	59	11	17	71
20	India	53	15	31	42

Source: Bank for International Settlements, Hassan (2013)

[26] Daily averages in April 2013, billions of US dollars (adjusted for double-counting). Data source: BIS (2013).
[27] These are estimates, based on the difference, for each currency, between global foreign exchange turnover for that currency, and turnover in the respective country's foreign exchange market.

Table 9.A2 Foreign exchange derivatives turnover, 2013[28]

Rank	*Currency*	*Forwards*	*FX Swaps*	*Options*	*Total*[29]
3	Japan	123	332	153	619
5	Australia	50	183	27	266
6	Switzerland	27	149	14	191
7	Canada	36	101	12	151
8	Mexico	14	58	6	79
10	New Zealand	11	50	3	66
16	Turkey	10	39	3	54
17	Brazil	34	1	11	48
18	South Korea	24	16	4	45
19	**South Africa**	**7**	**31**	**2**	**40**
20	India	24	10	3	38

Source: Bank for International Settlements, Hassan (2013)

[28] Daily averages in April 2013, billions of US dollars (adjusted for double-counting). Data source: BIS (2013).

[29] Including 'currency swap'as a separate category to 'foreign exchange' swaps.

10
Challenges of Urbanisation in India

Isher Judge Ahluwalia

10.1 Introduction

In recent years there has been an increasing realisation that urbanisation is set to accelerate with India's transition to faster economic growth, but there is still an inadequate understanding about the need to plan for urbanisation and for translating these plans into action. Only then can conditions be created on the ground which foster agglomeration economies, encourage employment and enterprise, and support the growth momentum in an inclusive and sustainable manner. There is also not enough appreciation of a fundamental reality of the Indian situation that the fortunes of the rural sector are also crucially linked to the way urbanisation proceeds, e.g., how agriculture can be an important part of a modern supply chain, how the quantity and quality of water available for agriculture are significantly affected by the process of urbanisation, etc.

This chapter makes a strong case that planned urbanisation is fundamental to the sustainability of overall rapid and inclusive growth of the Indian economy. Section 10.2 presents a brief overview of the context of recent economic growth in India. Section 10.3 documents the available empirical evidence on the low level of urbanisation which is now picking up pace. It lays bare the perverse political economy of India which has strong resistance to acknowledging urbanisation which is actually taking place on the ground. It documents the abysmal state of service delivery within the Constitutional framework of the three-tier governmental system which requires the different governments working individually and jointly to ensure service delivery. Section 10.4 discusses the investment and financing requirements to bridge the urban infrastructure deficit in Indian cities and towns. It highlights the importance of governance in finding sustainable financing solutions besides recognising its role in improving service delivery. Capacity for urban planning and management at the local government level clearly emerges as a major challenge. Section 10.5 presents an assessment

of JNNURM (Jawaharlal Nehru National Urban Renewal Mission), a flagship programme of the Government of India covering the period from December 2005 to March 2014, and the lessons that this Mission offers. Section 10.6 concludes.

10.2 India's rapid economic growth interrupted: 2000–14

The period from 2000–02 to 2010–11 was a period of rapid growth for the Indian economy with GDP growing at 7.7 per cent per annum on average, a rate India had never seen before. The economy slowed down significantly thereafter to 6.7, 4.5, 4.7 and 5.5 per cent growth rates in the subsequent four years.[1] The deceleration was partly a reflection of the adverse external environment arising from the global slowdown which affected all developing countries, but it was substantially due to home-grown problems with respect to policies and institutions. The growth momentum was put at risk because of policy log jam and the government's inability to put in place the necessary institutional reforms for a better investment climate including a regime with planning and facilitating urbanisation. The inability to develop a credible approach in dealing with issues of land acquisition and environmental sustainability also took a toll on the investment climate.

This chapter argues that the medium term prospects for India's economic growth remain high – around 7.5 per cent. A new democratically elected government of India has assumed office in May 2014 with a clear majority in favour of National Democratic Alliance, dominated by the Bharatiya Janata Party (BJP), a right of centre political party. A declared priority of the new government is to push economic reforms including, especially, development of infrastructure to bring growth back on track.

The rapid growth which accelerated from 5.6 per cent per annum in the 1990s to 7.7 per cent per annum in the subsequent decade was driven by the private sector and led by the services sector. IT, BPO, financial services and healthcare services played a major role in this acceleration. These sectors derived their global competitiveness from a strong knowledge base which had been developed in some states of India and the fact that they were insulated from the constraints of physical infrastructure which allowed them to exploit the opportunities of buoyant external demand. The restrictive aspects of the Industrial Disputes Act and Contract Labour Act were also not applicable to the service firms.

Since the manufacturing sector is critically constrained by physical infrastructure, and the unreformed labour laws are also a major obstacle in the

[1] A recent revision of the data changes the growth numbers for 2012–13, 2013–14 and 2014–15 from 4.5, 4.7 and 5.5 per cent to 4.9, 6.6 and 7.2, respectively. Even so, the average trend growth rate of GDP for the period 2001–02 to 2014–15 comes to around 7.2/7.3 per cent per annum.

competitiveness of this sector, it is not surprising that manufacturing did not perform well. Absence of planned urbanisation also meant that cities were congested and polluted. Poor water and sanitation conditions and polluted air also added to an adverse investment climate which was already suffering from an overload of high transactions costs of doing business. Even so, some knowledge-based parts of manufacturing, e.g., pharmaceuticals, auto-components and automotive sectors, were globally competitive and participated in the growth momentum.

Looking ahead, it is vital for Indian policy makers to create conditions on the ground such that cities can effectively act as engines of growth while they also create a policy regime which delivers a competitive and nimble manufacturing sector capable of adjusting to the changing external demands by commodity as well as by destination. The example of Punjab in the post-1991 period clearly shows that without an industrial policy and an urbanisation strategy in place, a rich agricultural base cannot continue to deliver economic growth.[2] Prime Minister Narendra Modi's emphasis on the importance of manufacturing in the Indian economy in his Independence Day speech on 15 August 2014 is a welcome signal. But a great deal of legislative, administrative and regulatory reform is needed before the "Make in India" campaign is successful. A new challenge has arisen in recent years from the uncertainties related to the corporate tax regime through retrospective amendments. This was expected to be resolved with the change of government in May 2014 but has not happened.

An important feature of growth during 2000–14 was that it was associated with a substantial decline in the percentage of the population in poverty. Available data shows that the poverty ratio declined from 45 per cent in 1993–94 to 37 per cent in 2004–05 and 22 per cent in 2011–12. With increasing demands for raising the poverty line, an official committee under C. Rangarajan came up with revised estimates which still showed a decline in the population in poverty from 46.2 per cent in 2004–05 to 29.5 per cent in 2011–12. Non-income aspects of inclusion, especially access to health and education, began to be addressed during 2000–2014. But the fault-lines of the growth process also became increasingly visible.

First and foremost, growth of employment did not keep pace with the growth of output in the non-agriculture sectors, and there were periods when employment in the formal sector even declined. Admittedly growth of employment in the non-agriculture sectors in India had all along been slow in the previous 50 years but the expectation was that as growth of output accelerated, it would bring with it faster growth of employment. This did not happen. Expanding employment opportunities in the industry and services sectors which provide scope for high-productivity jobs continues to be the principal challenge for India's policy makers (Figure 10.1).

[2] Ahluwalia, 2009.

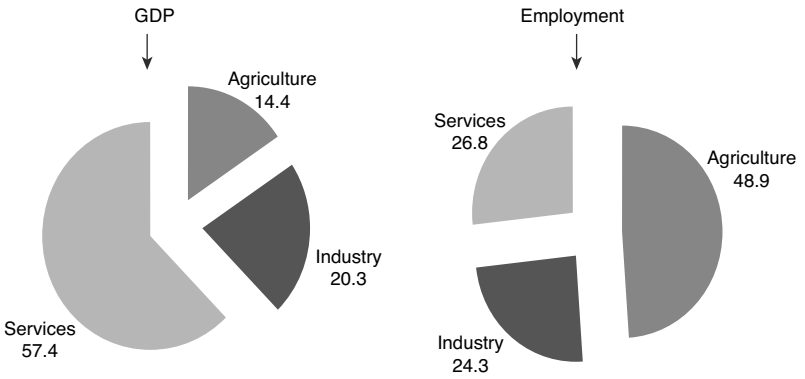

Figure 10.1 Share in GDP and employment of major sectors 2011–12

Source: Central Statistical Organisation, latest NSSO data on employment available for 2011–12

While employment grew slowly, scarcity of skills emerged as a major challenge. It took only 10 years of GDP growth at close to 8 per cent per annum to show how unprepared India was and still is with respect to the demand for skilled manpower. Considering that India's working age population as a proportion of the total population will continue to rise until 2040, this demographic opportunity presents a tremendous challenge for empowering the youth with the necessary skills and higher education. If there is employment intensive growth, and skills match the growing demand in different sectors, the potential demographic dividend can be realised. The Government of India launched a National Skill Development Initiative in 2007 and followed this up with the setting up of a National Skill Development Corporation in 2008 which works within the framework of public private partnership with active engagement of the private sector so that mismatches between demand and supply of skills can be minimised. A National Policy for Skill Development and Entrepreneurship has been announced in 2015.

Since market forces and private investment had an important part to play in accelerating economic growth during the 2000s, the role of government in providing a regulatory environment which would strengthen the domestic competitive environment and build a globally competitive economy became very important. Legislative and institutional reforms were beginning to be put in place during the period 2001–2011, e.g., Electricity Act of 2001, setting up of the Telecom Regulatory Authority of India, Competition Commission of India, etc. The process was by no means either smooth or fast, and there was a lot of learning by doing along the way. The infrastructure sectors such as electricity and telecommunications showed maximum stress as institutional reforms were slow

and not always steady; these sectors continue to show tremendous opportunity as well as enormous challenges.

An important strategic development during this period was the planned highway expansion in the country with the Golden Quadrilateral freight corridors and other networks. The Delhi-Mumbai Industrial Corridor (DMIC), for example, spans over six states and envisages the development of a number of hubs for manufacturing and commerce, and self-contained state of the art townships and world-class infrastructure. Townships are already being planned in consultation with the state governments. Similarly, the Eastern Dedicated Freight Traffic Corridor passes through six states, bypassing densely populated towns in these states, thereby offering new opportunities for planned urban metropolitan and regional development.

A few cities like Bangaluru, Hyderabad, Chennai, Pune, Ahmedabad, and Delhi were major players in fuelling the growth momentum, but these cities soon began to show the stress of inadequate infrastructure of urban roads, public transport, affordable housing, and water and sanitation. With the expansion of city boundaries and large villages growing into towns in situ, urban planning was urgently needed to support and accommodate rapid growth and inclusive development. In the event, absence of urban planning led to poor urban infrastructure and consequent governance challenges which resulted in a significant deterioration in the state of public services and proliferation of slums in these cities. About a quarter of the urban population of India is estimated to be living in slums, much of it in the large metropolitan cities.[3] The heavily distorted land and housing markets in India result in a situation in which not only the poor but also not-so-poor live in these slums. This large segment of the population does not have access to basic minimum urban services such as water and sanitation. In recent years, infrastructure development for urbanisation has also suffered from the dilatory processes for environmental clearances and a contentious socio-political environment with respect to land acquisition.

