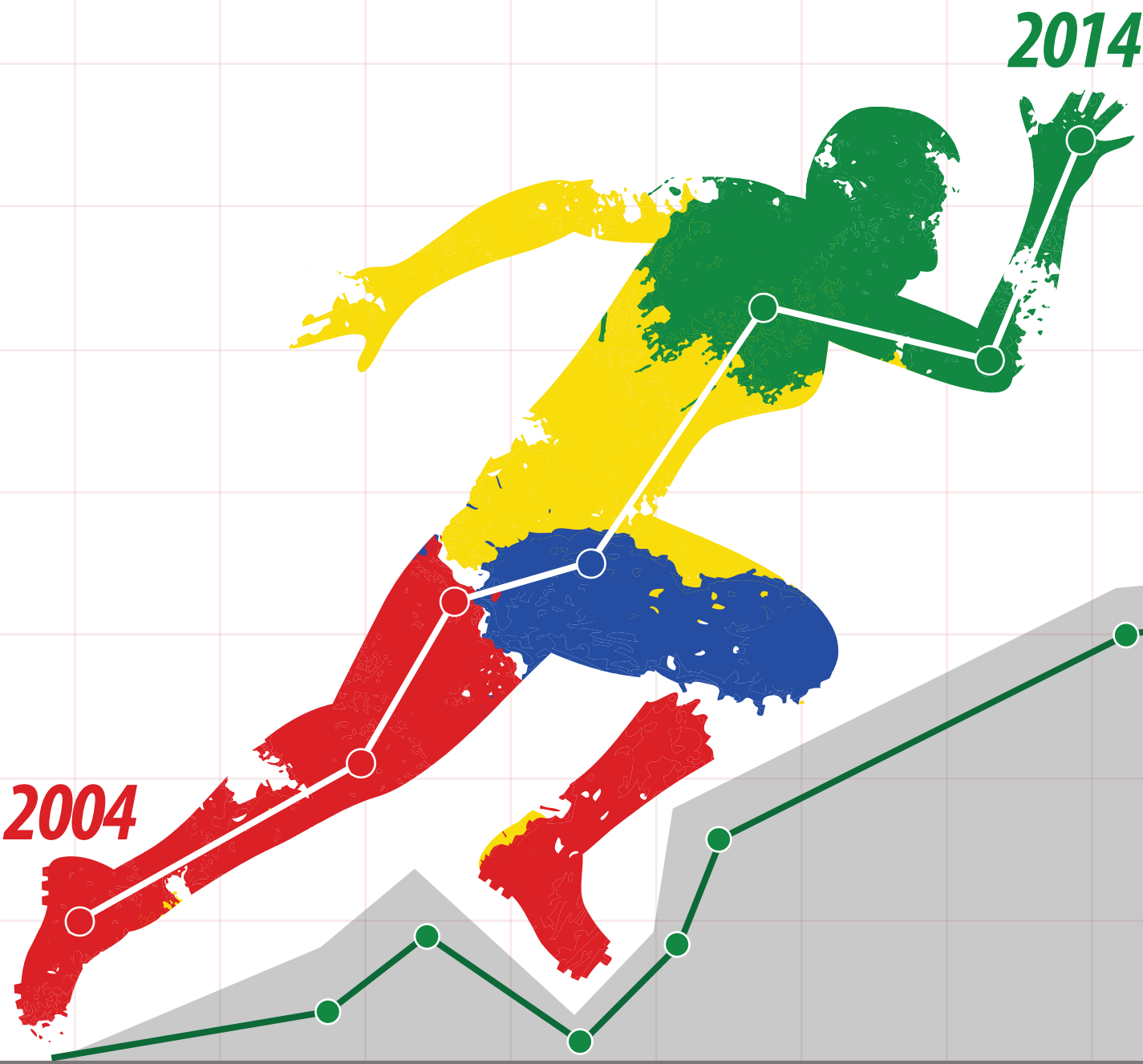
ETHIOPIA'S GREAT RUN

The Growth Acceleration and How to Pace It



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LIST OF ABBREVIATIONS

ADLI	Agricultural Development Led Industrialization
AGP	Agricultural Growth Program
AGSS	Agricultural Sample Survey
AISE	Agricultural Input Supply Enterprise
ATA	Agricultural Transformation Agency
ATVET	Agricultural Technical and Vocational Education and Training
CA	Capital Account
CBE	Commercial Bank of Ethiopia
CIMMYT	International Maize and Wheat Improvement Center
CPIA	Country Policy and Institutional Assessment
CSA	Central Statistical Agency
DA	Development Agent
DB	Doing Business
DBE	Development Bank of Ethiopia
DSA	Debt Sustainability Analysis
EES	Ethiopian Electric Service
EEU	Ethiopian Electric Utility
EEU	Ethiopia Economic Update
EIAR	Ethiopian Institute of Agricultural Research
EPRDF	Ethiopian Peoples' Revolutionary Democratic Front
ERA	Ethiopia Railways Corporation
ERHS	Ethiopia Rural Household Survey
ESE	Ethiopian Seed Enterprise
ESLSE	Ethiopian Shipping and Logistics Services Enterprise
FAOSTAT	Food and Agriculture Organization Statistics
FDI	Foreign Direct Investment
FtF	Feed the Future
FY	Fiscal Year
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GNI	Gross National Income
Govt C	Government Consumption
GTP	Growth and Transformation Plan
GVA	Gross Value Added
HDI	Human Development Index
HIPC	Heavily Indebted Poor Country Initiative
IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
LFS	Labor Force Survey
LIC	Low Income Country
LMIC	Lower Middle Income Country
M2	Broad Money Aggregate
MDG	Millennium Development Goals
MDRI	Multilateral Debt Relief Initiative
MOA	Ministry of Agriculture
MOFED	Ministry of Finance and Economic Development
NASA	National Aeronautics and Space Administration
NBE	National Bank of Ethiopia (The Central Bank)
OLS	Ordinary Least Squared
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PIM	Public Investment Management
Polity2	Governance variable
PPP	Purchasing Power Parity
PPP	Public Private Partnership

PPTs	Percentage Points
PSNP	Productive Safety Net Program
q/ha	Quintal per hectare
REER	Real Effective Exchange Rate
RER	Real Exchange Rate
RuSACos	Rural Saving and Credit Cooperatives
SOE	State Owned Enterprise
SSA	Sub-Saharan Africa
SSA5	Burkina Faso, Mozambique, Rwanda, Tanzania, Uganda
TFP	Total Factor Productivity
TOT	Terms of Trade
UN	United Nations
UNDP	United Nations Development Program
WDI	World Development Indicators
WTO	World Trade Organization

EXECUTIVE SUMMARY

This report addresses two questions: What explains Ethiopia's growth acceleration? How can it be sustained? In brief, we find that Ethiopia's rapid economic growth, concentrated in agriculture and services, was driven by substantial public infrastructure investment and supported by a conducive external environment. To sustain high growth, three policy adjustments are proposed, including: identifying sustainable ways of financing infrastructure, supporting private investment through credit markets, and, tapping into the growth potential of structural reforms.

PART A: EXPLAINING GROWTH

The Growth Acceleration

Ethiopia's economic growth has been remarkably rapid and stable over the past decade. Real GDP growth averaged 10.9 percent in 2004–2014, according to official data. By taking into consideration population growth of 2.4 percent per year, real GDP growth per capita averaged 8.0 percent per year.[1] The country moved from being the 2nd poorest in the world by 2000 to the 11th poorest in 2014, according to GNI per capita, and came closer to its goal of reaching middle income status by 2025. This pace of growth is the fastest that the country has ever experienced and it also exceeds what was achieved by low-income and Sub-Saharan African countries in that period. Recent growth was also noticeably stable, as the country avoided the volatility by spells of drought and conflict which had plagued growth in the past.

Accelerated economic progress started in 1992 with a shift to an even higher gear in 2004. Econometric analysis supports a story of two growth accelerations as average growth increased from 0.5 percent in 1981–92 to 4.5 percent in 1993–2004 and to 10.9 percent in 2004–14. The first 'gear shift' took place shortly after the political and economic transition of 1991 with the downfall of the communist Derg regime and the introduction of a more market-oriented economy. The subsequent Ethiopian People's Revolutionary Democratic Front (EPRDF) government, in turn, implemented a series of structural economic reforms during the 1990s which paved the way for the second growth acceleration starting in 2004 (the subject of this report). Interestingly, structural economic reforms have been largely absent from Ethiopia's recent story of success, though they offer a promising growth potential if implemented.

The recent growth acceleration was part of a broader and very successful development experience. Poverty declined substantially from 55.3 percent in 2000 to 33.5 percent in 2011, according to the international poverty line of US$1.90. Despite rapid growth, Ethiopia remained one of the most equal countries in the world with a Gini coefficient of consumption of 0.30 in 2011. But progress went beyond monetary dimensions. Life expectancy increased by about one year annually since 2000 and is now higher in Ethiopia

[1] Using UN population estimates and applying them to the official national accounts data in constant factor prices.

than the low income and Sub-Saharan Africa averages. In fact, Ethiopia also surpassed these peer groups in several other key development indicators, including child and infant mortality. As a result, the country has attained most of the Millennium Development Goals. That said, Ethiopia faces a challenge in promoting shared prosperity as the poorest 15 percent of the population experienced a decline in well-being in 2005–11 mainly as a result of high food prices.

Growth was concentrated in services and agriculture on the supply side, and, private consumption and investment on the demand side. While agriculture was the main economic sector at the beginning of the take-off, the services sector gradually took over and was complemented, in recent years, by a construction boom. Out of an average annual growth rate of 10.9 percent in 2004–14, services contributed by 5.4 percentage points followed by agriculture (3.6 percentage points) and industry with 1.7 percentage points. Private consumption contributed to most growth on the demand side with public investment becoming increasingly important.

Growth decompositions reveal relatively high contributions from total factor productivity and structural change. While capital and labor accumulation was important for growth, Ethiopia stands out from other non-resource rich fast-growing Sub-Saharan African countries (SSA5) by its very high total factor productivity growth of 3.4 percent per year.[2] Similarly, while most labor productivity growth came from within sectors (as in other countries), inter-sectoral labor shifts (structural change) explain a quarter of decadal of Ethiopia's recent per capita GDP growth (which is higher than in most other countries). Still, Ethiopia remains at an early stage of development as reflected by continued high returns to capital.

Economic Strategy – 'The Ethiopian Way'

Ethiopia stands out in many ways, including in the economic strategy that paved the way to success. In brief, economic strategy focused on promoting agriculture and industrialization while delivering substantial public infrastructure investment supported by heterodox macro-financial policies. Ethiopia's strong commitment to agricultural development is noteworthy as reflected by high government spending and the world's biggest contingent of agricultural extension workers. While a strong push for infrastructure development at the early stage of development is far from unique, the way in which Ethiopia achieved this sets it apart.

Heterodox financing arrangements supported one of the highest public investment rates in the world. Even if Ethiopia generally did not follow the recommendations of the Growth and Development Commission (2008), it did deliver the recommended impressive rates of public investment with the purpose of crowding-in the private sector. Despite low domestic savings and taxes, Ethiopia was able to finance high public investment in a variety of orthodox and heterodox ways. The former include keeping government consumption low to finance budgetary public infrastructure investment as well as tapping external concessional and non-concessional financing.

Three less conventional mechanisms stand out: First, a model of financial repression that kept interest rates low and directed the bulk of credit towards public infrastructure. Second, an overvalued exchange rate

[2] The IMF (2013) identifies six fast-growing Non-Resource Rich Sub-Saharan African countries, including Burkina Faso, Ethiopia, Mozambique, Rwanda, Tanzania and Uganda. Excluding Ethiopia, we refer to this group as SSA5. Although natural resources is becoming increasingly important in some of these countries they were not natural resources dependent at the relevant period of analysis (1995–2010).

that cheapened public capital imports. Third, monetary expansion, including direct Central Bank budget financing, which earned the government seignorage revenues.

Ethiopia's economic strategy was unique. Although Ethiopia gradually moved in the direction of a market-based system, it continued to intervene in most sectors of its economy thereby not adopting some of the key recommendation of the Growth Commission of 'letting markets allocate resources efficiently'. Indeed, apart from market oriented reforms implemented during the 1990s, structural economic reforms have been absent from Ethiopia's growth strategy in part because of initial economic success. Although it was inspired by the East Asian development state model and shares some common features, it is also different from these countries both in conception and outcomes. Agriculture, for instance, features much more prominently in the Ethiopian strategy than in East Asia. Critically, also, Ethiopia's economic success thus far has not been derived from the success of numerous firms drawn from the private sector as in East Asia.

Explaining Growth: The Role of Structural, External and Stabilization Factors

Using a cross-country regression model, we are able to distinguish between key drivers of growth. Our approach avoids tweaked Ethiopia-specific results because we use an existing regression model originally constructed to investigate growth elsewhere. The model is estimated on 126 countries for the 1970–2010 period, including low income countries. Ethiopia's per capita real GDP growth rate is predicted using Ethiopian values of the underlying growth determinants for three different periods: Early 2000s, Late 2000s, and Early 2010s. We distinguish between structural, external and stabilization factors. The model predicts Ethiopia's growth rate quite accurately thereby underscoring its relevance as a useful analytical tool for our purposes.

Economic growth was driven primarily by structural improvements. When measured at Purchasing Power Parity (PPP), the model predicts a real GDP per capita growth rate for Ethiopia of 4.3 percent in 2000–13 compared with an observed rate of 4.8 percent. The contribution of structural factors is estimated at 3.9 percentage points. The growth acceleration was also supported by a conducive external environment. Exports quadrupled in nominal terms, while volumes doubled, reflecting a substantial positive commodity price effect. Macroeconomic imbalances in the form of exchange rate overvaluation and high inflation held back some growth.

Public infrastructure investment, facilitated partly by restrained government consumption, was the key structural driver of growth. In contrast to many countries in the region, the government deliberately emphasized capital spending over consumption within the budget and this was key for supporting growth, according to the model. This shift was facilitated by declining military spending following the 1998–2000 war with Eritrea giving rise to a 'peace dividend'. Increased openness to international trade also supported growth as did the expansion of secondary education, though these effects were less pronounced.

The strong contribution of infrastructure investment arises from a substantial physical infrastructure expansion combined with their high returns. Ethiopia stands out during the 2000s for having registered very rapid infrastructure development. Using the data for 124 countries over four decades, the country was among the 20 percent fastest in terms of infrastructure growth over the past decade. Although this is partly the result of starting from a very low level, these infrastructure growth rates also exceed those of fast growing regional peers with comparable income levels. As we do not know the true economic return to infrastructure investment in Ethiopia, their average returns are estimated from the country sample. Given that

public investment was concentrated in providing basic infrastructure, such as energy, roads, and telecom, this growth effect seems plausible.

Macro-financial policies held back some growth, though the effect was small. Based on the experience of other countries, the model predicts growth to fall when credit to the private sector declines, the exchange rate appreciates and inflation is high. Ethiopia experienced all three trends over this period and this gives rise to an estimated negative macro-financial growth effect. What stands out, however, is that the quantitative effect is quite small (0.44 percentage points). This result helps explain how Ethiopia was able to achieve high economic growth in the presence of seemingly sub-optimal macro-financial policies. In fact, it raises the question of whether growth was able to accelerate precisely because of this heterodox policy mix, which supported growth-inducing infrastructure investment. Although it is hard to conclude firmly either way, Ethiopia's experience supports the impression that 'getting infrastructure right' at the early stage of development can go a long way in supporting growth.

The Role of Structural Change

A modest shift in labor from agriculture to services and construction can explain up to a quarter of Ethiopia's per capita growth in 2005–13. This result illustrates the strong potential of structural change as a driver of economic growth as discussed in the literature (e.g. McMillan et al. 2014). Although Ethiopia has experienced high economic growth and some structural change in production away from agriculture towards services, the similar shift in employment has been much more modest. Nevertheless, agricultural employment did decline from 80 to 77 percent between 2005 and 2013 and because agricultural labor productivity is so low, this shift gave rise to static efficiency gains as relative labor shares increased in construction and services where the average value added of a worker is up to five times higher.

The nature of structural change taking place in Ethiopia differs notably from the vision of government policy. Specifically, economic strategy in Ethiopia aims to promote the kind of structural change first described by Sir Arthur Lewis (1954) in which workers move out of agriculture and into manufacturing. Ethiopia has followed this 'trodden path of development' only partially as economic activity (output and jobs) have shifted from agriculture and into construction and services, largely by-passing the critical phase of industrialization. In response, the government has strengthened its institutional, legal and regulatory framework focusing on promoting light manufacturing FDI, especially in the form of industrial parks (see World Bank 2015 for details).

The growth acceleration period marked the rise of the services sector in Ethiopia. Services overtook agriculture to become the largest economic sector, the biggest contributor to economic growth, and is the second biggest employer. Within services, commerce, 'other services' and the public sector were the most important contributors to output and jobs. On the other hand, the Ethiopian services story is predominantly one of a rise in traditional activities, which require face-to-face interaction, rather than modern activities such as ICT or finance.

Ethiopia's growth acceleration was also supported by positive demographic effects. The economic take-off coincided with a marked increase in the share of the working-age population giving a positive boost to labor supply. Up to thirteen percent of per capita growth in 2005–13 can be attributed to this 'demographic dividend' effect. A continued rise in the working age population will support potential economic growth in the coming decades, but for the country to fully reap these benefits it must accelerate the ongoing

fertility decline and equip workers with marketable skills to be attractive to prospective employers. Both the manufacturing and services sectors would play an important role in absorbing this additional labor.

Drivers of Agricultural Growth

Ethiopia's agricultural sector has recorded remarkable rapid growth in the last decade and was the major driver of poverty reduction. The sector is, by far, the biggest employer in Ethiopia, accounts for most merchandise exports and is the second largest in terms of output. The sector also contributed to most of the employment growth over the period of analysis. Although some labor shifted out of agriculture, substantial shifts are likely to take a long time. Critically, agricultural growth was an important driver of poverty reduction in Ethiopia: Each percent of agricultural growth reduced poverty by 0.9 percent compared to 0.55 percent for each percent of overall GDP growth (World Bank, 2015). For these reasons, the report takes a deeper look at the drivers of agricultural growth.

Agricultural output increases were driven by strong yield growth and increases in area cultivated. Yield growth averaged about 7 percent per year while area cultivated increased by 2.7 percent annually. A decomposition of yield growth reveals the importance of increased input use as well as productivity growth. As in the Green Revolution, increased adoption of improved seeds and fertilizer played a major role in sustaining higher yields. While starting from a low base, these inputs more than doubled over the last decade. Total factor productivity growth averaged 2.3 percent per year.

The factors associated with agricultural production growth include extension services, remoteness and farmer's education. A regression model was used to identify the likelihood of adopting modern technology. Farmers that received extension visits, less remote households and more educated farmers were more likely to adopt improved agricultural technologies.

Recent agricultural growth is largely explained by high government spending on extension services, roads, education as well as favourable price incentives. First, Ethiopia has built up a large agricultural extension system, with one of the highest extension agent to farmer ratios in the world. Second, there has been a significant improvement in access to markets. Third, improved access to education led to a significant decrease in illiteracy in rural areas. Fourth, high international prices of export products as well as improving modern input—output ratios for local crops have led to better incentives. Other factors played a role as well, including good weather, better access to micro-finance institutions in rural areas, and improved tenure security. Recent poor rains in Ethiopia during 2014 and 2015 pose a major challenge to the country and the impact of climate change stresses the importance of continued investment in irrigation to reduce reliance on rain-fed production.

PART B: SUSTAINING GROWTH

Managing Growth Expectations

What should we expect in terms of Ethiopia's growth rate over the next decade? Following a decade-long spell of double digit growth on the back of a strategy and performance that seemingly emulates the East Asian developmental states, including China, one might assume that such high growth rates can be sustained in

the future on the back of the same strategy that worked so well in the past. The second part of this report takes a deeper look at this issue on the basis of available international and country-specific evidence.

We begin by highlighting the exceptional nature of the past decade performance by drawing upon the objective statistical experience of growth accelerations elsewhere. According to Pritchett and Summers (2014), cross-country experiences of per capita GDP growth since the 1950s has been an average of 2 percent per year with a standard deviation of 2 percent. Episodes of per capita growth of above 6 percent tend to be extremely short-lived with a median duration of nine years. China's experience from 1977 to 2010 is the only instance of a sustained episode of per capita growth exceeding 6 percent and only two other countries come close (Taiwan and Korea). In other words, these country experiences are statistically exceptional.

A country specific analysis of growth head- and tailwinds suggest a balance of factors at play in Ethiopia. These factors were derived on the basis of the stylized facts and conceived wisdom emanating from the most recent growth and economic development literature. The likelihood of continued high growth in Ethiopia is buoyed by five factors: productivity-enhancing structural change, within-sector productivity gains (including agriculture), technological catch-up, urbanization, and FDI. The demographic transition and a large domestic market offer important potential. These factors would need to be balanced against a number of 'growth headwinds' factors. Exogenous factors include geographical disadvantages and a slowdown of world trade. Endogenous factors include: lagging agricultural productivity, low export size and diversification, a small financial sector, low levels of human capital and poor trade logistics. Most of these 'inhibitors' do not pose insurmountable hurdles but collectively they could dampen Ethiopia's chances of maintaining its growth rate over the course of the next decade.

Cyclical analysis suggests that a slowdown is pending. By the very nature of having experienced a growth acceleration, Ethiopia's real GDP per growth rate has exceeded the potential rate of GDP growth for the past decade. Potential GDP growth, in turn, is a function of capital, labor and TFP growth. Investment has been exceptionally high the past years and is thus likely to slow down. A rising working age population provides some growth impetus, but total factor productivity growth will be hard to sustain at its current high levels. Additionally, economic activity has been strongly supported by a construction boom in the past 3 years (2011/12–2013/14). Even if government policy drives part of this boom, the private component is cyclical in nature and will not last indefinitely.

Regression model simulations indicate a growth slowdown under alternative policy scenarios. We use the abovementioned regression model to identify growth drivers and simulate three scenarios. The first scenario assumes continued infrastructure investment that comes at the cost of private sector crowding-out in the credit market, the buildup of inflationary pressures due to supply constraints, and, a policy of continued real exchange rate appreciation to keep capital imports cheap. The second scenario aims to promote accelerated private sector investment and reduce macroeconomic imbalances. Specifically, the pace of public infrastructure investment slows down but is partially substituted by private sector involvement. The third assumes an acceleration public infrastructure investment at the cost of growing macroeconomic imbalances. All three policy scenarios yield comparable annual real GDP per capita growth rates of about 4 percent in PPP terms, which is well below the rate of 6.5 percent observed in the Late 2000s.

Put together, alternative approaches suggest a likely range of GDP growth between 4.5 and 10.5 percent over the next decade. In per capita terms, this is equivalent to a range of 2.0 to 8.0 percent assuming a population growth rate of 2.5 percent per year. The lower bound is given by international experience of growth accelerations and Ethiopia's 1993–2004 growth rate. The upper bound is given by the maximum

achieved in Ethiopia and elsewhere. We note that a decadal growth projection based on Ethiopia's level of Hausmann-Hidalgo concept of 'economic complexity' is at the lower range at 4.4 percent per year. The challenge confronting policy makers is to make sure that growth remains at the higher end of this range.

To sustain high growth, three policy adjustments are proposed. This includes (1) supporting private investment through credit markets; (2) identifying sustainable ways to finance infrastructure, and; (3) tapping into the growth potential of structural reforms. We discuss each of these in turn.

Supporting Private Sector Led Growth with Credit

While public infrastructure investment helps firms to become more productive, Ethiopian firms appear more concerned with getting access to credit. According to six different survey instruments, credit is mentioned as the more binding constraint for firms. This matters, because it suggests that the government may have made progress in addressing the infrastructure constraint and now needs to pay more attention to alleviating other constraints important to firms. It is indicative that the marginal return to private investment may be higher than the marginal return to public infrastructure investment. Indeed, empirical estimates of these relative returns presented in this report support this assessment. This results arises from the fact that Ethiopia has the third highest public investment rate in the world and the sixth lowest private investment rate combined with the economic logic of diminishing marginal returns.

Arguably, the Ethiopian economy would benefit from a shift of domestic credit towards private firms. If the aim of government policy is to enhance the productivity of private firms, then it is important to understand what the firm-level constraints are. If firms really need credit more than access to new roads or better telecommunication to grow and prosper, then government policy would need to support the alleviation of the credit constraint at the firm level. Since public infrastructure investment is partially financed via the same domestic savings pool, it is clear that infrastructure financing competes directly with the financing of private investment projects.

Two policy reforms could potentially address the challenge of private sector credit. The first would be to continue the existing system of financial repression, but to direct more credit towards private firms. In that way Ethiopia's financial system would become more similar to Korea, where the bulk of credit was directed towards private priority sectors. A second reform involves a gradual move towards a more liberalized interest rates that better reflect the demand and supply for savings/credit and encourage more savings.

Policy reforms should be informed by two criteria: the relative returns of public and private investment, and, the savings rate. This insights were derived from a simple theoretical model developed for the purposes of this study. Financial repression with more private credit is attractive in situations where the marginal return to private investment is much higher than the marginal return to public investment. Interest rate liberalization is attractive if the saving rate of the country is low as welfare would rise by increasing the deposit rate towards more market-determined levels. The report presents evidence that both constraints are binding in Ethiopia.

Ethiopia needs to provide more access to credit to the private sector and this can be done either within or outside the existing policy paradigm. The theoretical analysis and the empirical evidence suggest that there are welfare enhancing effects of either option. Given Ethiopia's preference for financial repression, the less substantive reform would be to maintain this system, but to follow South Korea's footsteps and direct the bulk of domestic credit to priority private sectors.

Identifying Alternative Infrastructure Financing Sources

Continued infrastructure development remains one of Ethiopia's best strategies to sustain growth, but the current financing model is not sustainable. Infrastructure was the most important driver of economic growth during the growth acceleration. This is because the economic returns to infrastructure were high and the physical infrastructure expansion in Ethiopia was substantial. Since Ethiopia continues to have the 3rd largest infrastructure deficit in Africa, it is not surprising that the cross-country regression model also predicts this policy to be the best going forward. However, the past infrastructure expansion was financed via a range of mechanisms that will begin to show their limits in the future in terms of external debt sustainability, private sector crowding out in the credit markets and a strong exchange rate that undermines external competitiveness. Going forward, Ethiopia needs more infrastructure, but it would need new mechanisms to finance it.

There are a range of alternative financing mechanisms to continue and the report briefly discusses their merits. Some options are consistent with current government strategy and thinking. This includes raising tax revenues, increased private sector involvement (including PPPs) and improved public investment management. Other options deviate from the existing paradigm, including: increasing domestic savings and developing capital markets via a higher real interest rate; greater selectivity and prioritization of investments; securitization of infrastructure assets, and; improved pricing, including higher electricity tariffs.

The Growth Potential of Structural Reforms

Ethiopia lags behind Sub-Saharan African peers in most reform dimensions. This is especially the case for domestic finance, the current account, the capital account, and services trade restrictiveness. On the positive side, Ethiopia has done well in reducing trade tariffs and is at par with peers here. What would be the impact on growth if Ethiopia closed the reform gap with its peers? To address this question, we perform a benchmarking exercise using an existing regression model that links reform with growth (Prati et al., 2013).

Even modest structural reforms that close gaps with peers would potentially have considerable impact on GDP per capita growth. The results presented are only indicative and do not constitute a comprehensive appraisal of reforms that have actually been introduced. If Ethiopia were to catch up with the average Sub-Saharan Africa country in terms of financial liberalization, its per capita GDP growth rate would be boosted by 1.9 percentage points per year. These substantial effects arise because this type of reform is highly potent for growth and owing to a substantial reform gap. Similar reforms of the current account and opening the capital account are estimated to increase real GDP growth rates by 0.8 and 0.7 percentage points, respectively.

There are considerable firm level gains to be reaped from services sector liberalization in Ethiopia, especially in credit access, energy and transport services. For example, if the access to credit conditions of Ethiopia were to match those of Rwanda, then firm labor productivity would increase by 4.3 percent, keeping all else equal. Similarly, if electricity conditions were to also match those of Rwanda, the labor productivity gains would be close to a 2.2 percent. Finally, matching China's transportation services would imply productivity gains of 4.2 percent. These results were derived using a similar benchmarking method based on an existing regression model.

In terms of reform sequencing, Ethiopia has already followed international best practice through its 'trade-first' approach, although it has proceeded very slowly. Economic theory, country experience and best international practice would generally suggest the following sequence of reforms: (1) trade liberalization;

(2) financial sector liberalization, and (3) capital account opening. That said, every country experience has been unique and reforms have to be customized to their specific country setting. It is noteworthy that Ethiopia has so far liberalized its merchandise trade, but not yet its services trade. The next possible step on the reform path may be to engage in services trade and financial sector liberalization.

Although there are economic benefits to reforms as well as an emerging consensus about their sequencing, policy makers are often concerned about risks. While the average longer term net benefits seem to be positive, there is no guarantee that all countries will automatically benefit from reforms. Ethiopia has the added advantage of being in a position to learn the lessons of successful as well as painful experiences of other countries. Still, there are important pitfalls on the reform path (e.g. regulatory frameworks need to be well developed before liberalizing domestic finance) and these would need to be studied more carefully if Ethiopia were to re-initiate the structural reform agenda.

Monitoring Growth Model Sustainability

Finally, the report propose a series of indicators that would be worth monitoring going forward to capture the many trade-offs that are embedded in the current growth strategy. At some point, we argue, the costs of pursuing the current policy would outweigh its benefits. For example, the loss of external competitiveness associated with an overvalued exchange rate may outweigh the benefits in the form of cheaper public capital imports. A deterioration in these indicators may precede a slowdown in growth and provide early warning to policy makers that the current growth model has run its course. Policy makers are encouraged to be proactive and initiate reform efforts now as opposed to waiting until growth slows down.

With the recent launch of the Second Growth and Transformation Plan and the recent appointment of a new economic team, the timing is right to consider the proposals of this report. Encouragingly, the GTP2 envisions a strong increase in the tax revenue to GDP ratio in a bid to raise domestic savings and identifying alternative and more sustainable ways to finance infrastructure. In a similar vein, the private sector is expected to play an important role in supporting infrastructure provisions in ways that reduced the need for public borrowing. The new strategy also stresses the role of the private sector as the ultimate engine of growth and emphasizes the need to maintain a competitive real exchange rate. Moreover, domestic savings are to be mobilized by ensuring that the real interest rate remains positive. The analysis and proposals put forward in this report are aimed to support the Government of Ethiopia in achieving these goals in its quest towards becoming a lower middle income country by 2025.

PART A: EXPLAINING GROWTH

Part A is structured as follows: Chapter 1 highlights the key characteristics of the growth acceleration. Chapter 2 describes the economic strategy that supported high growth. Chapter 3 identifies key growth determinants distinguishing between structural, external and stabilization factors. Chapter 4 explains the take-off of the agriculture sector. Chapter 5 utilizes a structural change framework to gain further insights about the determinants of growth.

1 THE GROWTH ACCELERATION

Ethiopia has experienced a growth acceleration since 2004, enabling a catch-up with the rest of the world, as a part of a very successful broader development performance. While agriculture was the main growth contributor at the beginning of the take-off, the services sector gradually took over and has been complemented, in recent years, by a construction boom. Private consumption contributed to growth on the demand side with public investment becoming increasingly important. A Solow growth decomposition shows that growth was driven by factor accumulation along with very high total factor productivity growth. A Shapley decomposition reveals that most of the increase in value added per person came from higher within-sector labor productivity supported by structural and demographic change. Still, Ethiopia remains at an early stage of development as reflected by continued high returns to capital.

1.1 Recent Economic Growth in Perspective

Economic growth has been remarkably rapid and stable over the past decade. Real GDP growth averaged 10.9 percent in 2004–2014, according to official data. By taking into consideration population growth of 2.4 percent per year, real GDP growth per capita averaged 8.0 percent per year in this period. This substantially exceeds per capita growth rates achieved in the first decade after the country's transition to a market-based economy (1992–2003: 1.3 percent; 1993–2004: 4.5 percent), under the communist Derg regime (1974–91: –1.0 percent), and during monarchy (1951–73: 1.5 percent). Droughts and conflict produced volatile growth patterns prior to 2004, but growth has been rapid and stable since then—an impressive performance from a historical perspective (Figure 1.1.1). Ethiopia's growth rate also exceeded regional and low-income averages over the past decade. Since taking off in 2004, growth has consistently exceeded low-income and Sub-Saharan Africa averages as well as SSA5 (Figure 1.1.2).

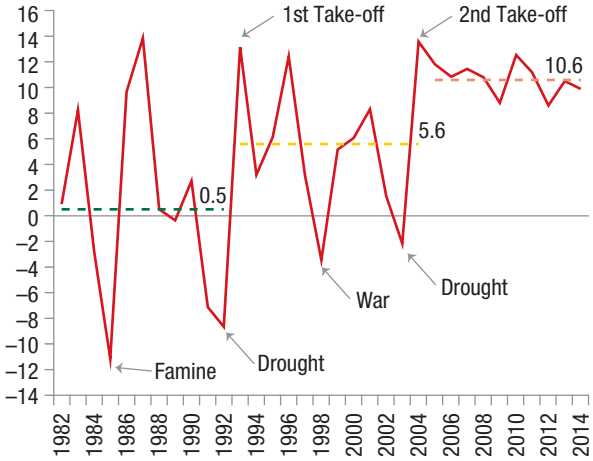
As a result, Ethiopia's real GDP has tripled since 2004 although it remains well below regional and low-income levels. Figure 1.1.3 illustrates the dramatic rise in real GDP observed over the past decade while Figure 1.1.4 puts this performance into perspective by comparing with relevant peers showing that although Ethiopia is catching up with peers, its income level remains low. Comparisons with China are also insightful (Figure 1.1.5). While China and Ethiopia had similar levels of income in the 1980s, China is now 14 times richer than Ethiopia. Ethiopia managed to grow 'at Chinese rates' for about decade, but China itself experienced a growth acceleration that lasted for three decades. Encouragingly, Ethiopia has moved from being the 2nd poorest to the 11th poorest country in the world since 2000, according to GNI per capita (Atlas Method). It also moved closer to its goal of becoming a middle income country by 2025 gradually narrowing the gap to the relevant income threshold (Figure 1.1.6). In sum, Ethiopia made a lot of progress, but it remains a poor country.