Policy makers in the decade of growth acceleration also had to grapple with the old challenges of inadequate and poor quality infrastructure, macroeconomic vulnerability in an increasingly more open economy, and slow growth of employment. The new political forces of the rising aspirations of a young population (50 per cent of India's population is below the age of 25) and the strong emergence of state governments as political power centres, added to the complexity of the situation in which growth challenges had to be addressed.

As urban share of GDP increases, investors look for economies of agglomeration in cities while they would also themselves contribute to these economies. Planned urbanisation besides being crucial for the quality of life of the people living in Indian cities and towns, has a significant role to play in generating

[3] Metropolitan cities are cities with population of over 1 million.

these economies and minimising congestion diseconomies so that cities can contribute to a healthy investment climate and a supportive environment for enterprise and employment. Integrated planning of land use and transport with special emphasis on public transport and affordable housing for the low-income groups is extremely important if agglomeration economies are not to be offset by congestion diseconomies. The challenges and opportunities presented by urbanisation in India's current stage of development are spelt out in the subsequent sections.

10.3 Empirical evidence on urbanisation

Only 31 per cent of India's population lived in urban areas according to the latest Census of India of 2011 but this segment contributed 62 per cent of GDP which is projected to increase to 75 per cent by 2031.[4] India's urban population share is much lower than in many countries with which India is normally compared, e.g., China – 48 per cent, Indonesia – 56 per cent, Mexico – 79 per cent, Korea – 83 per cent and Brazil – 87 per cent. India's urban population is projected to increase to 40 per cent by 2031. This would mean that having increased from 286 million in 2001 to 377 million in 2011, India's urban population will reach 600 million in 2031. The absolute numbers are staggering, and there is reason to believe that these numbers are underestimates.[5]

Urban development is principally the responsibility of the state governments. In 1992, the 74th Constitutional Amendment had formally recognised Urban Local Bodies (ULBs) as the third tier of government. It recommended that state governments transfer to local governments a set of specified functions, assigning to them the responsibility for the provision of water, solid waste management, waste water treatment, storm water drains, etc. The Constitutional Amendment also recommended that State Finance Commissions (SFCs) be set up by the state governments to spell out the principles for sharing/devolving a part of the revenue of the state government to local governments. The expectation was that SFCs will follow the exemplary tradition of the Central Finance Commission (CFC) in the quality of their membership and recommendations, so that funds will be devolved to the third tier for discharging the constitutional mandate of service delivery. This has not happened. As a result, the mandates of ULBs have

[4] The Mid-Term Appraisal of the Eleventh Five Year Plan had noted that the contribution of the urban sector to India's GDP grew from 29 per cent in 1950–51 to 62–63 per cent in 2009–10 and that it is expected to increase to 70–75 per cent by 2030 (page 378, Chapter 18, Mid-Term Appraisal of the Eleventh Five Year Plan, Planning Commission, Government of India).

[5] High Powered Expert Committee on Urban Infrastructure and Services, Ministry of Urban Development, Government of India (Ahluwalia, 2011).

remained unfunded. The third tier of government remains hamstrung by lack of finances and also capacity.

While the state governments have not paid adequate attention to urban development, the Government of India has also looked the other way. JNNURM (Jawaharlal Nehru National Urban Renewal Mission) was the first national Mission which focused the nation's attention and the state governments' energy in getting city governments to work on urban renewal and urban development. But the complex agenda of linking government financing of projects to reforms in the urban sector was only partially effective. A recent detailed assessment of JNNURM is provided in a paper on Urban Infrastructure and Service Delivery by the present author in the volume, *Urbanisation in India: Challenges, Opportunities and The Way Forward* , edited by Ahluwalia, Kanbur and Mohanty (Sage, 2014). A successor Mission AMRUT (Atal Mission for Rejuvenation and Urban Transformation) has been launched in June 2015 which will cover 500 cities with the focus on better water and sanitation conditions, transport, and green spaces. Clean India Campaign or Swacch Bharat also includes an urban component with overlapping objectives to be delivered jointly by the three tiers of government. In addition, a Smart Cities Mission will cover 100 cities selected on a competitive basis, for providing smart urban solutions for infrastructure and service delivery. The financing mechanisms and governance structures for these Missions are yet to be spelt out. It is hoped that these Missions will learn from the experience of JNNURM.

One reason for the neglect of urban development issues is that the political economy of development in India has remained dominantly focused on rural development. In the minds of many politicians, India continues to live in villages even though more and more Indians are shifting to cities and towns. India's political system has been reluctant to recognise urbanisation. The last time Parliamentary and state legislative constituencies were redefined to reflect population changes within the country, including because of growing urbanisation, was in 2008. This was done by the Order of the Delimitation Commission which took account of the population changes between 1971 and 2001. India's urban population in 2001 was 28 per cent. The ground reality has been changing rapidly since then, but the next delimitation exercise will only be in 2030–31 when India's urban population would be at least 40 per cent. Until then, urban India will remain underrepresented in the political process.

Interestingly, there is strong resistance at the local government level to 'go urban' because they see more largesse coming their way if they remain 'rural'. Many centrally sponsored schemes for education, health, infrastructure and employment, for example, are specifically targeted to the rural sector, thereby developing political conviction at the local government level that there is "more money" in remaining rural. It is not surprising therefore that between 2001 and 2011 even though the number of areas defined by the census as "towns"

increased by over 2500 from 1362 to 3894, the number of towns with statutory urban local bodies increased by less than 250. This means that by 2011, there were more than 2500 "*laavaris*" or orphan urban areas with no statutory authority responsible for the development of urban infrastructure and delivery of urban services in these areas.[6]

The inadequacy and poor quality of delivery of services to urban areas has been mentioned earlier. This is as true for the availability and quality of drinking water as it is for waste water treatment, solid waste management, urban roads, public transport or street lights. A summary overview on water and sanitation will convey the sense of the challenge. In the case of drinking water, for example, a little less than two-thirds, i.e. 64 per cent, of the urban population is covered by individual piped water connections, compared with 91 per cent in China, 86 per cent in South Africa, and 80 per cent in Brazil. The situation is even worse with respect to the duration of water supply which ranges from a couple of hours every third or fourth day to six hours daily across the cities and towns of India, unlike in China and Brazil where water flows through the pipes at all hours of the day and night.

Only about 30 per cent of the urban population is connected to sewerage networks and less than 20 per cent of the total sewage generated is treated before disposal. The untreated sewage is dumped into open storm water drains and discharged as such into rivers and lakes. The problem is further compounded by chemical pollution which comes from uncontrolled discharge of industrial effluents. As cities return wastewater or sewage into rivers and lakes without treatment, they pollute the primary natural source of drinking water and create the need for further treatment which in turn requires more use of electricity for generating clean drinking water. The problem of drinking water cannot be addressed separately from the problem of waste water treatment.

The good news is that some successful pilots have emerged in recent years which provide a 24x7 supply of drinking water through public private partnership or reforms of public utilities. In a pioneering example, the three cities of Karnataka, i.e., Hubli-Dharwad, Belgaum and Gulbarga, delivered 24x7 water in four selected wards each (covering about 10 per cent of their population). But these solutions based on complete replacement of the distribution network were not cost-effective, and pricing to cover costs remains a serious problem. There is some progress more recently on scaling up in these cities. Nagpur in Maharashtra has taken the lead in moving towards a 24x7 supply via a public-private partnership within an integrated water management framework and with an eye on cost-effectiveness as well as cost recovery.

Maharashtra Sujal Nirmal Abhiyaan (MSNA) was a good example of a state-led reform-oriented programme of integrated management of water and sanitation,

[6] Laavaris is one who has no one to look after him or her.

which covered all urban local bodies in Maharashtra except the five large cities covered under JNNURM. A number of towns, e.g., Amravati, Malkapur, Badlapur showed excellent outcomes under MSNA through a 24x7 water delivery while recovering operations and maintenance costs. But after a few initial successes, MSNA has been virtually abandoned in Maharashtra. If best practices are not sustained even where they have shown good results, where is the hope for learning from such results in other states?

The state of municipal solid waste management has also reached alarming proportions in many Indian cities and towns. Urban India produces an average of 160,000 to 180,000 metric tonnes of municipal solid waste or garbage every day,[7] and the bigger cities are the worst culprits.[8] The Municipal Solid Waste (Management and Handling) Rules were notified by the Government of India in 2000, but they are observed more in the breach. Most urban local governments have confined themselves to collection and transportation of solid waste, and there has been little emphasis on either reduction of waste or segregation of dry waste and wet waste at source. Recycling is normally done by the informal sector which includes the abominable practice of rag-pickers typically sifting through garbage looking for what they can sell. Segregation at source between dry and wet waste could create conditions in which rag pickers can provide a useful role in sorting for recycling the solid waste in an organised manner. Pune is a good example of integrating rag-pickers in the supply chain of processing, recycling and disposing of the dry waste.

In a large number of Indian cities, solid waste is typically dumped into local community bins from where it is collected sporadically and transported in open trucks to intermediate transfer stations, eventually finding its way to open dumpsites. Rajkot in Gujarat is one of the first cities to have an integrated approach to the management of solid waste with collection, processing, recycling, converting waste to energy and finally disposing through sanitary landfills. Pammal in Tamilnadu has focused on collection, processing and recycling with active involvement of the community. Pune in Maharashtra has not only worked on building awareness on the importance of reduction of waste and its segregation into wet biodegradable waste and the rest, but has also put in place the appropriate alternative processing arrangements such as decentralised bio-methanation plants for wet waste and high technology capital intensive waste to energy plants for unsegregated mixed waste. It is the residue that goes into the sanitary landfills. The recognition of the challenge of solid waste management is growing

[7] This includes household waste, institutional waste from offices, shops, and hotels, medical waste from hospitals and clinics, waste picked up in the course of street cleaning, and construction debris.

[8] Kolkata leads with 11,520 tonnes per day (TPD), while Mumbai with 11,124 tpd and Delhi with 11.040 tpd, follow closely.

in urban India, although effective responses are slow to emerge. Bangaluru, for example, has passed a law which makes it mandatory to segregate solid waste at source into dry and wet before it is collected. Much more is needed including a campaign to build awareness on the importance of reducing waste. This has to be supplemented with a knowledge base on the alternatives available including waste to energy options.

10.4 Investment requirements, financing and implications for governance

Provision of necessary public services in Indian cities and towns will obviously require additional resources. In 2008, the Government of India set up a High Powered Expert Committee (HPEC) under the Chairmanship of the present author to provide an estimate of the urban infrastructure investment requirement over the 20-year period 2012–2031. The HPEC Report (Ahluwalia, 2011) estimated an investment requirement of $827 billion (at 2009–10 prices) for urban infrastructure, including for slum redevelopment and capacity building. This was based on the assumptions that (i) GDP would increase at 8 per cent per annum for the 20-year period, (ii) all the unserved and underserved population between 2012 and 2031 will be covered, (iii) all the additional population will be covered, and (iv) the norms for service delivery set by the Ministry of Urban Development will apply universally. The investment estimate does not include primary education, primary health, and electricity distribution, and it also does not cover land cost. About two-thirds of the total investment requirement is for urban roads, transport and traffic support infrastructure, where the backlog is very large. Just about one-fourth of the investment requirement is for water, sewerage, solid waste management, storm water drains and street lighting. The cost of operations and maintenance is estimated at an additional $ 400 billion for old and new assets together.

If investment in urban infrastructure were to increase by 15 per cent per annum during the period from 2012 to 2017, 12 per cent per annum over the subsequent five years and 8 per cent per annum over the next 10 years, this would bring about the needed increase in investment of $827 billion. Since total expenditure on the urban sector amounted to 1.6 per cent of GDP in 2011–12, the estimated requirements would imply that it should reach 2.2 per cent of GDP by 2031–32. This can be financed if there are efforts at resource mobilisation and deployment at all levels of government.

The Government of India can scale up urban development funding through national programmes such as the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) from 0.1 per cent of GDP to 0.25 per cent of GDP. The recently announced AMRUT – a successor to JNNURM – is in the process of being put together in design, scope and scale. A separate mission has been launched to

develop 100 Smart Cities, while a campaign for Clean India will also have an urban component to be implemented by cities and state governments.

State governments need to enter into constitutionally mandated revenue-sharing arrangements with city governments and create an enabling environment for reform so that the urban local governments can fulfil the mandate given to them by the Constitution. As recommended by HPEC (Ahluwalia, 2011), a good opportunity is provided by the Goods and Services Tax (GST) since the legislative process for a Constitutional Amendment for GST is in the works. Ideally, a small proportion of GST (which would be agreed upon between the state governments and the Government of India) should be earmarked for transfer to local governments. This would go a long way in providing some basic financial support to the city governments. But the political climate for such devolution is missing, and the state governments are reluctant to do so.

Urban local governments must aggressively push reforms in order to increase their own revenues, which was less than one-third of total expenditure on the urban sector in 2011–12. Own revenue of urban local governments accounts on average for only 0.6 per cent of GDP. Their total revenue is only 0.9 per cent of the gross domestic product (GDP) on average, much lower than the revenues of urban local governments in South Africa (6 per cent) and Brazil (7.4 per cent).[9] Because there is wide variation around the average, there are many local governments which do not even raise enough financial resources to pay salaries to their employees and are dependent on the state government for the same. The HPEC (Ahluwalia, 2011) recommended that own revenue must increase to 1.5 per cent of GDP by 2031–32.

It is important to strengthen the capacity of city governments to generate their "own" revenue. Municipal bodies in India can levy and collect only those taxes that state governments choose to devolve from their powers as specified in the State List in the Seventh Schedule to the Constitution. The 74th Constitutional Amendment Act did not provide for a "municipal finance list" in the Constitution to match the municipal functions listed, thereby signalling "incomplete devolution" and leaving the issue of financial devolution to be addressed by the state governments. Typically, the most important tax levied at local level is property tax. The responsibility of designing the property tax system in India rests with state governments, while local governments are allowed to fix tax rates within a band and prepare a collection strategy. However, property tax is actually controlled by state governments. This effectively takes away the prime funding instrument from the control of the municipality as was evidenced in the last few years when Haryana and Rajasthan abolished/diluted their property tax in all cities of their states in two separate instances.[10] The fact that states can take

[9] Rao and Bird, 2010, and Mohanty et al., 2007

[10] Punjab had agreed in December 2006 under the JNNURM to withdraw the exemption from property tax for self-occupied properties by December 2008 but did not do so.

such a decision suddenly and arbitrarily creates political risk that is damaging for the local governments' ability to access market finance.

To make access to finance possible through borrowing and/or public private partnership, urban local governments must work on a revenue model which makes them both credit-worthy and market-worthy. This makes it absolutely essential to relate user charges to the cost of service delivery. It may well be that in the first instance only partial recovery of operation and maintenance (o&m) costs is possible, but it is important to commit to covering this over a specified period. A commercial orientation will also require focusing attention on improving efficiency in operations through administrative reforms and putting in place better systems of delivery.

Last but not the least, it is extremely important to develop capacity for urban planning and city management. Improvement in service delivery is crucially dependent on the reform of institutions and the capacity of those who run the institutions for service delivery and revenue generation. For this a municipal cadre is very important, which can then be trained in urban planning, city management, use of new technology, etc.

10.5 JNNURM: a brief assessment

Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was a major initiative of the Government of India to help urban renewal with active involvement of the state governments as well as city governments in planning, financing and reforming governance. There were four sub-Missions run by two separate Ministries, the Ministry for Urban Development and the Ministry for Housing and Poverty Alleviation. While both the level of funding and the coverage of cities seemed to fall short of what was needed, the absorptive capacity of the system proved to be limited even in making the best use of what was on offer. In retrospect, it is clear that capacity to plan and manage at the local government level and capacity to guide and facilitate at higher levels of government are critical preconditions for the success of a national Mission like JNNURM.

The Government of India committed Rs 660 billion as its share in a total investment pool of over Rs 1000 billion. By July 2014, Rs 521 billion was disbursed for projects with a total cost of Rs 1292 billion. More than 50 per cent of the funding was for projects in drinking water, sewerage, drainage, waste water treatment and solid waste management.

The focus on bridging infrastructure deficit through project funding meant that there was less focus on improvement in service delivery in assessing performance and more on monitoring reform commitments made by the urban local government and the state government. This was because JNNURM was designed with the objective of providing urban infrastructure by partially funding such projects and linking the financial support with specific reforms at the

state level and at the level of the city government and specific shares of financial contributions from these governments. The reforms were divided into mandatory reforms and optional reforms in the areas of planning, administration and finance; project-oriented fund transfers from the Government of India through the state governments to city governments were used as a driver of change for reforms in the second and third tiers of government to improve the state of Indian cities.

In the event, JNNURM had limited success in driving urban reforms. The reform conditionality of a project under JNNURM was not easy to enforce because of the way the link was designed between project financing and policy reform at the macro level. Through no fault of the project managers, funding for the project could be jeopardised if the state government or the city government did not deliver on a reform commitment. If laxity on reform was overlooked in the interest of the specific project, it created problems of moral hazard, and if funding was interrupted, it would mean locking in a great deal of capital and delaying project completion. Since most city governments did not cross the threshold of reforms that would generate a credible revenue model, private finance was not forthcoming. Both for attracting funds from the capital market and for public private partnerships, the absence of a credible revenue model proved a major roadblock to attracting private finance.

The biggest contribution of JNNURM was to bring the challenges of urbanisation to the centre of the overall policy discourse on economic development and create dynamism in the urban sector which had long suffered neglect. Urban local governments were expected to engage directly in the process of identifying infrastructure projects within the framework of a City Development Plan and the state governments were expected to provide an enabling environment for bringing concrete proposals for funding to the Government of India and put forth their own share of financing. The author has presented a number of case studies in a recent volume, *Transforming Our Cities* (Harper Collins, 2014) which show the success of JNNURM in improving services on the ground. The analysis of these case studies shows that their success crucially depended on the enabling environment for reform and innovation provided by the state government for the local governments, on the capacity to plan, implement and manage projects at the city level, and relative financial resilience of the urban local government. Of course, human leadership and information technology also played a very major role.

It would be fair to say that JNNURM raised the ambition of Indian cities. Whether it is continuous water supply from a treated source for all in the small town of Malkapur in Maharashtra, or inspiring stories of solid waste management in Pune, Rajkot and Pammal, or waste water treatment in Navi Mumbai, Surat and Chandigarh, or improvement in public transport scenario through buses in Bangaluru and BRTS in Ahmedabad, it is clear that Indian cities are on

the road to transforming themselves. Similarly, e-governance with back end integration has made a significant difference to citizens' problems in getting birth or death certificates, or building sanctions, or paying property tax and/or utility bills. Bangaluru in Karnataka, Hyderabad in Andhra Pradesh, Kalyan Dombivili, Pune and Pimpri Chinchwad in Maharashtra, Ahmedabad and Surat in Gujarat are only some of these cities. In all these cases, change in urban India is not only in the air but is beginning to show on the ground. It is necessary to look deeper into what has made this possible and put the capacities, institutions and policies in place across the urban landscape of India. The new initiatives of Swacch Bharat, AMRUT and Smart Cities program launched in 2015 would do well to incorporate the lessons learnt from JNNURM.

10.6 Conclusion

The analysis in this chapter has spelt out the clear need for facilitating and accommodating urbanisation of the Indian economy as it gathers further momentum in the coming years. The dividends from this approach go beyond benefitting the urban areas. Neglecting urban development not only has huge adverse implications for public health but it also makes high growth rates of GDP unsustainable. The chapter also argues that in addressing the challenges of urbanisation, the different roles of the Government of India, state governments and urban local governments as laid out in the Constitution need to be kept in mind and capacities built at all three levels to create a mutually supportive environment for urban planning and management. Since accountability for delivery of basic services rests with the urban local governments and state governments have the overall responsibility for urban development, the Government of India can only play a strategic role in guiding the process, particularly in states which are lagging behind, nudging them towards the necessary reforms and building awareness of best practices from other states. Another very important area where the Government of India should play a major strategic role is in transport connectivity within and across states with special emphasis on metropolitan area development and regional development.

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11
Are Foreign Direct Investments in the Balkans Different?

Saul Estrin and Milica Uvalic[1]

11.1 Introduction

The chapter examines whether there are specific features driving foreign direct investment (FDI) to the Western Balkan (WB) countries – Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia – compared with other transition economies. Despite many positive developments during the 2000s, the Balkans may still face an image problem: for many potential foreign investors, the word Balkan 'conjures up troubled images of war and conflict, rather than investment opportunities and economic potential' (Cviic and Sanfey, 2010, p. 124). This chapter explores whether FDI into the Western Balkans has been lower than can be explained by the economic characteristics of the region, such as the smaller size of domestic markets and greater distance from the main investing economies. Our analysis confirms this view; FDI to the Western Balkans is driven by the same economic, geographical and institutional factors as other transition economies, but there is evidence of a significant negative regional effect.

We first provide, in section 11.2, a brief historical background and discuss the key characteristics of FDI inflows to the Balkan region during the 1990s and the 2000s. Although the primary focus is on the WB countries, Bulgaria and Romania are also occasionally considered. We go on in section 11.3 to test hypotheses about FDI on the basis of a gravity model. The conclusions in section 11.4 point to the main results.