1.2 Rapid Growth in the Context of Development Progress

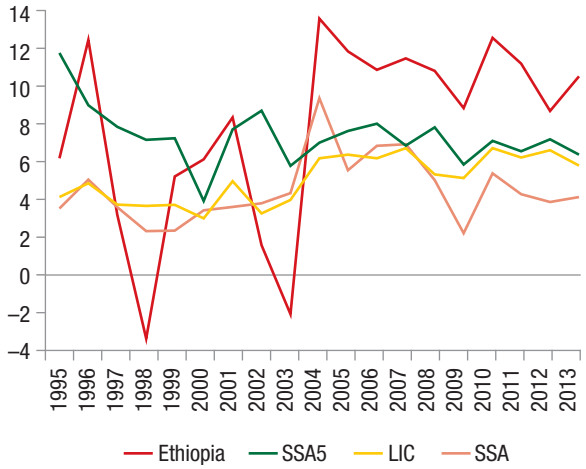
Ethiopia's growth performance over the past decade was part of a broader and very successful development experience. From 2000 to 2011 the wellbeing of Ethiopian households improved on a number of dimensions. In 2000, Ethiopia had one of the highest poverty rates in the world, with 55.3 percent of the population living below the international poverty line of US$1.90 2011 PPP per day (Figure 1.2.1) and 44.2 percent of its population below the national poverty line. By 2011, 33.5 percent lived on less

FIGURE 1.1: Recent Economic Growth in Perspective

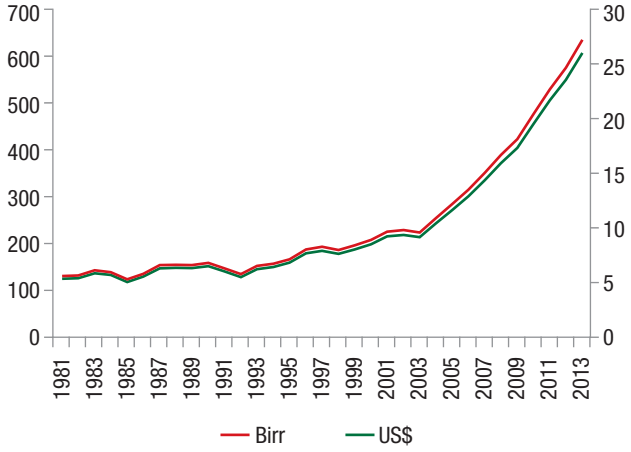
1. Ethiopia, Real GDP growth



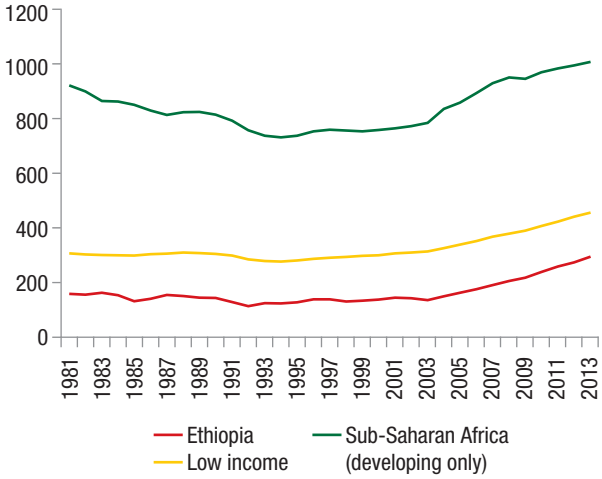
2. Real GDP growth in Ethiopia, SSA and LICs



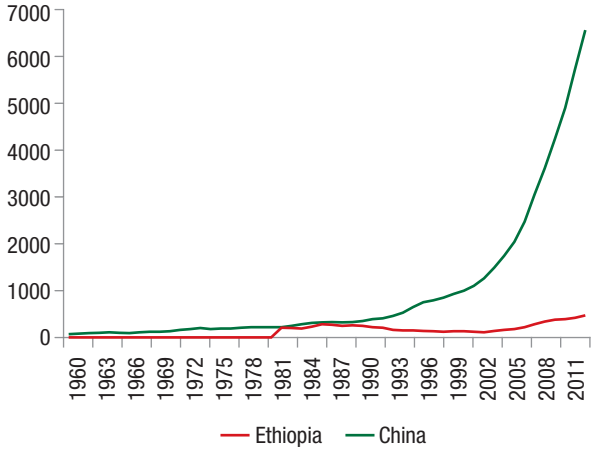
3. Real GDP in Birr (left axis) and US$ (right axis)



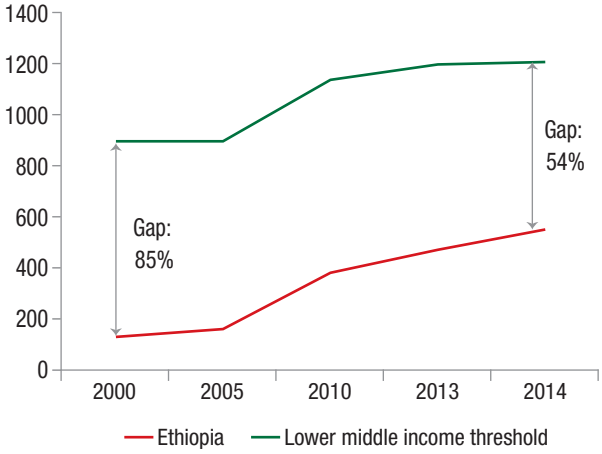
4. Real GDP per Capita (2005 US$)



5. GNI per Capita (Atlas Method): Ethiopia & China



6. GNI per Capita (Atlas Method)



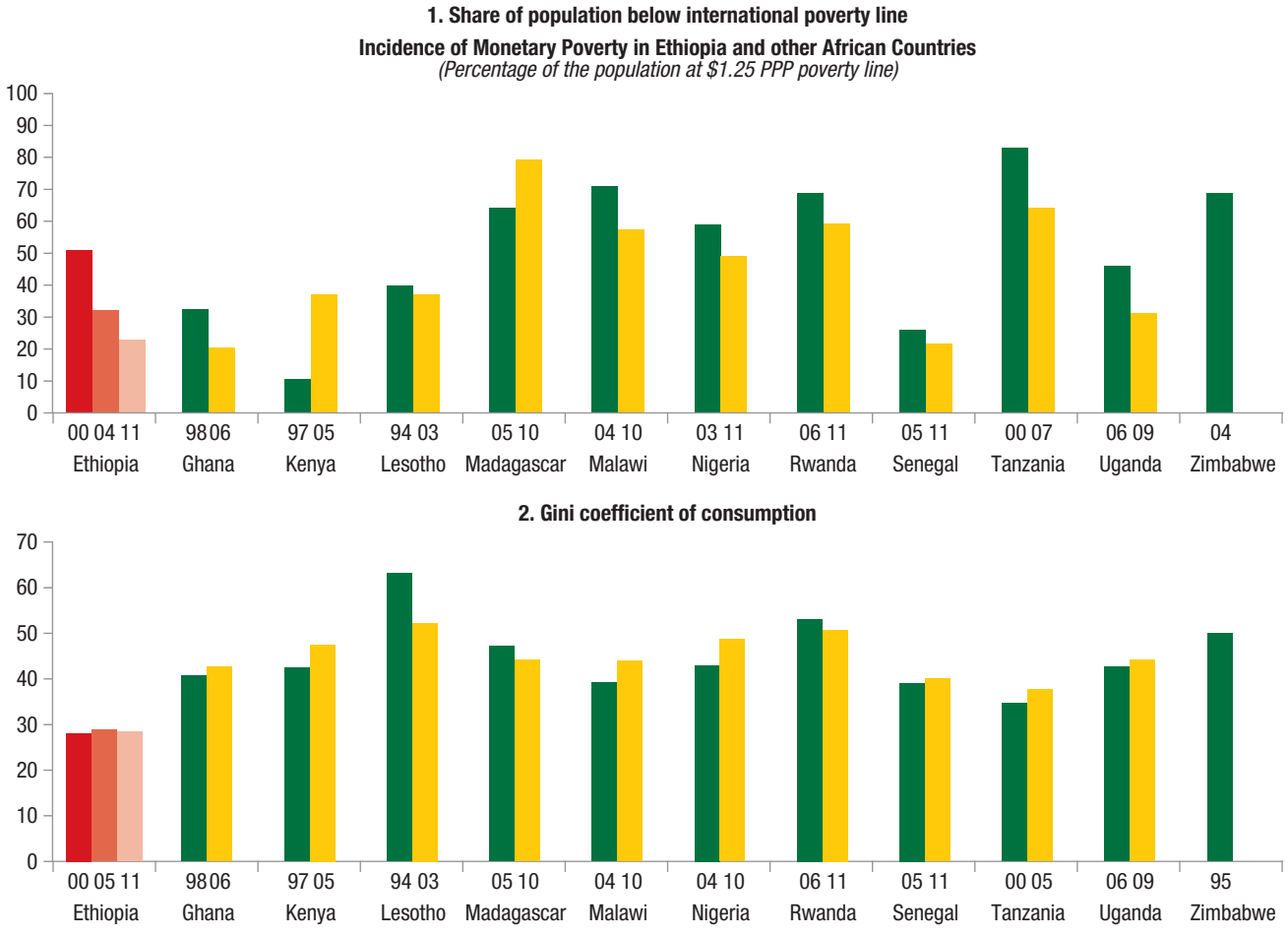
Source: World Bank (WDI).
Note: SSA5 include Burkina Faso, Mozambique, Rwanda, Tanzania and Uganda.

than the international poverty line and 29.6 percent of the population was counted as poor by national measures. Ethiopia is one of the most equal countries in the world and low levels of inequality have, by and large, been maintained throughout this period of rapid economic development (Figure 1.2.2).

Nevertheless, Ethiopia faces a challenge in terms of promoting shared prosperity. Promoting shared prosperity requires fostering the consumption growth of the bottom 40 percent. Prior to 2005, Ethiopia made good progress on sharing prosperity: consumption growth of the bottom 40 percent was higher than the top 60 percent in Ethiopia. However, this trend was reversed in 2005 to 2011 with lower growth rates observed among the bottom 40 percent (Figure 1.2.3). As explained in more detail in World Bank (2014a), this can largely be explained by the effect of rising food prices in 2011 which hurt the real incomes of marginal farmers and urban dwellers.

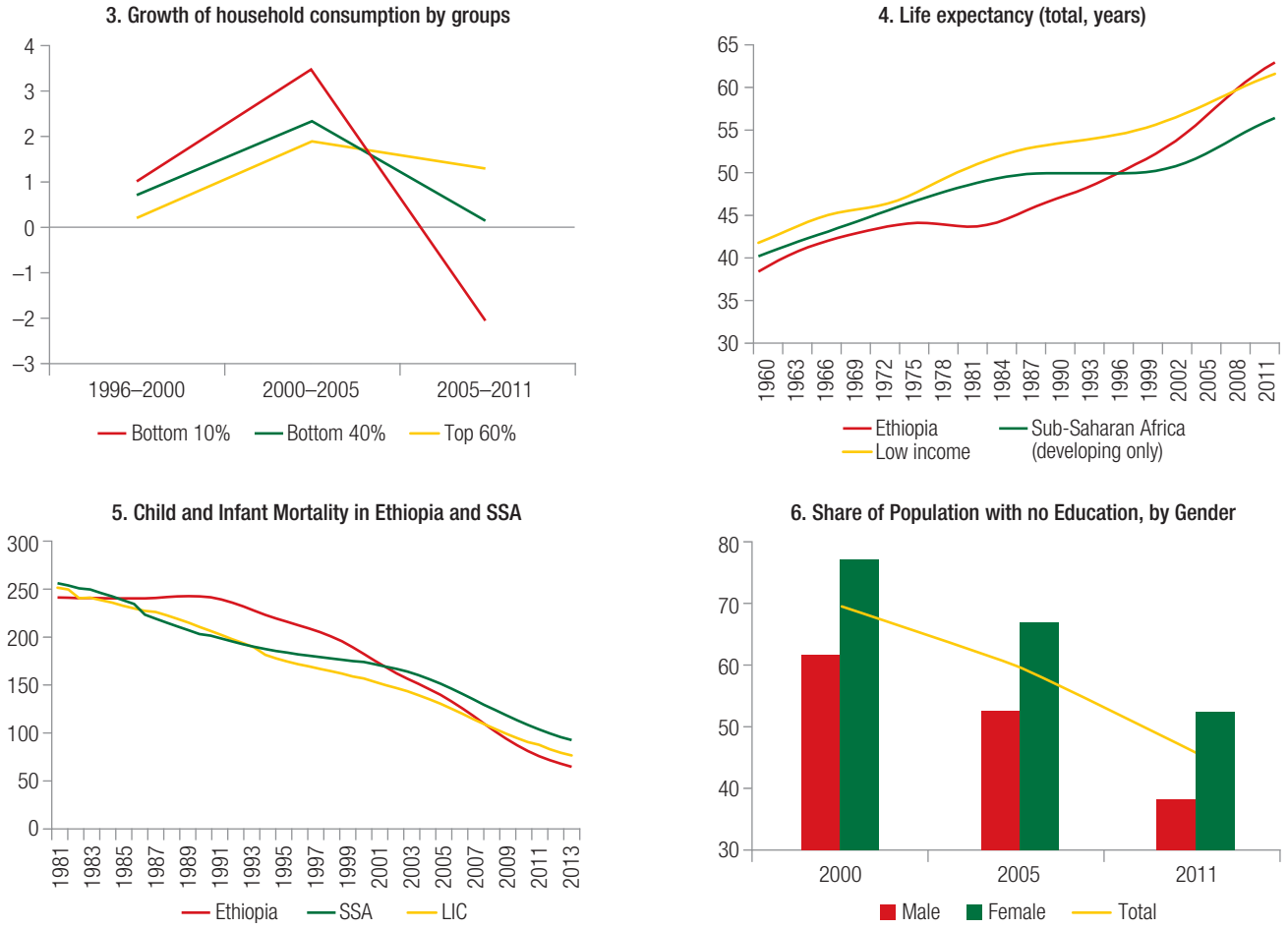
The average household in Ethiopia has better health, education and living standards today than in 2000. Life expectancy increased by about one year per year that passed since 2000 and is now higher in Ethiopia than the low income and regional averages (Figure 1.2.4). Substantial progress was made towards the attainment of the Millennium Development Goals (MDG), particularly on extreme poverty, undernourishment, gender parity in primary education, infant and child mortality (Figure 1.2.5), maternal mortality, HIV/AIDS, malaria and water access, though

FIGURE 1.2: Ethiopia's Development Performance



(continued on next page)

FIGURE 1.2: Ethiopia's Development Performance *(continued)*



Source: 2.1–2.3 and 2.6: World Bank (2015). 2.4–2.5: World Bank (WDI).

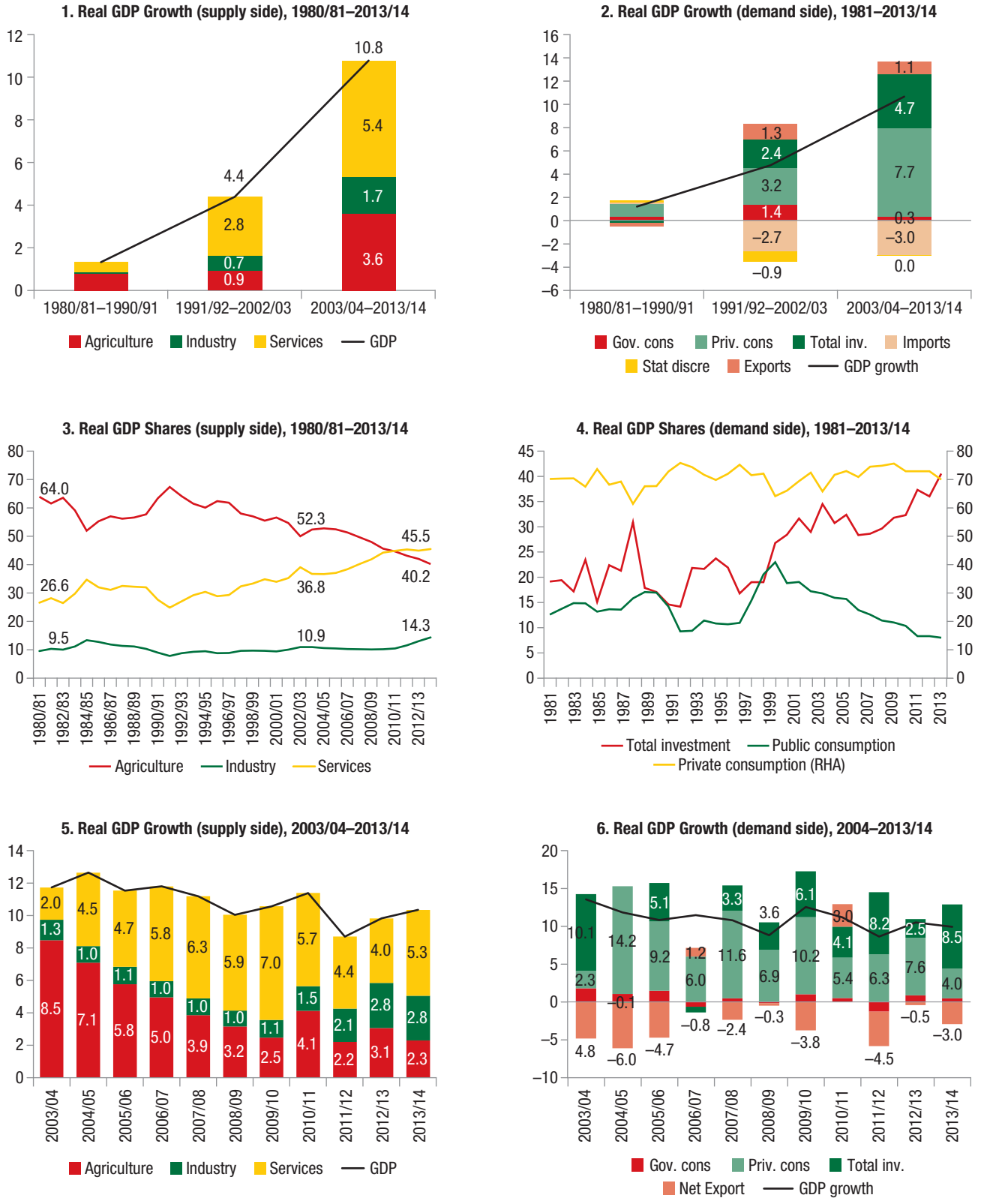
progress is lagging in primary enrolment and sanitation. Women are now having fewer births—the total fertility rate fell from 7.0 children per women in 1995 to 4.1 in 2014. At the same time, the prevalence of stunted children was reduced from 58 percent in 2000 to 40 percent in 2014. The share of population without education was also reduced considerably from 70 percent to less than 50 percent (Figure 1.2.6). Finally, the number of households with improved living standards measured by electricity, piped water and water in residence doubled from 2000 to 2011. Despite this impressive progress, the country faces deep challenges in every dimension of development. One key challenge is to sustain rapid economic growth.

1.3 Proximate Growth Determinants

The growth acceleration was driven by services and agriculture on the supply side, and, private consumption and investment on the demand side. More recently, there is evidence of a boom in investment and construction activity. Figure 1.3 decomposes growth and output into major supply and demand side components since 1980. The following trends emerge:

- Growth was driven primarily by services and agriculture (Figure 1.3.1).
- The services sector has overtaken agriculture as the largest in terms of output. This shift has been

FIGURE 1.3: Growth Characteristics



Source: Staff Estimates based on data from the Ministry of Finance (National Accounts Department).

ongoing for a decade, and it accelerated since 2004 (Figure 1.3.3).

- Since 2004, the sectoral drivers of growth have shifted further towards services and, lately, industry. The recent rise of industry is due to a construction boom and not because of a rise in the manufacturing sector which remains very small at about 4 percent of GDP.
- Private consumption and investment were the major demand side contributors (Figure 1.3.2).
- The investment rate has increased substantially since mid-1990s with a commensurate decline in public consumption (Figure 1.3.4).
- Agriculture is no longer the major driver of growth. In 2004, about a quarter of growth was due to agriculture. By 2014, less than a quarter of growth came from this sector.
- The growth contribution of investment activity has increased in recent years (Figure 1.3.6).

High total factor productivity growth and factor accumulation account for most economic growth. Growth can come from two sources: using more factors of production or inputs (labor and capital) to increase the amount of goods and services that an economy is able to produce or combining inputs more efficiently to produce more output for a given amount of input. Decomposing into these two sources yields insights into the proximate causes of growth. As illustrated in Figure 1.4.1, the growth acceleration period (in this case: 2000–10) was characterized by substantially higher total factor productivity (TFP) growth, and, accumulations of capital and labor compared to previous decades.[3] The contribution of human capital, in comparison, was modest and did not increase in the 2000–10 period. TFP growth was particularly high in Ethiopia compared with fast-growing regional peers not dependent on natural resources (SSA5), as shown in Figure 1.4.2.

Rising labor productivity was a major contributor to growth with positive contributions from structural and demographic change. Figure 1.4.3 decomposes gross value added per person into four components: labor productivity gains within sectors, labor productivity gains between sectors (structural change), demographic gains, and increases in the employment rate. For the 1999–2013 period as a whole, more than seventy percent of growth is attributed to within-sector labor productivity gains, especially in agriculture and commerce (Figure 1.4.4). The other three components contribute to varying degrees depending on the time period. The structural change and demographic effects are particularly pronounced in the later period (2005–13). The employment effect, in comparison, is negative owing to a rise in the student population.

Despite substantial capital accumulation, the returns to capital have remained high. Table 1.1 shows estimates of the return to capital (change in output as a result of a change in capital) using two alternative methods. The estimated return on capital ranges from 18 to 24 percent depending on the period of analysis and method. Interestingly, returns to capital increased during the high growth period (2004–12) according to both methods, in spite of the fact that the capital growth rate also increased.

This finding is consistent with the fact that Ethiopia is still in the early phases of development as the economy continues to be capital scarce. Two theories of growth and economic development support this observation. First, in the neoclassical growth model (Solow, 1956), starting from a low level of output per worker, saving and investment take place and the capital-labor, and thus the output-labor ratio, rises. The economy experiences diminishing returns to capital: the marginal product of capital, and thus the market-determined rate of profit of capital, falls. Second, within a competitive market economy of the Lewis (1954) model, it is only when the economy

[3] The TFP estimates presented here are comparable to other recent estimates despite differences in decomposition method, assumptions and time periods. The IMF (2012) estimates TFP growth at 5.2 percent for the 2006/07–2010/11 period with contributions of 2.6 percent and 3.2 percent for labor and capital, respectively. Merotto and Dogo (2014) decompose a real GDP growth rate of 11.1 percent for the 2003/04–2011/12 period into (percentage points): TFP (4.3), capital (4.3), labor (2.0), and education (0.4).

FIGURE 1.4: Growth Accounting and Decompositions

Source: 4.1–4.2: IMF (2013). 4.3–4.4: Martins (2015).

TABLE 1.1: Capital Growth Rates and Estimated Returns to Capital (percent)

	Full period	Sub Periods			
	1983–2012	1983–2001	1991–2001	2002–2003	2004–2012
Real GDP Growth Rate	5.2	3.0	5.2	–2.2	10.8
Method 1: Initial-year gross fixed capital formation					
Capital Growth Rate	7.1	6.0	5.1	6.4	9.2
Average Rate of Return to Capital	23.5	24.7	21.8	20.0	21.7
Method 2: 'Rule of Thumb' capital output ratio					
Capital Growth Rate	5.0	3.2	5.3	5.3	8.4
Average Rate of Return to Capital	18.7	17.9	17.9	17.9	20.5

Source: Merotto and Dogo (2014).

emerges from the first, labor surplus and capital scarce classical stage of development and enters the second, labor scarce and more capital abundant neoclassical stage that real incomes begin to rise generally.

When did the Ethiopian economy take-off? Interestingly, the econometric evidence is suggestive of two recent take-offs, as discussed in Box 1.1. The first, in 1992, when there was a change in economic and political systems. The second, in 2004, when economic growth rates became consistently high and stable. It can therefore be argued that the economy changed to higher gears both in 1992 and 2004. For the purposes of this study, we shall focus mainly on the period since 2004, which is henceforth termed 'the growth acceleration'.

Why has growth volatility declined since 2004? There are three main reasons for why the standard deviation of Ethiopia's growth rate dropped from 6.0 in 1992–2003 to 1.4 in 2004–14. First, there was an absence of major droughts and the weather was relatively favorable. Second, there was relative political stability and an absence of wars and conflict. Third, the Ethiopian economy is relatively closed and external events tend to have less impact than in other countries in the region. In particular, the trade-to-GDP ratio is quite low, the capital account is closed and there are no foreign banks operating in Ethiopia. During the 2008/09 global financial crisis, for instance, Ethiopia was mainly affected by a decline in exports rather than the GDP growth.

In summary, Ethiopia has experienced a growth acceleration since 2004 in the context of a very successful development performance.

BOX 1.1: When Did Ethiopia's Economy Take Off?

The concept of an economic take-off was conceptualized by Rostow (1960). He proposed a historical model of growth whereby economies undergo five stages of growth as follows: (1) traditional society; (2) preconditions for take-off; (3) take-off; (4) drive to maturity; and (5) age of high mass consumption. Although Rostow's theory has faced much criticism, the concept he introduced remains useful as it identifies a point in time in the early stages of development where an economy starts growing at high and self-sustained rates. Subsequently developed econometric methods help identify and analyze sustained growth take-offs (e.g. Hausmann et al. 2005)).

Two alternative years emerge as candidates for a take-off in Ethiopia: 1992 and 2004. To motivate the discussion consider the following average annual growth rates: (1981–1992: 0.5%), (1993–2004: 4.5%) and (2004–2014: 10.9%). This box briefly discusses the arguments in favor of either of these two interpretations and attempts to reconcile them. We follow the definitions of Hausmann et al. (2005): (a) a growth acceleration should be sustained for at least 8 years and the change in growth rate has to be at least 2 percentage points; (b) a country can have more than one instance of growth acceleration as long as the dates are more than 5 years apart; (c) trend breaks were selected at the 1% level of significance ($\alpha = 0.01$) in the Autometrics options in the software package OxMetrics 7 (Doornik et al., 2013). The test results illustrated below are sufficiently robust to changes in these specifications.

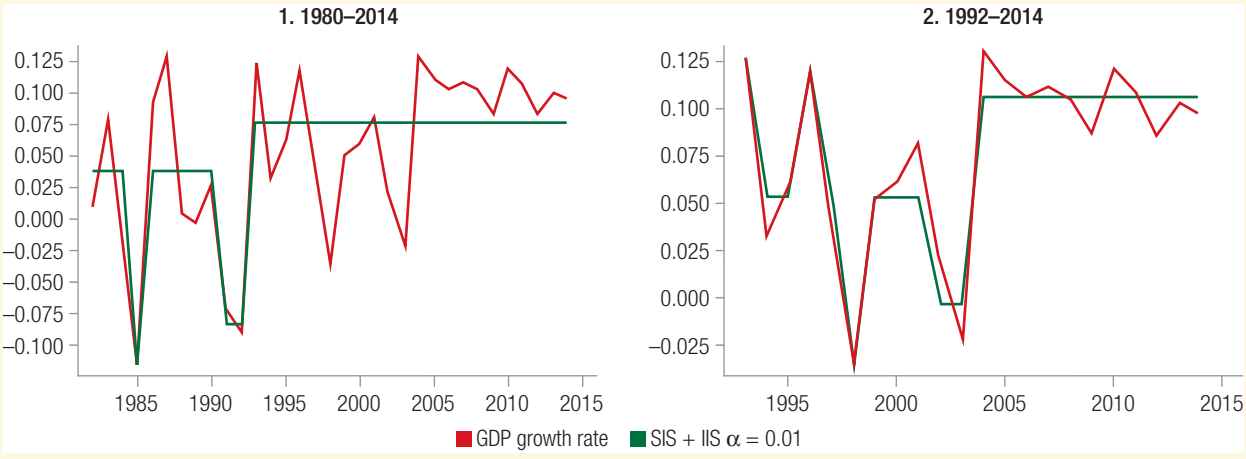
Econometric tests reveal a break in GDP growth in 1992 when the focus is on the 1980–2014 period and extreme observations are taken into account. This result is derived using the algorithm developed in Doornik et al. (2013) which identifies the existence, timing and significance of breaks in mean growth rates. In the years 1998 and 2003 GDP growth witnessed sharp contractions, which coincide with the war with Eritrea and a period of severe drought, respectively. Accounting for these two extraordinary observations, statistical tests singled out the year 1992 as a period marking a turning point in growth performance (see Figure 1.5.1). This essentially reflects the fact that Ethiopia's GDP growth rate surged from 0.5% in 1981–92 to 7.7% in 1993–2014.

Identifying 1992 as a break point is consistent with the hypothesis that the economy took off around the time of political and economic regime change. The shift in growth performance around 1992 is associated with the introduction of market-oriented economic reforms that ensued the demise of the socialist Derg regime (1974–1991). In addition, the period since 1992 was preceded by political regime change and the end of a major civil war. Note, however, that economic growth was relatively unstable in 1992–2004 compared to 2004–2014. This prompts the need for studying the period since 1992 separately.

Econometric tests identify 2004 as the turning point in growth performance when the focus is on the 1992–2014 period. The result, illustrated in Figure 1.5.2, unveils that that the period 1992–2014 comprises two 'distinct' growth regimes: 1993–2003 (when GDP growth was significantly higher than that in 1980–1992), and 2004–14 (when growth accelerated further and exhibited more stability).

In sum, it can be argued that the economy changed to higher gears in both 1992 and 2004. The year 1992 marked the shift from a command economy to a more market-oriented economy. Growth was higher, but somewhat unstable. 2004, in turn, marked the first year of an unprecedented sustained high-growth period.

FIGURE 15: Ethiopia: Real GDP Growth



Note: Red line: actual GDP growth rate. Green line: fitted line derived from the statistical test. Source: Haile (2015).

2 ECONOMIC STRATEGY – 'THE ETHIOPIAN WAY'

Which economic strategy did the Ethiopian government pursue? In brief, economic strategy focused on promoting agriculture and industrialization while delivering substantial public infrastructure investment supported by heterodox macro-financial policies. Overall, there was substantial government intervention in many aspects of the economy. Ethiopia's economic strategy was unique. It differed markedly from other strategies, such as the recommendations of the Growth Commission (2008) as well as the experience of other fast growing African countries. Although it was inspired by the East Asian development state model and shares a few common features, economic strategy also differed from this model both in conception and outcomes.

Ethiopia is a unique country and its economic growth strategy is no exception. The country prides itself of many special characteristics, including not being colonized, the use of the Julian calendar (with 13 months), of being the cradle of mankind and origin of coffee, and having its own worldwide known cuisine. On the economic front, there are also many unique characteristics, including on the economic policy side. As argued in this chapter, Ethiopia's policy mix is an interesting hybrid of alternative economic models, but most of all it is unique.

The chapter is structured as follows: Section 2.1 describes the main elements of Ethiopia's economic strategy. Section 2.2 compares it briefly with the recommendations of the Growth and Development Commission (2008). Section 2.3 briefly juxtaposes Ethiopia's strategy with that of non-resource rich, fast-growing Sub-Saharan African countries (SSA5). Finally, Section 2.4 makes comparisons with East Asian Developmental States.

2.1 Main Elements of Economic Strategy

Since 1991, Ethiopia has pursued a policy of Agricultural Development Led Industrialization (ADLI). ADLI builds on the development theories from the 1960s in which (smallholder) agriculture needs to be developed first to facilitate demand for industrial commodities and inputs for industrialization. The policy aims to increase agricultural productivity to increase overall production, as well as invest in those industries with most production linkages to rural areas. The strategy assumes that inter-sectoral linkages will reinforce the growth impetus derived from increasing productivity in both sectors with the agricultural sector obtaining machinery, chemicals and consumption goods from industry in exchange for food and raw material. Since the 1990s, ADLI implementation was rather interventionist as agricultural productivity increased and linkage development requires substantial public investment and direct support policies, but initially it was done rather cautiously.

Starting in the mid-2000s, ADLI was gradually complemented by efforts to promote light manufacturing to support structural transformation and exports. The 2005 PASDEP 5-year plan focused on boosting agricultural production via intensification and yield growth and an industrial and export earnings strategy based around industries with linkages to agriculture. Horticulture was encouraged with great success, but attempts to boost leather processing and other industries were initially less successful. Under the Growth and

Transformation Plan (2010–15), the country's industrialization process has been promoted by emphasizing light manufacturing in key sectors where the country has a perceived comparative advantage (e.g. apparel, leather, agribusiness, wood, and metal). The process is supported through industrial policy (e.g. directing scarce credit and foreign exchange towards selected sectors).[4] More recently, the government has emphasized the importance of developing industrial zones aimed at attracting foreign investors. Indeed, the second Growth and Transformation Plan (2015–20), is expected to put an even stronger emphasis on structural transformation (along the lines of the 'Lewis Model'), industrialization, urbanization, and export promotion.

Massive public infrastructure investment has been at the center of economic strategy since the mid-1990s. The public investment rate rose from about 5 percent in the early 1990s to 18.6 percent of GDP in 2011, making it the third highest in in the world (World Bank, 2013). Starting from very low levels of infrastructure, Ethiopia has invested heavily in the energy, transport, communications, agriculture and social sectors. Power generation capacity increased from 473 MW in 2002 to 2,268 MW in 2014, and is projected to reach 4,138 MW in 2015. More than 10,000 MW generation capacity will be available by 2020 once major ongoing hydro, geothermal and wind projects have been completed. Chief amongst these is the construction of Africa's largest dam, the Grand Ethiopian Renaissance Dam at a cost of US$4.2 billion (8.5 percent of GDP). The federal and regional road network increased from 26,500 km in 1997 to 60,000 km in 2014. Railway lines connecting Addis Ababa with the Port of Djibouti as well as a Light Railway line in the capital are near completion. The customer base of Ethio Telecom (a state monopoly) rose from 7 to 26 million (mobile, fixed, internet) in 2011–14 and projects to upgrade the existing networks are ongoing. Ethiopia has also invested heavily in the agriculture, education, health, and water & sanitation infrastructure over the past decades. In spite of this impressive growth, Ethiopia's infrastructure deficit remains the third largest in Africa, according to the AfDB.

Heterodox financing arrangements to support public investment is at the heart of the strategy. Public investment projects are implemented over the national budget and through State Owned Enterprises (SOEs) using domestic and external sources of financing. Domestic financing draws upon a range heterodox arrangements, including: direct lending and bond purchases by state-owned banks to finance SOE projects, and, compulsory purchases by private banks of bonds whose proceeds partly finance long term development lending to the private sector by DBE (the '27 percent rule'). The dominance of state-owned banks (accounting for about two thirds of banking system deposits) and credit rationing in the presence of negative real interest rates imply cheap sources of financing for public projects, but also lead to the exclusion of many private investment projects. This partly helps explain why the private investment rate in Ethiopia is the sixth lowest worldwide. In sum, this model can be described as 'financial repression' (see Box 2.1). In addition, monetary policy has occasionally been relatively loose, contributing to higher than necessary inflationary pressures, including through regular direct central bank financing of the budget.

The role of government in the Ethiopian 'mixed economy' is substantial compared to market economies. In welfare economic textbook versions of a 'market economy', government intervention is justified in the context of market failure, including information asymmetry, externalities, monopoly, and, to meet social policy objectives. Government interventions in the Ethiopian 'mixed economy' model includes welfare economic justifications, but goes beyond this, as summarized in Table 2.1.

[4] Rodrik (2008) describes Ethiopia's industrial policy framework as simply consisting of: (a) a list of priority sectors (export-oriented agribusiness, textiles and garments, processed leather, and so on); and (b) a list of incentives (cheap land, tax incentives, technical support).

TABLE 2.1: Key Characteristics of the Ethiopian Economic Model

Role of Government Intervention	
Production	The government produces some goods and services and its rationale include: (a) to encourage competition (e.g. wholesale markets), (b) there is 'insufficient capacity' in the private sector (e.g. sugar production), and (c) to meet social objectives (e.g. keeping some retail prices low).
Credit and foreign exchange	The State channels the majority of credit and foreign exchange through state-owned banks, mainly the Commercial Bank of Ethiopia (CBE) and Development Bank of Ethiopia (DBE). The former largely supports public investment and the latter supports long term private investment.
Protected sectors	Key services sectors (finance, telecom, trade logistics, retail) are protected from foreign competition on the basis of 'infant industry' arguments that the domestic private sector is too underdeveloped to withstand foreign competition (e.g. retail) or the government regulator insufficiently prepared (e.g. financial sector).
State monopoly enterprises	Despite privatization of some SOEs, major state monopoly companies remain, including electricity production (EET) and distribution (EES), telecoms (Ethio Telecom), railways (ERC), sugar (Sugar Corporation), trade logistics (ESLSE), and air transport (Ethiopian Airlines). Sometimes profits are transferred between SOEs (e.g. from telecoms to railways).
Capital account	Closed. This implies that domestic residents and banks do not have access to foreign capital markets. Moreover, repatriation of profits from Foreign Direct Investment (FDI) is difficult.
Land	The Government owns all land. Land users can buy and sell lease rights.
Promoting 'value creation' and avoiding ‚rent-seeking'.	A key objective of government intervention is to promote 'value creation' and minimize 'rent seeking'. To illustrate, if a private investor acquires land and builds a plant that converts a raw material (say leather) into an intermediate or final product (say shoes) and employs labor in this process then the activity is 'value creating'. If, on the other hand, the land is not put into productive use and the investor sells the land use rights at a profit five years later then the activity is termed 'rent seeking'. An alternative term for the latter may be 'speculation'.
Economic Development Policy	
Public investment	Substantial public investment is facilitated through a heterodox policy mix of: low or negative real interest rates, credit and foreign exchange allocations, real currency appreciation, recurrent expenditure restraint, and low international reserves.
External borrowing	In addition to the concessional multilateral credits, Ethiopia is relying substantially on bilateral non-concessional credits, especially from China. Sovereign bond financing is also used.
ADLI	Agriculture Development Led Industrialization (ADLI) which emphasizes smallholder agricultural growth to stimulate growth in other sectors of the economy, most notably industry.
Sectorial policies	Emphasis is put on the development of agriculture and manufacturing. The services sector receives less attention (except exports). Key sectors (leather, textile, metal, cut flower and agro industry) are actively favored owing to their potential comparative advantage (labor intensive production drawing upon domestic resources base).
Structural transformation	The Government vision of structural transformation follows the Lewis model, whereby the process of industrialization gradually absorbs surplus labor from the agriculture sector. This is associated with labor productivity growth, urbanization, and reduced population growth.
Financial and Monetary Sectors	
Absence of key financial markets	Negative real interest rates imply excess demand for credit, so the credit market clears via rationing as opposed to the price mechanism. The dollar is not depreciating fast enough compared to the domestic-foreign price differential. As a result there is excess demand and a black market premium. Given a fixed, low nominal interest rate, the Treasury Bill market also does not clear via the price mechanism. There is no stock market. A very limited market exist for corporate and subnational bonds. The recent sovereign bond market marks an exception.
Printing money and the seignorage	Ethiopia has experienced very high levels of inflation over the past decade. The resulting seignorage provided the Government a substantial source of finance. The federal budget continues to be partly financed through direct advances from the central bank.
Savings	The Government has raised money for a major infrastructure project (the Grand Renaissance Dam) using bonds. A housing savings scheme, promoted by CBE, is also in place.

Source: Own elaboration based on The Growth Report (2008).

2.2 Did Ethiopia Fo he Insights of 'The Growth Commission'?[5]

Ethiopia has emphasized public investment, but de-emphasized the promotion of a vibrant private sector. International experience underscores the relevance of emphasizing public investment for growth because it expands the range of opportunities and returns on private investment. According to the Growth and Development Commission (2008): 'No country has sustained rapid growth without also keeping up impressive rates of public investment—in infrastructure, education, and health. Far from crowding out private investment, this spending crowds it in. It paves the way for new industries to emerge and raises the return to any private venture that benefits from healthy, educated workers, passable roads, and reliable electricity.' However, the same report also notes that 'Government is not the proximate cause of growth. That role falls to the private sector, to investment and entrepreneurship responding to price signals and market forces … Government provides the environment for growth, but it is the private sector that invests and creates wealth for the people.' Ethiopia followed the first part of this advice, but faces a challenge in following the second.

Remarkably, Ethiopia achieved high growth despite generally not following consensus view on how to achieve it. Aside from public infrastructure investment and a few other polices, Ethiopia generally did not follow the recommendations of the Growth Commission. Table 2.2 offers a systematic comparison of the common characteristics of the 13 high growth economies studied by the Commission and the experience of Ethiopia. Of the five major characteristics, Ethiopia's experience coincided in terms of 'committed, credible, and capable government', high investment, and relative macroeconomic stability. On the other hand, Ethiopia did not fully exploit the world economy, let markets allocate resources, or mustered high rates of savings. In terms of the additional ingredients of high growth experiences elsewhere listed in the table, Ethiopia's experience only narrowly coincides, including on labor markets and equality. On the other hand, in most other dimensions there is limited coincidence. Differences in key dimensions such as capital flows, financial sector development, regional development and the quality of the public debate, stand out. Similarly, Ethiopia implemented a number of what the Growth Report cites as suboptimal policies, such as energy subsidies, open-ended protection of some sectors, price controls and export bans.

2.3. Fast Growing Non-resources Rich African Peers

Ethiopia's growth experience stands out from a group of similar, high-performing regional peers, analyzed by the IMF. Five other non-resource dependent African economies experienced high growth rates, though not as high as Ethiopia: Burkina Faso, Mozambique, Rwanda, Tanzania, and Uganda (SSA5). According to the IMF (2013a), these countries (including Ethiopia) share several key characteristics which help explain their growth performance, such as improved macroeconomic management, stronger institutions, increased aid, and higher investment in human and physical capital. This leads the report authors to conclude that 'their experience demonstrates that improvements in macroeconomic policy combined with structural reforms and reliable external financing, can foster productive investment and stimulate growth' (ibid).

A closer inspection of the Ethiopian experience, however, reveals that it fits the IMF narrative only partially. What sets Ethiopia markedly apart is its emphasis on a state-led model of growth (which most peers moved away from), the strong focus on agricultural development and uneven progress in macroeconomic management and institutions. The absence of major recent structural reforms in Ethiopia also stands

[5] The Commission, headed by Nobel Laureate Michael Spence, based its growth recommendations on the experience of 13 high growth economies (9 from East Asia).

BOX 2.1: The Banking Sector in Ethiopia

Ethiopia's banking sector consists of two state-owned commercial banks, one state-owned development bank and 16 private banks. Three public banks constitute 77 percent of total assets of the banking sector. Within this group are the Commercial Bank of Ethiopia (CBE) and the Development Bank of Ethiopia (DBE). CBE holds 80 percent of the total outstanding loans and DBE is a large holder of treasury bills. There are no foreign-owned banks.

On average, banks appear to be well capitalized and profitable. The system-wide capital adequacy ratio was 17.2 in June 2014 compared to the 8 percent minimum requirement. The profitability of the banking sector remains high with return on assets and return on equity at 3.1 and 44.6 percent, respectively and well above regional averages (2 and 17 percent, respectively). Asset quality is also good with nonperforming loans at less than 3 percent of banks' total loan portfolio (March 2014). The system-wide liquidity ratio, however, is only slightly above the 15 percent minimum requirement.

Ethiopia's banking sector is characterized by 'financial repression'. The term financial repression was initially coined by McKinnon (1973), who defined it as government financial policies strictly regulating interest rates, setting high reserve requirements on bank deposits, and mandatorily allocating resources. Economists are divided as to whether financial repression is good or bad for economic growth (see Chapter 7, Box 7.1, for a discussion). In Ethiopia, the key characteristics include: (1) below market-clearing deposit rates; (2) relatively high reserve and liquidity requirements of banks; (3) allocation of the bulk of credit by state-owned banks, especially CBE and DBE.

Nominal interest rates are low and rigid. The minimum deposit rate, regulated by NBE, has remained constant for the past five years at 5.0 percent. The lending rate is fully liberalized, but has been relatively unchanged over the same period with minimum and maximum observed lending rates unchanged at 7.5 and 16.25 percent, respectively. Moreover, the spread between the minimum deposit rate and the observed maxiumum lending rate has been constant at around 11 percent. As a result, changes in the real interest rates have exclusively been a product of changes in inflation (Figure 2.1.3).

Domestic credit has declined over time, as a share of the economy, as a result of low real interest rates. Figure 2.1.1 reveals a substantial reduction in domestic credit as a share of GDP over the past decade from 35.7 percent of GDP in 2004 to 28.6 percent of GDP in 2014. This demonetization trend is mirrored in a similar decline of broad money (M2) as a share of GDP, which declined from 38.5 percent in 2004 to 28.4 percent in 2009. The most plausible explanatory factor for this trend has been the low real interest rate observed over this period.

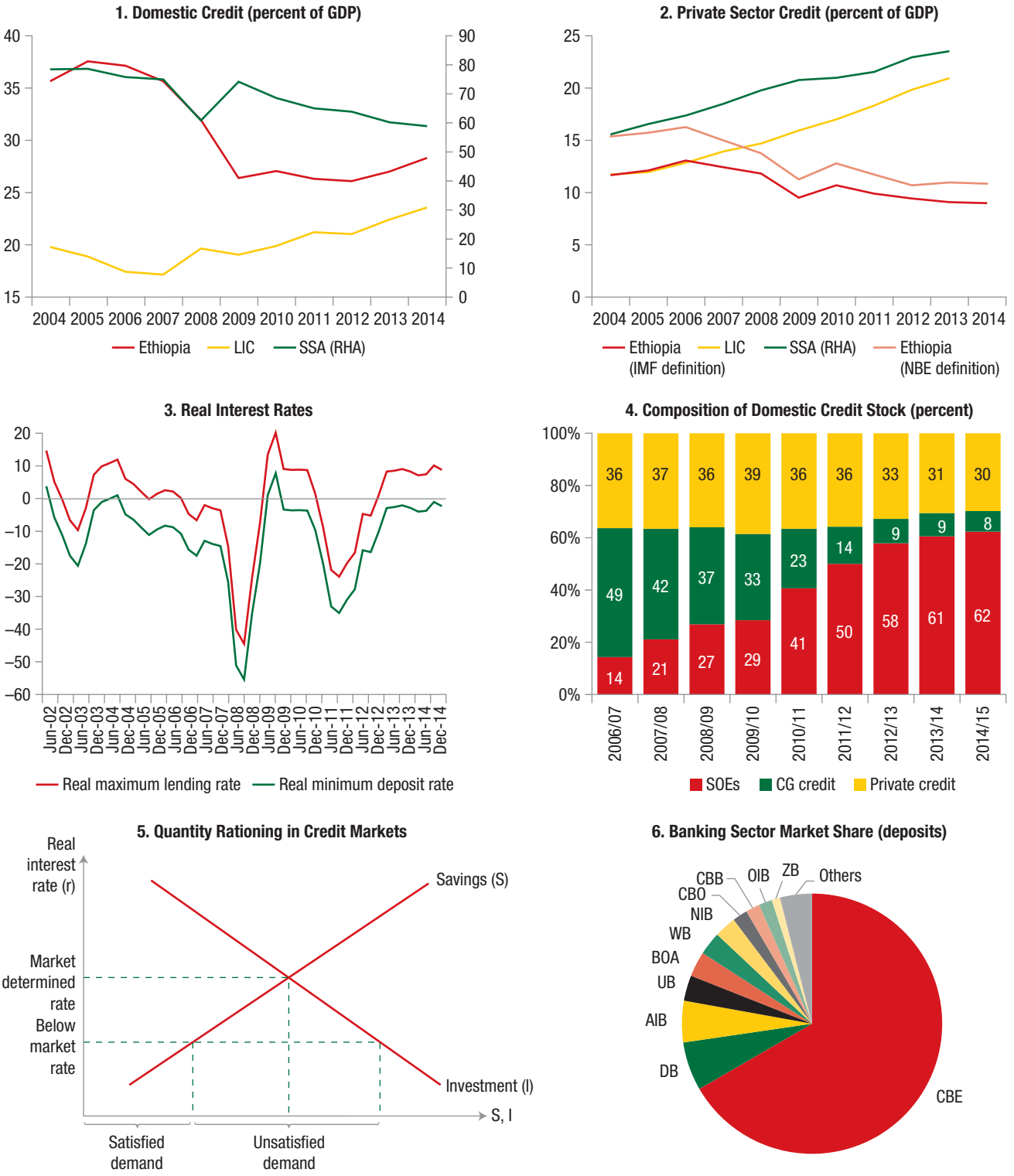
Credit growth has been increasingly concentrated in public projects rather than private ones. This is reflected in the composition of domestic credit stock (Figure 2.1.4). The share of private credit in total outstanding credit has declined from 37 percent in 2007/08 to 28 percent in 2014/15. Conversely, the share of loans to State Owned Enterprises increase from 21 to 62 percent over this period.

Private sector credit, as a share of GDP, has declined because of declining domestic credit and a policy preference for financing SOEs. Put differently, the private sector has been taking a smaller share of a shrinking cake. Private sector credit declined from about 16 to 11 percent of GDP in 2004–14, according to the NBE definition, which counts all DBE loans as private.

In sum, Ethiopia's credit market is characterized by financial repression with an emphasis of financing public infrastructure projects. Figure 2.1.5 illustrates this in a simple investment-savings diagram. The savings curve slopes upward as a higher real interest rate encourages households to save. The investment curve is downward sloping because more investment projects are profitable at low real interest rates. In a market-based system, the real interest rate is determined where the two curves intersect. In the case of Ethiopia, the minimum deposit rate is effectively set by the Government (NBE) and this will have a strong bearing on the level of the real interest rate. Since it is set below the market rate, the market clears via quantity rationing. Some agents get access to credit at the below market rate. Other agents are completely excluded from credit access giving rise to 'unsatisfied demand'.

out, as discussed in Chapter 8, whereas African countries, including SSA5, reformed substantially. Ethiopia also did not improve much on standard quantitative measures of institutional development compared with high-performing regional peers. Ethiopia lags considerably behind on three dimensions of the Worldwide Governance Indicators (Kaufman et al., 2010): 'voice and accountability', 'political stability and absence of violence/terrorism', and 'regulatory quality'. On the other hand, foreign investors often cite economic and political stability as a reason to locate in Ethiopia. Though there have been improvements in 'rule of law', Ethiopia still scored lower than peers. Encouragingly, it was at par with others in government effectiveness

FIGURE 2.1: Financial Sector Indicators



Source: World Bank (WDI), NBE, IMF and CSA. NBE definition includes DBE. IMF definition includes DBE.

TABLE 2.2: Growth Commission Recommendations and Ethiopia's Experience

Common characteristics of fast growth	Ethiopia's Strategy and Experience
They fully exploited the world economy	Has a very low export-to-GDP ratio, is not a WTO member, has high services restrictiveness levels and overvalued real exchange rate.
They maintained macroeconomic stability	Has maintained some degree of macroeconomic stability, but has often chosen to forgo some stability in the interest of pursuing high growth through public investment.
They mustered high rates of saving and investment	Investment: Yes. Savings: Not until very recently.
They let markets allocate resources	Ethiopia has a mixed economy where the markets allocate some resources, while the Government allocates others.
Committed, credible, and capable governments	Yes.
Ingredients	
Technology transfer	Limited. Also not taking full advantage of FDI in services sector.
Competition and structural change	Limited.
Efficient labor markets	Yes
Export promotion and industrial policy	Investment in airline services and horticulture were successful. Other areas have been less successful.
Capital flows and Financial Market Openness	Closed capital account.
Financial sector development	Financial repression.
Urbanization and rural investment	Urban infrastructure investments are implemented. Rural investment is high.
Equity and equality of opportunity	Very low income inequality. Strong progress on equality of opportunity, but low levels remain.
Regional development	There is a need to develop 'second cities' to complement the capital, Addis Ababa.
The environment and energy use	Ethiopia is a regional leader on promoting the green economy. Energy subsidy encourages 'over consumption'.
The quality of the debate	Limited.
Examples of Sub-optimal growth policies	**Ethiopia's Strategy and Experience**
Subsidizing energy except for very limited subsidies targeted at highly vulnerable sections of the population.	Has some of the lowest tariffs in the world with across the board subsidies benefitting primarily the better-off who actually have access to energy.
Providing open-ended protection of specific sectors, industries, firms, and jobs from competition.	Many services sectors benefit from the absence of foreign competition.
Imposing price controls to stem inflation, which is much better handled through macroeconomic policies.	Temporarily adopted in January-May 2011.
Banning exports for long periods of time to keep domestic prices low for consumers at the expense of producers.	Grains exports are currently banned.
Resisting urbanization and as a consequence underinvesting in urban infrastructure.	Ethiopia has very low urbanization rates and the Government's interest in urbanization is relatively recent.

Source: Own elaboration based on The Growth Report (2008).

and control of corruption. Finally, Ethiopia has consistently scored lower than SSA5 on the World Bank Country Policy and Institutional Assessment (CPIA) index (3.4 vs. 3.8 in 2005–13).

However, there is something that sets Ethiopia apart institutionally that is not well captured in most commonly used governance indices. Ethiopia has, to some extent, followed the 'authoritarian developmental state model' with a mixed state-market approach with country specific aspects. One very important aspect of such a model is that rents are managed with a view to increasing productivity and competiveness over time, and that individual rent-seeking does not crowd out this orientation. Ethiopia's main strength is having institutionalized how power is organized based on a development oriented vision, including an understanding of how development needs to be shared among competing groups to keep the country unified. These systems are not just heterodox from an economics point of view, they are also heterodox institutionally—i.e. they do not conform to the Western consensus of what is a good institutional model—and consequently don't show up as particularly good on World Governance indicators. The experience in Africa is different—efforts to pursue state-led development have failed where they were tried and mostly ended in the 1980s (debt crisis/structural adjustment). The main reasons for such failure include poor investment choices, a failure to invest in a 'Green Revolution' to improve agriculture, and rent-seeking and corruption.

2.4. An East Asian Strategy?[6]

When Ethiopia's economic strategy is viewed through the East Asian or Chinese mirror, there are similarities but also important differences. Ethiopia, in its policy pronouncements, highlights manufacturing, underscores the desirability of using exports as a lever to raise the growth rate and relies on state owned or controlled firms to promote industrial change. It often compares itself with China, Vietnam and Korea. There are similarities, including substantial government leadership in the development process, high rates of investment, the promotion of light manufacturing and structural change. However, there are a number of important differences of economic strategy:

- **First, agriculture features much more prominently in Ethiopia than in the Asian growth strategy.** A sizable agricultural economy was a point of departure for Japan, Korea, Taiwan (China) and China and in the latter case, the successful reform of the rural economy lent impetus to and helped win political backing for the reform process. Resource transfers from the rural sector through terms of trade effects, may have contributed modestly at the start of the industrialization but their role diminished rapidly. It was the transfer of workers from the agricultural sector into industrial jobs in rapidly urbanizing economies that raised productivity and enlarged the GDP. This is the model of structural change Ethiopia is now trying to follow, though it has yet to succeed as workers are moving to services instead.
- Second, East Asia's performance in the last quarter of the 20th century is inseparable from **the success of numerous firms mainly drawn from the private sector**, specialized in manufacturing and the penetration of Asia's manufactured exports into the markets of western countries.
- Third, the acceleration of growth in East Asia was followed quickly by an **increase in domestic saving** (which bankrolled development) and in investment with the private sector in the forefront because expanding opportunities and government incentives created profitable opportunities, which companies were eager to capitalize on and not because of a change in the business environment. Despite recent increases in savings in Ethiopia, it still has a much larger savings-investment gap than the East Asian countries.

[6] This sub-section draws heavily upon a background paper by Shahid Yusuf (2014) commissioned for this report.

- **Fourth, infrastructure did not drive growth in East Asia although it undoubtedly played a supporting role.** All East Asian countries invested in infrastructure to accommodate the needs of industry, trade and urbanization, but such spending followed rather than led the development process. In Ethiopia, recent growth has been driven by infrastructure as discussed later in Chapter 3. More recently, China has sustained its growth at great cost, by investing lavishly in infrastructure and urban real estate for which there is little immediate demand, but this was not the East Asian norm during its growth heyday.
- **Fifth, East Asian countries actively used real exchange rate undervaluation to gain competitiveness and promote growth and exports.** By contrast, Ethiopia's real exchange rate has remained overvalued over the past several decades.

Ethiopia's strategy, while it incorporates elements of the East Asian model, diverges significantly in terms of conception and outcomes from that of East Asian. After a decade of growth that matches the highest rates achieved by Japan, Korea and China, the structure of the Ethiopian economy, its low level of urbanization, its export composition (notably the large share of unprocessed commodities and of transport services), its heavy dependence on foreign financing, and the continuing salience of the state in economic decision-making, does not resemble that of the East Asian "tigers" nor for that matter does the quantum of resources (including savings) mobilized domestically, the investment by the private sector in tradable activities, the number of Ethiopian firms active in the global marketplace and the influx of FDI.

In summary, more than anything, Ethiopia's growth strategy stands out for its uniqueness rather than its resemblance to other strategies. It is characterized by a focus on agricultural and industrial development with a strong public infrastructure drive supported by heterodox macro-financial policies. It has a few characteristics in common with regional fast growers, draws selectively from East Asian policies, but bears little resemblance to the conceived wisdom derived from the Growth Commission. Finally, it stands out for a relative absence of structural economic policy reforms—a topic we re-visit in Chapter 8.

EXPLAINING GROWTH: STRUCTURAL, EXTERNAL AND STABILIZATION FACTORS[7]

3

Growth was driven by public infrastructure investment and restrained government consumption supported by a conducive external environment. Using a cross-country regression model, we are able to distinguish between structural, external, and stabilization factors. The growth acceleration is mainly explained by structural factors, including infrastructure and low government consumption. Increased trade openness and the expansion of secondary education also helped, but the effects were modest. Macroeconomic factors held back some growth, owing to declining private credit, real currency overvaluation, and relatively high inflation.

3.1 Introduction

The purpose of this chapter is to classify growth determinants into structural, external, and stabilization factors. In previous chapters we described the characteristics of the Ethiopian growth process and the economic strategy that supported it. We found that growth was concentrated in the services and agriculture sectors, and characterized by high total factor productivity and substantial capital and labor accumulation. Economic strategy was characterized by high public investment and heterodox financing arrangements, among others. This chapter brings these pieces together by linking growth performance directly to economic policies.

We apply a cross-country regression model to derive insights about the determinants of growth. In particular, we use an existing regression model developed by Brueckner (2013) and originally constructed to investigate growth in Latin America. This approach avoids tweaked Ethiopia-specific results and helps address the following question: Can we explain Ethiopia's recent growth performance by factors also observed to influence growth elsewhere?

The econometric method is a System Generalized Method of Moments (GMM). Internal instruments are used to avoid endogenity biases of lagged dependent and explanatory variables. The model is estimated on 126 countries for the 1970–2010 period, including low income countries and using 5 year averages of non-overlapping averages. We divide our period of analysis as follows: Early 2000s, Late 2000s, and Early 2010s (see Annex A3.1 for a definition).

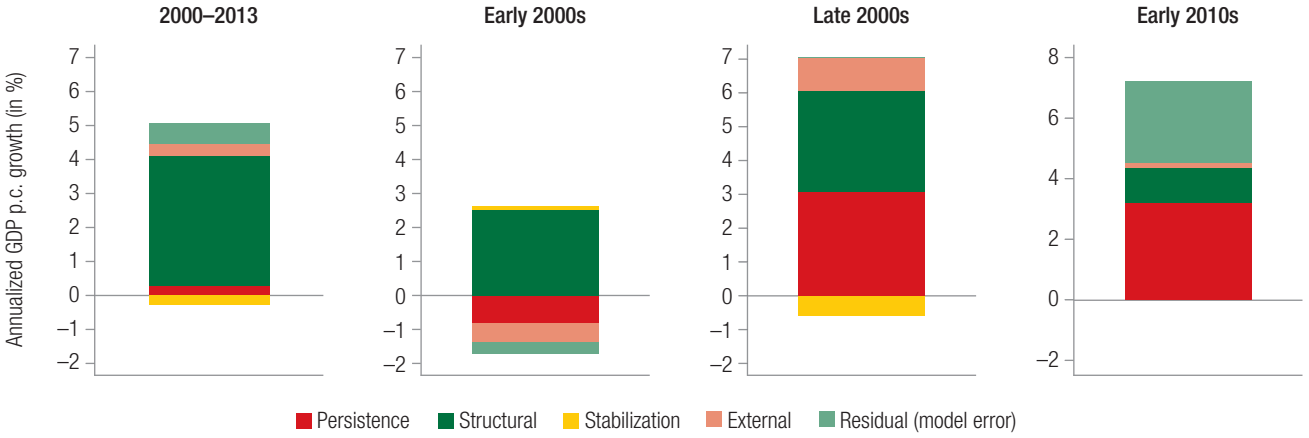
The model has three types of variables as well as a persistence effect. Structural factors include variables such as human capital, private sector credit, trade openness, infrastructure and government consumption. Stabilization factors include inflation, the real exchange rate and the presence of a banking crisis. External factors are commodity prices and terms of trade. The model also includes a persistence effect, capturing the fact that changes in the underlying variables can also affect growth in periods after they were implemented.

The model accurately predicts Ethiopia's growth over the period of analysis and is reasonably robust. Our growth predictions are quite similar to observed rates and the model has a better predictive power than similar studies on Ethiopia. Moreover, it passes a series of robustness tests, including the choice of infrastructure variable which emerges as one of the key explanatory factors.

The chapter focuses on presenting the main results of the analysis while deferring the methodology to a technical annex. Specifically, Section 3.2 presents the main results of the analysis. Annex A3.1 describes the methodology used to derive these results. Annex A3.2 examines model robustness. Additional details on methodology are available in Moller and Wacker (2015).

[7] This chapter is a summary of Moller and Wacker (2015).

FIGURE 3.1: Regression Results: Key Growth Drivers in Ethiopia (Real GDP per Capita)



Note: A positive residual implies that actual growth was higher than predicted growth. Source: Table 3.1.

3.2 Explaining Ethiopia's Recent Growth Performance

Economic growth in 2000–13 was driven primarily by structural improvements, according to model results. The results are illustrated in Figure 3.1, which summarizes more detailed results contained in Table 3.1. The left panel of Figure 3.1 shows that almost all of the (predicted) growth performance of the 2000–2013 period can be attributed to structural factors: the model estimates these factors to have contributed 3.9 percentage points (ppts) of average annual per capita growth rate of 4.3 percent (measured in Purchasing Power Parity, PPP). The positive effect of the external environment was outweighed by the negative effects associated with macroeconomic imbalances (each accounting for 0.3 ppts). The remaining growth impetus was explained by persistence effects. Finally, the residual captures the difference between model predicted growth and actual growth.

Public infrastructure investment and restrained government consumption were the key structural drivers of growth. These two factors were linked as an expansion in budgetary infrastructure investment was facilitated by reduced government consumption, arising partly as a result of a 'peace dividend' effect following the end of the 1998–2000 war with Eritrea (Figure 3.2.2). As previously mentioned, public investment was also financed by extension of credit through the domestic banking sector and foreign borrowing, and partly executed through off-budget state owned enterprises. It also helped for growth (0.3 ppts) when Ethiopia opened more to international trade, especially in the Early 2000s, as trade of goods and services increased its share of GDP from 37.5 percent in 2002 to 48.7 percent in 2012 (World Bank, 2014a).[8] Although Ethiopia made substantial efforts in improving educational attainment of its population over the past decade, the growth enhancing effects hereof have been somewhat modest (0.3 ppts), as reflected in the regression results and the Solow decomposition results presented in Chapter 1 (Figure 1.1.5), though this may be a measurement problem as discussed by Pritchett (2001). Secondary education (the explanatory variable) remains limited, even if gross enrolment improved from 13.1 to 32.8 percent over the period of analysis.[9]

Financial disintermediation held back some growth. An expansion of credit to the private sector enables firms to invest in productive capacity, thereby

[8] See also Chapter 2 Figure 2.2.1 on the trade policy reform side.
[9] See World Bank (2012) for an analysis of the challenges related to secondary education in Ethiopia. There is also evidence of a substantial mismatch between skills supply and demand, for instance in manufacturing (World Bank, 2014b).

TABLE 3.1: Parameter Values, Changes and Predicted Growth Effects (real GDP per capita)

		2000–13		Early 2000s		Late 2000s		Early 2010s	
	Parameter	Change	Predicted effect	Change	Predicted effect	Change	Predicted effect	Change	Predicted effect
Persistence	**0.781**	**0.005**	**0.28%**	**–0.010**	**–0.82%**	**0.039**	**3.07%**	**0.041**	**3.20%**
Structural:			**3.84%**		**2.52%**		**3.01%**		**1.20%**
Δln(schooling)	0.018	0.064	0.20%	0.094	0.17%	0.090	0.16%	0.008	0.01%
Δln(credit/GDP)	0.074	–0.013	–0.16%	0.012	0.09%	–0.009	–0.07%	–0.042	–0.31%
Δln(trade/GDP)	0.082	0.020	0.28%	0.052	0.42%	0.019	0.16%	–0.012	–0.10%
Δln(govt C)	–0.262	–0.040	1.79%	0.009	–0.24%	–0.041	1.08%	–0.086	2.26%
Δln(tele lines)	0.141	0.072	1.74%	0.147	2.07%	0.119	1.68%	–0.051	–0.72%
Δln(institutions)	–0.003	0.000	0.00%	0.000	0.00%	0.000	0.00%	–0.000	0.00%
Stabilization:			**–0.28%**		**0.09%**		**–0.58%**		**0.01%**
Δln(inflation)	–0.011	0.052	–0.10%	0.055	–0.06%	0.285	–0.32%	–0.182	0.21%
Δln(exch rate)	–0.064	0.016	–0.18%	–0.023	0.15%	0.040	–0.26%	0.031	–0.20%
Δln(bank crisis)	–0.040	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
External:			**0.34%**		**–0.55%**		**0.95%**		**0.18%**
Δln(TOT change)	0.118	0.016	0.32%	–0.047	–0.55%	0.081	0.95%	0.014	0.16%
Δln(commodity prices)	10.482	0.000	0.01%	0.000	0.00%	0.000	0.00%	0.000	0.02%
Predicted average annual GDP per capita growth rate			**4.18%**		**1.24%**		**6.45%**		**4.53%**

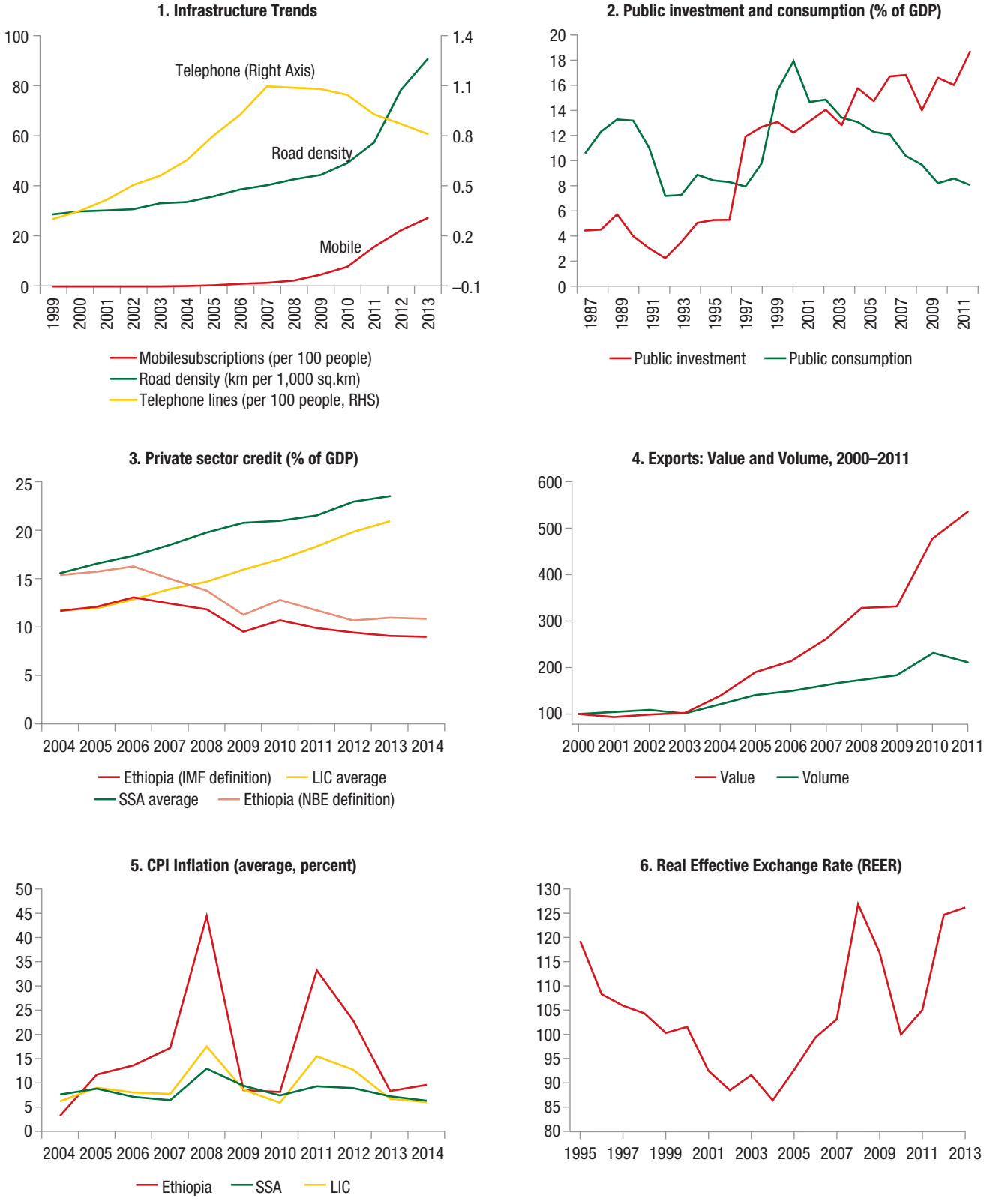
Source: Authors' calculation, obtained by inserting Ethiopian values for the explanatory variables and using the regression coefficients (parameters) of the baseline model presented in Annex Table A3.1 (column 1).

laying the foundation for a sustainable growth path. However, Ethiopia is falling behind its peers in this area (Figure 3.2.3). Regression results suggest a small negative growth effect of financial repression policies whereby rationed credit is channeled through state-owned banks primarily towards public investment. It is noteworthy that the negative quantitative effect was substantially smaller than what is generally perceived (–0.2 ppts in 2000–13). On the other hand, the negative growth effect shows an increasing trend (rising to –0.3 ppts in the Early 2010s), suggesting that financial repression policies may become more costly if maintained. Indeed, this would be consistent with the experience of China.[10]

Structural improvements were particularly important in the late 2000s supported by a positive external environment, but held back by macro imbalances. How did growth drivers change over time? While structural factors dominate in the Early 2000s (2.5 ppts) and Late 2000s (3.1 ppts), they become less pronounced in the Early 2010s (1.2 ppts). The diminishing effect in the last period, however, is affected by the choice of the infrastructure variable, as discussed in Annex A3.2. The growth contribution of

[10] See Huang and Wang (2011) for a review of the effects of financial repression policies on growth and for empirical evidence suggesting that such policies were conducive in the early (but not later) stages of growth in China.

FIGURE 3.2: Trends in Key Growth Drivers



Source: 1: Moller & Wacker (2015). 2: World Bank (2013). 3: World Bank (WDI). 4: World Bank (2014a). 5.5–5.6: IMF (WEO).

the external environment increased over the period, shifting from a negative (–0.5 ppts) to a positive contribution (0.9 ppts) between the Early 2000s to the Late 2000s and a weak positive effect in the Early 2010s (0.2 ppts). The deteriorating macro environment was a drag on growth only during the late 2000s (–0.6 ppts), but not in the other two periods. The substantial persistence effect observed in the late 2000s and early 2010s (about 3 ppts) echoes the growth drivers during the early and late 2000s, respectively. We interpret this as the lagged effect of the structural improvements implemented in earlier periods.[11]

A conducive external environment also supported the growth acceleration. As argued in World Bank (2014a), a strong rise in exports helped support the economic boom. Since 2003 exports quadrupled in nominal terms, while volumes doubled, reflecting a substantial positive price effect (Figure 3.2.4). This is consistent with findings by Allaro (2012) that exports 'Granger caused' growth and with Gebregziabher (2014) who finds strong causal effects from exports on real output. The strong growth effect is somewhat surprising given that merchandise exports account for only 7 percent of GDP—the lowest among populous developing countries (services exports account for an additional 7 percent of GDP).