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11.2 Patterns of FDI in the Balkans

Over the past twenty years there has been a flourishing literature about FDI in Eastern Europe, since foreign capital has played an important role in most countries during the transition to market economy. A number of studies have looked into the volume, forms, origins and destination of FDI by economic activity (for example, Lankes and Venables, 1996; Meyer, 1998; Estrin, Richet and Brada, 2000; Bartlett, 2008; Kalotay, 2010; Hunya, 2011, 2012). In addition, econometric papers have examined the locational determinants of FDI (for example, Bevan and Estrin, 2004; Bevan, Estrin and Meyer, 2002; Janicki and Wunnava, 2004; Dikova and van Witteloostuijn, 2007). However, there has been relatively little research on FDI into the Western Balkans.

Political and economic instability may explain why, in the considerable literature on FDI in transition economies, there has been little research specifically on the Balkans. From 1991 onwards, political events have had negative economic implications for the whole region. In particular, the disintegration of the Yugoslav federation led to the break-up of traditional economic links, a very deep recession, delays in economic reforms and later integration with the EU (Uvalic, 2010, 2012).

The papers that have focused on FDI in the Balkans are inconclusive as to whether there is a negative 'Balkans' effect on FDI. Christie (2003) finds FDI in the South East European (SEE) region is low relative to the Central East European (CEE) countries, but his analysis is incomplete since it excludes three Balkan countries. Brada, Kutan and Yigit (2006) find that conflict, instability and delayed transition have reduced FDI inflows in the Balkans and Demekas et al. (2005) also find actual FDI in most Balkan countries to be lower than potential. Only Kekic (2005) finds that the determinants of FDI to the Balkans do not differ from those in other transition regions. However, there has been a strong upsurge in FDI in most Balkan countries since 2000, which may have compensated for the earlier lack of FDI. Hence it is important to re-examine these issues taking into account more recent data.

Main features of FDI in the 1990s

The Balkan region attracted little FDI during the 1990s. Even if we include Bulgaria and Romania in the Balkan region, by 1996 inward FDI stock in Albania, Bulgaria, Croatia, Macedonia, Romania and FR Yugoslavia (without Bosnia and Herzegovina that in 1992–95 was at war) amounted to only US$3.4 billion or 5.7 percent of total inward FDI stock in all 27 transition economies; less than their share (7.7 percent) in total population of the transition region and much less than implied by their history. The situation improved after the signing of the Dayton Peace Accords in 1995, but over the whole 1989–2000 period, the inward

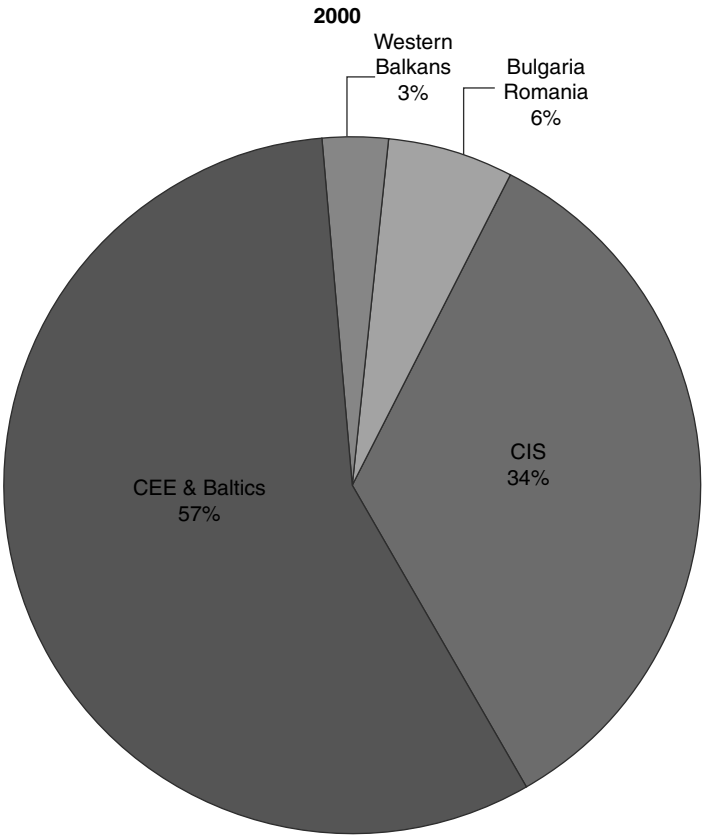

Figure 11.1 Inward FDI stock by transition regions, 2000 (shares, in percent)

FDI stock in the seven SEE countries amounted to around US$15.3 billion or 9.4 percent of total inward FDI stock in all 27 transition countries (see Figure 11.1).

Romania has been the main recipient, as by 2000 it had attracted by far the most FDI in the Balkans, almost as much as all the other countries put together. In 2000, Bulgaria, Croatia and Romania accounted for more than 80 percent of the total inward FDI stock in the SEE region (see Figure 11.2).

Upsurge of FDI in the 2000s

From the early 2000s, the Balkan countries greatly improved their economic performance and accelerated transition-related economic reforms. The international community also changed its policies towards the region after the end of the Kosovo conflict in mid-1999 with the launch of the EU Stabilization and Association Process specifically for the Western Balkans, offering them trade liberalization, assistance programmes, contractual relations and prospects of EU

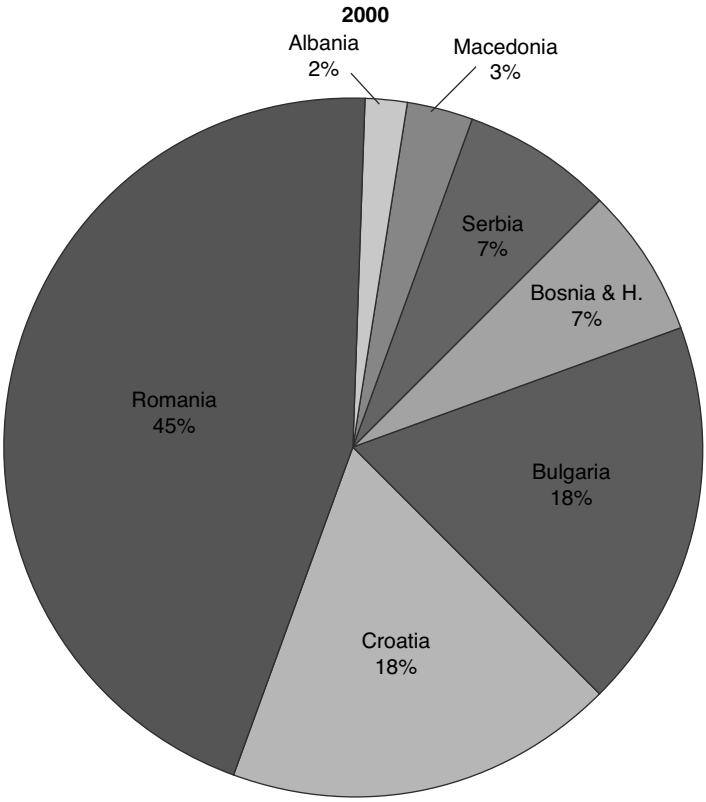

Figure 11.2 Inward FDI stock in SEE, by country, 2000 (shares, in percent)

membership. Perhaps as a consequence of the improving political and economic climate, there was a marked increase in FDI thereafter. Even so, by 2010 the eight Balkan countries (including Bulgaria and Romania) had received only around a third of the volume of FDI that had gone to the eight countries in CEE and the Baltics. The share of the eight Balkan countries in total inward FDI stock in the transition region increased to 14.7 percent in 2010 (5.8 percent in the Western Balkans and another 8.9 percent in Bulgaria and Romania, see Figure 11.3), by 2010 representing almost double their relative share in the population of the transition region.

However, intra-regional shares in FDI have not changed substantially (see Figure 11.4). Romania, Bulgaria and Croatia continued to be responsible for the bulk of total inward FDI stock in 2010 (78 percent), but Serbia has also attracted increasing FDI after 2003.

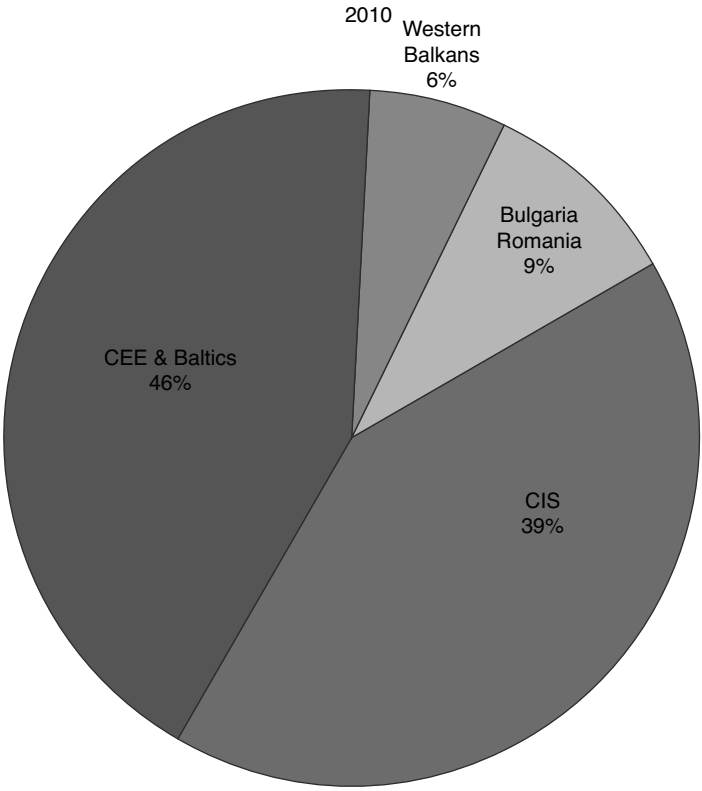

Figure 11.3 Inward FDI stock by transition regions, 2010 (shares, in percent)

In order to account for the very different sizes of the individual SEE countries – Montenegro has a population of just 0.6 million while Romania has 21.5 million – data on inward FDI stock per capita (in 2010 and 2011) are reported in Figure 11.5. Montenegro as the smallest SEE country is ahead of all the others in FDI per capita terms, followed closely by Croatia and Bulgaria. Although Montenegro in 2010–11 had the highest FDI stock per capita among all countries considered, this indicator may be misleading because larger countries generally attract more FDI. There are no perfect indicators of FDI, so it is sensible to consider a variety of indicators jointly.