The growth drag of macroeconomic imbalances sets Ethiopia apart from high performing regional peers, though the effect was modest. Growth was held back by high inflation and an overvalued exchange rate in the Late 2000s. The country experienced much larger inflationary impacts of the two commodity price shocks in 2008 and 2011 than other low income and African countries (Figure 3.2.5). This is partly explained by expansionary policies in the form of high growth of the monetary base owing to credit expansions to state owned enterprises and direct central bank lending to the government. Following the 2010 devaluation, the monetary authorities also allowed the unsterilized accumulation of foreign exchange reserves arising from the ensuing rise in exports and this contributed to additional inflation (inducing a negative growth effect of 0.3 ppts in the Late 2000s). Most other countries in Africa achieved better monetary control by shifting toward reliance on indirect instruments like open market operations to soak up liquidity. Monetary policy instruments in Ethiopia, in contrast, are limited to changes in bank reserve requirement and sales/purchases of foreign exchange reserves. In addition, the real exchange rate was allowed to appreciate substantially since 2004[12], owing to insufficient nominal depreciation in a system of foreign exchange rationing (Figure 3.2.6).[13] This made the import of expensive public infrastructure equipment relatively cheaper but undermined export competitiveness. The net effect on growth was negative (0.3 ppts in the Late 2000s), though not as substantial as estimated elsewhere.[14] Nevertheless, what stands out from these simulations is that the negative growth effect of some macro policies was not that substantial. High inflation and an overvalued exchange rate cut little over half a percentage point from economic growth rates. This helps explain why Ethiopia was able to grow fast in the presence of some sub-optimal macro policy choices.

Would economic growth have been higher in the absence of heterodox macroeconomic policies? It is hard to give a precise answer to this question. However, it should be pointed out that financial repression, a strong real exchange rate and monetary policy induced inflation all helped support high public infrastructure

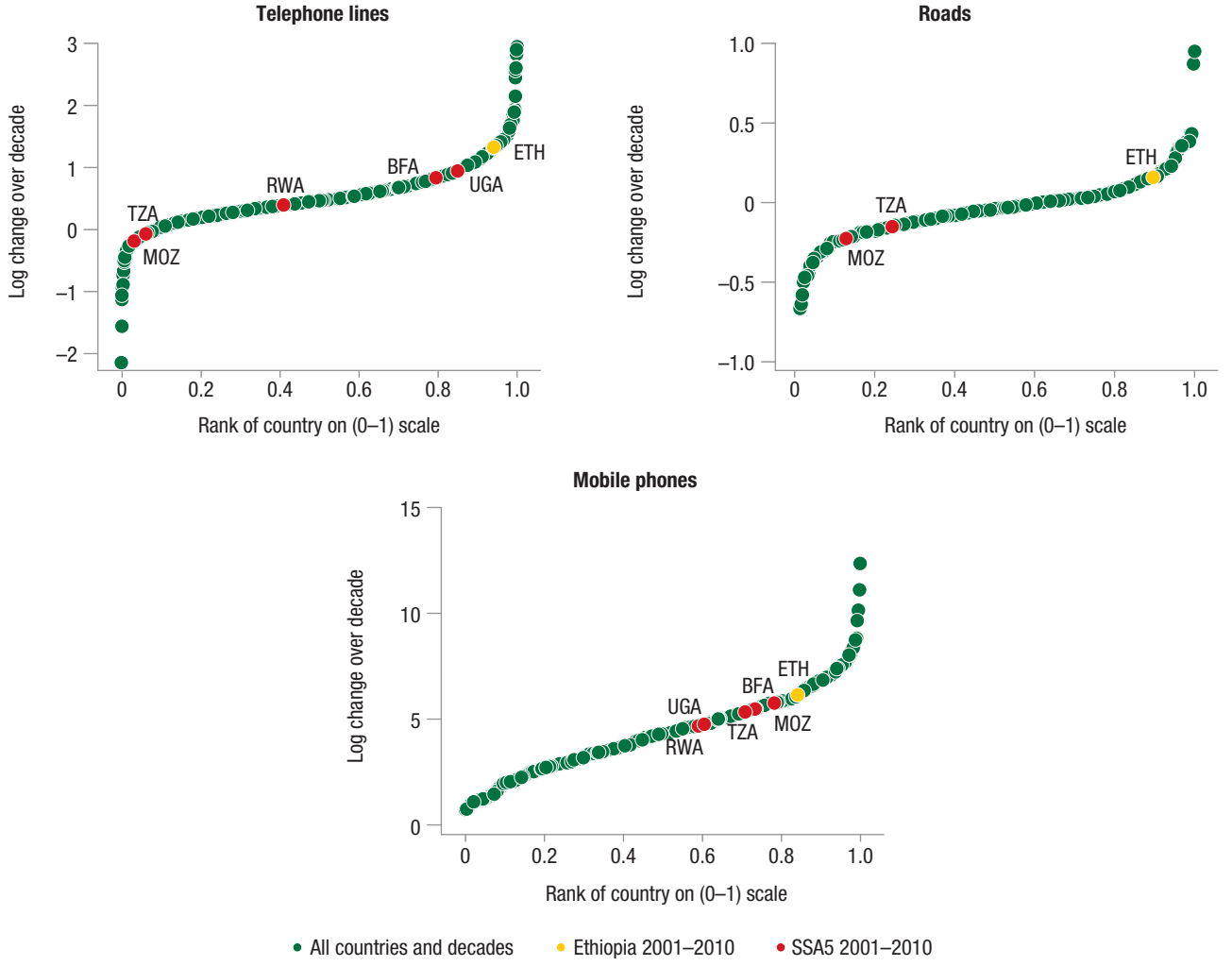
[11] The subsistence effect should not be conflated with the unexplained residual as per Equation (2) in Annex A3.1.

[12] The degree of real exchange rate overvaluation fluctuated over time. World Bank (2013) shows that the real exchange rate of Ethiopia has remained overvalued throughout the 1951–2011 period. By 2011, the RER over-valuation was 31 percent. The IMF (2014), using alternative methods and measurement, finds that the real effective exchange rate was overvalued by 10–13 percent in 2014.

[13] The *de facto* exchange rate arrangement is classified as a crawl-like arrangement by the IMF (2013b). The authorities describe it as a managed float with no predetermined path for the exchange rate. The annual pace of nominal depreciation, however, has been stable at 5 percent in recent years. The NBE continues to supply foreign exchange to the interbank market based on plans prepared at the beginning of the fiscal year, which take into account estimates of supply and demand.

[14] The World Bank (2014a) estimates that 10 percent real exchange rate overvaluation in Ethiopia holds back the growth rate by 2.2 percentage points. This is generally consistent with our coefficient derived from the full cross-country data set, which implies that an immediate 0.6 percentage point decrease in the short run will cumulate to a 3 percentage point effect over the long run.

FIGURE 3.3: Infrastructure Growth Rates: Ethiopia in the Global Context (1970–2010)

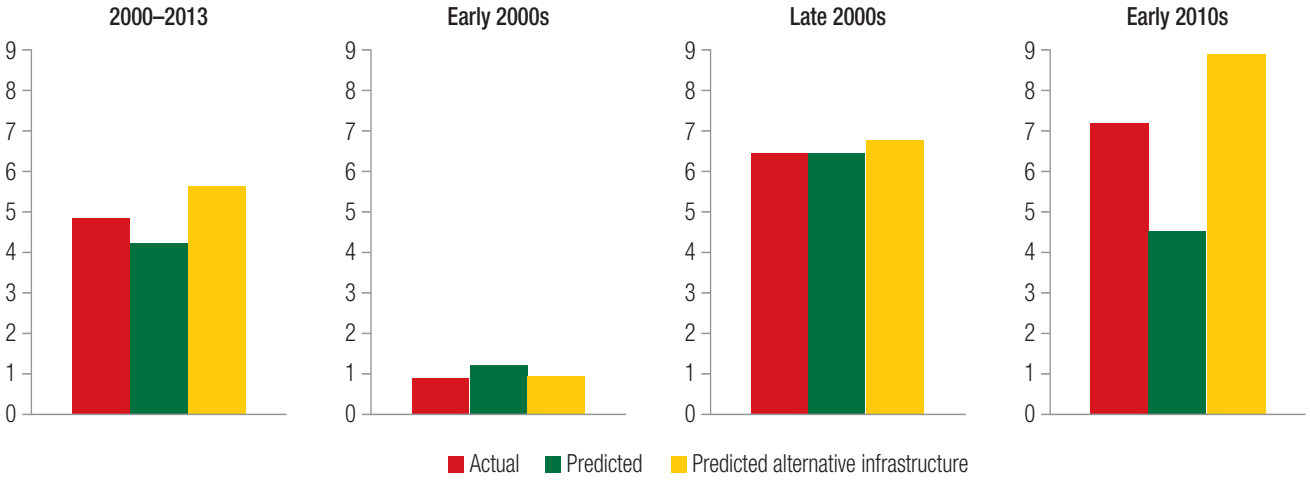


Source: Author's calculation based on WDI data.

investment. By providing full access to credit at negative real rates and foreign exchange at below market prices, the cost of public investment was reduced substantially. Moreover, direct central bank financing of the budget deficit and seignorage allowed more public investment to be financed, thus supporting growth. In the presence of more orthodox macro policies, public infrastructure investment would have been lower, which would have lowered growth. The net growth effect of these two alternatives is difficult to estimate with precision, but it is unlikely that that public infrastructure investment could be maintained at similar high levels on the back of orthodox macro policies.

Why did infrastructure contribute so strongly to growth in Ethiopia? In brief, because of the substantial expansion in physical infrastructure that took place over the past decade combined with the estimated high returns to infrastructure investment (derived from 124 countries in 1970–2010). To put Ethiopia's infrastructure performance into perspective, we use the underlying data set to identify decadal infrastructure growth rates for the 124 countries over 4 decades (1970s–2000s). Figure 3.3 illustrates the results for three infrastructure variables. Each observation represent a country and each country is represented 4 times. Ethiopia's performance in the 2000s

FIGURE 3.4: Prediction Performance of the Model



Source: Authors' calculation.
Note: 'predicted' is based on the baseline model, 'predicted alternative infrastructure' subtracts the effect of phone lines from the baseline result and instead adds the average effect of roads and cell phones.

is marked in red. We note that infrastructure growth (measured in log changes over decades) is among the 20 percent fastest in all 3 cases. That infrastructure growth is high for countries at low levels is not surprising. However, the results resonate further as SSA5 countries are also plotted (in blue). Ethiopia outperformed these countries in infrastructure growth, which helps explain recent economic growth.

Our growth predictions are quite similar to observed rates and the model has a better predictive power than similar studies on Ethiopia. Figure 3.4 compares actually observed per capita growth with the predictions from the model. As illustrated, the model slightly under-predicts growth in the entire period (2000–2013) while almost perfectly capturing the differing magnitude of the slow growth period in the Early 2000s and the growth acceleration of the Late 2000s. Predictions for the Early 2010s are the least precise, but this can be corrected by a substitution of infrastructure variables, as discussed later. While discrepancies for country-specific results derived from cross-country studies are not exceptional in the literature (see results for LAC countries in Araujo et al., 2014), our residual compares very favorably to the Ethiopia results derived from the cross-country OLS regression model reported in IMF (2013a), where the residual effect predominates. Our residuals are quite small as depicted previously in Figure 3.1 (gray bars).

Our key findings are summarized as follows: Overall, the model provides good predictions of Ethiopia's growth performance since 2000 and our results offer plausible quantitative explanations for key economic trends and policy developments over this period. We find evidence that public infrastructure investment—financed in part by restrained government consumption—was the key structural driver of growth. While this policy mix enjoys broad support among mainstream macroeconomists, heterodox policies pursued by the Ethiopian government such as financial repression, an overvalued real exchange rate, and monetary policy induced inflation (including 'printing money' to finance public spending) are more controversial. Interestingly, the empirical results show that the growth dividend of the former set of policies outweighed the drag from the latter. This helps shed light on the question of how Ethiopia could achieve high economic growth in the presence of seemingly growth-inhibiting macro-financial policies.

Annex 3.1 Methodology

Our analysis is based on previous studies investigating the determinants of growth in developing countries. We use an empirical growth model originally set up by Loayza et al. (2005) which was improved and updated by Brueckner (2013). These cross-country growth regression models were originally constructed to investigate growth in Latin America and the Caribbean (Araujo et al, 2014).

Such cross-country growth regressions may have their limitations, but their insights should not be neglected. We are well aware that cross-country growth regressions have their limitations. While some strands in the literature neglect them altogether, we at least view them as one possible approach to gain insights into the dynamics of growth (see also Durlauf, 2009), especially in a country like Ethiopia where data coverage is relatively scarce. Furthermore, our econometric approach tries to address the most conventional methodological issues that can arise in cross-country growth regression exercises.

This approach avoids tweaked Ethiopia-specific results. Taking an existing cross-country regression model to analyze Ethiopia's recent growth performance potentially runs the risk that Ethiopia-specific factors might not be well-reflected in the model. However, this is essentially our goal as setting up a new cross-country model for our purpose will be prone to model selection that produces the 'best' results for the specific case of Ethiopia. In essence, our approach helps address the following question: can we explain Ethiopia's recent growth performance by factors also observed to influence growth in other countries? Or is the Ethiopian case a specific one? Even if one remains skeptical of cross-country growth regressions, a failure of the model to appropriately predict observed growth in Ethiopia would suggests that factors that correlate with growth in most countries cannot explain Ethiopia's growth acceleration. On the other hand, a good predictive performance would imply that Ethiopia's growth acceleration is in line with experiences of other countries and allow us to decompose those correlates of growth in more detail.

Model and Data

The underlying model expresses domestic income as function of key growth drivers. Our goal is to estimate the impact of certain variables X_{ct} on domestic income, measured as the natural log of real PPP GDP per capita (lny_{ct} for country c in period t). More formally, the estimated equation can be written as the dynamic ('steady-state') process:

$$lny_{ct} = \theta lny_{ct-1} + \Gamma ln(X)_{ct} + a_c + b_t + e_{ct} \qquad (1)$$

where ac and bt are country and time fixed effects, respectively; and ect is an error term that remains unexplained by the model ('residual', i.e. the difference between predicted and observed growth). Note that a time period t is the average over (non-overlapping) 5-year periods to smoothen short-run and cyclical effects.

These drivers of growth are grouped into the categories of structural, stabilization, and external effects. Following the above-mentioned studies, the individual variables in the vector Xct are assigned to those three categories. This facilitates an interpretation whether growth was driven by "good policies" (structural, stabilization) or "good luck" (external). We briefly discuss the individual variables (which are taken from the Brueckner (2013) dataset) and their intuition below. A more detailed technical description, including the original data sources and variable values for Ethiopia is presented in Moller and Wacker (2015).

Stabilization variables contain inflation, banking crises and the exchange rate. Capturing the idea that macroeconomic fluctuations can influence growth over an extended period, we control for the number of banking crises in each period, the inflation rate, and the exchange rate. A decrease in the latter variable is equivalent to a currency depreciation.[15]

[15] As the interpretation of the exchange rate variable is somewhat difficult in the cross-country context from a policy perspective, it should rather be

Structural variables capture a broad set of fundamental country characteristics. This includes secondary school enrollment as a proxy for human capital, a measure for trade openness (trade-to-GDP ratio adjusted for population), an institutional variable (polity2), and private credit-to-GDP as a measure of financial development. Our baseline variable for infrastructure is fixed telephone lines per capita but given the substantial impact obtained for this variable, we also perform alternative specifications with mobile phone and road coverage. Furthermore, our model includes government size (government consumption to GDP). Although several government expenditures can have a beneficial effect on income (especially in areas like health, education, or public infrastructure), the essential idea of this variable is to capture the negative effects that an excessive government and associated taxes can have on private activity. As our model describes long run growth, this should not be confused with the positive stimulative effects that increased government consumption can have during economic downturns. It should also be noted that our model is conditional on other variables, i.e. the positive effect of government spending for education and infrastructure, e.g., will be captured by those variables (and lagged GDP).[16] Finally, a high level of consumption (i.e. recurrent) expenditures limits fiscal space to counter cyclical shocks. Generally welcome counter-cyclical measures can then only be financed with relatively distortionary taxes (see also Afonso and Furceri, 2010, on the effect of expenditure volatility) or an increased debt burden.[17]

External factors are reflected in terms of trade and commodity prices. Net barter terms of trade and the country-specific commodity export price index of Arezki and Brueckner (2012) are used to capture the most important effects of the global environment on growth. Furthermore, global conditions will also be reflected in the time dummies.

Although our variables are not perfect, they allow for a large coverage of developing countries. In the best case, one would have more sophisticated variables to reflect the underlying economic rationale. E.g., educational achievements might be a better proxy for human capital than attainments. Unfortunately, data on such a level of quality is not available for a broad range of countries. Researchers thus face a trade-off between data sophistication and country coverage. Since data quality is especially poor in lower income countries, while our goal is to include them in the sample to obtain most appropriate estimates for Ethiopia, we are thus limited to the mentioned data at hand. On the upside, this leaves us with a panel of 126 countries for the 1970–2010 period (see Moller and Wacker (2015) for country coverage).

Estimation

We use System GMM estimation with a limited set of internal instruments. This method is appropriate as some of the explanatory variables, Xct, may themselves be a function of the dependent variable and because dynamic panel estimation in the presence of country fixed effects generally yields biased estimates for the lagged dependent variable (e.g. Nickel, 1981; Wooldridge, 2010). Our estimator uses internal instruments to avoid endogeneity biases. More specifically we use one first-differenced lag of the explanatory variables as instrument for those variables in levels (see Arellano and Bover, 1995, and Blundell and Bond, 1998).[18] To addresses most conventional

seen as a control variable, i.e. controlling for the fact that an undervalued exchange rate might boost growth temporarily.

[16] See also Loayza et al. (2005: 40–41). Optimally, one would like to subtract such expenditures like health, education, or infrastructure but this is not feasible for the wide range of countries included in the sample. Following the line of reasoning above, one should also note that the negative effect of government size is considerably smaller when the model is estimated unconditionally (i.e. without controlling for other variables), reflecting the fact that it then implicitly captures the positive effects of education, infrastructure etc. (see the results in Araujo et al., 2014, especially Tables 3 and A.3).

[17] For an alternative view on the effects of government consumption on output in neoclassical growth models, see e.g. Aiyagari et al. (1992) and the literature therein.

[18] We limit the instrument set to one lag in the baseline model in order to ensure that the number of instruments does not grow too large in the System GMM estimation and furthermore avoid over-fitting the model by using the 'collapse' sub-option in the STATA *xtabond2* command. Commodity prices, terms of trade and time dummies are treated as exogenous. We also use the one-step estimator as the two-step estimator is infeasible given the dimension of our data set. This also avoids severely downward biased standard errors associated with the two-step estimator (Blundell and Bond, 1998). See Brueckner (2013) for further details and discussions.

methodological pitfalls, our model includes country fixed effects which avoids unobserved heterogeneity across countries, while the use of internal instruments avoids endogeneity biases. By limiting the instrument set to one lag we avoid the well-known problems associated with too many instruments (Roodman, 2009).[19]

Despite the limitations and concerns about System GMM, of which we address several in robustness checks, we find it to be the most appropriate estimation method for our purpose. System GMM can incorporate a wide range of (linear) relationships among current and lagged values of economic variables. It also helps isolate exogenous changes in a variable from automatic reactions of that variable to other variables in the system and is careful not to confuse changes in a variable with a temporary shock. Furthermore, the identification strategy over time variation makes it appropriate to assess our periods of interest for one country, as opposed to identification strategies using cross-country variation (like the between-effects estimator) that also potentially suffer from unobserved cross-country heterogeneity. Given the dimension of our panel data set (especially the focus on a relatively short period) and some data gaps, we also find it superior to cointegration methods. To address remaining concerns, we also perform several robustness checks in addition to the battery of checks applied by Brueckner (2013), as discussed in Annex 3.2.

Calculating Growth Contributions in Ethiopia

Growth contributions over each time period can be calculated by first-differencing equation (1):

$$\Delta lny_{ct} = \theta(\Delta\ lny_{ct-1}) + \Gamma \Delta ln(X)_{ct} + \Delta b_t + \Delta e_{ct} \qquad (2)$$

as log-changes approximate growth rates of a variable. I.e. growth can be explained by a persistence effect ($\theta[\Delta\ lny_{ct-1}]$), changes in the explanatory variables X, and a period-specific global shock (Δb_t).[20] Note that the country fixed effect cancels out because it is time-invariant. To illustrate: growth in the Late 2000s can be explained by a dynamic persistence effect from the Early 2000s, the change in explanatory variables X in the Late 2000s, and a global time-specific shock (relative to the previous period). In this setting, the persistence effect should be interpreted as an 'echo' (or fading out) of previous improvements. Finally, the residual part Δe_{ct} remains unexplained by the model.

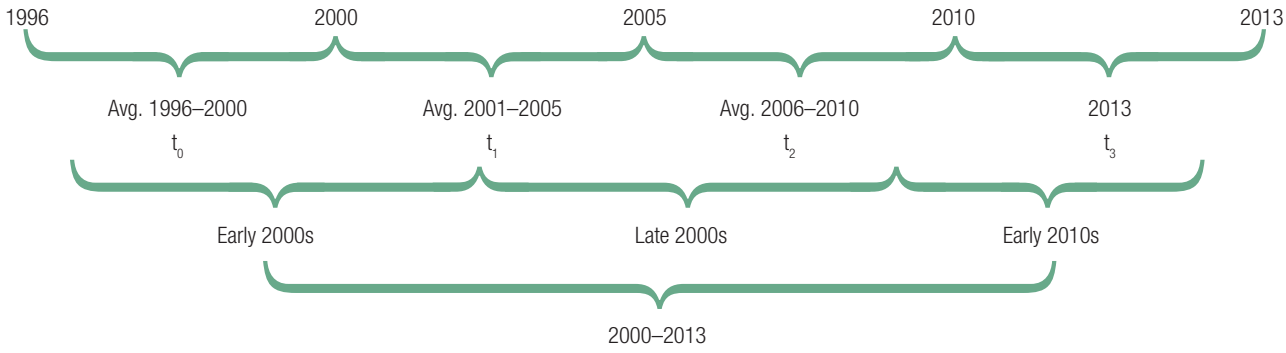
For calculating Ethiopia's drivers of growth, we extend its explanatory variables by one 5-year period. As the original dataset contains average 5-year values across countries until 2010 only, we update the Ethiopia values using 2013 data. We treat the latter period (the 'Early 2010s') as if it represented a 5-year period average for 2011–2015. This can be motivated by the consideration that the 2013 value is the mid-point for this period and most macro variables are highly persistent. Since not all of the 2013 data were available from sources fully consistent with the original dataset we added to the logged original series the log changes between the 2006–2010 averages and the 2013 values of those data we had available.[21] Despite some caveats, this approach allows us to also analyze the most recent period of Ethiopia's growth performance. Furthermore, it should be noted that this extension does not affect the model estimation

[19] Since the preparation of the Brueckner (2013) study, recent findings have shown that this might give rise to the opposite problem of suspiciously weak instruments (Bazzi and Clemens, 2013; Kraay, in progress) which we briefly address in the robustness section.

[20] Our calculation differs slightly from the one in Brueckner (2013) and Araujo et al. (2014) as we do not use the actual lag of the growth rate for calculating the persistence effect from equation (2) but instead take the growth rate as predicted from the model. Furthermore, we take second differences of external factors as they enter the estimated levels equation already in first differences. To calculate effects for the 2000–2013 period, we proceed as follows to accommodate dynamic effects: we calculate the changes over the full 15-year period and multiply them by the respective coefficient Γ times $(3+2\theta+\theta^2)/3$. This assumes that the change has been uniform over time and accommodates their dynamic effects. Similarly, the persistence effect is calculated as $(\theta+\theta^2+\theta^3)/3$ times the growth rate in the period prior to 2000.

[21] Where series were not identical (e.g. education), adding log (i.e. percentage) changes still provides a good proxy. For the commodity price index growth, we took the 90th percentile of previous index changes in Ethiopia. This was fairly consistent with our attempts to construct a similar index for this period. For the real exchange rate, we used IMF data for the Real Effective Exchange Rate (using the fiscal year 2013/14 as reference) as a proxy.

FIGURE A3.1: Definition of Time Periods Used in the Study



results as it was performed after estimation (and for Ethiopia only).

To facilitate an analysis of the growth acceleration period since 2004 with the available data, it is useful to define time periods precisely. As illustrated in Figure A3.1, our analyzed period 1996–2013 consists of 4 data points (t_0, t_1, t_2 and t_3), each capturing the average values of the following time periods: 1996–2000, 2001–2005, 2006–2010, and 2011–2015 (proxied by the 2013 value). In the remainder of the paper, we refer to 'Early 2000s' as the change between the 1996–2000 and 2001–2005 averages, the 'Late 2000s' is defined as the performance between the 2001–05 and 2006–10 averages, and the 'Early 2010s' comparing 2006–2010 averages and 2013 values.

It is also instructive to recap the implications and dynamics of this empirical neoclassical growth model. The level equation (1) implies that the (log) level of GDP changes with the (log) level of the explanatory variables X. Any change or innovation in the (log) level of X will thus have a permanent effect on (log) GDP and the effect is intermediated through a temporary (transitory) effect on the growth rate. A one-time increase in human capital in the Early 2000s, for example, will thus be captured as $\Delta \ln(x) > 0$ in equation (2) and impact the growth rate in the same period with parameter Γ. This growth-enhancing effect will be echoed in the Late 2000s via the lagged dependent variable effect as $\theta \Gamma < \Gamma$ (which is captured as persistence effect in our model) and eventually fade out over time.

Our model is well specified and consistent with economic theory. Table A3.1 summarizes the regression model. Overall, there is no indication that the model is mis-specified and parameters show the expected signs, except from the institutional variable Policy2 which is statistically insignificant.[22] Parameter estimates are either statistically significant or at the borderline of significance, except for schooling which is a well-known issue in growth regressions (e.g. Pritchett, 2001) and should not lead to neglect of education policies.

[22] Institutional quality usually does not vary as much over time, so it is difficult to identify the according parameter in this context.

TABLE A3.1: Regression Baseline Results

	(1)	(2)	(3)	(4)
VARIABLES	log of GDP per capita (in PPP)			
Persistence	0.781***	0.784***	0.726***	0.746***
	(0.0569)	(0.0563)	(0.0491)	(0.0392)
ln(exch rate)	–0.0640	–0.0622	–0.0553*	–0.0172
	(0.0404)	(0.0392)	(0.0332)	(0.0355)
ln(schooling)	0.0178	0.0445	0.0104	–0.0266
	(0.0503)	(0.0502)	(0.0463)	(0.0452)
ln(credit/GDP)	0.0743**	0.0542*	0.0432*	0.0238
	(0.0311)	(0.0304)	(0.0221)	(0.0245)
ln(trade/GDP)	0.0824	0.0609	0.0916***	0.0968
	(0.0502)	(0.0490)	(0.0350)	(0.0584)
ln(govt C)	–0.262***	–0.259***	–0.215***	–0.127
	(0.0442)	(0.0423)	(0.0359)	(0.0810)
ln(tele lines)	0.141***	0.129***	0.0769***	0.0816***
	(0.0309)	(0.0297)	(0.0216)	(0.0261)
ln(inflation)	–0.0113	–0.0145	–0.00523	–0.0128
	(0.0118)	(0.0110)	(0.00886)	(0.0112)
Δln(TOT change)	0.118***	0.123***	0.116***	0.110***
	(0.0286)	(0.0277)	(0.0264)	(0.0339)
ln(bank crisis)	–0.0399	–0.0430	–0.0414	–0.0461*
	(0.0317)	(0.0314)	(0.0259)	(0.0236)
Δln(commodity prices)	10.48***	11.11***	7.507***	6.963
	(2.686)	(2.546)	(2.391)	(4.943)
ln(institutions)	–0.00265		0.00190	–0.00549
	(0.0330)		(0.0247)	(0.0255)
Constant	2.502***	2.829***	3.203***	2.469***
	(0.708)	(0.465)	(0.600)	(0.453)
Observations	464	502	464	464
Number of countries	126	141	126	126
Estimation	SysGMM	SysGMM	SysGMM	FE
Note:	Baseline	w/o Polity2	lags 1–3 as instruments	baseline as FE
No of instruments	153	166	171	
AB(1)	0.023	0.024	0.033	
AB(2)	0.102	0.045	0.062	
Sargan test	0.131	0.017	0.001	

Note: Based on Brueckner (2013). Standard errors in parentheses. ***, **, and * indicate statistical significance on the 1, 5, and 10 percent level, respectively. AB(1) and AB(2) is the p-value of the Arellano and Bond test for first and second order autocorrelation, respectively. Sargan test reports p-values.

Annex 3.2 Model Robustness

Our model passed a series of robustness checks. The original model of Brueckner (2013) also underwent a series of standard robustness checks. E.g. it was shown that main results are robust to taking 10-year non-overlapping panel data, balanced panel data, time-varying coefficients, or alternative specifications. Furthermore, unconditional models were estimated variable by variable as this limits the weak-instrument problem in the case where various instruments appear strong in isolation but are highly correlated so that they are weak when used together (see Dollar and Kraay, 2003). Further to these results, we present three other specifications in Table A1.1: column (2) reports the results without the Polity2 variable that had a counter-intuitive sign in the baseline specification. The results (which also allow to include a wider set of countries for which Polity2 is not available) are almost identical to the baseline model in column (1). In column (3) we expand the instrument set for the explanatory variables to include lagged differences for lags 1, 2, and 3 (as opposed to including only the first lag). While not a fully sophisticated check for instrument robustness, this should still convince the reader of the robustness of the results to the used instrument set and that we do not use too few instruments. Results are again similar to the baseline, though the infrastructure parameter is (statistically significantly) smaller but still significant and large. The results of the Sargan test also indicate that the instrument set is not as appropriate as in the baseline model. In column (4) we also report fixed-effect results for comparison, again with similar results to the baseline but a somewhat smaller (but positive and significant) infrastructure parameter. The fact that the lagged dependent variable parameter of this model is somewhat smaller than in the baseline also confirms that our baseline model is well-specified because of the downward bias of this parameter in fixed effect estimation (Nickell, 1981).

We also examine whether some variables had a significantly different effect on growth in Ethiopia, but find no substantial Ethiopia-specific effects for growth drivers. As a robustness check, we estimate an Ethiopia-specific coefficient—parameter by parameter. This stepwise procedure is chosen to keep the instrument set in the GMM framework at a reasonable size. Our results do not show any statistically significant deviation of Ethiopia's determinants of growth from the overall sample of countries included (See Moller and Wacker, 2015, for results). This is consistent with the findings of Brueckner (2013) that the underlying model is largely robust to parameter heterogeneity. We only find a strong and positive country-specific effect of Polity2 but as this variable is trending upwards in Ethiopia between 1970 and 2000, it only captures the growth of income over time: after controlling for a country-specific time-trend, this Ethiopia-specific variable is no longer statistically significant. Moreover, we exclude Ethiopia from the baseline model to avoid the possibility that Ethiopia itself is driving the results, in which case the good performance of the model to explain the country's growth would be tautological. Although the broad country coverage of our sample makes this unlikely, the results of Warner (2014) warrant some caution. The results reported in column (2) of Annex Table A3.1 however, confirm that the exclusion of Ethiopia from the sample has almost no effect.

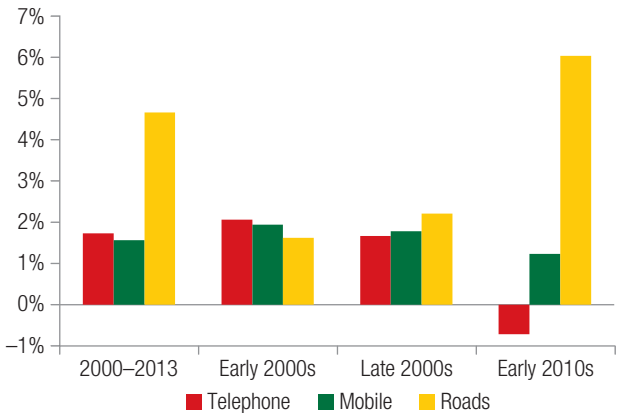
Some effects differ in lower income countries but these differences are not significant. As one may argue that the overall model includes several high-income countries and is thus not appropriate for Ethiopia, we re-estimate the model using only countries that were below the median or mean of GDP p.c. in 1995. Detailed results are presented in Moller and Wacker (2015) and they provide some weak evidence that our benchmark model somewhat overestimates the positive impact of infrastructure (as proxied by telephone lines). We also estimated the model for landlocked countries only but due to the small sample size (25 countries with a total of 85 observations), results were mostly insignificant and thus not very informative.

Overall, these results support the baseline model but suggest that the infrastructure results may be on the higher side. As demonstrated, our

model is robust to a wide range of alternative specifications. Where results differ in magnitude, this difference is rarely statistically significant and thus often reflects random sample effects. The only case where infrastructure is statistically insignificant arises in a considerably reduced sample and the quantitative result is still in line with parameter estimates from other robustness checks. In total, these robustness checks suggest, however, that our estimate for infrastructure in the baseline model may be on the higher side. However, we find no evidence that any of these alternative models would be more appropriate to capture growth in Ethiopia over the recent past. Moreover, even if we assume one of the lower parameter values (which themselves might be on the lower side), the associated contribution of infrastructure to Ethiopia's growth acceleration would still be substantial and in the range of one percentage point per year.

The results are also robust to the choice of alternative infrastructure variables, apart from diverging trends in Early 2010. Given the critical explanatory importance of infrastructure and the difficulty of appropriate measurement and interpretation, we also tested whether results are sensitive to alternative variable specification. The model results reported in Table A3.1 use fixed telephone line coverage. We tested two alternative infrastructure variables, namely mobile phone subscribers and road coverage and found nearly identical results up to 2010.[23] We note that all three types of infrastructure are provided exclusively by the public sector in the case of Ethiopia giving us greater confidence in drawing inferences between public infrastructure investment and growth. Both alternative infrastructure variables have a strong positive impact on growth in our model, although the effect of roads is only at the borderline of statistical significance (z statistic 1.55). The results are depicted in Figure A3.3 as annualized contributions to the overall predicted growth rate (in percentage points). The bars for telephone lines simply reproduces the results depicted in Table A3.1 to facilitate comparison. We can further see that the effect of fixed telephone coverage and roads for explaining growth in Ethiopia

FIGURE A3.2: Growth Impact of Infrastructure



Source: Author's calculation.

in 2000–13 is nearly identical, despite minor differences in magnitudes and with respect to the timing across sub-periods.[24] Differences only arise in the last period (the Early 2010s), which is then also reflected in the 2000–2013 predictions. Over this period, fixed telephone lines were declining but this does not adequately capture infrastructure developments as some substitution towards cell phones took place and other infrastructure—such as roads—was increasing considerably as well (see Figure 3.2.1).

When correcting for alternative measurements, we are able to predict growth in Early 2010s with greater accuracy. To assess the impact of these alternative infrastructure measures on the overall predicted growth rate, we subtract the effect of phone lines from our baseline predictions and instead add the average effect of roads and cell phones, with the results depicted in the light-red bar of Figure A3.2 ('predicted alternative infrastructure').[25] As one can

[23] As our original data set only covered roads data until 2007 in Ethiopia, we replaced this data using national sources.

[24] For a firm-level analysis showing the positive effect of road infrastructure on firm location choice and startup size in Ethiopia, see Shiferaw et al. (2013).

[25] Note that this calculation is possible because variables are measured in logs but it is only correct if one assumes that the substitution of the infrastructure variables in the regression model would have no effect on the estimated parameters of other variables.

see, this corrects for this Early-2010s specific effect. Especially if one assumes an average of our baseline prediction and the one with alternative infrastructure, our predictions come very close to the actually observed growth rate.

Infrastructure improvements in the early 2010s paid off during later years as well. As one can see from Figure 3.2.1, our baseline variable of telephone lines saw a considerable pickup (from very low levels) in the Early 2000s, stagnating in 2007. It is unlikely, that all these improvements are captured in the GDP growth rate of the Early 2000s but they would also be reflected in the Late 2000s (via persistence effects). During the Late 2000s, mobile phones started to substitute for landlines, which also explains why the growth effect for landlines is considerably smaller than for mobile phones in the Early 2010s.

4 GROWTH AND STRUCTURAL CHANGE[26]

Ethiopia has experienced growth from structural change as labor shifted from agriculture into services and construction. About a quarter of Ethiopia's recent economic growth can be explained by a sectoral shift of just three percent of its worker. However, structural change in Ethiopia did not follow the desired path of expanding the share of its small manufacturing sector and this remains a major challenge. International and regional experience suggest that all economic sectors are of importance at different stages of development. In Ethiopia, agriculture matters because of poverty and size, manufacturing because it creates urban jobs, and, services because it helps manufacturing become more competitive and absorb the rapidly growing labor force.

4.1. Introduction

Structural change is vital for sustaining economic growth. In simple terms, structural change can be defined as the reallocation of labor from low-productivity sectors to more dynamic (higher-productivity) economic activities.[27] For most developing countries, this would usually require shifting labor from subsistence agriculture to commercial agriculture, manufacturing, and modern services. 'The speed with which this structural change takes place is the key factor that differentiates successful countries from unsuccessful ones' (McMillan and Rodrik, 2011).

The traditional path of economic development involved processes of export-oriented industrialization and deindustrialization. One of the oldest ideas in development economics is that the route towards development involves structural change, following first a process of industrialization where workers leave the agricultural sector for the higher-productivity manufacturing sector and second one of deindustrialization where workers move into services. This path was first taken by Western countries and replicated in recent decades by East Asia. Farmers moved into higher-productivity manufacturing or agro-processing; economies diversified and began to export more sophisticated goods. The share of the labor force employed in manufacturing peaked at 25 to 45 percent in countries like the UK, U.S. and Sweden before these countries de-industrialized. Even Korea, where the manufacturing employment share was in the single-digit range in the 1950s, peaked at nearly 30 percent before decreasing in the 1980s.

Premature deindustrialization makes it harder for today's developing countries to follow this trodden path. Low- and middle-income countries are beginning to deindustrialize at lower shares of industry in output and employment than their predecessors did. This stylized fact has become known as 'premature deindustrialization' (Rodrik, 2015). India has been pointed out as the paradigmatic case of a country in which the size of its manufacturing sector declines relatively early on, after employment in the sector reached 13 percent of the total workforce. Other examples include Brazil, where manufacturing employment peaked at 16 percent, and Mexico where it peaked at 20 percent. This compares with early industrializers that managed to place at least 30 percent of its labor force in manufacturing before the sector started declining.

Services are now playing the role manufacturing did in the past and there is an ongoing debate over the implications of premature deindustrialization for countries' development. Take Africa as

[26] This chapter draws upon background papers prepared for this report by Ghani and O'Connell (2014), Hollweg, Rojas, and Varela (2015), and, Martins (2015).

[27] Structural change can also refer to the changing composition of output. However, since shifts in production tend to precede shifts in employment, this transformative process is arguably only under way once labor starts to relocate.

an example. Nearly two decades of strong growth are transforming the structure of Africa's economies, but not as expected. Sectoral composition of output has shifted in favor of services, with this sector's growth outpacing that of agriculture. Commensurate labor shifts are taking place very slowly (World Bank, 2014).

On the one hand, optimists argue that services may have the potential to become the new growth escalator for developing countries. Ghani and O'Connell (2014) show that countries furthest away from the frontier of productivity show the fastest productivity growth in services, converging independently of their structural characteristics (known in development economics as 'unconditional convergence').[28] The authors do not argue that service is superior to manufacturing, or the other way round. Rather, they make the point that the late comers to development now have many more levers to pull. Arguably, services can also be dynamic and contribute to growth and jobs. These arguments build on previous work by Ghani (2010) showing how developing countries can take advantage of modern services exports where they actually have a higher revealed comparative advantage compared to their own goods exports and compared also to high-income countries. Although India is the most famous case of services-based growth, there are a dozen other examples including Bangladesh, Mozambique and Rwanda.

On the other hand, premature deindustrialization could instead imply a movement of labor to prospectively less dynamic sectors, thus diminishing developing countries' growth potential going forward. Rodrik (2014) argues that services are different from manufacturing in two important ways, which make the sector unlikely to play the role of a growth escalator. First, with the rise of technology, many segments of services are themselves tradable and becoming important in global commerce. While these are high productivity, high wage, and high skill-intensive sectors, they require highly trained workers, which are unlikely to be those exiting agriculture in Ethiopia or other developing countries. As manufacturing worldwide has become more capital and skill-intensive, it has diminished its potential to absorb abundant labor from rural areas. As a result, the bulk of excess labor in low-income countries is absorbed in non-tradable services operating at low levels of productivity. Second, because of the non-tradability of these sectors, partial productivity gains are self-limiting as they cannot expand without inducing a negative terms of trade shock against themselves. Put differently, since demand in these sectors is constrained to within national borders, productivity improvements can only result in a price reduction. In manufacturing, instead, exports provide an opportunity to avoid that outcome, since exporters face, potentially, almost infinite demand for their products.

Moreover, the manufacturing sector has a strong potential to lead the growth process. Making this case, Rodrik (2013a) develops an analytical framework identifying four distinct channels for growth consistent with empirically observed stylized facts. The first, the 'fundamentals' channel is a process of convergence that accompanies the accumulation of fundamental capabilities arising from broad-based investment in human capital and institutional arrangements. The second channel is the forces of unconditional convergence operating within manufacturing, which refers to the empirical fact that poorer countries achieve higher labor productivity growth rates in manufacturing than richer countries (Rodrik, 2013b). Those two dynamic effects are potentially augmented by two effects of reallocating labor from traditional activities to higher-productivity manufacturing (third channel) and modern services (fourth channel).[29]

Africa's structural change experience has been one of realizing static gains and dynamic losses.

[28] Rodrik has raised questions regarding the robustness of this 'unconditional convergences in services' result with respect to the period of analysis (Project Syndicate, October 13, 2014). By comparison the Rodrik (2013b) result regarding unconditional convergence in manufacturing is statistically more robust.

[29] While intuitive appealing and insightful, this framework falls somewhat short in comprehensively explaining Ethiopia's growth acceleration since 2004. The fundamentals channel was only partially at play in Ethiopia as institutional improvements were modest as were human capital accumulation effects. Static efficiency gains emerged as some agricultural labor shifted into construction and services. Although unconditional convergence in manufacturing is an empirical regularity, Ethiopia did not experience a very high rate of labor productivity growth in this sector. Nor were there any much sign of productivity-enhancing labor shifts into modern services.

An analysis of Africa's experience by Timmer et al. (2014) show that the expansion of manufacturing activities during the early post-independence period led to a growth enhancing reallocation of resources. This process of structural change stalled in the mid-1970s and 80s. When growth rebounded in the 1990s, workers mainly relocated to market services which had above-average productivity levels, but productivity growth was low and increasingly falling behind the world frontier. This pattern of static gains but dynamic losses of reallocation since 1990 is found for many African countries. It is comparable to patterns observed in Latin America, but different from those in Asia.

These considerations are highly relevant for a country such as Ethiopia, which is experiencing structural change from agriculture directly to services. As in the rest of Africa, output shifts have been pronounced and the employment shifts modest. Because it is a poor country, Ethiopia's employment structure (A: 78%; I; 7%; S:15%) resembles more that of Africa's poor people (A: 78%; I; 5%; S:16%) than the regional average (A: 37%; I: 24%; S: 40%) (World Bank, 2014).

In line with the conventional wisdom, the Government of Ethiopia has been pursuing a strategy of industrialization in recent years. This strategy is consistent with the recommendations of Rodrik, as well as those of Dinh et al (2012) and Lin (2011). Hinh Dinh and co-authors argue that Ethiopia has abundant low-cost labor, which gives it a comparative advantage in less-skilled, labor-intensive sectors such as light manufacturing. This is held back by constraints such as shortage of industrial land, poor trade logistics and limited access to finance. To unleash the comparative advantage, therefore, policy should focus on addressing these sector-specific constraints. Justin Lin (2011), in turn, argues that rising wages in China will ultimately imply the export of millions of unskilled manufacturing jobs to low-wage countries such as Ethiopia, as China moves up the ladder of development and specializes in more skills-intensive manufacturing.

But the results of this industrialization strategy are yet to materialize, both for Africa and Ethiopia. In addition to arguments of 'premature deindustrialization' and 'the potential of services as a growth escalator', questions have emerged both with respect to the ability to Ethiopia successfully pursue manufacturing-led growth and benefit from Chinese exports of low wage jobs. Shahid Yusuf (2014) in a background paper to this report, argues that the smallness of the sector make such prospects highly challenging and that China will fight hard not to lose even unskilled manufacturing jobs. More recently, The Economist (2015) has argued that Asia's dominance on manufacturing will endure, making development harder for others, including Africa, and that 'just waiting for higher Chinese wages to push jobs their way is a recipe for failure'. When China loses market share for industrial exports, it does so to countries such as Vietnam, Indonesia and Cambodia rather than to low-wage countries in Africa.

With this backdrop, this chapter seeks to address the following questions: What was the role of structural change during Ethiopia's growth acceleration? How does Ethiopia's experience of structural change compare with other countries? Which sectors offer Africa and Ethiopia the best hope of growth and transformation?

The remainder of the chapter is structure as follows: Section 4.2 presents an analysis of structural change in Ethiopia in the 1999–2013 period, including changes in output, employment and labor productivity. Section 4.3 documents the rise of the services sector. Section 4.4 summarizes the international patterns of structural change and places Ethiopia's experience in this context. Section 4.5 outlines the challenges faced by Africa in terms of the sectoral emphasis of their growth paths and brings these considerations into a discussion of Ethiopia's options.

4.2 Structural Change in Ethiopia[30]

Ethiopia's output tripled in real terms over the past 14 years—driven primarily by services and

[30] The period of analysis (1999–2013) is determined by the use of three consecutive Labor Force Surveys in 1999, 2005, and 2013.

agriculture. Real gross value added increased from 184 billion birr in 1999 to 571 billion birr in 2013, as illustrated in Figure 4.1.1. Services contributed to half of output growth in this period, while agriculture contributed by one third (Figure 4.1.3). Industry, which apart from manufacturing also includes construction and utilities, contributed about 15 percent to growth. The contribution of manufacturing was just 4 percentage points.

The structure of output shifted from agriculture towards services while the corresponding employment shift was modest. The output share of agriculture declined from 57 percent in 1999 to 42 percent in 2013 (Figure 4.1.5). Services output, meanwhile, increased from 33 to 45 percent, while industry increased from 10 to 13 percent. Agriculture continued to dominate employment, as illustrated in Figure 4.1.6, though its employment share declined from 80.2 to 77.3 percent between 2005 and 2013. Workers moved mainly into services (1.8 percentage points) and construction (0.7 percentage points).

Total employment increased by 15 million people since 1999 reaching 40 million in 2013 (Figure 4.1.2). Agriculture accounted for three quarters of employment growth (11 million people). Manufacturing employment increased from 1.1 million in 1999 to 1.8 million in 2013, but remains relatively small (about 5 percent of employment). The services sector accounted for 16 percent of total employment growth (2.4 million people), as shown in Figure 4.1.4.

Labor productivity levels are highest in sectors such as finance, utilities, mining, and transport, and is lowest in agriculture and manufacturing. Output per worker per year ranges from 126,700 birr (2010/11 prices) in finance to just 6,000 birr in agriculture and 9,200 birr in manufacturing (Figure 4.2.1). It is useful, however, to put these figures into perspective, since their ultimate impact on the economy greatly depends on the relative employment weight of each sector. Figure 4.2.3 combines information on labor productivity and sectoral shares of employment in 2013. This highlights the important role of the agriculture, manufacturing and commerce sectors.

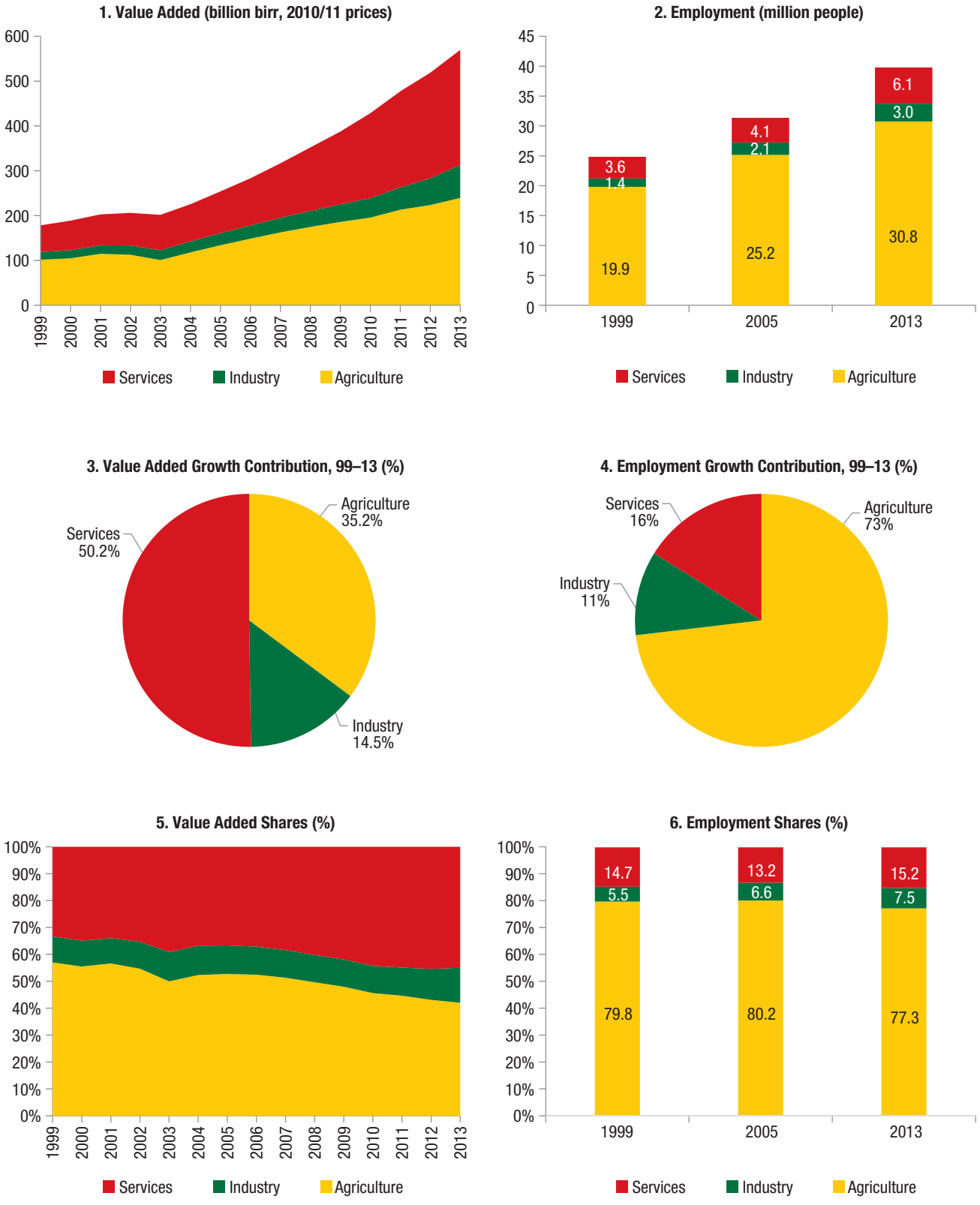
Labor productivity growth in commerce was twice as high as in manufacturing and construction. In general, labor productivity (gross value added per worker) increased by 4.8 percent per year in 1999–2013, while accelerating over this period from 2.7 percent in 1999–2005 to 6.5 percent in 2005–13 (annual growth rates). Figure 4.1.2 shows sectoral differences of labor productivity growth. Most sectors exhibited strong positive productivity growth, except mining, finance and utilities all of which have small employment shares.

Economic growth can be understood and analyzed in terms of rising labor productivity. Figure 4.2.4 presents a decomposition of output (value added per person), which can increase for various reasons, including: rising labor productivity within each sector (if each worker produces more), structural change (if workers move from low- to higher productivity activities), demography (if the relative share of the working age population rises) and employment (if a higher share of the working age population is employed).

Ethiopia has experienced strong labor productivity growth. Between 1999 and 2013, real value added per person exhibited an average annual growth rate of 4.5 percent. Aggregate labor productivity growth accounted for nearly 90 percent of this increase, with 72 percent due to within-sector improvements and 17 percent due to structural change. Changes in the employment rate and the demographic structure contributed with 5 percent and 6 percent, respectively. If labor had not relocated across sectors, output per capita growth would have been nearly one fifth lower.

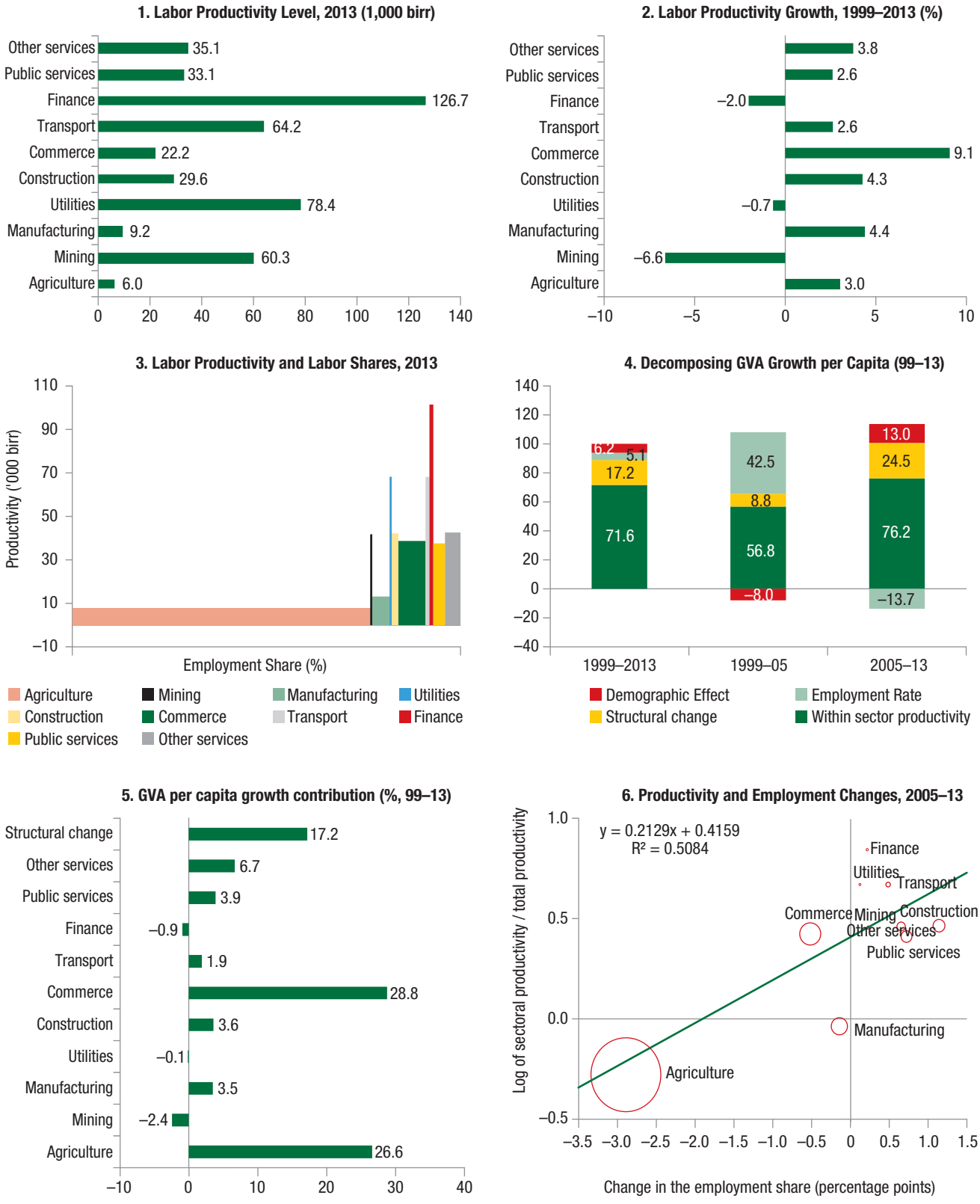
Structural and demographic change has accelerated since 2005. The contribution of structural change was increasing over time—from 9 percent in 1999–2005 to 25 percent in 2005–2013. The negative impact of the employment rate in 2005–2013 might be partly explained by young people staying longer in education—since the working-age population

FIGURE 4.1: Ethiopia: Output and Employment by Sector, 1999–2013



Source: National Accounts Directorate, MoFED. Central Statistical Agency (CSA): LFS 1999, LFS 2005, LFS 2011.

FIGURE 4.2: Ethiopia: Labor Productivity, 1999–2013



Source: Martins (2015) using data from National Accounts Directorate, MoFED. Central Statistical Agency (CSA): LFS 1999, LFS 2005, LFS 2011.

includes those aged 10 and above. This might actually constitute a positive development, to the extent that young people are acquiring relevant skills that can boost growth and structural change in the future. Changes in the demographic structure had a negative effect on growth in 1999–2005 as a consequence of a rising dependency ratio. In recent times, however, demographic change has been playing a more positive role. As a youth bulge enters the labour force, it lowers the (child) dependency ratio and potentially delivers a demographic dividend (See Box 4.1). Commerce and agriculture provided the strongest contributions

BOX 4.1: The Demographic Dividend

Ethiopia's growth acceleration was supported by positive demographic effects. The economic take-off coincided with a marked increase in the share of the working-age population giving a positive boost to labor supply. Up to thirteen percent of per capita growth in 2005–13 can be attributed to this demographic effect. A continued rise in the working age population will support potential economic growth in the coming decades.

The demographic dividend describes the interplay between changes in a population's age structure due to the demographic transition and rapid economic growth. Declines in child mortality, followed by declines in fertility, produce a 'bulge' generation and a period when a country has a large number of working age people and fewer dependents. Having a large number of gainfully employed workers per capita gives a boost to the economy (World Bank, 2014). The economic benefits of a demographic dividend, however, are not automatic. For the youthful workforce to add value they must be equipped with education and skills and the business environment must be such as to generate jobs sufficient to productively absorb the available labor.

Ethiopia experienced rapid demographic change over the past three decades. Child and infant mortality started declining in the mid-1980s while the total fertility rate fell rapidly a decade later in the mid-1990s, partly in response to lower death rates. Population growth rates declined and life expectancy increased. In 1980, Ethiopia was doing worse on these indicators than the average Sub-Saharan African country. By 2010 this situation was reversed.

Declining mortality followed by declining fertility produced a shift in the age-structure of the population as more people were able to work. According to UN data, the share of the working-age population started increasing in 2005—at the same time when the economy took off. Having been constant since 1985 at about 50–51 percent, the working age population share increased to 52.3 percent in 2010 to 55.1 percent in 2015 with a projected peak of 67.5 percent in 2055. A similar pattern is observed for the dependency ratio which remained relatively constant in 1990–2005 at around 97–98 percent, but then declined to 91.3 in 2010 and 81.5 in 2015.

A rising share of the working age population accounts for thirteen percent of Ethiopia's per capita growth in 2005–13. This result is illustrated in the decomposition of value added per person presented in Figure 4.2.4. Changes in the demographic structure had a negative effect on growth in 1999–2005 (by 8.0 percent) as a consequence of a rising dependency ratio. However, during the 2005–13 economic boom period, a rising working age population can account for 13.0 percent of per capita growth. By comparison, demography accounted for 20 percent of per capita growth in the Republic of Korea in 1970–90 (Martins, 2014; 2015).

Ethiopia's demographic transition is taking place faster than in the rest of Africa. Africa's share of the working age population started rising in 1990, but will not peak until ninety years later in 2080. The same process will take only 50 years in Ethiopia (2005–55). This is the result of a more rapid decline in mortality and fertility in Ethiopia compared to the rest of the region.

Improvements in female education had a particularly important impact on rapidly declining fertility in Ethiopia. The 1994 education reform removed school fees, instituted school lunches in rural areas, increased the education budget, and allowed classes to be taught in the local language rather than Amharic (World Bank, 2014). This lead to a substantial increase in female education by 0.8 years, on average. This, in turn, reduced the probability of teenage birth and teenage marriage (by 7 and 6 percentage points, respectively, per year of additional schooling).

For Ethiopia to reap the benefits of the demographic dividend it must put in place policies to further accelerate the fertility decline and for the economy to absorb a rapidly increasing labor force. Speeding up the fertility decline require policies to reduce child mortality and improve child health, support female education and empowerment, addressing social norms on fertility, reducing child marriage and expanding comprehensive family planning programs. Reaping the ensuing economic benefits, in turn, require measures on the labor supply and demand side. Workers must be endowed with marketable skills to be attractive to prospective employers and employment of women outside the home must be encouraged. Demand for labor can be boosted by attracting foreign direct investment through an improved business environment (Galor and Weil, 1996; World Bank, 2014).

to within-sector productivity (Figure 4.2.5). This is partly explained by their large employment shares.

Ethiopia experienced growth-enhancing structural change, especially since 2005. Figure 4.2.6 plots changes in employment shares and the relative productivity of sectors—the latter is measured by the log of the ratio between sectoral productivity and total productivity in 2013. In a classic pattern of structural change, we would expect to find agriculture in the bottom-left quadrant—with relatively low labour productivity and a declining labour share—and the more dynamic economic sectors in the top-right quadrant—with relatively high labour productivity and a rising labour share. The figures provides some evidence of growth-enhancing structural change in Ethiopia, with the labour share declining in the sector with the lowest labour productivity (i.e. agriculture) and increasing in more dynamic sectors—albeit slowly. On the other hand, commerce and manufacturing observed a decline in their labour shares, while manufacturing has relatively low productivity levels.

4.3 The Rising Services Sector

The services sector was one of the driving forces behind Ethiopia's growth acceleration. In this section, we analyze the performance of the sector in more detail, starting by highlighting the stylized facts:

- The services sector is the **largest in terms of economic output** accounting for 45 percent of value added in 2013/14.
- The sector accounts for about **half of economic growth** generated during the 2004–14 growth acceleration period.
- Services are the **second biggest employer** in Ethiopia, accounting for 15 percent of total employment (6.1 million people).
- It **helped absorb a rapidly growing labor force** by creating 2.4 million new jobs between 1999 and 2013 (16 percent of all new jobs).
- The services sector **supported structural transformation** in the form of labor shifts away from low productivity agriculture and into services (the share of services employment increased by 1.5 percent while the share of agriculture declined by about 3 percent).
- This structural transformation produced **efficiency gains** because labor productivity in services is higher than in agriculture (and manufacturing). Commerce, for instance, is five time more productive than agriculture.
- **Services sector exports are as large as merchandise exports**, each accounting for roughly 7 percent of GDP (World Bank, 2014).
- **The contribution of services to poverty reduction has been modest.** Agriculture contributed the most to poverty reduction (World Bank, 2014).

Drilling down further into the Ethiopian services sector we divide it into five sub-sectors, as follows:

- Commerce: Wholesale & retail trade. Hotels & restaurants.
- Transport: Transport; storage & communication.
- Finance: Financial intermediation.
- Public services: Public administration & social services. Education. Health & social work.
- Other services: Real estate, renting & business. Other community social and personal services. Activities of private households. Extraterritorial organizations and bodies.

Commerce, 'other services' and the public sector are the most important services sub-sectors in terms of output and employment in Ethiopia. Put together, they account for 85 percent of sector value added and 92 percent of jobs. Specifically, each account for roughly a half, a quarter and a fifth of value added and jobs in the services sector (Figures 4.3.1 and

[31] Note the similarity in value added and employment shares of these three sectors, which is not the case for the economy as a whole.

4.3.2).[31] The remaining services sectors are transport (10 percent of services output and 6 percent of services jobs) and finance (5 percent of services output and 2 percent of services jobs). Output shares hardly changed over time, though the employment share of 'other services' and public services have increased while commerce declined (Figures 4.3.3 and 4.3.4).

Labor productivity levels are highest in finance while the commerce sector saw the strongest increase in labor productivity growth. Figures 4.3.5 illustrates services sector labor productivity levels. Output per worker in finance is twice as high as transport and 4–5 times larger that of the remaining services sectors. Commerce labor productivity growth was 3–4 times stronger than other services sectors, except finance which experienced a decline.

The Ethiopian services story is predominantly one of a rise of traditional rather than modern activities. Figure 4.3.6 illustrates trends in value added between 1998 and 2011 dividing the services sector into two components. Modern activities include finance as well as communications. The remaining sectors (commerce, transport, public services, and other services are classified as traditional services, which typically require more face-to-face interaction.[32] As shown in the graph, traditional services rose from 31 to 42 percent of value added in 1998–2011, while modern services increased their share from 2 to 3 percent mainly on account of finance.

4.4 Ethiopia's Experience in the International Context

Services have grown much faster than other sectors in Ethiopia, just like in other low income countries. Figure 4.3.1 compares economic growth rates by sector in Ethiopia data from other countries (both developed and developing) during the last two decades. It shows that both services and industry have experienced faster growth rates than agriculture. Service has experienced the fastest growth rate in Ethiopia, as well as for other low income countries. Services grew fast than other sectors in all country groups, except China.

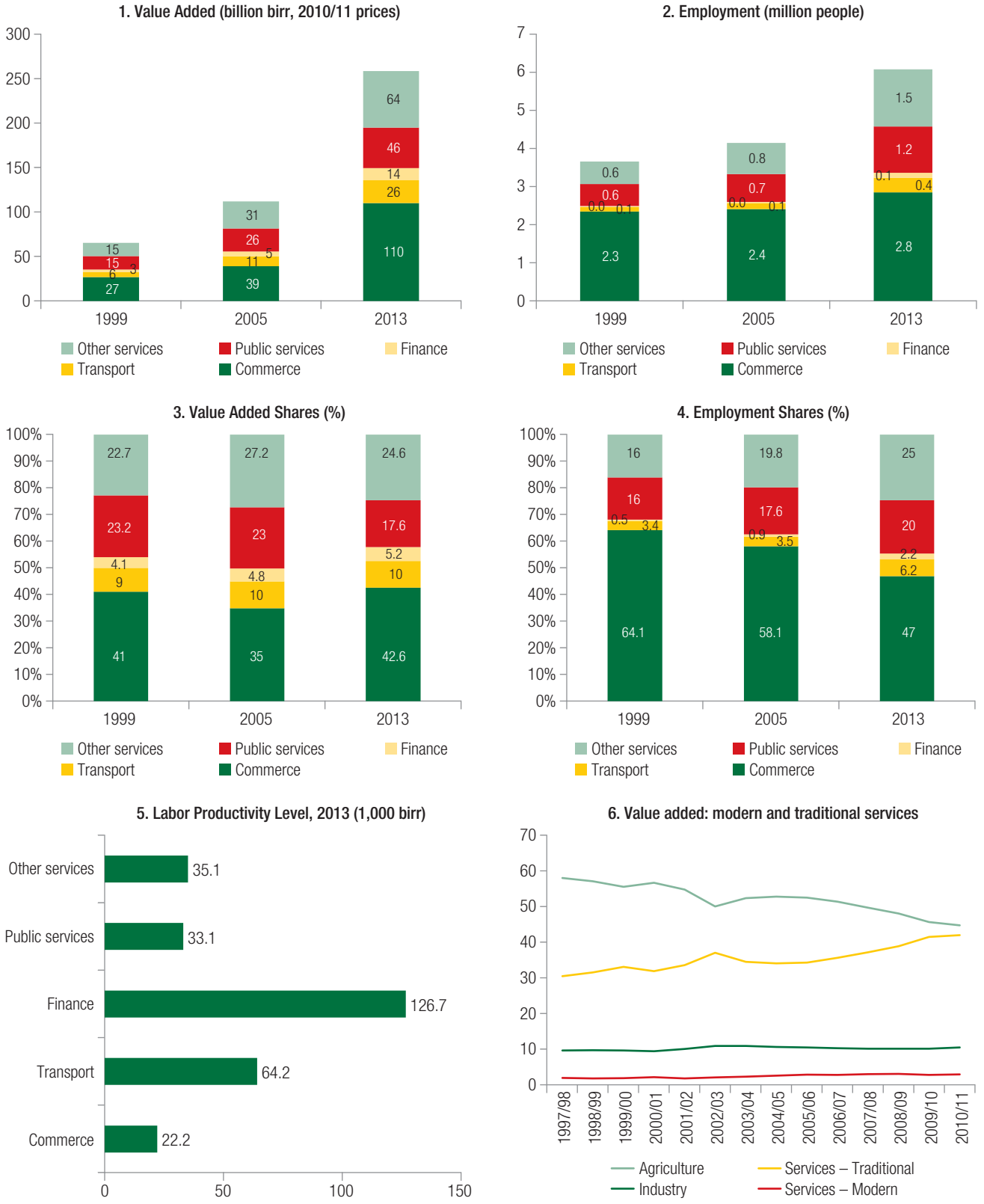
Services have made the largest contribution to growth in Ethiopia, just like in most other countries. Figure 4.3.2 compares the contribution of different sectors to growth in Ethiopia with other countries. Indeed, services have made the largest contribution to growth in both developing and developed economies. Once again, China is an exception to this trend.

Labor productivity growth in Ethiopian services was relatively high. Figure 4.3.4 plots growth in service labor productivity for Ethiopia and other countries on the vertical axis (from late 1990s to late 2000s), and initial service labor productivity on the horizontal axis (early 1990s). The fitted line is a downward sloping line implying that low income countries like Ethiopia that started with a lower level of labor productivity in services, and were further away from the global labor productivity frontier, have experienced a much faster catch up and growth in service labor productivity. This is good news for low income countries in Africa as they have more room to catch-up. As discussed in more detail in Ghani and O'Connell (2014) this is suggestive evidence of a potential phenomenon of unconditional convergence in services. Note that Ethiopia is above the trend line, implying higher productivity growth than expected at its level of income.

Conversely, Ethiopian manufacturing labor productivity growth was relatively low. Figure 4.3.3 plots growth in manufacturing labor productivity on the vertical axis and initial labor productivity on the horizontal axis. The fitted line is also downward sloping implying that late comers to development that started with a lower level of labor productivity in manufacturing have also experienced a faster growth in productivity. This graph is comparable to the one used by Rodrik (2013b) to demonstrate unconditional convergence in manufacturing. Unfortunately, Ethiopia is below the trend line, implying a much slower progress in the manufacturing sector compared to the East Asian Tigers which are above the line.

[32] There is no internally agreed definition of modern versus traditional services (Goswani and Saez, 2014).

FIGURE 4.3: The Ethiopia Services Sector



Source: National Accounts Directorate, MoFED. Central Statistical Agency (CSA): LFS 1999, LFS 2005, LFS 2011.

As countries grow richer, their services output and job shares increase at the expense of agriculture. Figure 4.4 plots output and employment shares for the three major sectors (agriculture, manufacturing and services)[33] against income per capita across a sample of about 100 countries. The fitted regression lines are positive for services and negative for agriculture, implying increasing and declining shares, respectively, as income rises. The inverted U shape of manufacturing suggest a rising contribution to output and jobs at early stages of development, but declining shares at later stages of development where manufacturing gives way for services.

The global pattern has changed over time as services are now creating more jobs and manufacturing less (premature deindustrialization). Figures 4.3.5 compares the relationship between the share of a country's total employment in the industrial sector against its level of income. This relationship is shown for three different points in time, 1988 (blue), 2000 (green), and 2010 (red). It shows that the job curves in industry have shifted downwards over time. This means that industrial sectors are creating fewer and fewer jobs over time. Put another way, the point at which de-industrialization begins is happening earlier in the development process. Improvements in technology have made manufacturing much more capital-intensive. This is happening even at the low-quality end of the spectrum (Rodrik, 2012). So the capacity of manufacturing sector to absorb labor is shrinking over time. Figure 4.3.6 for the services sector shows the opposite trend as service job curves have shifted upwards over time. This means that services are creating more jobs and also at earlier stages of development.

Ethiopia's structural change pattern is consistent with these international trends, except for manufacturing output which remained a small share of the economy. Reverting now to Figure 4.4, note that it also compares Ethiopia's 1992–2012 trends with those across the world in 2012. While the services share of output and employment increased at the expense of agriculture, the manufacturing output share did not rise as expected at this stage of development. In fact, the predicted manufacturing output share given Ethiopia's income per capita is about 10 percent compared to the actual one of 5 percent. The job share for manufacturing did exhibit the expected rising trend and level. However, when combined with the output share, it is clear that some manufacturing labor productivity growth was held back.