FDI by sector of economic activity

Another interesting feature of FDI in the Balkans is its sectoral distribution. This issue is likely to be important in assessing the longer-term impact of FDI on individual economies, such as its contribution to the promotion of exports or to the generation of new employment. FDI by sector of economic activity based

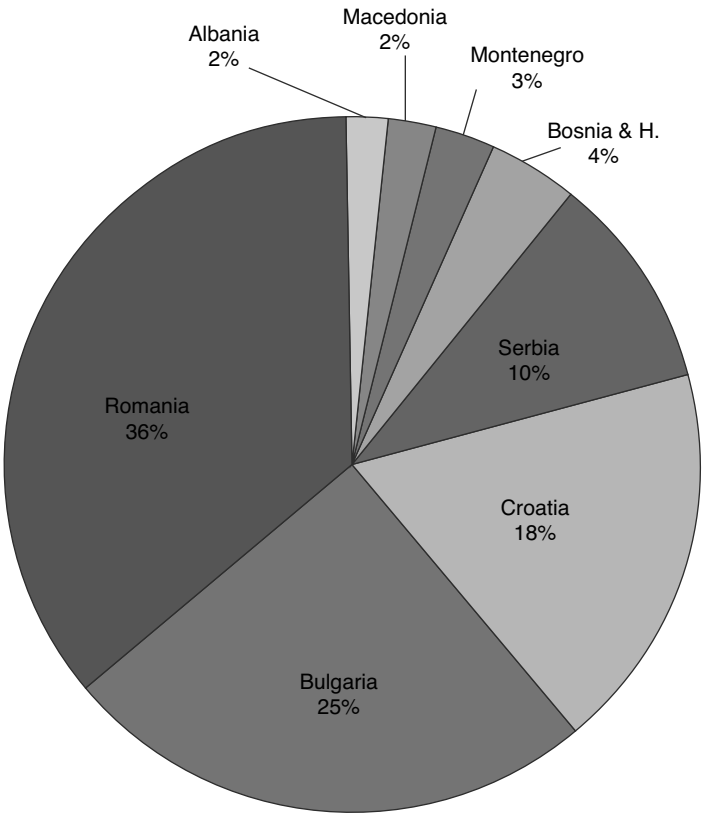

Figure 11.4 Inward FDI stock in SEE, by country, 2010 (shares, in percent)

on the WIIW database shows that by 2010, the service sector accounted for the largest part of inward FDI stock in all seven SEE countries, on average 62 percent of total in the SEE region.[2] The service sector represented around 50 percent of inward FDI stock in Macedonia and Romania, close to 60 percent in Albania and Bosnia and Herzegovina, 68 per cent in Bulgaria and as much as 73 percent in both Croatia and Serbia. Banking, telecommunications, real estate and wholesale and retail trade have been among the most favored sectors of foreign investors in the region. The only three countries that have attracted a considerable amount of FDI in manufacturing are Bosnia and Herzegovina (35 percent of total), Macedonia (31 percent) and Romania (32 percent), which is in contrast to

[2] Were data on FDI by sector of economic activity available for Montenegro, the average FDI stock in services in the SEE region would undoubtedly be even higher, since many foreign investors in Montenegro have invested in tourism.

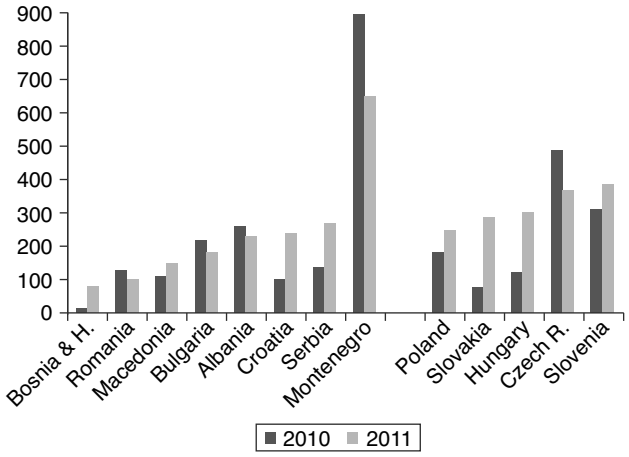

Figure 11.5 FDI stock per capita in SEE and CEE (million EUR), 2010 and 2011

the much lower shares in the other countries – 16 percent in Albania, 17 percent in Bulgaria, 20 percent in Serbia and 21 percent in Croatia.

How does this compare to the situation in the five CEE transition economies? The share of FDI invested in various services is slightly lower in CEE than in SEE – on average, 56 percent, but the variations within CEE have been much lower than within SEE. A share of FDI in services of a bit over 60 percent was registered only in Poland and Slovenia, but in as many as five Balkan countries. In the five CEE countries manufacturing accounts, on average, for 29.4 percent of inward FDI stock, compared to 24.7 percent in the seven SEE countries. Particularly three CEE countries have attracted substantial amounts of FDI in manufacturing: the Czech Republic (30 percent), Poland (32 percent) and Slovakia (36 percent). This probably helps to explain why FDI has been less an agent of structural changes in SEE than in CEE.

11.3 Determinants of FDI location in transition and Balkan economies

The theory of the multinational enterprise (MNE) suggests that firms engage in outward FDI when they have some resources that they can transfer and exploit, known in the literature varyingly as firm specific advantages (FSAs) (Rugman, 1982) or ownership (O) advantages (Dunning, 1993). Only certain types of firms and products are suitable for exploiting these advantages through internalisation (I), namely creating subsidiaries for research, production and distribution in other countries, rather than by exporting or the use of licenses and long term

contracts. Finally, the choice of location (L) is driven by firms finding the optimal place where to *combine* their FSAs with locational advantages to both exploit and explore their FSAs. This framework is known as the OLI paradigm (Dunning, 1993; Dunning and Lundan, 2009). It argues that firms expand internationally where they can redeploy their internationally-transferable proprietary resources and capabilities to both exploit and explore their resource base. The combination of the FSAs of the firm with the specific conditions found in potential host locations is essential. In other words, different types of firms are attracted to different locational advantages.

The study of locational determinants of FDI represents a long-established literature that originated with Mundell's (1957) factor endowment theorem (see Brainard, 1997). The predominant empirical approach to the study of FDI flows is based on gravity models borrowed from international trade research, which posit that the main drivers of trade or foreign investment flows are a) the size of the host economy, b) the size of the source economy, and c) the distance between the two economies (Bloningen, 2005; Carr et al., 2001). While these variables have persistently shown to be an important – if not the most important – determinant of FDI (Chakrabarti, 2001; Anderson and van Wincoop, 2003), recent literature has considerably broadened the notion of locational advantages to encompass the attractiveness of a potential host economy as both a site for production and as a market. Contemporary literature therefore additionally considers:

1. the costs of production, especially unit labour costs (or wage differentials) and locally available intermediate goods (Bevan and Estrin, 2004);
2. specifically for investment in the primary sector, the presence of natural resources (Hejazi and Pauli, 2003);
3. the institutional framework facilitating or inhibiting the operations of foreign investors, either in an aggregate form, by focusing on specific aspects such as corruption (Habib and Zurawicki, 2002), or by analysing multiple aspects simultaneously (Bevan, Estrin and Meyer, 2004; Globerman and Shapiro, 2003; Grosse and Trevino, 2005);
4. membership of international trade and economic associations; for example Bevan and Estrin (2004) studying transition economies explored the effects of announcements of likely European Union (EU) membership.

The four classic motivations for FDI (Dunning, 1993) – market seeking; efficiency seeking; resource seeking; and asset seeking – provide a further justification for the estimation framework. Market seeking FDI is driven by size and growth of the host economy market and probably played an important role in the investment into the transition economies, especially in the early years (Lankes and Venables, 1996; Bevan and Estrin, 2004). The size of the economy is captured by the GDP of the host economy, and this variable is sometimes supplemented by the rate of growth of the host economy. The ability to exploit

market seeking opportunities is enhanced by scale economies, and these will be greater if the FDI source economy provides a larger domestic market for investing multinational enterprises; this argument provides a basis for the inclusion of the source economy GDP in the estimating equation. Distance between the source and host economies is an indicator of the transactions cost of doing business through foreign investment, and the quality of institutions in the host economy is a further indicator of the cost side of the investment opportunity.

Efficiency seeking FDI usually takes the form of investment by firms seeking lower manufacturing costs, for example by relocating production facilities to countries of lower labour cost or outsourcing elements in a firm's value chain to lower cost of suppliers abroad. Bevan and Estrin (2004) controlled for this by enhancing the basic gravity model with the inclusion of labour costs in the host economy, and the variable was found to be significant for their panel of transition economies. Membership of free trade associations and economic communities also reduce cross border transactions costs and we therefore also control for the announcement of EU membership in our empirical work. More generally, efficiency seeking has often been cited as a motivation for investment to Thailand and the Philippines, and for much FDI into transition economies, for example the major investments by German car firms into Slovakia and the Czech Republic in the 1990s (Estrin, Richet and Brada, 2000). However, low wages are a two-edged sword for foreign investors; low wages might reduce labour costs but they also limit domestic demand in the host economy. Thus efficiency seeking investors will be attracted by low labour costs; market seeking investors will favor countries with high and rising wage payments.

The third motivation, resource seeking, is quite a distinct one, of relevance to multinationals in the resource sector. This is not an important aspect of the Balkans story, but may be relevant across transition economies as a whole; hence we include an indicator of the resources available in the host economy as a control variable in our estimating equation.

Finally, asset seeking FDI is usually considered in terms of tangible or intangible assets, for example patents or brands. This motivation is likely to predominate in FDI between advanced economies, but is not obviously relevant for transition economies, especially the Balkans. However, the privatisation process has created a specific asset seeking explanation for FDI in transition (see Estrin et al., 2009). Thus, for most transition economies, the process of privatisation has formed a distinct motivation for FDI. Western multinationals are attracted to enter reforming economies during privatisation programmes by making acquisitions because prices are relatively low and because of highly favorable tax policies or even subsidies associated with the privatisation. We have therefore included a variable for progress in large scale privatisation in our estimating formula.

We use this empirical framework to explore the factors influencing the locational choice of FDI from developed Western economies to transition economies,

including the Balkans, Central and Eastern Europe, the Baltic States and the rest of the former Soviet Union. Our hypothesis about the impact on FDI of being located in the Balkans is tested by the sign and significance of a dummy variable for the Western Balkan countries within a common estimating equation.[3] We therefore estimate an equation of the form:

$$\begin{aligned} FDI_{ij} = f(&GDP_i, GDP_j, \Delta GDP_j, distance_{ij}, wages_j, resources_j, \\ &institutions_j, EUmembership_j, Western\ Balkans_j) \end{aligned} \quad (1)$$

where i denotes the source economy and j denotes the host economy. We estimate equation (1) across 17 transition economies from more than 70 source economies over the 1990–2011 period.

FDI is measured as the flows from country i to j in a given year (derived from the WIIW database). For source and host economy *GDP* we use IMF WEO data, and the impact of market seeking factors, which the latter measures, is in some regressions augmented by the inclusion of *GDP growth* (ΔGDPj) in the host economy. Turning to *distance*, we use the geographic measure (km) between capitals, sourced from CEPII. Host economy *wages* are defined as average gross monthly wages and sourced from the WIIW, while to control for *resources*, we include fuel, ores and metal exports of the host economy as a percentage of merchandise exports (World Bank development indicators).