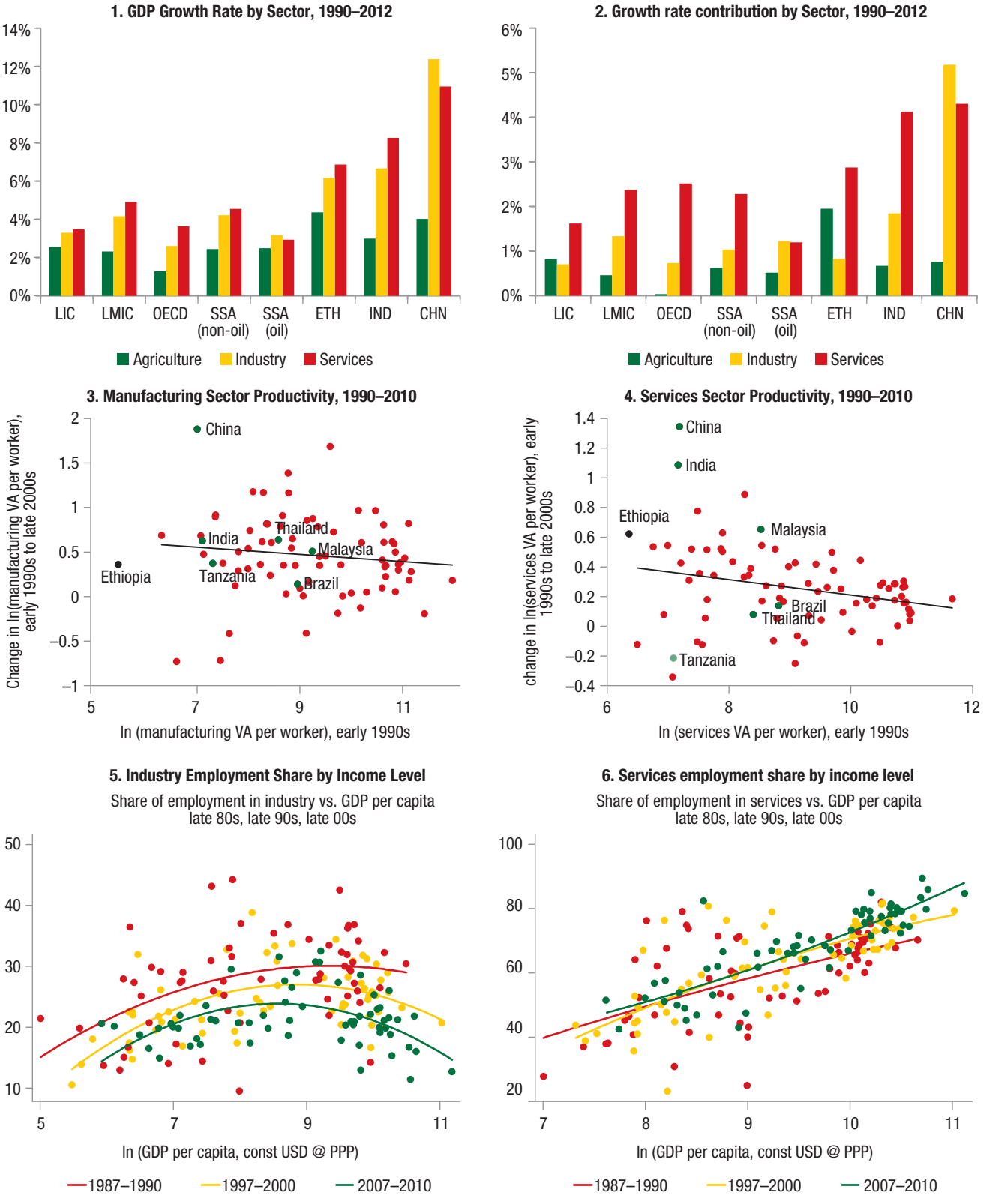
4.5 A Regional Perspective and Potential Implications for Ethiopia

Rodrik (2014) argues that Africa has four options to generate sustained, rapid growth in the future. The first one is to revive manufacturing and put industrialization back on track, so as to replicate as much as possible the traditional route to convergence. The second is to generate agriculture-led growth, based on diversification into non-traditional agricultural products. The third is to generate rapid growth in productivity in services, where most of the people will end up in any case. The fourth is growth based on natural resources, in which many African countries are amply endowed. Given that the natural resources sector is still in its infancy in Ethiopia (World Bank, 2014), we dwell primarily on the first three strategies.

Africa's nascent industrialization process is held back by its poor business climate and may not overcome the global challenge associated with 'premature de-industrialization'. Chinese greenfield investments in manufacturing in countries such as Ethiopia, Nigeria, Ghana, Tanzania offers hope that Africa is well poised to taking advantage of rising costs in Asia, but the aggregate data do not yet show something like that is happening. The consensus view on what holds African manufacturing back is a 'poor business climate', including costs of power, transport, corruption, regulations, security, contract enforcement, and policy uncertainty. According to Rodrik, an undervalued real exchange rate may be

[33] Note that this presentation omits industry sectors different from manufacturing, including construction and utilities.

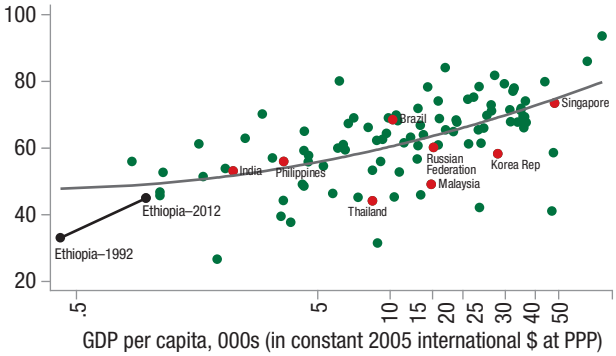
FIGURE 4.4: Labor Productivity, Growth and Employment by Sector



Source: World Bank (WDI) reproduced from Ghani and O'Connell (2014).

FIGURE 4.5: Output and Employment Shares across Countries, 2012

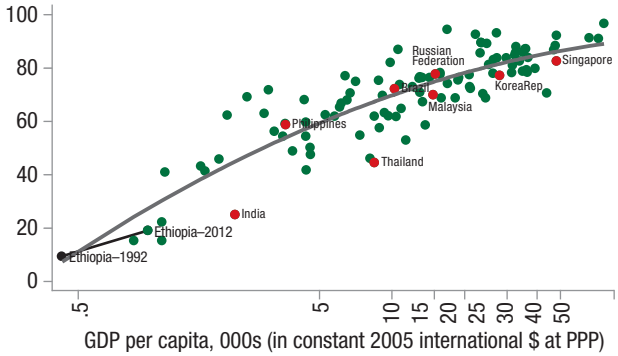
Services VA % of GDP vs. GDP per capita, 2012
Ethiopia & Comparator Countries



Data source: ILOSTAT database & World Bank World Development Indicators, 2014. Ethiopia data from national accounts.

2012 GDP share regressed on log (2012 GDP per capita) & log (2012 GDP per capita) squared.

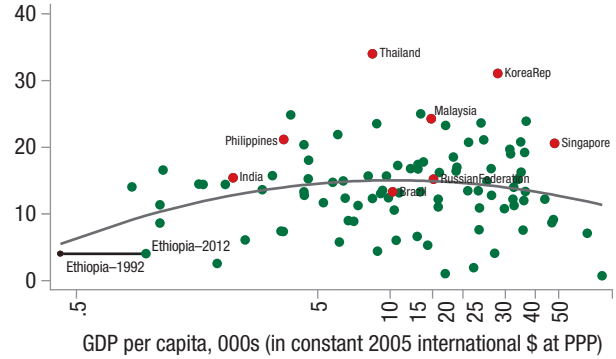
% Employment in Services vs. GDP per capita, 2012
Ethiopia & Comparator Countries



Data source: ILOSTAT database & World Bank World Development Indicators, 2014. Ethiopia data from Authors' calculations using labor force surveys.

2012 employment share regressed on log (2012 GDP per capita) & log (2012 GDP per capita) squared.

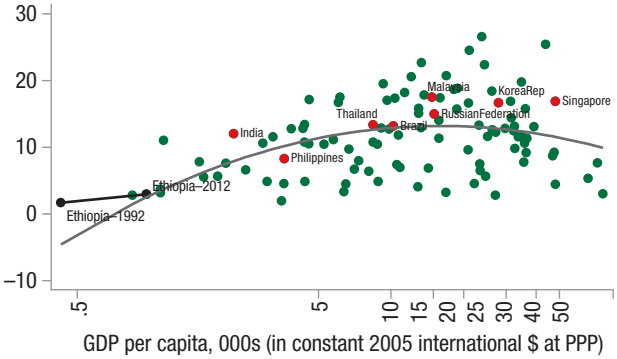
Manufacturing VA % of GDP vs. GDP per capita, 2012
Ethiopia & Comparator Countries



Data source: ILOSTAT database & World Bank World Development Indicators, 2014. Ethiopia data from national accounts.

2012 GDP share regressed on log(2012 GDP per capita) & log(2012 GDP per capita) squared.

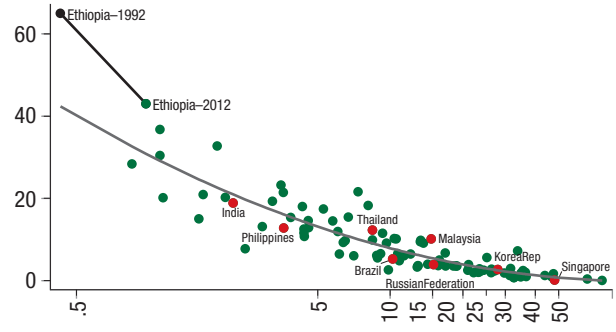
% Employment in Manufacturing vs. GDP per capita, 2012
Ethiopia & Comparator Countries



Data source: ILOSTAT database & World Bank World Development Indicators, 2014. Ethiopia data from national accounts.

2012 GDP share regressed on log(2012 GDP per capita) & log(2012 GDP per capita) squared.

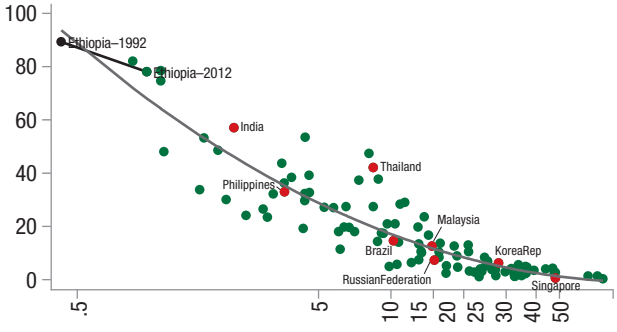
Agriculture VA % of GDP vs. GDP per capita, 2012
Ethiopia & Comparator Countries



Data source: ILOSTAT database & World Bank World Development Indicators, 2014. Ethiopia data from national accounts.

2012 GDP share regressed on log(2012 GDP per capita) & log(2012 GDP per capita) squared.

% Employment in Agriculture vs. GDP per capita, 2012
Ethiopia & Comparator Countries



Data source: ILOSTAT database & World Bank World Development Indicators, 2014. Ethiopia data from national accounts.

2012 GDP share regressed on log(2012 GDP per capita) & log(2012 GDP per capita) squared.

Source: World Bank (WDI) reproduced from Ghani and O'Connell (2014).

the most effective tool in overcoming these obstacles for spurring industrialization as a real exchange rate depreciation of, say 20 percent, is effectively a 20 percent subsidy on all tradable industries. Sustaining this, of course, would require an appropriate monetary and fiscal framework. Yet it remains much harder for Africa to industrialize today than previously as global demand has shifted from manufacturing to services and because of fiercer global competition, including from Asia.

Since so much of Africa's workforce is still in agriculture, it may make sense to prioritize agricultural development as a part of a growth strategy. Without question, there are many unexploited opportunities in African agriculture, whether in perishable non-traditional products such as fruits and vegetables or perishable cash crops such as coffee. Agricultural diversification is equally hampered by a 'poor business climate' in addition to policy challenges associated with extension, land rights, standard setting, and input provision. Once again, the exchange rate can be an important compensatory tool. The main counter-argument is that it is very difficult to identify historical examples of countries that have pulled such a strategy off. In fact, one of the strongest correlates of economic development is export diversification away from agriculture. Moreover, even if this strategy were to succeed it would not reverse the process of migration to urban areas, implying the need for strategies addressed towards urban job generation.

Despite encouraging examples, competitiveness in the services sector may depend on skills and institutions that Africa is yet to acquire. A strategy emphasizing services productivity growth draws encouragement from success cases observed in industries such as mobile telephony and mobile banking. Though Rodrik argues that services have not traditionally acted as a 'growth escalator' like manufacturing, there are important counter-examples emerging from South Asia as documented by Ghani (2012). One challenge for Africa is the relatively high requirement on worker skills. The IT sector requires long years of education and institution building before farm workers are turned into programmers or even call center operators. Contrast this with turning a farmer into a factory worker in producing garments or shoes. So raising productivity in services requires steady and broad-based accumulation of capabilities in human capital, institutions, and governance. Services technologies also seem less tradable and more context-specific. Productivity gains in narrow segments may be easily established (e.g. by letting in Walmart or Carrefour in retailing), but productivity gains along the entire retail sector is much more challenging. What do these regional trends imply for Ethiopia?

Given the large size of the agriculture sector in Ethiopia today and in the future, it is imperative that continued efforts are made to make the sector more productive. The agriculture sector is, by far, the biggest employer in Ethiopia, accounts for most exports and is the second largest in terms of output. The sector also accounted for most of employment growth over the period of analysis. Although some labor shifted out of agriculture, substantial shifts are likely to take a long time. Moreover, agricultural growth has been an important driver of poverty reduction in the last decade. Each percent of GDP growth reduces poverty by 0.55 percent, but each percent of agricultural growth reduces poverty by 0.9 percent (World Bank, 2015). As a result, further labor productivity improvements in the sector are indispensable for Ethiopia's future prospects.

Ethiopia faces considerable challenges in terms of achieving growth and structural change through manufacturing or 'industrialization.' A major challenge relates to that of scale: the manufacturing share of output is remarkably small at 4 percent and has remained at this level since 1980. By comparison, manufacturing account for about 9 percent of output in SSA—an already low level. Lack of manufacturing sector growth during the take-off has not been an issue, but since the rest of the economy has grown at a similar rate of about 10–11 percent there has been no structural change in output in favor of manufacturing. Similarly, only 5 percent of the labor force is engaged in manufacturing—a share that has hardly changed

since the mid-1990s. The sector has the second lowest labor productivity level amongst major sectors, only twice as high as agriculture.

While encouraging, the rise of the construction sector raises questions about sustainability of recent achievements on growth and structural change. The construction sector is, in its very nature, a sector highly dependent on the business cycle. The sector is booming now, but this boom will not last forever, and could in a worst case scenario turn into a bust, as seen elsewhere. Over the past three years, about a fifth of GDP growth is attributed to the construction sector. This is substantial, as the sector has limited value added owing to high input costs. Construction activity is driven by a combination of public and private investment which led to a rise in employment from 1.5 to 1.9 million workers between 2005 and 2013, many migrating from rural areas and working as day laborer. Construction has led to recent growth, jobs and contributed to structural change. At some point, this impetus will fade as the business cycle turns, even as the country continues to pursue an infrastructure-led growth strategy.

On the other hand, the services sector has demonstrated considerable potential for Ethiopia, including through its contribution to structural change and in creating jobs. The services sector is the largest in terms of economic output and is the second largest employer in the economy. It accounts for most of the structural shifts away from agriculture in terms output and, to a lesser extent, labor. Levels of labor productivity are relatively high and labor productivity growth has been substantial. However, the services expansion has been into traditional and non-tradable sectors.

Achieving high growth will also require acknowledging the importance of many services sectors as growth and development escalators. The services and manufacturing sectors in Ethiopia are more intensely linked than in most countries in the world: 63 percent of all inputs used for Ethiopian manufacturing exports are from services. In Ethiopia, services are more important for manufacturing value added than the manufacturing sector itself, which contrasts with many countries in the world. This is because manufacturing is concentrated in low-value added activities with little domestic value addition taking place, and with transport and distribution services playing a very important role. Thus, the competitiveness of the services sector is crucial for manufacturing to thrive (Hollweg et al., 2015).

Going forward, Ethiopia would need to move forward across all sectors. Agriculture productivity improvements are indispensable, as the majority of the labor force (including the majority of the poor) will continue to work in the sector. Manufacturing growth is essential for structural change and it offers positive prospects for employment, exports and productivity gains. The services sector is also of high importance given its employment generating potential which is important to absorb the rapidly rising working age population.

Annex 4.1: Selected Structural Change Indicators

TABLE A4.1: Gross Value Added by Sector

	GVA by sector (constant 2010/11 birr, million)			GVA by sector (% total GVA)			GVA by sector (Annual compound growth, %)		
Sector	1999	2005	2013	1999	2005	2013	1999–05	2005–13	1999–13
Agriculture	101,374	133,571	238,752	55.1	49.0	41.8	4.7	7.5	6.3
Mining	1,708	2,470	8,157	0.9	0.9	1.4	6.3	16.1	11.8
Manufacturing	7,988	11,048	24,798	4.3	4.1	4.3	5.6	10.6	8.4
Utilities	2,102	3,021	6,124	1.1	1.1	1.1	6.2	9.2	7.9
Construction	5,378	10,262	34,832	2.9	3.8	6.1	11.4	16.5	14.3
Commerce	26,867	39,108	110,158	14.6	14.4	19.3	6.5	13.8	10.6
Transport	5,828	11,264	25,792	3.2	4.1	4.5	11.6	10.9	11.2
Finance	2,657	5,443	13,559	1.4	2.0	2.4	12.7	12.1	12.3
Public services	15,167	25,788	45,563	8.2	9.5	8.0	9.2	7.4	8.2
Other services	14,875	30,533	63,585	8.1	11.2	11.1	12.7	9.6	10.9
Total	183,944	272,508	571,320	100.0	100.0	100.0	6.8	9.7	8.4

Source: Calculated official national accounts data.

TABLE A4.2: Employment by Sector

	Employment by sector (thousands)			Employment by sector (% total employment)			Employment by sector (Annual growth, %)		
Sector	1999	2005	2013	1999	2005	2013	1999–05	2005–13	1999–13
Agriculture	19,869	25,208	30,821	79.8	80.2	77.3	4.0	2.5	3.2
Mining	16	82	195	0.1	0.3	0.5	31.8	11.5	19.8
Manufacturing	1,107	1,529	1,882	4.4	4.9	4.7	5.5	2.6	3.9
Utilities	28	33	90	0.1	0.1	0.2	2.7	13.4	8.7
Construction	229	446	825	0.9	1.4	2.1	11.8	8.0	9.6
Commerce	2,342	2,406	2,845	9.4	7.7	7.1	0.5	2.1	1.4
Transport	123	146	378	0.5	0.5	0.9	3.0	12.6	8.4
Finance	20	38	134	0.1	0.1	0.3	11.6	17.1	14.7
Public services	578	729	1,212	2.3	2.3	3.0	3.9	6.6	5.4
Other services	585	818	1,492	2.4	2.6	3.7	5.7	7.8	6.9
Total	24,897	31,435	39,874	100.0	100.0	100.0	4.0	3.0	3.4

Source: Calculated from labour force surveys.

TABLE A4.3: Labour Productivity by Sector

Sector	GVA per worker by sector (constant 2010/11 birr, thousands)			GVA per worker by sector (Annual growth, %)			Employment Elasticity		
	1999	2005	2013	1999–05	2005–13	1999–13	1999–05	2005–13	1999–13
Agriculture	5.1	5.3	7.7	0.6	4.9	3.0	0.85	0.28	0.41
Mining	109.0	30.1	41.7	–19.3	4.2	–6.6	9.50	0.60	3.04
Manufacturing	7.2	7.2	13.2	0.0	7.8	4.4	0.99	0.19	0.33
Utilities	75.0	91.9	68.2	3.4	–3.7	–0.7	0.40	1.68	1.15
Construction	23.5	23.0	42.2	–0.4	7.9	4.3	1.05	0.36	0.48
Commerce	11.5	16.3	38.7	6.0	11.5	9.1	0.06	0.10	0.07
Transport	47.4	76.9	68.2	8.4	–1.5	2.6	0.20	1.23	0.61
Finance	135.2	143.6	101.4	1.0	–4.3	–2.0	0.88	1.70	1.41
Public services	26.2	35.4	37.6	5.1	0.8	2.6	0.37	0.86	0.55
Other services	25.4	37.3	42.6	6.6	1.7	3.8	0.38	0.76	0.47
Total	7.4	8.7	14.3	2.7	6.5	4.8	0.55	0.24	0.29

Source: Calculated from labour force surveys and national accounts data.

TABLE A4.4: Sectoral Decomposition of GVA Per Capita Growth (1999–2013)

Sector	Share of contribution from (%):			Total contribution (%)
	Within-sector productivity	Between-sector shifts	Changes in employment	
Agriculture	26.6	1.4	0.5	28.5
Mining	–2.4	3.5	0.6	1.8
Manufacturing	3.5	0.0	0.6	4.1
Utilities	–0.1	0.9	0.2	0.9
Construction	3.6	3.2	1.7	8.5
Commerce	28.8	–4.1	–2.7	21.9
Transport	1.9	2.7	0.7	5.3
Finance	–0.9	3.5	0.4	3.0
Public services	3.9	1.9	1.1	7.0
Other services	6.7	4.1	2.1	12.9
Total	71.6	17.2	5.1	93.8

Note: The total does not add up to 100 because the demographic component (6.2 percent) cannot be disaggregated by sector.
Source: Calculated from labour force surveys and national accounts data.

TABLE A4.5: Sectoral Decomposition of GVA Per Capita Growth (2005–2013)

Sector	Share of contribution from (%): Within-sector productivity	Between-sector shifts	Changes in employment	Total contribution (%)
Agriculture	34.3	2.6	–16.7	20.1
Mining	0.8	1.0	0.4	2.2
Manufacturing	5.1	0.0	–1.0	4.2
Utilities	–0.7	1.5	0.2	1.0
Construction	6.0	2.4	1.1	9.5
Commerce	29.6	–1.5	–2.1	26.0
Transport	–1.1	5.2	0.9	5.0
Finance	–1.7	4.2	0.4	2.9
Public services	1.1	3.2	1.1	5.4
Other services	3.0	5.8	1.9	10.7
TOTAL	76.2	24.5	–13.7	87.0

Note: The total does not add up to 100 because the demographic component (13 percent) cannot be disaggregated by sector.
Source: Calculated from labour force surveys and national accounts data.

TABLE A4.6: Demographics and Employment Rate

	1999	2005	2013
Total population	54,453	63,229	80,444
Working-age population (10+)	36,022	41,018	55,629
Working-age population (% total population)	66.2	64.9	69.2
Employment rate	69.1	76.6	71.7

Source: Calculated from labour force surveys.

5 DRIVERS OF AGRICULTURAL GROWTH[34]

Ethiopia's agricultural sector has recorded remarkable rapid growth in the last decade. There have been significant increases—more than a doubling—in the use of modern inputs, such as chemical fertilizers and improved seeds, explaining part of that growth. However, there was also significant land expansion, increased labor use, and Total Factor Productivity (TFP) growth, estimated at 2.3 percent per year. The expansion in modern input use appears to have been driven by high government expenditures on the agricultural sector, including agricultural extension, but also by an improved road network, higher rural education levels, and favorable international and local price incentives.

5.1 Introduction

This chapter identifies drivers of Ethiopia's agricultural modernization process. As in the Green Revolution, increasing adoption of improved seeds and chemical fertilizer have played a major role in agricultural output growth. While starting from a low base, the adoption of improved seeds and the use of chemical fertilizer more than doubled over the last decade. This increasing adoption of modern agricultural inputs has been facilitated by large investments in the agricultural sector and beyond, leading to improved road and communication networks, a better educated rural population, and a large agricultural extension workforce. To further stimulate agricultural growth in the country in the last decade, there were no major droughts, which Ethiopia has suffered from before, there were improved incentives for agricultural intensification because of favorable international prices for export crops and improved modern input–output price ratios for locally consumed crops, and, more broadly, there was an end of widespread civil conflict.

Agriculture is the second largest economic sector in Ethiopia and cereal production accounts for more than a quarter of GDP. Out of the 10.7 percent average annual growth in real GDP recorded during the last decade, agriculture accounted for 3.6 percentage points. This compares to 5.6 percent and 1.5 percent for services and industry, respectively. However, the contribution of agriculture to overall growth has declined over the decade (from 7.1 percent in 2004/05 to 2.3 percent in 2013/14). Within agriculture the crop production subsector was most important representing 28 percent of GDP and growing at an average annual rate of 8.8 percent. Other agricultural activities (animal farming, hunting, and forestry) jointly accounted for nearly 12 percent of GDP and grew at 5 percent a year, on average. Owing to its predominant importance and in light of the available data, the analysis of agricultural growth presented here focuses primarily on the cereal production of smallholder farmers within the main season (meher).

The chapter is structured as follows: Section 5.2 provides evidence on growth in the agricultural sector over the last decade and further decomposes this growth into different components. Section 5.3 discusses the modernization of the agricultural sector and looks at the increasing adoption of chemical fertilizer, improved seeds, and other modern and improved practices. Section 5.4 identifies four major drivers that have contributed to agricultural growth in the country, and discusses more in particular the role of extension, improved marketing, rural education, and incentives.

[34] This chapter is based on the background paper prepared by IFPRI: Bachewe, Berhane, Minten, and Taffesse (2015). The World Bank sincerely appreciates the collaborative efforts with IFPRI in its preparation. Interested readers are encouraged to consult the background paper for more detailed information about data sources and methodology.

Section 5.5 presents evidence on these drivers. Section 5.6 concludes and discusses further challenges for agricultural growth in the future.

5.2 The Growth of Agriculture 2004–2014

The total area cultivated increased by 2.7 percent per year over the past decade. In the 2013/14 main agricultural season smallholder farmers in Ethiopia cultivated 12.9 million hectares of land compared to 10.1 million in 2004/05 (Figure 5.1.1). This growth was mainly driven by expansion of area covered by cereals. Grains accounted for about 96 percent of the total cropped area during 2004/5–2013/14. In particular, nearly three-quarters of the area was covered by the five major cereals (teff, barley, wheat, maize, and sorghum). Next in importance were pulses and oilseeds. Area allocated to pulses, vegetables, root crops, and fruits grew relatively faster, but from a low base.

Agricultural output and the number of smallholder farmers rose by 9.4 percent and 3.8 percent per year, respectively. By any standard, the growth in crop output in the last decade has been quite rapid. According to CSA estimates, total agricultural output level during the meher in 2013/14, estimated at 32 million metric tons, was 124 percent higher than the level in 2004/5. This was mainly driven by growth in cereals output, which accounted for 72 percent of the total. The number of smallholders grew from 11 million in 2004/5 to 15.3 million in 2013/14 (Figure 5.1.1).

Yield growth averaged about 7 percent per year. Yields in cereals averaged 21.4 quintals per hectare (q/ha) in 2013/14 and ranged from about 28 q/ha in maize to 13 q/ha in teff. Averaged annual yield growth by crop ranged from 8.1 percent for maize to 4.8 percent for barley, while reaching 5.2 percent for teff, 5.9 percent for wheat and 7.1 percent for sorghum. Growth in cereal yields was faster relative to other crop groups with the exception of root crops, which had considerably higher variation in yields.

The contribution of area expansion has been declining over time. Figure 5.1.2 illustrates the contributions of area expansion and yield growth to output growth for grains. While cultivated area increased by 4 percent in the beginning of the decade, this declined to 0.8 percent in 2013/14. Growth in yields has consistently been higher than area expansion over the decade, but the difference has become significantly larger at the end of the decade than in the beginning.

A Solow decomposition of crop output growth reveals the importance of increased input use, including labor, as well as productivity growth. Specifically, labor accounted for 31 percent followed by the expansion in cultivated area (13 percent), increased application of chemical fertilizer (8 percent), improved seeds (11 percent), returns to scale (8 percent) and rural roads (3 percent). The unexplained residual, or total factor productivity growth, reached 22 percent. Average annual TFP growth was 2.3 percent (Figure 5.1.3).

A cursory look at outcomes in other countries can provide a perspective. Figures 5.1.5 and 5.1.6 report on maize and wheat yield levels and growth rate during 2004–2013 for selected countries. The impressive growth rates recorded in Ethiopia are clearly from a low base and the country has a lot of catching up to do relative to those with the highest yield levels. For instance, in 2004 Ethiopian maize yields were less than a quarter of those in Egypt and a fifth of those in the USA. By 2013, the gap narrowed and Ethiopian maize yields reached 44 person of Egypt's and a third of the USA. Nonetheless, these gaps remain considerable.

The performance of Ethiopia's agriculture is consistent with the recent recovery and growth of agriculture in many African countries. Nin-Pratt (2015) reports that agricultural output per worker grew by 2 percent during 2001–2012. This compares to 0.6 percent growth during 1990s and no growth in the 1970s and 1980s. He also estimates annual average TFP growth rate of 2.2 percent for the best performers (ranging between –1.0 and 4.2 percent) during 1995–2012. The corresponding figure reported for Ethiopia is 2.6 percent.

The use of complementary sources of data reinforces the impression of significant yield growth in

FIGURE 5.1: Agricultural Growth in Ethiopia, 2004–14

Source: (1) and (2) CSA annual reports. (3) Bachewe et al (2015) using CSA and NBE data. (4) Bachewe et al (2015) using AGP, FtF, ATA and IFPRI data. (5) and (6) FAOSTAT.

the cereal sector over the past decade. We complement the data on agricultural change from the CSA presented so far with two complementary methods, namely a comparison of data from large ad hoc household surveys over the last 6 years (see Bachewe et al., 2015) and from the Ethiopian Rural Household Survey (ERHS). Given that surveys were fielded in different areas and with different methodologies, caution is required in comparing yields over time. The results are illustrated in Figure 5.1.4. While growth rates are similar, it is to be noted that there a differences in yield levels between these different data sources and survey methods.[35]

5.3 Land Intensification and Adoption of Improved Agricultural Technologies

Land and labor expansion have been important contributing factors to increased agricultural production and land intensification. Cultivated land increased by 27 percent over the last decade, according to CSA, while the number of smallholders increased by 39 percent. This indicates smaller sizes of farms over time (the average landholding size declined annually by 1.4 percent over this period) and therefore more intensive labor use per unit of land, given relatively little off-farm opportunities in rural areas (World Bank, 2014a). Headey et al. (2014) confirm these stylized facts and document how already small farm sizes have been declining quite rapidly and that young farmers cultivate substantially less land than previous generations did. They also find that family labor use per hectare increases substantially with increasing land pressure, leading to higher gross incomes per hectare.

To what extent did Ethiopia experience elements of a Green Revolution? Technological change in agriculture—such as the replacement of traditional seed varieties with improved cultivars and the increased adoption of chemical fertilizers, often aided by better water management through improved irrigation—has been the driver for a dramatic increase of agricultural output in Asian countries in the 1960s and 1970s, usually referred to as the Green Revolution (Evenson and Gollin, 2003). There has been since a significant effort to try to replicate this revolution in the African continent, and in Ethiopia in particular. Since early 1990s, Ethiopia has implemented several cereal intensification programs promoting the adoption of modern agricultural technologies. At the center of these strategies has been the push for adoption of chemical fertilizer—improved seed packages by smallholders (Spielman et al., 2010). In this section, we assess to what extent changes in the adoption of these improved technologies have happened in the last decade and how they might have contributed to agricultural growth.

In line with Ethiopia's intensification efforts, chemical fertilizer imports and use have dramatically increased over the last decade. Fertilizer imports have increased by 124 percent and fertilizer use by smallholders increased by 144 percent over the past decade (Figure 5.2.1). The figures imply significant imported fertilizer carryovers given that imports exceeded use. These trends are noteworthy as Ethiopia has one of most depleted soils in Africa (IFDC, 2012), and despite the introduction of chemical fertilizers in the late 1960s, their application levels had remained low for decades (Rashid et al, 2013).

Most fertilizer use has been on cereals, in part because of the attention given to cereal production to achieve food security in Ethiopia. According to CSA, 2.1 million (46 percent) holders growing cereals used fertilizer in 2004/05 and this number increased to 5.5 million (76 percent) holders in 2013/14 (Figure 5.4.2). Cereal area applied with fertilizer—which nearly doubled during the same period from 2.7 million hectares in 2003/04 to 5.2 million hectares in 2013/14, or an increase from 36 percent to 53 percent of the total cereal area—accounted for at least 91 percent of total fertilized area in all years except in 2009/10. The intensity of fertilizer use on areas covered with fertilizer has also increased substantially from 92 kg/ha in 2003/04 to 122 kg/ha in 2013/14.

[35] Please refer to the background paper by Bachewe et al (2015) for details.

Fertilizer use on other crops has also shown significant increases over the same period considered. However, fertilizer adoption is less prevalent for these crops than for cereals. For example, the proportion of area fertilized for other crops such as pulses, oilseeds, and vegetables has also nearly doubled in the same period (an increase from 7.9 percent to 14.5 percent for pulses, from 5.4 percent to 11 percent for oilseeds, and from 24.9 percent to 43.1 percent for vegetables). The proportion of area covered with root crops that was fertilized also increased from 20 percent in 2003/04 to 31 percent in 2013/14.

Significantly more improved seeds have been developed and released in Ethiopia in the last decade than in any period before. Improved variety release has been particularly dynamic in the case of wheat and maize. These improved varieties of wheat and maize were most often developed and released by the Ethiopian Institute of Agricultural Research (EIAR) in collaboration with the International Maize and Wheat Improvement Center (CIMMYT). In the case of wheat, it is estimated that 54 of the available 87 improved varieties over the last 40 years were developed and released in the period 2001–2011 (Figure 5.2.3). This compares to 33 and 45 respectively in the case of maize. For other cereals, the number of varieties were lower, possibly because of lower funding and less international involvement. For example, 32 improved varieties of teff were released over the last 40 years of which 20 were released in the period after 2000 (ATA-MoA, 2014).

Once improved seeds have been released, there has been a heavy reliance on the Ethiopian Seed Enterprise (ESE) parastatal for the production and distribution of improved seeds. In the past the ESE used to produce most of the new improved varieties on its own farms, as well as on state farms, with large private farms playing only a minor role in production of new varieties. However, given the consistent shortage of base seed in the system, there has been an increasing decentralization, with other seed distributors being allowed to participate in the system to cover base seed shortages (Alemu et al., 2010). Regional research institutes and private seed companies have therefore become more important over time in improved seed distribution and it is estimated that there are now more than 30 private, agricultural cooperatives, and parastatal seed producers in Ethiopia (Benson et al., 2014). While there are still important challenges relating to timeliness of seed delivery and the quantity and quality of seed provided (Benson et al., 2014; Spielman and Mekonnen, 2013; Spielman et al., 2010), seed availability has improved over the last decade, leading to higher adoption rates and higher agricultural growth.

The share of farmers using improved seeds in the cereal sector has increased over the last decade. While overall adoption rates are low, the share has seen significant improvements, with more than a doubling noted over the last decade, from 10 percent of the cereal producers in 2004/05 to 21 percent in 2013/14 (Figure 5.2.4). This was driven by the rapid increase of improved maize seed adoption which increased from 12 to 28 percent over the decade. Large increases are also noted in the case of teff where adoption of improved seeds increased from 1 percent to 5 percent and of wheat from 4 percent to 8 percent over that same period. While these official data show significant improvement in adoption over time, there might however likely be significant measurement errors in improved seed adoption in the country, as discussed in Bachewe et al. (2015).

Access to irrigation is low and did not change significantly in the last decade. We further look at two other modern agricultural practices, i.e. irrigation and pesticides, which were a major contributor to the Green Revolution in Asia. While root crops (especially potatoes and onions) are more likely to be grown on irrigated land, CSA numbers illustrated in Figure 5.2.5 indicate that the proportion of the area irrigated has not changed in a significant way over the last ten years for these crops as well.[36]

[36] Other data sources on irrigation that find irrigated areas are much larger than those reported by CSA. This includes an estimate Hagos et al. (2009) of 5 percent of total cultivated area in 2006 and by Mulat (2011) of about 5 percent in 2011. As explained in Bachewe et al (2015) this may be due to differences in seasonal coverage and the fact that irrigation is more common in larger farms as opposed to among smallholders.

FIGURE 5.2: Input Use: Fertilizer, Improved Seeds, Irrigation and Pesticides

Source: (1): Imports: AISE for 2004/05–2011/12 and Comtrade thereafter. Use: CSA-AgSS. (2): CSA: AGSS. (3): ATA-MoA (2014). 4: CSA-AGSS. 5 & 6: CSA Annual Reports. See details in Bachewe et al (2015).

Pesticides use, on the other hand, increased significantly over time. While 13 percent of the crop area was exposed to pesticides in 2004/05 this increased to 21 percent in 2013/14 (Figure 5.2.6). Again, these trends were driven mainly by cereals which show relatively high adoption rates and growth over this period.

In sum, important changes took place in the adoption of improved agricultural technologies over the last decade. There has been more than a doubling in the use of chemical fertilizer, improved seeds, and pesticides over this period, illustrating the increasing modernization and intensification of agriculture in Ethiopia. The uptake of these improved agricultural technologies was particularly pronounced in the second half of the decade (2009/2010–2013/14) suggesting that land expansion and TFP growth were major contributing factors to agricultural growth in the first half of the decade (2004/05–2009/10), but that in the latter half agricultural growth was explained by increasing use of modern inputs.

5.4 Drivers for Change

What were the drivers associated with increased agricultural production in Ethiopia? To identify the drivers for the increasing adoption of improved technologies in the last decade, two conditions have to be met. First, they need to be linked with significantly increased adoption of improved practices. Second, they need to have shown major positive changes over the last decade. In this section, we focus mostly on the first issue, using primary data analysis as well as a literature review. Table 5.1 relates different associates with the adoption of improved seeds and/or chemical fertilizer for four main cereals in the country, i.e. teff, maize, wheat, and barley. We run a Probit model using as dependent variable the adoption of this improved technology (yes=1; no=0) for these four crops and characteristics of the household, plot characteristics, and climatic variables as explanatory variables. Table 5.1 presents the average marginal effects.

The regression results show large and significant effects for extension, remoteness, and education on improved technology adoption. Farmers that received extension visits are associated with higher likelihoods of adoption of improved technologies. Less remote households and more educated households are more likely to adopt improved agricultural technologies. These factors are significant and consistent associates of improved technology adoption and have shown large changes over the last decade (as we will argue below) and can therefore be justified to be main drivers for improved technology adoption in the last decade.

Other factors show significant association with improved technology adoption as well. First, larger plots are associated with a higher likelihood of improved technology adoption. This holds for the four cereals. Second, cultivator managed plots have a lower likelihood of adoption of improved technologies. Third, access to credit of the households leads to higher likelihoods of adoption of improved agricultural technologies. However, their effects are not significant in all specifications or these factors have not shown large changes over the period studied. While these results from the national agricultural sample survey illustrate that these three drivers show a significant association with improved technology adoption, the results however do not unambiguously show that productivity change can be attributed to these factors, because of possible endogeneity issues. A number of authors have looked at this issue with better, but not nationally representative, datasets. We review that literature below.

First, a number of studies have assessed the impact of the increased coverage by extension agents. Dercon et al (2009) have shown that extension has yielded significant impacts on consumption growth. Others show that there is a strong association between increased use of technologies, mainly use of improved seeds, fertilizer and pesticides, and extension services provided (Ragasa et al., 2013; Berhane et al., forthcoming; Minten et al, 2013). Using large-scale panel data in high-potential agricultural areas, Berhane et al. (forthcoming) illustrate that the extension system

TABLE 5.1: Probit Model: Adoption of Improved Seeds or Chemical Fertilizer in Cereal Production

	Barley	Maize	Teff	Wheat
Received extension visit (1=yes)	0.3276*** 0.037	0.5605*** 0.024	0.3589*** 0.025	0.3744*** 0.022
Avg. travel time to nearest city (pop. >=50000); hours	–0.0153*** 0.004	–0.0035 0.004	–0.0134** 0.004	–0.0201*** 0.005
Age of head (years)	0.0001 0.000	–0.0007** 0.000	0.0004 0.000	–0.0004 0.000
Household head is female (1=yes)	0.0323** 0.011	–0.0003 0.009	0.0271* 0.012	0.0346** 0.013
Education (highest grade)	0.0103*** 0.002	0.0049*** 0.001	0.0074*** 0.002	0.0073*** 0.002
Household size	0.0057** 0.002	0.0047*** 0.001	0.0010 0.002	0.0043* 0.002
Plot area in hectares	0.1357*** 0.034	0.1557*** 0.024	0.1371*** 0.021	0.2339*** 0.038
All farm plots combined	–0.0020 0.004	–0.0034 0.004	0.0088 0.006	–0.0003 0.005
Cultivator owns the land (1=yes)	–0.0262* 0.011	–0.0730*** 0.011	–0.0228* 0.010	–0.0361** 0.013
Cultivator used irrigation (1=yes)	–0.1212*** 0.023	0.0529 0.048	–0.1896*** 0.049	–0.1441* 0.057
Cultivator rotated crops (1=yes)	0.0143 0.023	–0.0289 0.019	0.0611* 0.027	0.0590* 0.027
Cultivator has access to credit (1=yes)	0.0310* 0.013	0.0465*** 0.011	0.1163*** 0.014	0.0884*** 0.014
Average population density in woreda	0.0000 0.000	0.0004*** 0.000	0.0003** 0.000	0.0000 0.000
Technology adoption rate in woreda (last year); all crops	0.5920*** 0.028	0.3177*** 0.032	0.6641*** 0.040	0.6413*** 0.028
Rainfall, elevation, slope, and climate variables	Included	Included	Included	Included
Observations	18913	38390	31247	19619

Source: Bachewe et al (2015) using CSA Agricultural Sample Survey 2008/09.
Table shows (average) marginal effects. For dummy variables marginal effect is the discrete change from the base level. Clustered standard errors (at EA level) below coefficients; * p<0.05 ** p<0.01 *** p<0.001.

does not increase productivity directly but that it works mostly indirectly via its effects on input use and input use complementarities. Krishnan and Patnam (2014) further illustrate that the effect of extension diminishes over time and that neighborhood effects become more important in stimulating improved technology adoption.

Second, Dorosh et al. (2012) illustrate the importance of remoteness on adoption of improved technologies for Africa as a whole. Using data from a remote area in Ethiopia, Minten et al. (2013) show, using data from a quasi-experimental setting, that a 20 km increase in the distance from the farm to the modern input distribution center and output market

led to a 47 kg/ha and 6 kg/ha reduction in chemical fertilizer and improved seed use, respectively. Stifel and Minten (2015) further show a large association of remoteness with agricultural production. These results suggest substantial impacts of remoteness on modern input use and they therefore suggest that an improved transportation network contributes significantly to the increase in modern input use.

Third, Huffman (2001) shows that the dominant effect of education on agriculture is technical change. International literature for developing countries shows that more educated farmers are more efficient and adopt modern technologies more easily (Ogundari, 2014; Appleton and Balihuta, 1996; Jamison and Lau, 1982). In the case of Ethiopia, several authors have illustrated the important effect of education on fertilizer use and innovation more broadly, especially in traditional areas in Ethiopia (Endale, 2011; Asfaw and Admassie, 2004; Knight et al., 2003; Weir and Knight, 2004). Illiterate farmers accounted for 63 percent of the total number in an average year during 2004/5–2013/14, according to CSA. Moreover, the proportion of farmers with informal education was 8.5 percent while those with formal education of grades 1–3 and 4 or higher accounted for 10.5 and 18 percent of the total. Figures 5.3.1 and 5.3.2 indicate that relative to their share, farmers with education in Ethiopia perform superior in the adoption of modern inputs, as shown by CSA surveys. However, out of the total number of farmers that adopted fertilizer and improved seeds, illiterate farmers accounted for 58 percent and 54 percent, respectively.

Fourth, the ratio of output over input prices has been shown to be a major incentive for the adoption of fertilizer and other improved technologies in Africa (Morris, 2007). Spielman et al. (2012) document to what extent incentives matter in the adoption of fertilizer in Ethiopia in particular. Minten et al. (2013) illustrate for the North of Ethiopia how distances to input distribution centers and changes in value-costs-ratios, driven by transportation and transaction costs, lead to significantly lower adoption rates of chemical fertilizer as well as improved seeds. The World Bank (2014) further shows that poverty reduction in the country was linked with improved agricultural performance, especially when prices were high, access to markets was good, and fertilizers were used.

In sum, the available evidence therefore shows that four factors (extension, roads, education and incentives) are associated with increasing adoption of improved technologies in Ethiopia. Evidence on the changes in the last decade of these four main drivers—agricultural extension, road infrastructure, education, and incentives—for the adoption of improved agricultural technologies as well as other factors is discussed next.

5.5 Evidence on Changes in Drivers

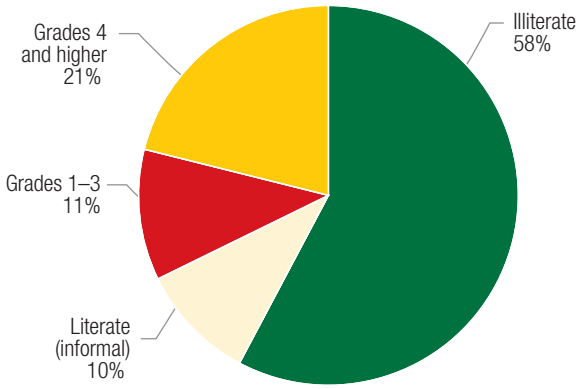
Government Strategy

Cognizant of the fact that the vast majority of the Ethiopian population resides in rural areas, mostly deriving livelihoods from agriculture, the Government of Ethiopia (GoE) has long put agriculture at the center of its national policy priorities. An Agriculture Development Led Industrialization (ADLI) strategy was formulated in the mid-1990s that served as roadmap to transform smallholder agriculture in the country. The emphasis and focus given to ADLI paved the way for rethinking overall growth pathways and served as a blueprint of the national development agenda in the decades to come. ADLI envisioned national development through the need for concerted efforts to transform Ethiopia's traditional agriculture sector first, which according to the plan, would eventually provide impetus to other sectors including manufacturing.

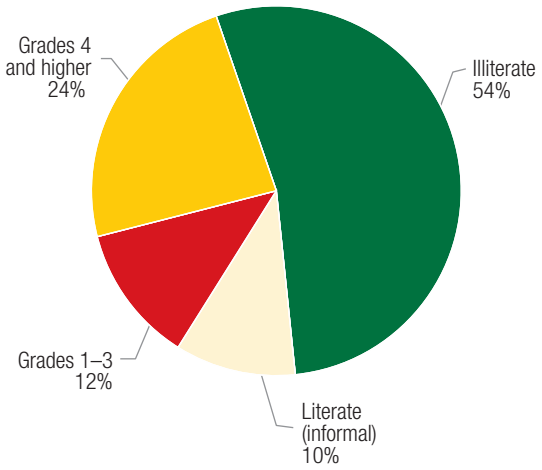
To ensure a more efficient utilization of land and labor resources in rural areas, the GoE invested heavily in the provision of rural public services in the late 1990s and early 2000s. Among the top priorities in the agenda were rural education and health, rural infrastructure, extension services, and strengthening of public agricultural research. Government

FIGURE 5.3: Input use by Educational Level and Government Agricultural Expenditure

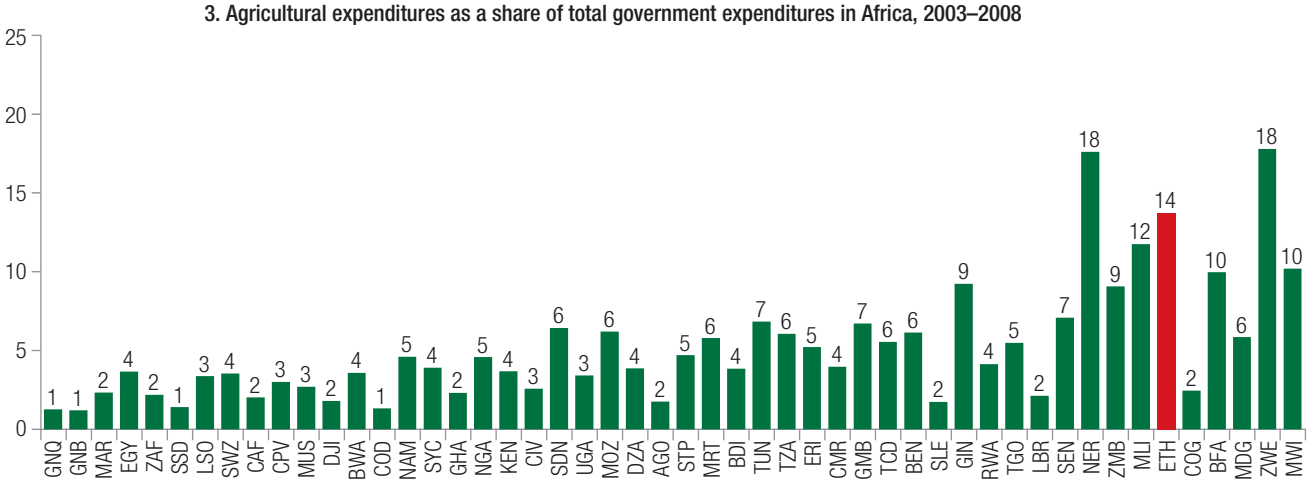
1. Proportion using fertilizer



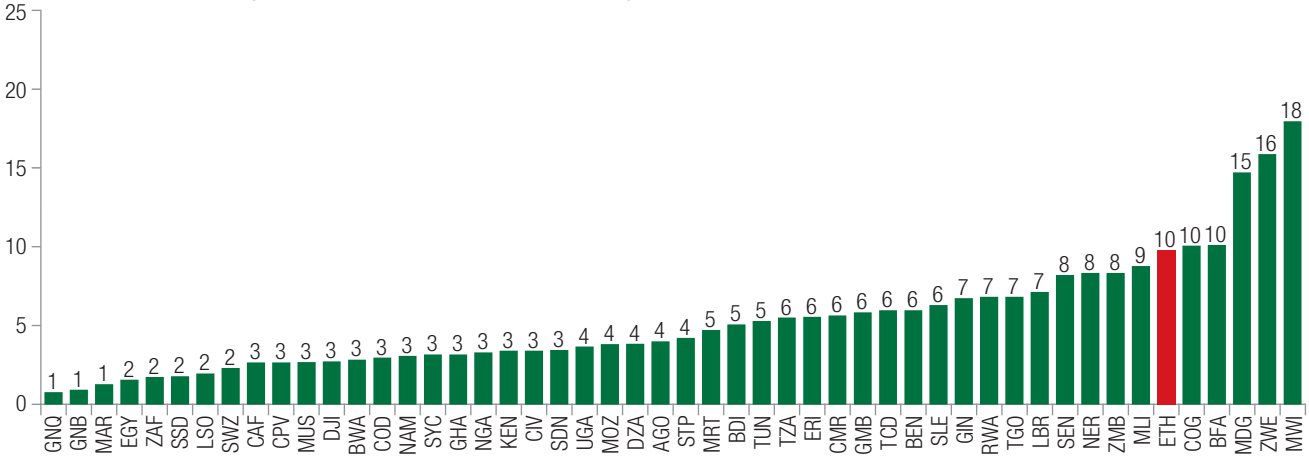
2. Proportion using improved seeds



3. Agricultural expenditures as a share of total government expenditures in Africa, 2003–2008



4. Agricultural expenditures as a share of total government expenditures in Africa, 2008–13



Source: (1) and (2): CSA Annual Reports. (3) and (4): Benin (2014).

expenditures in Ethiopia have over the years been guided by several plans. Since 2005, a five-year planning period was used. The period 2005–2010 was guided by the Plan for Accelerated and Sustained Development to End Poverty (PASDEP). The period 2010–2015 was the first phase of the Growth and Transformation Plan (GTP). In these plans, Ethiopia has consistently advanced the agricultural sector as one of the important sectors to invest in.

For example, Ethiopia signed the CAADP[37] agreement in 2003 and was one of the few countries to meet the targeted 10 percent expenditures in this area. Ethiopia was one of only four countries that met the 10 percent target over the two periods (the three other countries are Malawi, Zimbabwe, and Burkina Faso), as illustrated in Figures 5.3.3 and 5.3.4. Ethiopia's agricultural expenditures made up 17 percent of the total budget in the first period (2003–2008). This declined to 10 percent for the period 2008–2013 (Benin, 2014). The sections below illustrate the extent to which this expenditure has contributed to facilitate improved agricultural performance and the adoption of improved agricultural technologies, likely contributing to reduce some of the inefficiencies that have hampered improved technology adoption in the past (Jack, 2011).

Changes in Informational Efficiency and the Role of Agricultural Extension

At the core of the GoE's investment in rural areas and agriculture has been the provision of a public agricultural extension system which has seen unprecedented public expenditures since 1992 (Davis et al., 2010). These expenditures largely focused on the provision of advisory and training services through a public extension structure that spans from the federal ministry to the regions and down to the woreda and kebeles through frontline extension agents.

In an effort to redress the challenges faced and to scale up best practices learned in the earlier period, the government launched a more comprehensive large-scale extension system in 2002. As part of the scaling up, a new wave of training of Development Agents (DAs) was launched through Agricultural Technical and Vocational Education and Training (ATVET) centers newly established throughout the country. The PASDEP plan outlined to assign at least three DAs (specializing in crop production, livestock and natural resources) in each kebele. The new DAs were trained and mandated to train farmers and carry out agricultural extension services in each kebele. Each kebele was planned to build one Farmer Training Center where farmers would have access to participatory demonstrations for improved technologies and new farming systems.

Ethiopia achieved one of highest extension agent-to-farmer ratios found in the world. By 2008 and 2009, ATVET centers established throughout the country had trained some 60,000 DAs and around 8,500 Farmer Training Centers had been built at the kebele level. As a result, there is one DA for every 476 farmers or 21 DAs per 10,000 farmers in Ethiopia (Figure 5.4.1). This is significantly higher than in other countries such as China, Indonesia and Tanzania, where this ratio stood at 16, 6, and 4 respectively (Davis et al., 2010).

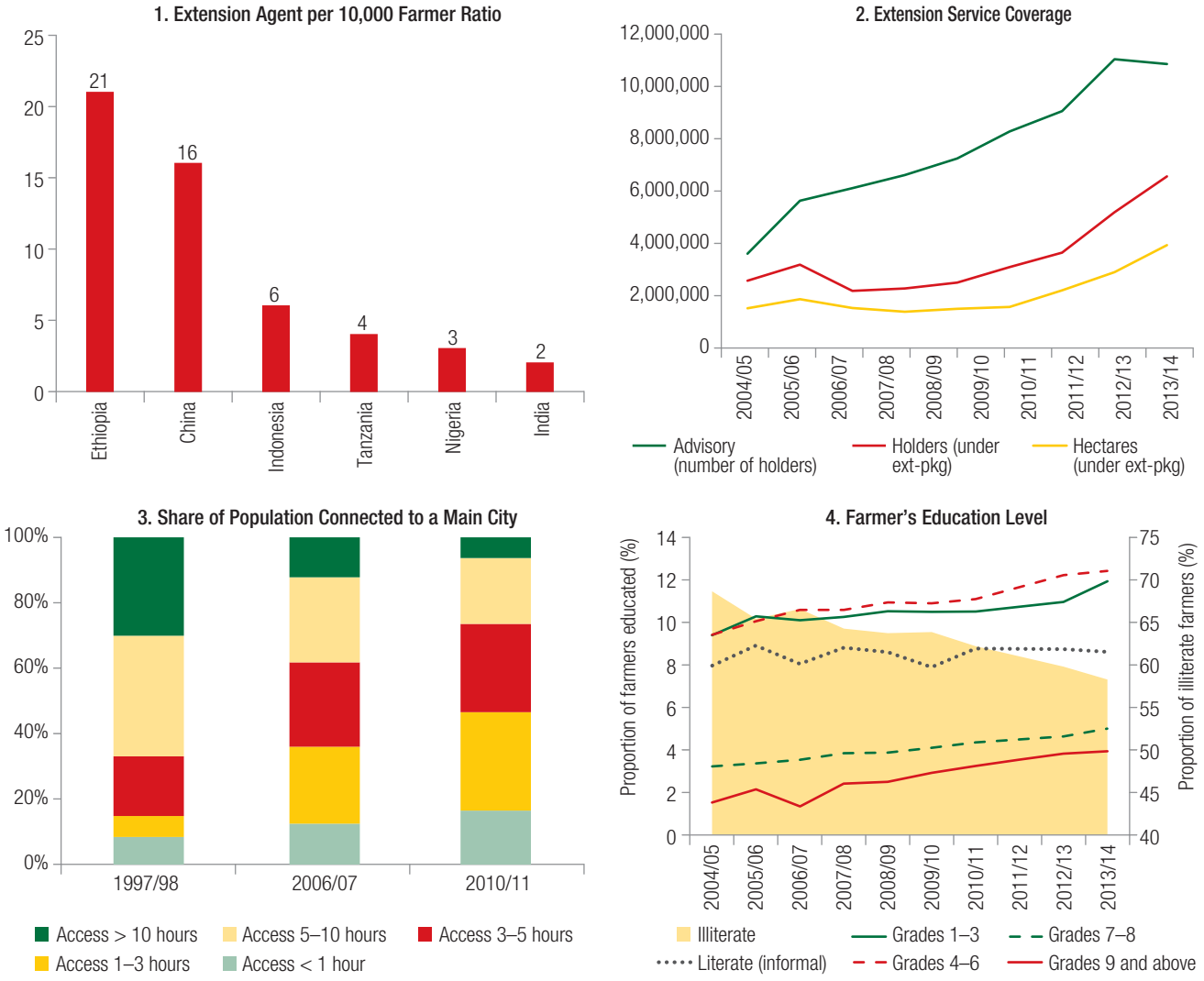
The number of holders reporting using the extension advisory service tripled with a doubling in the use of extension packages. As illustrated in Figure 5.4.2, it increased from 3.6 million in 2004/05 to 10.9 million in 2013/14. The number of holders that participated in various crop type extension packages more than doubled, from 2.6 million in 2004/05 to 6.6 million in 2013/14. In the same period, the planted area covered by the extension package program increased from 1.5 million hectares in 2004/05 to 3.9 million hectares in 2013/14.

Changes in Input and Output Market Efficiency

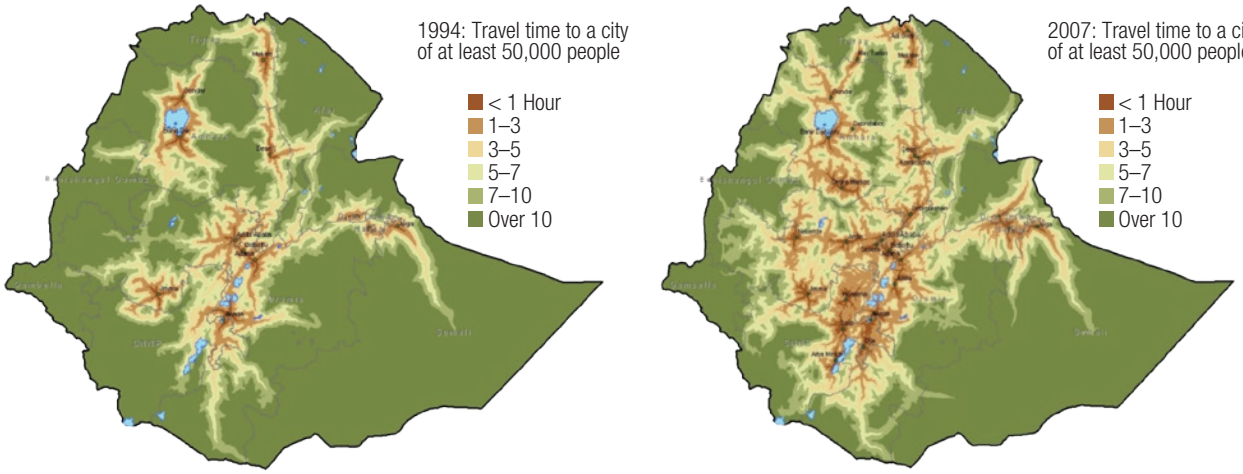
Well-functioning agricultural marketing systems are important anywhere in the world, but especially so in Ethiopia. This is because of the disastrous

[37] Comprehensive Africa Agriculture Development Program (CAADP).

FIGURE 5.4: Extension Service, Transport to Markets, and Farmer's Education



5. Travel time to a city of at least 50,000 people (1996/97 and 2010/11)



Source: (1): Davis et al (2010). (2): CSA-AASS. (3) & (5): Kedir et al (2015). (4): CSA Annual Reports.

implications in the past of badly functioning food markets for food security, with food stocks available in some parts of the country and widespread famine in other parts (von Braun et al., 1998). Major reasons for historically badly functioning food markets in Ethiopia have been linked to lack of market information, bad road infrastructure, and high transaction costs (e.g. von Braun and Olofinbiyi, 2007). However, there have been important changes in this area in the last decade in Ethiopia which have improved the functioning of these markets.

Most importantly, the Ethiopian government has embarked on a large road investment program in the last two decades. The total length of all-weather surfaced roads tripled in less than 15 years, from an estimated 32,900 km in 2000 to 99,500 km in 2013 (NBE, 2014). This type of road development has important effects on the connectivity of agricultural markets in the country. In 1996/97, transportation infrastructure connected Addis Ababa to a limited number of urban markets such as Mekelle, Bahr Dar, Jimma, and Dire Dawa. By 2010/11, secondary cities linked to each other, and major corridors linking key market centers were fully constructed (Figure 5.4.5). Whereas in 1997/98, only 15 percent of the population was within 3 hours of a city of at least 50,000 people, 47 percent was within 3 hours of such centers in 2010/11 (Figure 5.4.3). The improved road network has further led, among others, to a reduction of travel times between wholesale markets in the country by an estimated 20 percent. However, travel costs might have even fallen further possibly driven by more competition and a shift to bigger and cheaper trucks (Minten et al., 2014). In this regard, the growing accessibility and expanding transport services have been shown to have positive impacts on agricultural productivity (Li, 2011).

An important contribution to changes in market performance has also been urbanization and increasing commercial surplus flowing from rural to urban areas. Urbanization has increased rapidly, but starting from a low base, and it is estimated that, compared to the beginning of the decade, 3.7 million more people are living in urban settings in Ethiopia. As urban people are much less likely to grow their own food, this implies that commercial surplus has increased significantly over the last ten years. Moreover, access to urban centers leads to increasing agricultural intensification and urbanization which can then act as an engine of agricultural transformation (Schultz, 1951). For example, Figure 5.5.1–2 show that adoption of herbicides and chemical fertilizer (DAP as well as UREA) for teff production was significantly higher in villages close to Addis compared to the more remote ones. While a significant improvement is seen over time for most farmers, intensification has however been more pronounced in villages close to cities (see also Kedir et al., 2015).

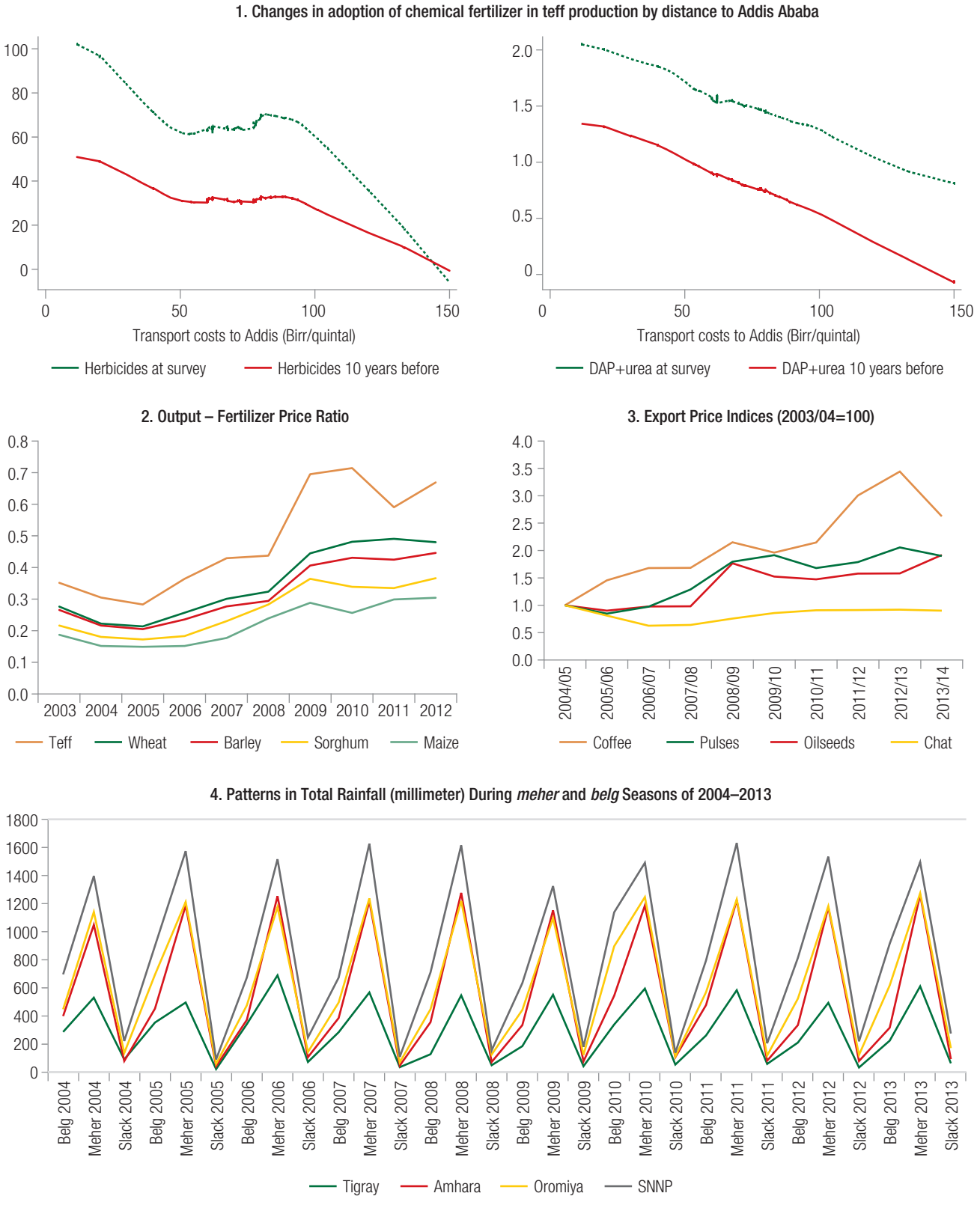
Education

Ethiopia made significant strides to achieve universal primary education coverage, particularly in rural areas. This increases the number of educated farmers as some of these students make their livelihood afterwards in the agricultural sector. Moreover, efforts have also been made to make adult education accessible. Growth in the proportion of farmers with higher levels of education over the last decade is striking. Figure 5.4.4 shows that the share of illiterate farmers declined at 1.8 percent per year over this period. Furthermore the proportion of informally educated farmers increased at an average annual rate of 1 percent while those in grades 1–6 and 7–8 increased at about 3 percent and 5 percent. The increase in the proportion of those with at least grade 9 education was remarkable standing at 15 percent.

Prices and Incentives

Over the last decade, prices in in input and output markets have changed significantly which have led to improved incentives for agricultural intensification. This has been the case for the tradable and non-tradable agricultural sector. Figure 5.5.2 illustrates the ratios of output prices of the five main

FIGURE 5.5: Modern Input Adaption, Prices and Rainfall



Source: (1): Minten et al (2013). (2) & (3) Berhane et al (forthcoming). (4) NASA.

cereals over chemical fertilizer prices were twice as high in 2012 than in 2004, leading to improved incentives for chemical fertilizer use for the production of these crops. This changing ratio over time seems to have been linked to a number of factors, including the fixing of margins for chemical fertilizers for the distributing cooperatives in order to keep their prices low—sometimes leading to profitability issues for these distributing cooperatives (Rashid et al., 2013)—, increasing exchange rate overvaluation making imports cheaper (World Bank, 2014b), a decline in international fertilizer prices since 2008 (FAO, 2012), and high output prices, especially from 2008 until 2010.

International prices were significantly higher for most export crops at the end of the decade than in the beginning. Figure 5.5.3 shows that the price of coffee was 2.5 times higher in 2012/13 than in 2003/04 while the prices of oilseeds and pulses were twice as high. In contrast, the price of chat stayed rather stable over this period. This general price increase for export commodities has led to significantly higher export revenues from these export crops as well as for increasing incentives for investments in these commodities, as for example shown in the rapid expansion of sesame cultivation in the country over the last decade.

Other Factors

Over the last decade, there have been no major incidences of large-scale droughts that have plagued Ethiopia before. Given the rain-fed character of Ethiopia's agriculture, its production is heavily dependent on timely and sufficient rainfall. Figure 5.5.4 shows levels of rainfall for the four main agricultural regions, of the meher, belg, and slack seasons for the years 2004 until 2013. It illustrates, on average, the relative stability of rainfall patterns seen over the last decade. Moreover, Ethiopia is equipped with a good early warning system for the crop and the livestock sector as well as with a large safety net program—the Productive Safety Net Programme (PSNP)—as to deal with the consequences of droughts. In the case that there were droughts, government and donors have been addressing the production shortfalls adequately as illustrated by interventions after the drought in the Horn of Africa in 2012 (Maxwell et al., 2014).

Other factors have contributed to improved agricultural productivity but their importance has been more limited than the drivers mentioned above. This includes access to credit, lower riskiness for technology adoption, land certification, mobile phone technology, and safety nets. Each of these are discussed in turn.

Lack of access to credit is seemingly one of the major constraints to promoting agricultural productivity and rural transformation overall. Following the international microfinance revolution in the 1980's and 1990's, Ethiopia has seen remarkable progress in this sector starting in the early 2000s. Over the last two decades, the number of microfinance institutions (MFIs) in the country has grown to 32 (from one in 1994). Figures 5.6.1 and 5.6.2 indicate that the MFI industry has expanded enormously in the last decade both in terms of number of active borrowers—from around 500 thousand in 2003 to around 3.5 million borrowers in 2014—and an outstanding loan portfolio from a little less than 2 billion in 2003 to around 11 billion birr (in 2011 prices) in 2014. In addition, significant amounts of government program loans were also disbursed through Rural Saving and Credit Cooperatives (RuSACos) in the last decade. Data from the Ministry of Agriculture indicate that in 2014 about 600 million ETB was disbursed to smallholders through RuSACos (which was about 56 million ETB in 2008/09). However, while there has been significant growth in this area, it is unclear how much of the micro-finance has been used towards the agricultural sector. For example, the CSA data shows that the share of farmers that used credit for agricultural purposes has not changed significantly over time (it varied between 22 percent and 28 percent over the period 2005–2013). It therefore seems that credit might have been more readily available in rural areas, but it might not have directly impacted agricultural activities.

FIGURE 5.6: Microfinance Activity, Fertilizer Constraints, Crop Damage and Real Wages

Source: (1) & (2): ASEMI. (3) AGP Survey (2011). (4) & (5): CSA.

The risk situation might also have changed in favour of higher agricultural productivity over the last decade. Dercon and Christiaensen (2011) show that uninsured risk is a significant constraint on technology adoption in Ethiopia, and although insurance markets may be no different in 2014 than in 2004, it is plausible that the riskiness of technology adoption has changed: (i) the doubling of output-input price ratios makes negative returns to fertilizer use in the event of bad weather much less likely; (ii) there is now a functioning public safety net for many; (iii) the run of good weather may make the salience of bad weather shocks more muted (perhaps changing farmer's expectations of the risk); (iv) farmers are seemingly richer, have more assets, and are better able to self-insure; and (v) the micro-finance institutions may be easier to default on than the government (formerly the main credit provider).