There is not an agreed single measure of institutional quality, and the literature notes the problems that arise from collinearity between alternative measures (Bevan, Estrin and Meyer, 2004). After some experimentation, we decided to use two indicators of institutional quality, namely investment freedom (*invtfreedom*) and a quality of property rights protection index (*propertyrights*), derived from the Heritage Foundation's Index of Economic Freedom. In addition, we take into account FDI opportunities from privatisation using the EBRD's large scale privatisation index (*ti_ls_privatisation*). In controlling for EU membership, we follow Bevan and Estrin (2004) in focusing on the announcement effect (*eu_announcement)*. Finally, we include a *Western Balkans* dummy variable, taking the value of 1 if a country is located in the Western Balkans and 0 otherwise. The economic variables are all included in logs to address non-linearities and non-normality of the data, and we lag all relevant variables (namely, all excluding distance, the Balkans dummy, resources and the EU announcement dummy) to address potential questions of endogeneity.

[3] We also explored the impact of a Baltics dummy to see whether this fairly isolated regional cluster has special characteristics similar to the Western Balkans, distinguishing them from Central and Eastern Europe and the rest of the former Soviet Union. The results are reported below.

Table 11.1 FDI Inflows to transition economies, 1990–2011

VARIABLES	−1 m1 logfdi	−2 m2 logfdi	−3 m3 logfdi	−4 m4 logfdi	−5 m5 logfdi	−6 m6 logfdi
Loggdpi_lag1	1.08***	0.14	0.19*	0.34***	0.17	0.37***
	(0.04)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)
Loggdpj_lag1	1.40***	1.93***	1.93***	1.93***	1.93***	1.93***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Logdistanceij	−2.92***	−4.08***	−4.07***	−4.06***	−4.07***	−4.06***
	(0.06)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Logwagesi_lag1		1.25***	1.26***	1.27***	1.68***	1.25***
		(0.26)	(0.26)	(0.31)	(0.31)	(0.31)
Westernbalkans		−4.07***	−3.97***	−4.08***	−4.50***	−3.94***
		(0.27)	(0.27)	(0.43)	(0.47)	(0.47)
Resources		0.05***	0.04***	0.06***	0.02**	0.06***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
eu_announcement		2.16***	2.03***	3.34***		3.27***
		(0.42)	(0.42)	(0.49)		(0.49)
gdpj_growth_lag1		2.06**	1.88**	2.68***	2.70***	2.62***
		(0.91)	(0.91)	(0.97)	(0.97)	(0.97)
ti_ls_privatisation_lag1			0.22**	0.20*	0.24**	0.18*
			(0.11)	(0.11)	(0.11)	(0.11)
Propertyrights_lag1				−0.00	−0.02*	−0.01
				(0.01)	(0.01)	(0.01)
Invtfreedom_lag1					0.02*	0.01
					(0.01)	(0.01)
Constant	1.32***	3.57**	2.79*	0.88	2.09	0.47
	(0.47)	(1.49)	(1.51)	(1.57)	(1.60)	(1.58)
Observations	15.978	6.451	6.451	6.322	6.322	6.322
R-squared	0.26	0.38	0.38	0.38	0.38	0.38

The correlation coefficients between the independent variables suggest there are some issues of collinearity among the institutional variables. Thus the institutional quality variables are collinear – countries tend to have good or bad institutions but there is no variation according to the type of institution. The Balkans dummy is correlated with institutional quality, and EU membership with institutional quality and privatisation. Thus there is some evidence that institutional quality drives EU membership rather than the converse.

To address these problems, we estimated a horse race over the entire sample period (1990–2011) to explore the effects of collinearity on our results, by adding one or several variables at a time. Selected regressions are reported in Table 11.1; results on the key variables of interest are not affected by changes in specifications. Column 1 provides the basic model formulation, in which FDI

from around the world into the transition economies is explained by the GDPs of the home and host economies and the geographic distance between them. As expected, the estimation describes very well the FDI inflow process; FDI is positively and significantly related to the GDP of the host and source economy, and negatively related to their distance apart.[4]

Column 2 reports an expanded specification which takes account of wages, resources, and GDP growth, as well as the Western Balkans and EU dummies. The additions leave unchanged the main results concerning the gravity model. We also find that FDI is higher in transition host economies where wages are higher, which suggests that market seeking motivations may dominate efficiency ones in this region. This is consistent with the finding that only a minority of FDI to the transition economies is into the manufacturing sector, where FDI is likely to be driven especially by cost considerations. The importance of market seeking motivations is also underlined by the positive significant effect of the lagged GDPj growth variable. There is support for resource motivations as a driver of FDI into the transition economies, indicated by the positive significant coefficient on the resources variable. We further confirm the significant positive impact of the announcement of future EU membership for the host economy on FDI inflows, previously identified for an earlier period by Bevan and Estrin (2004). Thus for the transition economies there is a strong and highly significant EU announcement effect. This might suggest that FDI inflows to the Western Balkans would be lower because no country has been admitted to the EU.[5] However, even with all these controls we find that there remains an unexplained negative factor influencing FDI into the Western Balkans; the coefficient on the Balkans dummy variable is always negative and significant.[6]

It is possible that the negative Western Balkans effect on FDI could in fact be explained by less attractive assets in the region or weaker institutional arrangements. Thus in columns 3, 4 and 5 we first expand the model by adding a variable to control for asset motives, namely privatisation, and then include two institutional variables one at a time (property rights in column 4; investment freedom in columns 5 and 6). Because of potential collinearity we report the fullest specification both including (column 6) and excluding the EU announcement effect

[4] If the Western Balkans dummy is added to the basic specification in column 1, it is negative and significant and the other coefficients are almost completely unaffected. This and all other unreported regressions are available from the authors on request.

[5] The last year covered by our data is 2011; since then, only Croatia has become an EU member state on 1 July 2013.

[6] The results are not affected if a Baltic dummy is added to the specification in column 2; the dummy variable is negative and significant but much smaller than the Western Balkans dummy (–1.07 as against –4.95). Thus the group of Baltic states also receives less FDI, controlling for other factors, than CEE or the former Soviet Union, but not as less as the Western Balkan economies.

(column 5). As expected, privatisation has been a significant factor motivating FDI into the transition economies; the coefficient is positive and significant in all specifications where it is included. Thus, successful policies to carry out large scale privatisation are associated with increased FDI in the transition economy region. However, there are only weakly significant effects from the other two institutional variables and these are sensitive to model specification. In column 4 the property rights variable is insignificant, and in column 6 both property rights and investment freedom are insignificant. However, we see from column 5 that this effect is perhaps related to EU membership; when the EU variable is excluded the two institutional variables become weakly significant, though property rights with a negative sign. There are several interpretations of these results: one is that the EU only permits countries to join if their institutions are relatively good. A second is that the announcement of EU membership is associated with improvements in institutional quality in candidate economies.

Columns 3 to 6 represent a variety of specifications of the FDI inflow process to transition countries with all of the main variables discussed in the literature. This is a demanding specification in which to test whether there is an independent Balkans effect on FDI. We observe in columns 2 to 6 inclusive that the Western Balkan dummy variable is always negative and statistically significant. This indicates that even when the growth of their domestic economies, the relative weakness of institutions, the slow pace of privatisation and non-membership in the EU is taken into account, the Western Balkans countries still receive less FDI than would be expected on the basis of the size and location of their economies. The result is not sensitive to specification, either reported or further unreported tests.[7] These include estimating columns 4 and 6 to include a Baltic dummy variable (which is negative, weakly significant and smaller than the Balkan dummy) and estimating the same specification using a random effects model.[8]

11.4 Conclusions and policy implications

A key policy question is whether FDI in the Balkan region has been influenced primarily by exogenous, predetermined, factors such as the size of the economies, the level of development and their geographical position, or by endogenous, policy-induced measures (see Demekas et al. 2005). What can or cannot governments do to attract more FDI? This is a key issue for the current debate on the 'new growth model', since the expectations after 2009 across the

[7] We wished to explore whether the negative Western Balkans effect held equally in the sub-periods identified above. However, given the use of lags for our independent variables, the degrees of freedom were too few to generate reliable or robust estimates.

[8] It is not possible to test our main hypothesis using a fixed effects formulation. However, when a fixed effect specification is used, country specific dummies for the Balkan countries are typically negative.

Balkan region have generally been overly optimistic regarding the speedy return of FDI. Given the present unfavorable global climate for FDI, exhausted privatisation opportunities in most Balkan countries and still unsettled political issues, the return of large amounts of FDI is unlikely in the short run.

Our findings indicate that for the Western Balkans both groups of factors are important. Their location is relatively more distant from the major foreign investors than the transition economies of Central Europe, but our empirical analysis shows that the policy stance and institutional environment has also had an important role to play. The Balkan countries have not exploited the opportunities offered by privatisation adequately and have failed to improve their institutions, including the protection of property rights or the investment climate, to levels attained by other more advanced economies. This has been an important failure which has cost the countries dear in terms of FDI foregone. FDI to the Balkan countries could therefore be further increased by more adequate government policies, but this would imply grasping the nettle of deep rooted institutional reform.

We find that the levels of FDI to the Western Balkan economies can be explained by three categories of factors. The first is the size of the domestic economies; these economies are rather small and GDP of the host economy has a significant positive effect on FDI. The fragmentation of the region, which has been exacerbated by events since 1990, is clearly a factor mitigating against FDI. Secondly, their distance from the investing economies of Western Europe, and their remoteness from the EU, summarized in our framework by the distance variable, which is always negative and significant in our equations. There are no simple policy solutions to geographic issues but distance can be offset by greater trade, regulatory and institutional integration. The third category of factors relates to institutional quality, though this is harder to interpret because of collinearity between the various measures. Taken together, the results suggest that a variety of institutional factors are the third significant determinant of FDI into transition economies; in general there is more FDI into countries where institutions are more market supporting. Institutional quality is closely related to EU membership – it is the countries which score more highly in terms of these indicators of institutional quality which are members of the EU, though it is not clear in which direction the causality runs. Thus, the process of joining the EU leads countries to improve their institutional quality. On the other hand, the EU tends to admit as members countries which are further advanced in terms of developing their institutions. Thus we find that announcement of EU membership also leads to higher levels of FDI, but it is not clear whether this effect is independent from the institutional quality effect.

Even taking all these factors into account, our regressions confirm the view that there is a negative 'Western Balkans' effect on FDI. We observe that once all the institutional variables are taken into account, the dummy variable for

the Western Balkans is statistically significant, independently of whether the EU dummy is included or not. Thus being in the Western Balkans exercises an independent negative effect on FDI in an extended gravity equation. This seems to indicate that the unfortunate recent political history of the region, with conflicts, fragmentation and low growth, have exercised a long lasting and independent effect on their prospects for receipt of FDI. The political risk, deriving from various unsettled political issues in the region, still seems to exercise a negative effect on FDI.

Our empirical work establishes a positive correlation between announcement of EU membership and FDI. It is not clear whether this is because EU membership raises FDI per se, via reduced transactions costs and risk, because EU membership leads countries to improve their institutions, or because the EU only admits countries which already have superior institutions to membership. To the extent that the former phenomena are effective, it is clearly in the interest of Western Balkan countries seeking to increase their FDI in order to accelerate restructuring and reduce unemployment to strive towards EU membership. To the extent that EU membership is associated with superior institutions, the two policy recommendations of this chapter are therefore mutually supportive.

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12

Time-consistency and Dictator Punishment: Discretion Rather than Rules?*

Shaun Larcom, Mare Sarr and Tim Willems

12.1 Introduction

Following Kydland and Prescott's (1977) seminal work exhorting the use of rules over discretion, many governments responded by attempting to bind policy makers who are susceptible to time-inconsistency. In subsequent decades, much of the policy discussion and analysis has been concentrated on monetary policy (cf. the extensive literature following Barro and Gordon (1983)). However, there have been other fields where governments have increased their commitment to remain time-consistent. One such area is international justice and the treatment of dictators and warlords who have committed crimes under international law. There, commitment has been increased through the establishment of a permanent International Criminal Court (ICC) in 2002. The purpose of the ICC is to hold high ranking officials (including heads of state) accountable for acts of genocide, war crimes, and crimes against humanity. Indeed, an explicit aim of the Rome Statute (the treaty that established the ICC) is to "to put an end to impunity for the perpetrators of these crimes and thus to contribute to the prevention of such crimes".

History is littered with dictators who were threatened with grave consequences while committing atrocities, only to be offered amnesty or asylum deals later on. The rationale for such an approach is to end bloodshed in the quickest possible way. One salient example is Idi Amin, who after committing numerous atrocities was ultimately offered an asylum deal that saw him live out his life in comfort in Saudi Arabia. Throughout the twentieth century, scores of dictators were offered similar deals: asylum or amnesty in exchange for abdication and a halt to bloodshed and oppression. Since 2002, however, countries that are party to the Rome Statute of the ICC are required to cooperate with the Court and are no longer allowed to grant amnesty or asylum to ICC-indicted individuals. Herewith, the

* We thank participants of the 17th IEA World Congress in Jordan for useful comments.

international community has taken significant steps to bind itself to prosecuting dictators who commit atrocities while in power.

However, despite the fact that the international community has increased its commitment to punishing international crimes, there seems to remain some critical level of bloodshed beyond which the international community (or any single government) would rather be time-inconsistent and put the violence to an end through an amnesty-abdication deal. That is: commitment is still not perfect. This is for example evident from overtures to Bashar al-Assad of Syria concerning the possibility of an asylum-abdication deal back in 2012, and from the fact that the Rome Statute itself allows for some prosecutorial discretion.[1]

After building a model that captures important elements of this new institutional environment, we follow Larcom, Sarr and Willems (2014) (henceforth: LSW) and show that dictators may engage in strategic behavior. In particular, we show that dictators may choose to commit more atrocities than they would actually like to from a static perspective – purely to make the international community think twice and to ultimately "break" its original intention to punish them. While LSW obtain this result in an asymmetric-information setup where dictators have private information on their preferences, this chapter shows that a similar effect arises when dictators differ in, and have private information on, their costs of committing atrocities. Following LSW we label this phenomenon "the Terminator effect" – named after the Congolese warlord Bosco "the Terminator" Ntaganda who reportedly seized the city of Goma not to control it, but with the pure aim of putting pressure upon the international community to open negotiations regarding the future of himself and other members of his rebel group.[2]

We will show that, in response to greater commitment to ex-post punishment, this Terminator effect induces *more* dictators to *act worse*. If this effect were to dominate any benign effects of increased efforts at time consistency, discretion may be better than rules. Herewith, this chapter points out that the original Kydland-Prescott result can be overturned in the presence of strategic agents when commitment is imperfect.

12.2 Model

In this section, we present our model by first setting out the environment, after which we turn to the crucial issue of time-inconsistency. The model is similar in

[1] See "Assad's safe exit could be arranged" by Reuters, November 6, 2012 and Articles 16, 17 and 53 of the Rome Statute.

[2] See http://www.bbc.co.uk/news/world-africa-18821962.

spirit to LSW, but rather than considering heterogeneity in preferences for committing atrocities, this chapter considers heterogeneity in costs of committing atrocities.

Environment

Consider a two-period model (where time is indexed by $t = 1, 2$) in which the active players are the international community (henceforth: IC) and an incumbent dictator.

A dictator in power derives utility from taking certain actions that the IC perceives as "atrocities". We use a_t to denote the atrocities committed by a dictator in period t.

Committing atrocities is however costly to a dictator, as he, for example, needs to finance an army. Depending upon local circumstances (such as the wage rate, availability of weaponry, control over local militias, etc.), these costs "κ" may differ across dictators. Crucially, the personal value of κ is going to remain private information to a dictator: only he knows how costly it is for him to commit atrocities. All that the international community knows, is that κ is ex ante distributed according to some known c.d.f. $F(\kappa)$.

The goal of the IC is to minimize the total amount of atrocities that a dictator will commit, i.e. it aims to minimize the expected value of:

$$\mathcal{L} \equiv a_1 + a_2 \tag{1}$$

To discipline dictators, the IC announces ex ante that it will punish dictators at the end of period 2 for any atrocities that they have committed in the first two periods. In particular, we will assume that the IC publicly announces a linear punishment function $h(x_1+x_2) = \psi\,[a_1 + a_2]$. As it takes time to capture a dictator, we assume that it is not possible to punish a dictator before the end of period 2.

The dictator's objective is to maximize his own lifetime utility. Assuming log-utility for concreteness, this is given by:

$$\max_{a_1,a_2} \sum_{t=1}^{2} \log(a_t) - \kappa \sum_{t=1}^{2} a_t - \psi \sum_{t=1}^{2} a_t \tag{2}$$

Solving this maximization problem shows that a dictator with cost parameter κ will choose to set:

$$a_t^* = \frac{1}{\psi + \kappa} \quad \text{for } t = 1, 2 \tag{3}$$

So after observing a_1 (and knowing ψ), the IC is able to make an inference about the dictator's cost parameter κ by inverting (3), leading to:

$$\mathbb{E}_2^{IC}\{\kappa | a_1\} = \frac{1}{a_1} - \psi \tag{4}$$

Imperfect commitment

Time-inconsistency As in LSW, we now relax the assumption that the IC is ex ante able to commit itself to punishing the dictator ex post. While the IC may be able to increase the costs that it will incur in case it chooses to be time-inconsistent, it seems unrealistic to assume that it can push these costs up to infinity. Hence, we now move on to analyze a setup in which commitment is imperfect.

In particular, we assume that the loss incurred by the IC in case of time-inconsistency equals a finite $\Omega \geq 0$. Here, "time-inconsistency" refers to cases in which the IC does not punish according to the pre-announced punishment function $h(\cdot)$, but strikes an amnesty-abdication deal with the dictator instead. This deal can be closed at the beginning of period 2. Since involuntary removal of the dictator can only take place at the end of the second period in our model, this captures the notion that amnesty-abdication deals have the potential to shorten a dictator's time in office.

With respect to the loss Ω, we will follow LSW in assuming that:

Assumption 1 *Ω is an increasing function of ψ, i.e. $\Omega = \Omega(\psi)$ with $d\Omega(\psi)/d\psi > 0$ and $\Lambda(0) \geq 0$.*

This assumption captures the idea that the greater the IC's ex-ante commitment to punishing any misbehaving dictators (i.e. the "tougher" its talk up front), the greater the reputational loss it suffers when it reneges upon this intention ex post.

Amnesty-abdication deal The value that a dictator attaches to the amnesty offer is denoted by V. Dictators will only accept offers that provide more value than their status quo option of staying in power. Consequently, the IC will have to set $V > \log(a_2^*) - \kappa a_2^* - \psi[a_1 + a_2^*]$. Since the dictator has an informational advantage over the international community at this stage (he knows his value of κ, while the international community does not) he is able to exploit this edge when negotiating on V (cf. Sobel and Takahashi (1983)). Using Δ to denote the negotiation rents that the dictator is able to obtain, V equals:

$$V(\kappa, \psi) = \log(a_2^*) - \kappa a_2^* - \psi[a_1 + a_2^*] + \Delta \tag{5}$$

Upon abdication of the malevolent dictator, we assume that the IC believes that it is able to select and install a benevolent leader who does not derive any utility from committing atrocities. Consequently, the IC believes that a_2 will fall to zero after an amnesty-abdication deal and that peace is quickly re-installed. The best practical example of this happening is probably that of Liberia, where the malevolent Charles Taylor was replaced by Ellen Johnson Sirleaf (who went on to win the Nobel Peace Prize).

International community's optimal choice After observing crimes a_1 committed by the dictator in period 1, the IC's expected loss function is given by:

$$\mathbb{E}_2^{IC}\{\mathcal{L}|a_1\} = \begin{cases} a_1 + \mathbb{E}_2^{IC}\{a_2|a_1\} & \text{if } \mathbf{1}_A = 0 \\ a_1 + \Omega(\psi) & \text{if } \mathbf{1}_A = 1 \end{cases}, \tag{6}$$

where $\mathbf{1}_A$ is an indicator function that takes the value 1 if the incumbent dictator abdicates at the beginning of period 2 in return for amnesty (or only a minor punishment), and zero otherwise.

Since the dictator's cost parameter κ is private information, his first-period behavior is informative to the IC in predicting how he is going to act in period 2. In particular, the IC expects:

$$\mathbb{E}_2^{IC}\{a_2|a_1\} = \frac{1}{\mathbb{E}_2^{IC}\{\kappa|a_1\} + \psi} \tag{7}$$

By looking at the modified loss function (6), one can then see that the IC becomes willing to forget about ex-post punishment when:

$$\mathbb{E}_2^{IC}\{a_2|a_1\} = \frac{1}{\mathbb{E}_2^{IC}\{\kappa|a_1\} + \psi} \geq \Omega(\psi) \Leftrightarrow \mathbb{E}_2^{IC}\{\kappa|a_1\} \leq \frac{1}{\Omega(\psi)} - \psi \tag{8}$$

When this condition is met, the IC believes that the dictator has such a low cost of committing atrocities, that he will do more damage in period 2 if he stays in power, than the reputational damage done by a premature removal of the dictator through an amnesty-abdication deal.

From (8) one can see that there exists a critical cost-level $\widehat{\kappa}$ which would induce a dictator to set $a_1 = \widehat{a}_1 \equiv 1/(\widehat{\kappa} + \psi)$. It is defined by:

$$\mathbb{E}_2^{IC}\left\{\kappa \,\middle|\, a_1 = \frac{1}{\widehat{\kappa} + \psi}\right\} = \frac{1}{\Omega(\psi)} - \psi \tag{9}$$

At the underlying level $\widehat{a}_1$ of first-period atrocities, the IC is indifferent between removing the dictator through an amnesty-abdication deal, and sticking to its earlier resolve to capture and prosecute him. Consequently, it is optimal for the IC to offer amnesty to all those dictators with $\kappa \leq \widehat{\kappa}$: they would simply do too much damage if they stayed in power for another period.

The dictator's trade-off If a dictator of type $\kappa > \widehat{\kappa}$ were to adhere to his FOC (3), he would not obtain an amnesty-offer. The reason is that his $a_1^* < \widehat{a}_1$ (the critical level of atrocities that makes the IC give in). Consequently, he can only unlock the amnesty-option by setting $a_1 > a_1^*$, thereby committing more crimes than prescribed by static optimality. Since an escape via the amnesty-route is valuable to the dictator, he may choose to use period 1 to try and signal that his cost of committing atrocities is low, in particular that his $\kappa \leq \widehat{\kappa}$. Herewith, he sends the implicit threat that he will cause much damage should he remain in

power, which may induce the IC to offer him an amnesty-abdication deal at the beginning of period 2. The dictator is, in effect, trading off the loss of departing from his static optimum in the first period, with the dynamic gain of obtaining amnesty for his crimes. With reference to the behavior of Bosco "The Terminator" Ntaganda (who, in response to his ICC-indictment, attacked the city of Goma in 2008 with the pure aim of opening up negotiations regarding his own fate), we will call this the "Terminator effect".

The cost of signaling in this manner is only worth bearing for those dictators whose true cost parameter κ is sufficiently close to $\widehat{\kappa}$. To see this, note that there are two strategies available to a dictator with cost $\kappa > \widehat{\kappa}$. The first strategy ($\mathcal{F}$) consists of the dictator following his FOC (3), knowing that he will be punished at the end of period 2. Under this strategy $\mathcal{F}$, the dictator sets $a_1^* = a_2^* = 1/[\psi + \kappa]$, which yields indirect utility:

$$U^{\mathcal{F}} = 2\log\left[\frac{1}{\psi+\kappa}\right] - 2 \tag{10}$$

Choosing a repression-level $a_1 = a_1^*$ according to the FOC (3) however fails to secure amnesty for dictators with cost $\kappa > \widehat{\kappa}$ because for them $a_1^* < \widehat{a}_1$. To obtain an amnesty nevertheless, such a dictator has to deviate from the FOC (3) (call that strategy $\mathcal{D}$). Deviation is most cost-effective when the incumbent dictator mimics a type $\widehat{\kappa}$-dictator by setting $a_1 = \widehat{a}_1$. The value of this strategy equals:

$$U^{\mathcal{D}} = \log(\widehat{a}_1) - \kappa\widehat{a}_1 + V(\kappa, \psi) \tag{11}$$

Hence, a dictator with $\kappa > \widehat{\kappa}$ will choose to mimic a repressive tyrant of type $\kappa = \widehat{\kappa}$ if and only if he is better off deviating from static optimality at a_1^*, that is, if and only if:

$$U^{\mathcal{D}} \geq U^{\mathcal{F}} \Leftrightarrow \gamma(\kappa, \psi) \equiv \log\left[\frac{1}{\psi+\widehat{\kappa}}\right] - \frac{\kappa}{\psi+\widehat{\kappa}} + V(\kappa, \psi) - 2\log\left[\frac{1}{\psi+\kappa}\right] + 2 \geq 0 \tag{12}$$

Which dictators resort to the Terminator effect? The critical type $\overline{\kappa}$ below which a dictator is willing to invest in first-period crime with the intent of unlocking the amnesty-option in period 2, is implicitly defined by:

$$\gamma(\overline{\kappa}, \psi) = \log\left[\frac{\psi+\overline{\kappa}}{\psi+\widehat{\kappa}}\right] - \frac{\psi+\overline{\kappa}}{\psi+\widehat{\kappa}} + \Delta + 1 = 0 \tag{13}$$

It is straightforward to show that any dictator of type $\kappa \in (\widehat{\kappa}, \overline{\kappa}]$ will find it optimal to mimic the $\widehat{\kappa}$-type by setting $a_1 = \widehat{a}_1 > a_1^*$. When the IC sees a dictator setting $\widehat{a}_1$, it realizes that this does not immediately imply that the dictator is of type $\widehat{\kappa}$; after all, this behavior could also stem from a dictator of a type $\kappa \in (\widehat{\kappa}, \overline{\kappa}]$ who is acting strategically. Assuming for illustration purposes that κ follows a

uniform distribution over $(0, \kappa_{\max}]$, the IC's rational expectation is given by:

$$\mathbb{E}_2^{IC}\{\kappa|a_1\} = \begin{cases} \mathbb{E}\{\kappa|\widehat{\kappa} \le \kappa \le \overline{\kappa}\} = \int_{\widehat{\kappa}}^{\overline{\kappa}} \frac{\kappa f(\kappa)d\kappa}{F(\overline{\kappa})-F(\widehat{\kappa})} = \frac{\widehat{\kappa}+\overline{\kappa}}{2} & \text{when } a_1 = \widehat{a}_1 \\ \frac{1}{a_1} - \psi & \text{otherwise} \end{cases} \tag{14}$$

Combining this with equation (9), the implicit equation characterizing $\overline{\kappa}$ can then be rewritten as:

$$y(\overline{\kappa}, \psi) = \log\left[\frac{\psi + \overline{\kappa}}{\frac{2}{\Omega(\psi)} - \psi - \overline{\kappa}}\right] - \frac{\psi + \overline{\kappa}}{\frac{2}{\Omega(\psi)} - \psi - \overline{\kappa}} + \Delta + 1 = 0 \tag{15}$$

In brief, the IC grants low cost dictators of type $\kappa \le \widehat{\kappa}$ amnesty to remove them from power as quickly as possible – to ensure that they stop committing atrocities. But because the cost of committing atrocities is private information to dictators, it becomes optimal for dictators of type $\kappa \in (\widehat{\kappa}, \overline{\kappa}]$ to mimic their low cost $\widehat{\kappa}$-counterpart in the first period. They do this by setting sub-optimally high levels of atrocities in period 1 with the pure aim of "earning" themselves an exit via the amnesty-route at the end of period 1.

12.3 Analysis

As set out in the previous section, we need to distinguish between various groups of dictators: dictators with costs $\kappa > \overline{\kappa}$ and $\kappa < \widehat{\kappa}$ will set a_1 according to their FOC (3). For the former group this implies that they will face punishment at the end of period 2, while the latter group is able to exit the game through an amnesty-abdication deal at the end of period 1. Dictators who face costs $\kappa \in (\widehat{\kappa}, \overline{\kappa}]$ in contrast, will engage in strategic behavior and will mimic dictators with costs $\widehat{\kappa}$, so as to "earn" themselves an amnesty offer.

To analyze the effects of a policy change in ψ (and thereby in $\Omega(\psi)$), we need to consider how this change affects the various threshold values for κ. In particular, the sign of $\partial(\overline{\kappa} - \widehat{\kappa})/\partial\psi$ is key as this determines the size of the "Terminator group" which will worsen its behavior in an attempt to "break" the international community. This is done in the following proposition:

Proposition 1 *Enhanced commitment by the IC to ex-post punishment, increases the size of the "Terminator group":*

$$\frac{\partial(\overline{\kappa} - \widehat{\kappa})}{\partial\psi} = \frac{2[1 - (\overline{\kappa} + \psi)\Omega(\psi)]\Omega'(\psi)}{\Omega(\psi)^2} > 0$$

Proof Note that $sgn(\partial(\overline{\kappa} - \widehat{\kappa})/\partial\psi) = sgn(1 - (\overline{\kappa} + \psi)\Omega(\psi))$. Since equation (9) implies that $\overline{\kappa} < 1/\Omega(\psi) - \psi$, we have $sgn(1 - (\overline{\kappa} + \psi)\Omega(\psi)) > 0$. This proves the proposition. □

This proposition implies that in response to an increase in ψ, more dictators will resort to the "Terminator strategy" – consciously worsening their behavior in an attempt to earn themselves an exit via the amnesty-escape route.

As the following proposition shows, an increase in ψ also forces dictators in this "Terminator group" to commit more atrocities:

Proposition 2 *Enhanced commitment by the IC to ex-post punishment, increases the critical level of atrocities beyond which amnesty is granted:*

$$\frac{\partial \widehat{a}_1}{\partial \psi} > 0$$

Proof We have that:

$$\frac{\partial \widehat{\kappa}}{\partial \psi} = \frac{-\Omega(\psi)^2 + [-2 + (\overline{\kappa} + \psi)\,\Omega(\psi)]\,\Omega''(\psi)}{\Omega(\psi)^2} < 0,$$

since $(\overline{\kappa} + \psi)\,\Omega(\psi) < 2$ by equation (9). Combining this with the fact that $\partial \widehat{a}_1 / \partial \widehat{\kappa} < 0$ (by FOC (3)) proves Proposition 2. □

The reason is that since a higher value for ψ implies a larger reputational loss for the IC in case amnesty or asylum is granted ex post, a dictator now has to "work harder" (i.e. commit more atrocities) before the IC gives in. Although this deters some dictators from employing the "Terminator strategy" in the first place (one can also show that $\partial \overline{\kappa} / \partial \psi < 0$), the size of the "Terminator group" increases on a net basis (this is established by Proposition 1). The reason is that when the punishment parameter goes up, the amnesty-escape option becomes relatively more valuable – thereby inducing more dictators to engage in the "Terminator effect". So putting Propositions 1 and 2 together, shows that an increase in commitment by the IC, will induce *more dictators* (Proposition 1) to *act worse* (Proposition 2). This shows that the results found in LSW generalize to a setup in which information on the dictator's cost parameter (rather than information on the dictator's preferences, as in LSW) is hidden.

Finally, it is also possible to show that:

Proposition 3 *Enhanced commitment by the IC to ex-post punishment, disciplines those dictators who face costs outside of the "Terminator interval", i.e. those dictators with $\kappa > \overline{\kappa}$ or $\kappa < \widehat{\kappa}$:*

$$\frac{\partial a_t^*}{\partial \psi} < 0$$

Proof Follows immediately by realizing that dictators with $\kappa > \overline{\kappa}$ or $\kappa < \widehat{\kappa}$ set a_t according to (3). Differentiating (3) with respect to ψ proves the proposition. □

Whether the benign effect underlying Proposition 3 dominates the malign effects underlying Propositions 1 and 2, cannot be established unambiguously as this depends upon the distribution of κ across all active dictators. It does however illustrate the possibility that recent efforts by the IC to increase its commitment to the ex-post punishment of dictators who have committed atrocities while in power, could very well be counterproductive. Whether this is indeed the case, is ultimately an empirical question. We therefore hope that future work will be able to establish whether the net effect of this policy change is benign or not.

12.4 Conclusion

The question of how (and whether) to punish malevolent dictators is a difficult one: not only because the punishment-strategy of dictators tends to be subject to a time-consistency problem, but also because dictators may act strategically. In particular, this chapter has shown that when the international community is not able to fully commit itself to ex-post punishment, dictators may consciously choose to engage in bad behavior.

This qualifies the original findings of Kydland and Prescott (1977). In their seminal analysis of time-consistency problems, they argue in favor of "rules rather than discretion". In a setup where agents can act strategically, this chapter however shows that increasing commitment to ex-post punishment may actually worsen the original problem when the aforementioned "rules" cannot be cast in stone. Consequently, strategic responses from regulatees may very well overturn the original Kydland-Prescott result.

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