A large-scale land certification program was set up in the country in the 1990s as to ensure more secure land property rights. This land certification program has been one of the largest, cheapest, and fastest in Africa (Deininger et al., 2008) and it is estimated that about half of the farmers in the main four regions benefited from this (Ghebru et al., 2015). While land stays property of the state, the certificates have, however, allowed to ensure more secure property rights as they have been found to have led to higher investments, more land rental market activity, higher productivity, and improved food security (Holden et al., 2007; Deininger et al., 2011; Ghebru and Holden, 2013; Melesse and Bulte, 2015). As this land certification program in most areas happened before the period under study, it might not have directly contributed to increased productivity in the last decade but it seems however clear that the more secure property rights have been an enabler for the agricultural productivity increase seen in the last decade.

In the last decade there has been a spread of the mobile phone in urban and rural areas in Ethiopia. This might likely have impacted agricultural trade through improved access to information. While in the beginning of the decade, none of the agricultural traders and brokers used mobile phones, it was ubiquitous by the end of the decade, leading to more efficient markets (Minten et al., 2014). On the other hand, the penetration of the mobile phone with farmers in Ethiopia is still limited, especially when compared to neighboring Kenya. The available evidence also shows that the spread of mobile phones did not lead to major changes in agricultural pricing for these farmers that had access to a phone (Tadesse and Bahiigwa, 2015).

Ethiopia has started up since 2006 a large safety net program—the Productive Safety Net Program—that covers a large area of the country and benefits more than 7 million vulnerable people in the country. In this program, some of the participants are paid to participate in communal works to help improve communal infrastructure such as roads, irrigation, and terraces. Taffesse et al. (2015) show to what extent investments in these communal assets have contributed to higher agricultural productivity. However, the area covered makes only up a small part of the cultivated land of the country as a whole and might therefore only partly explain agricultural growth in the last decade.

5.6 Conclusion and Further Challenges

There have been significant changes in Ethiopia's agricultural and food economy in the last decade. Agricultural output more than doubled over the last decade driven by area expansion but more importantly by significant yield increases. The real value of agricultural GDP increased by 7.6 percent per year and export earnings from agricultural commodities doubled over this period. Moreover, average per capita food consumption increased by more than 20 percent over this period and we note a relative decline of expenditures on cereals in the consumption basket, indicative of important changes in food habits. This agricultural growth is further shown to have been associated with significant poverty reduction in the country (World Bank, 2014).

The increased productivity is partly explained by a rapid uptake of a number of improved

agricultural technologies. Over the period studied, total fertilizer consumption increased by 143 percent and the share of cereal farmers that applied chemical fertilizers increased from 46 percent in 2004/05 to 76 percent in 2013/14. Other chemical use, such as pesticides and herbicides, increased as well. More improved varieties for the major cereals were released in the period 2000–2011 than in the thirty years before and while there are still problems in distribution of improved seeds, its use—while still relatively low—doubled during this period. However, part of the growth cannot be explained by increasing adoption of these modern inputs, and other production factors, and we therefore also note significant growth in Total Factor Productivity (TFP), on average 2.3 percent per year. We further note that the increasing adoption of these modern agricultural technologies and its contribution to agricultural growth has especially happened in the second sub-period of the last decade. In the first sub-period, agricultural growth was relatively more driven by area expansion and TFP growth.

Major drivers for the increasing adoption of modern inputs seem to be multiple, linked with significantly higher expenditures in the agricultural sector. First, Ethiopia has built up in the last decade a large agricultural extension system, with one of the highest extension agent to farmer ratios in the world. Second, there has been a significant improvement in access to markets. Third, improved access to education led to a significant decrease in illiteracy in rural areas. Fourth, high international prices of export products as well as improving modern input—output ratios for local crops over the last decade have led to better incentives for the agricultural sector. These factors all show a strong association with increasing adoption of improved technologies, and consequently agricultural productivity. However, other factors played a role as well, including good weather, better access to micro-finance institutions in rural areas, and improved tenure security.

While the agricultural growth process in Ethiopia has been remarkable, there are a number of challenges that should be addressed to assure that this growth process will be continued in the future. Sustainable intensification will need to receive even more attention in the future as land constraints have increasingly become binding (Headey et al., 2014). It seems therefore that there will be a need for more widespread adoption of adapted modern inputs and improved technologies, especially as there is still significant opportunity for further growth. Chemical fertilizer use stays central to the government effort to increase agricultural productivity. It has therefore initiated a unique soil mapping exercise in the country as to adjust fertilizer packages to specific soil conditions. This is a promising development that might address soil deficiencies in the country more appropriately. However, emphasis on an efficiently functioning fertilizer distribution system is also needed as shown in the stated reasons on constraints to adoption of fertilizer by farmers in the baseline survey of the AGP program. While the share of farmers using fertilizer in these high potential areas was high, there were still significant issues with the availability of fertilizer as more than 20 percent and 12 percent of the farmers citing lack of supply and late arrival of fertilizer as a constraint to adoption respectively (Figure 5.6.3).

Higher adoption rates of improved and high-performing seeds are also needed. To stimulate adoption, better supply and marketing conditions are required. On the supply side it seems that while the public sector has an important role to play and more resources should be channeled to the development of improved seeds in local research settings given the high return to such investments (Alston et al., 2000), a more active role of the private sector is required as well. Moreover, marketing, distribution and information provision on improved seeds should be improved to generate a more vibrant seed sector in Ethiopia. To further agricultural intensification, there will also be a need for better water management and increasing irrigation, more intensive use of land through double cropping, and more attention to reduce important soil erosion problems in the country. This will require an important role of the government and the private

sector as to assure that appropriate technologies are developed and are available at an affordable price. As part of this effort, the innovation system's link with the public extension system as well as the private sector should be institutionalized and strengthened.

Climate change is expected to have a significant impact on Ethiopian agriculture in the decades ahead. It is estimated that the shifting rainfall patterns and increasing temperatures will lead to crop yield decreases as well as lower incomes from livestock (Robinson et al., 2013). Moreover, the incidences of unexpected weather shocks is expected to increase. Figure 5.6.4 illustrates that weather related events were already the major source of crop damage in the last decade. Incorporating climate change in agricultural development programs will therefore become increasingly important. This will have to be done through adaptation to possible effects of climate change as well as mitigation where practices are pursued that will lead to least greenhouse gas emissions.

Recent poor rains during the Belg **and** Meher **seasons illustrate the vulnerability of Ethiopia's rain-fed agricultural systems.** At the time of writing (October 2015), Ethiopia is experiencing severe drought following a failure of the Belg rains and very unstable rainfall pattern of the Meher rains. It is too early to determine the potential impact of this on agricultural growth and overall economic growth. Preliminary analysis of rainfall data and potential crop loss suggest that the current situation is similar to the one experienced in 2003, but not as bad as in 2002. Further efforts to expand the irrigated area would thus be imperative to make agriculture less reliant on the weather.

While agriculture has shown high growth rates and its growth has contributed to significant welfare improvements, there is still significant scope for improvement. One concern is the slow change in nutritional indicators and the high level of stunting in the country, especially in rural areas (Headey et al., 2014). More attention should therefore be paid to how agricultural growth can have enhanced beneficial effects on food diversity and nutritional indicators. While there are still a number of unknowns on how this nutritional transformation can be most efficiently achieved, it seems that behavioral change communication, sanitation, improved market access, and production diversity, especially in less connected areas, should have a major role to play (Hirvonen and Hoddinott, 2014; Hoddinott et al., 2013; Stiefel and Minten 2015).

Most of the agricultural growth has happened in the cereal sector in the last decade. However, as the Ethiopian population is becoming richer and more urbanized, this will likely lead to changing demands for foods, different consumption baskets, and a transformed agricultural sector. For example, there will be an increasing demand for livestock products—with more cereals being used as feed demand—, fruits and vegetables, processed and ready-to-eat products. Some of the products require the development of new and different value chains, given lack of relevant knowledge, seeds, and other inputs. Given the high perishability of some of these emerging agricultural products, investments will also be needed towards new off-farm technologies, such as cold storages and processing, that might then help to fulfil that demand.

Gender issues are also important in agriculture and addressing those seems needed to improve agricultural performance, but more importantly nutritional indicators, in Ethiopia. Empowering women in agriculture has likely pay-offs for nutritional and agricultural outcomes. This will require policies and interventions in different areas. For example, Kumar and Quisumbing (2015) show that reforms in law and land registration has been an important avenue to improved gender equality in Ethiopia.

Mechanization in Ethiopia's agricultural production and post-harvest activities is currently low. However, the increasing transformation of Ethiopia's economy is leading to higher real wages in rural areas (Figure 5.6.5). These higher rural wages will give incentives for an induced innovation towards labor-reducing technologies (Ruttan and Hayami, 1984). This trend can already be seen by the increasing adoption of herbicides, a substitute of weeding labor, in

commercial agricultural areas but it will also drive the demand for more mechanization, especially for these activities where there is a peak demand of labor, such as during planting and harvesting periods. Making sure that the right machines, and spare parts, at affordable prices will be there to alleviate that constraint is therefore also an important further challenge for sustained higher agricultural productivity.

PART B: SUSTAINING GROWTH

Part B is structured as follows: Chapter 6 discusses how to manage our expectations to Ethiopia's future growth performance. Chapter 7 analyzes Ethiopia's financing choice between public infrastructure investment and private investment, and considers complementary financing mechanisms for infrastructure. Chapter 8 analyzes the role of structural economic reforms in enhancing future growth.

6 MANAGING GROWTH EXPECTATIONS

What should we expect in terms of Ethiopia's growth rate over the next decade? Double digit growth? Given its low level of income, Ethiopia has substantial potential for realizing the benefits of catch-up growth, especially if it can avoid economic crises. At the same time, there are also reasons for being cautious with very high growth expectations. The first reason is statistical: only few countries have managed to sustain a growth acceleration beyond a decade. Second, country-specific growth headwinds appear to be somewhat stronger than the tailwinds. A third reason is cyclical: the ongoing private construction boom will not last forever. Finally, regression model simulations suggest a growth slowdown in three alternative policy scenarios. Going forward, growth may be expected to range between 4.5 and 10.5 percent. The objective of policy is to maximize the changes that high growth rates can continue.

6.1 Introduction

What should we expect in terms of Ethiopia's growth rate over the next decade? This chapter will refrain from making explicit long term growth projections for Ethiopia in recognition of the dismal record of economists in this area. What it does instead is to present a range of realistic outcomes to form our evidence-based expectations going forward. Notably, it argues that a continuation of the current trend, while being the policy objective under GTP2, is by no means a certain outcome and does in fact represent an optimistic scenario.

We address the following questions: What can we learn from the empirical evidence on growth accelerations across countries? What are the country-specific factors that either support or inhibit long-term growth? To what extent is the current growth acceleration a cyclical or permanent phenomenon? Which individual growth policies will give the 'biggest bang for the birr'? Which policy packages offer the best prospects for growth? How does this evidence help form our growth expectations for Ethiopia?

The chapter is structured as follows: Section 6.2 reviews the international experience with growth acceleration and derives stylized facts. Section 6.3 offers a qualitative discussion of country-specific head-winds and tail winds expected to affect growth going forward. Section 6.4 considers cyclical factors and presents quantitative estimates. Section 6.5 uses our cross-country regression model to benchmark the growth effect of individual policy variables. Section 6.6 uses the same model to simulate growth outcomes under alternative policy scenarios. Section 6.7 concludes.

6.2 Growth Accelerations: The International Experience

What can we learn from the empirical evidence on growth accelerations? A number of statistical facts can be derived about economic growth experiences across countries. The stylized facts that appear particularly relevant for Ethiopia are summarized in Box 6.1. Overall, the evidence compels us to contemplate a wider range of outcomes than are typically considered in Ethiopia. Many of the great economic forecasting errors of the past half century came from excessive extrapolation of performance in the recent past and treating a country's growth rate as a permanent characteristic rather than a transient condition.

How can Ethiopia's recent growth acceleration be interpreted in light of the empirical evidence? Between 2003/04 and 2013/14, Ethiopia achieved an average annual GDP growth rate of 10.9 percent and 8.0 percent in per capita terms. We note that our period choice is deliberately determined as the one which maximizes recent growth as the inclusion of

BOX 6.1: Stylized Facts about Growth Accelerations and their Aftermath

What to expect about growth accelerations:

- Cross-country experience of per capita GDP growth has been an average of 2 percent per year with a standard deviation of 2 percent (using Penn World Tables data since the 1950s).
- Episodes of per capita growth of above 6 percent are extremely short-lived with a median duration of 9 years.
- China's experience from 1977 to 2010 is the only instance of a sustained episode of per capita growth exceeding 6 percent for more than 32 years (1977–91: 7.61 percent and 1991–2014: 8.6 percent). Only two countries come close: Taiwan (1962–1994: 6.8 percent) and Korea (1962–1982: 6.3 percent).
- The end of an episode of super-rapid growth is nearly always a growth deceleration. Of the 28 episodes of above 6 percent per capita growth, only 2 ended with a shift to higher growth: Korea (1982) and China (1991).
- Since 1950, only 24 economies have notched up a 4.5 percent per capita growth over 30 years (Rodrik, 2013).
- Six non-resource rich economies have experienced decade long rates of per capita growth exceeding 7 percent: Japan, Korea, Hong Kong, Singapore, and China (Virmani, 2012).
- Six African countries experienced GDP per capita growth of more than 3 percent in 1995–2000 without that growth being driven by the exploitation of natural resource wealth: Burkina Faso, Ethiopia, Mozambique, Rwanda, Tanzania, and Uganda (IMF, 2013).
- The Commission on Growth and Development (2008) analyzed 13 economies that had grown at an average rate of 7 percent a year (total—not per capita!) or more for 25 years or longer since 1950.

What to expect after a growth acceleration:

- The single most robust and striking statistical fact about cross-national growth rates is regression to the global mean of 2 percent per capita growth.
- Past growth is not a good predictor of future growth. The R-squared of decade-ahead predictions of decade growth varies from 0.056 (for the recent decade) to 0.13. The best coefficient prediction is around 0.3 for decade-ahead predictions.
- The median of the growth episode that follows an episode of super-rapid growth is 2.1 percent per year.
- The reason for the low growth on average of developing countries versus developed countries is not the lack of rapid growth—it is the lack of the growth persistence and the very low growth rates during their periods of negative growth (North, Wallis, and Weingast, 2009).

Source: Authors compilation from Pritchett and Summers (2014) unless otherwise noted.

earlier years would reduce average growth. As an illustration of this statistically exceptional performance, we start by noting that it is 3 standard deviations above the global cross-country mean growth rate of 2 percent.

What can be (statistically) expected of Ethiopia's future growth performance? If we knew nothing about the Ethiopia economy and its prospects except for the recent growth acceleration, we could make the following assertions. In light of the stylized facts listed in Box 1, there is a high probability that Ethiopia's growth rate in 2015–25 would not be as high as t observed in 2004–14. Ethiopia might join the world league of countries with exceptional growth performance, but the associated probability is very low. The work by Pritchett and Summers (2014) suggests that a reversion to the global mean of 2 percent per capita growth is a statistically reasonable expectation. Even though the past is a poor predictor of the future, this would imply a growth rate of 2.4 percent per capita for Ethiopia (using their regression coefficient of 0.3). The statistical evidence also suggests that after 11 years of growth acceleration (above the median of 9 years), a growth deceleration could occur. Using the median experience across countries which experienced a growth acceleration would yield a per capita growth rate of 2.1 percent. Finally, and at the most pessimistic end of the range of statistical possibilities, it is not improbable that Ethiopia could even experience negative growth rates in the future. To illustrate, among 44 low income countries a negative growth rate has been registered 44 percent of the time and the growth rate was negative by 5.4 percent (North, Wallis and

Weingast, 2009). In fact, it is often the ability to avoid 'growth disasters' in the form of economic crises that set apart countries that achieve high long-term growth rates compared to those that do not.

Based on international cross-country experience it is reasonable to set a floor for our expectations to annual per capita growth in Ethiopia in the coming decade of 2 percent. This is not a prediction of what will happen to Ethiopia's growth over the next decade. Rather it is a suggestion to what might happen if Ethiopia's future growth patterns follow well established empirical regularities observed across countries. History teaches that abnormally rapid growth, such as what Ethiopia has experienced since 2004, is rarely persistent. While it might be the case that Ethiopia will continue for another decade of double digit growth this would be a statistical tail event.

A glance at Ethiopia's historical record suggests that this 'expectations floor' is not unreasonable. In fact, it coincides with the 2.1 percent per capita growth rate achieved between 1992 and 2001 under EPRDF. By contrast, the 1.5 percent per capita growth achieved under Monarchy (1951–73) or the –1.0 percent per capita under the Derg (1974–91) would not be a relevant basis for comparison owing to the widely different economic and political regimes.

At the other extreme, a repeat of the growth performance of the past decade, would represent a ceiling for growth expectations. As mentioned above, it would be unrealistic to expect a further acceleration of growth beyond the 8 percent per capita growth rate currently observed. After all, only 2 out of 28 growth acceleration episodes worldwide have followed this pattern. Similarly, there are examples of countries, even if the group is small, which managed to continue growing at very high rates for two decades. In sum, even if this is a low probability outcome in light of the cross-country empirical evidence, it cannot be ruled out.

6.3 Growth Tailwinds and Headwinds[38]

While statistical facts from cross-country experience are insightful and critical in forming expectations, it is equally important to consider country specific factors. Indeed, in their analysis of the future growth prospects of China and India, Summers and Pritchett (2014) take such an approach.

We identify a set of growth tailwind and headwind factors deemed relevant to a high-growth, non-resources rich, low-income African country, such as Ethiopia. These factors were derived on the basis of the stylized facts and conceived wisdom emanating from the most recent growth and economic development literature.

The likelihood that Ethiopia's growth acceleration could persist for a decade or more are buoyed by five key factors:

- **First, there is scope for achieving substantial gains from structural change** i.e. the large scale shifting of the population into higher value adding urban-industrial and services activities when combined with fundamental changes in institutional deepening and the strengthening of social capabilities.[39]
- **Second, additional productivity can be squeezed out through intra-sectoral transfer of resources from less to more productive activities.** In agriculture, for instance, this would involve the narrowing of the gap between yield per hectare on the most productive and the average farms and an increase in the share of mechanized, commercial farming.
- **Third, continuing productivity gains can be derived from technological catch-up** through the deepening of human capital and investment in Research and Development across the spectrum of economic activities with agriculture leading the way during the medium term.[40]

[38] This section draws from the background paper prepared by Yusuf (2014) for this report. The paper is a comprehensive review of the literature and more references can be found therein.
[39] These are the so-called *advantages of backwardness* first explored by Gerschenkron (1962). See also Abramovitz (1986) and Rodrik (2013a,b).
[40] See Comin and Hobijn (2010). Parente and Prescott (1999, 2003) maintain that technology gaps caused by barriers to the adoption of technologies are the cause of income divergences and slower growth.

- **Fourth, Ethiopia can tap the growth potential inherent in large urban agglomerations,** an integrated domestic market and demand from a nascent middle class.
- **Fifth, there are benefits to be reaped from FDI and participation in global value chains** mediating the trade of both light manufactures such as garments and footwear and of services.[41]

Two additional factors may also contribute to the strength of the tailwind at some point in the future:

- **For the 'demographic dividend' to serve as a tailwind for Ethiopia**, the fertility transition needs to be accelerated, the workforce endowed with marketable skills and businesses must invest in activities that create many more jobs.
- **A large domestic market** offers attractive somewhat protected opportunities for local businesses. With a population of 90 million, Ethiopia certainly has the numbers, although its low per capita income its small urban middle class and its fractionated domestic market currently undercut the advantages that could be bestowed by size.

Offsetting the factors underpinning Ethiopia's growth prospects are a number of 'growth headwinds' that would need to be overcome to sustain the growth momentum. These can be divided into two categories: exogenous factors; and those that are endogenous and reflect historical legacies and past policies.

The *exogenous factors* include:

The **geographical disadvantages** of being a landlocked, resource poor country in a relatively slow growing, conflict prone neighborhood.[42]

Slower growth of trade partners among developed economies[43] and a revival of manufacturing in these countries that dampens the performance of middle income countries and could restrain both South-North and South-South relations (premature de-industrialization).

The endogenous factors are several:

- **Lagging agricultural productivity**, traceable to illiteracy and low levels of education, biotic factors, access to fertilizer, environmental degradation, crop diseases, shortcomings of extension services, and infrastructure constraints.[44]
- **The size and characteristics of Ethiopia's export sector is inhibiting its ability to contribute to structural transformation.** Ethiopia has the lowest ratio of merchandise exports to GDP among populous countries in the world (7 percent); it has half as many of exporting firms as Kenya (which has half the population of Ethiopia), and average exporter size is small. Unprocessed and undifferentiated agricultural products dominate exports with manufactures accounting for only about 10 percent.[45]
- **A relatively small financial sector offering limited access to financial services to the vast majority of the population especially those living in the rural areas.** Access to financial services in Ethiopia is improving but remains low by world standards. Financial access remains particularly poor in rural areas where only six percent of the adult population is served by rural-focused institutions.
- **Low levels of human capital and IT use.** Ethiopia is ranked 172 out of 189 countries in

[41] See Wacziarg and Welch (2008), Baldwin (2011), and, Baldwin and others (1998).
[42] Growth of landlocked countries trailed that of coastal ones until recently however, in the past five years, landlocked countries have outperformed coastal ones by 1.5 percent per annum (Hostland and Giugale, 2013). See also Collier (2006), Hausman (2001), and Sachs, Mellinger and Gallup (2001).
[43] There are at least four contributing factors: the lingering after effects of the financial crisis; ageing of the workforce and its concomitant decline in many countries; higher energy prices; and the possibility that technological change might be slowing.
[44] See Reimers and Klasen (2013) for recent cross-country empirical evidence and Weir (1999) for Ethiopia.
[45] World Bank (2014).

the UNDP Education HDI Index (mean years of schooling were 2.4 years) and exhibit pervasive technological backwardness (including computer use and internet access) that impinges upon the productivity and international competitiveness of all sectors.

- **Weak transport infrastructure, and slow progress at trade facilitation practices** and easing foreign exchange restrictions on businesses constraints that discourage both domestic private and foreign investment. Trade logistics is a significant hindrance because the time to export is 44 days and costs are high, especially those related to document preparation.

Most of these 'inhibitors' do not pose insurmountable hurdles but collectively they may dampen Ethiopia's chances of maintaining its growth rate over the course of the next decade. Ethiopia can minimize the disadvantages of being landlocked through further investment in multimodal transport solutions, by increasing the efficiency of all transport modes and raising the quality of the logistics so as to enhance tracking and timeliness. Each of the other constraints can be eased through the application of policies many already in effect.

6.4 Cyclical Factors

A key questions is the extent to which the current growth acceleration is a cyclical or a permanent phenomenon. In this section we present three arguments suggesting that the cyclical component is sizeable suggesting lower growth rates going forward.

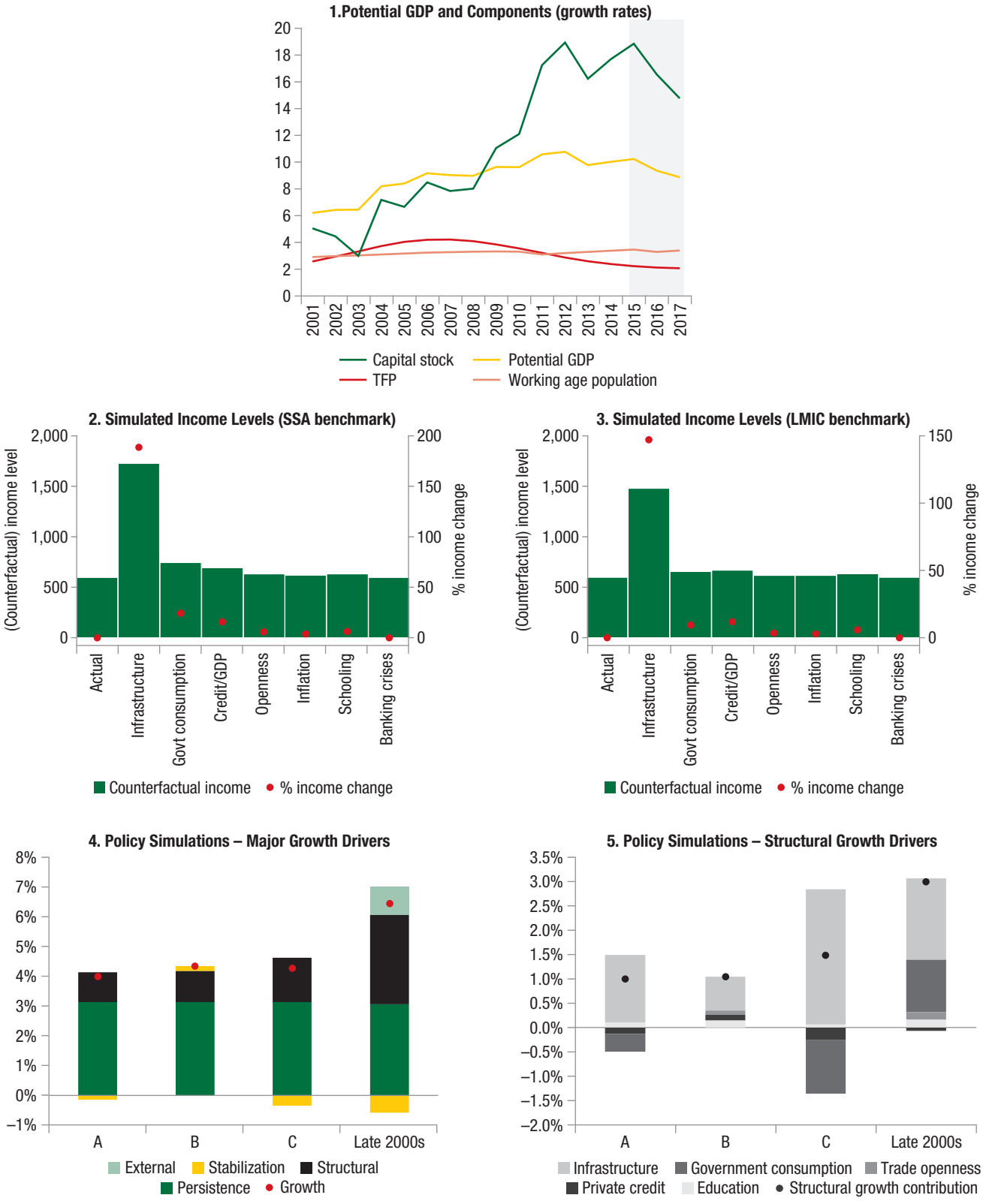
First, projections of potential GDP growth indicate a slowdown in the medium term on account of declining TFP growth. Figure 6.1.1 presents the historical trend and projections for potential GDP growth since 2001. Potential GDP growth is computed as a function of changes in the capital stock, labor force and total factor productivity along the lines of the Solow decomposition presented in Chapter 1. Potential GDP growth increased from 6.8 percent in 2001 to 9.7 percent in 2010. It subsequently declined to 9.0 percent in 2014 and is expected to decline further in the 2015–17 projection period. Capital growth has been exceptionally high the past years and is thus likely to slow down. A rising working age population provides some growth impetus, but total factor productivity growth will be hard to sustain at its current high levels. Since TFP growth (estimated using an HP filter for 1970–2012) was exceptionally high during the growth acceleration, this would suggest gradually declining TFP growth going forward (owing to the assumed mean reverting process of TFP growth).

A specific cyclical factor relates to the ongoing construction boom. A decomposition of recent GDP growth reveals that the contribution of construction has averaged about 20 percent the past 3 years (2011/12–2013/14) compared to an average of just 5 percent in the eight years prior. International experience suggest that construction booms are cyclical phenomena. As demand for housing and office space rises, construction activity with medium term gestation periods starts gradually rising to augment the supply. However, this process often overshoots leading to excess supply followed by declining prices. Lower prices, in turn, puts a halt to construction activity. A key unanswered question is what drove the unprecedented construction boom over the past three years in Ethiopia? Of particular interest is whether it was public or privately driven. Estimates from 2005 suggest that about half of construction value added is private and half is public (PSD Hub, 2010). If these shares are approximately correct also today, then the growth rate may fall by one percentage points once the private construction boom comes to an end. The public part of construction will continue as long as there is a sustainable policy in place to support public infrastructure investment.

6.5 Benchmarking

We return now to the cross-country regression model introduced in Chapter 3. The model can be used as a tool to gain further insights about economic

FIGURE 6.1: Potential GDP Projection, Results of Benchmarking and Policy Simulations



Source: Author's calculations.

TABLE 6.1: Benchmarking Structural, Stabilization and External Factors (2006–10 data)

		Lower Middle Income Countries				SSA
Variable	**Ethiopia**	**25%**	**Median**	**Average**	**75%**	**90%**
Real GDP per capita (PPP), US$	599.3	1,443.3	2,257.4	2,247.3	3,575.6	7,389.2
Real Exchange Rate	39.7	40.0	47.7	49.2	60.2	40.7
Secondary enrolment (gross, %)	32.8	42.2	55.0	54.9	82.1	86.0
Private sector credit (% of GDP)	20.1	14.1	25.9	23.6	36.7	44.5
Trade openness	0.2	–0.2	0.1	0.1	0.3	0.4
Gov. consumption (% of GDP)	9.1	7.9	11.0	12.3	19.5	6.4
CPI Inflation (annual, %)	18.4	6.0	8.8	8.7	12.0	4.3
Telephone Lines (per person)	1.1	1.3	4.0	3.4	8.8	7.0
Mobile phones (subscriptions)	3.7	30.0	44.5	40.0	57.1	78.0
Roads	0.5	1.6	2.9	2.6	4.1	6.2
Banking crisis (0=no; 1=yes)	0	0	0	0	0	0
Polity2 (governance variable)	12.0	8.0	14.5	11.1	19.0	19.0

Note that the best performing country depends on the variable in question. The 75th percentile is generally the 'best performer' for LMICs, however, for some variables that have a negative impact on growth it is the 25th percentile (exchange rate, government consumption, banking crisis and inflation). To facilitate interpretation we have underlined the relevant benchmark. Source: Authors' calculation based on main data set.

growth going forward. In this section we analyze the impact of changing each policy variable at a time holding all other variables constant. In the subsequent section, we vary several policies at a time.

Which policies would bring Ethiopia the Biggest Bang for the Birr? We address this question by simulating alternative values for the explanatory variables in the model—one by one. Specifically, we benchmark Ethiopia against Sub-Saharan African (SSA) and Lower-Middle Income (LMIC) peers. We use the 90th percentile of best-performing SSA countries (in each of the respective variables), and the 75th percentile of best-performing lower-middle income countries. These benchmark values are depicted in Table 6.1. LMICs have a real GDP per capita between US$981 and 4,526 (PPP) in the Late 2000s period in our data set, compared to US$599 in Ethiopia. We note that these benchmarks are ambitious, but they are chosen to better highlight the effects of benchmarking.

Despite recent progress on some fronts, Ethiopia still lags behind on various aspects that are important for growth. For example, while our analysis shows that infrastructure improvements have been important for economic growth, this does not mean that Ethiopia's infrastructure level does not lag behind and would not require further improvements. In fact, as shown in Table 6.1, the gap in infrastructure between Ethiopia and benchmark countries from Sub-Saharan Africa and with lower-middle income status is still substantial. The same is true for secondary education, inflation, and financial intermediation. Compared to the median of low-middle income countries and the best performers of SSA, Ethiopia also underperforms on institutions.

The most important gaps to close are not necessarily the largest ones, but the ones that matter the most for raising the growth rate. As our econometric model implies, some reforms will have a higher impact on growth than others. Our goal is thus to identify those gaps which will bring Ethiopia the 'biggest bang for the birr' by closing them. Building on the approach by Araujo et al. (2014), the underlying idea is that progress in areas where gaps are large is easier to achieve and should receive relatively more

policy attention, while this should be balanced against the potential payoffs in terms of income gains. The results are depicted in Figure 6.1, showing the (counterfactual) GDP per capita levels if Ethiopia reached variable levels of the SSA (Figure 6.1.2) or LMIC benchmark (Figure 6.1.3) for a given explanatory variable. For infrastructure, we take the average effect of roads, telephone lines, and mobile phone subscriptions. We calculate the counterfactual income by the period 2021–2025 assuming that Ethiopia closed its gap today.[46]

Continued infrastructure improvements offer the single best growth prospect for Ethiopia, according to benchmarking. This result is partly the product of a substantial existing infrastructure gap and partly because of the high economic returns to infrastructure. The simulated improvements imply that Ethiopia would have to achieve the same road coverage as Gabon (SSA) or Cote d'Ivoire (LMIC) or the mobile phone coverage similar to Mauritius (SSA) or Mauritania (LMIC). Conversely, the estimated growth effects of education and trade openness are relatively small.

Increasing credit to the private sector and addressing macroeconomic imbalances also offer important growth dividend. If Ethiopia reached the level of financial development (private credit to GDP) as Zimbabwe (SSA) or Bolivia (LMIC), its simulated income level would be 15.1 or 11.7 percent higher, respectively. Considering that Ethiopia also lags considerably behind in terms of price stability (inflation), this suggests that improvements in the country's macro framework would potentially provide further income gains.

Certain caveats should be kept in mind concerning these results. The outcomes of this exercise should not be interpreted mechanically, i.e. simply catching up with LMIC or SSA benchmark countries in terms of infrastructure will not bring per capita income to a threefold level. For starters, this exercise does not take into account other effects (such as external conditions). Furthermore, the nature of our model makes it more difficult to correctly identify some parameters compared to others. This concerns especially the relevance of governance, which is usually not very time-varying and thus hard to estimate in fixed-effects models (which offer other advantages). Furthermore, human capital effects are usually difficult to estimate in growth regressions. Finally, changes in a single policy variable would have to be traded-off with changes in other variables—a point we seek to address in the subsequent section.

6.6 Scenario Analysis

In this section, we use our model to gain further insights about the future of Ethiopia's growth. Specifically, we articulate three illustrative policy scenarios and assess their growth implications. Compared with benchmarking, this approach has the advantage of incorporating trade-offs involved in changing multiple policy variables simultaneously. The exercise has important methodological limitations implying that great care must be taken when interpreting results. Still, the simulations offer sufficiently meaningful insights about the future path of Ethiopia's growth and the sources of growth under alternative policies.

The three policy scenarios share a number of key background characteristics. We use Early 2010s data as the base values and project one decade ahead for the Early 2020s. This is done to facilitate an evaluation of Ethiopia's goal of reaching middle income status by 2025. For the external sector, we assume unchanged commodity export prices and terms of trade. Similarly, we do not expect institutional changes or the occurrence of a banking crises. Note that these baseline assumptions, together with the persistence effect of previous-period reforms, lead to a per capita growth rate of 3.1 percent. The individual scenarios are described below and summarized in Table 6.2 while Table 6.3 offer detailed results. (The results are also illustrated in Figure 6.1.5–6).

Scenario A: 'If it ain't broken why fix it?' This question is legitimate since Ethiopia's growth strategy

[46] Note that an improvement today will not only have an impact in the same period but also in future periods via the lagged dependent variable.

TABLE 6.2: Assumed Annual Growth Rates of Policy Variables by Scenario (percent)

	Late 2000s		Early 2020s					
	Base value		A. Business as Usual		B. Private Sector Reform		C. Accelerated Public Investment	
	2000s Δ%	Level	Δ%	Level	Δ%	Level	Δ%	Level
Structural:								
Δln(schooling)	6.4	32.8	3.3	45.4	4.5	51.1	2.0	40.0
Δln(credit/GDP)	–1.3	20.1	–1.3	17.7	1.3	22.8	–2.5	15.6
Δln(trade open)	2.0	0.2	0.0	0.2	0.7	0.21	0.0	0.2
Δln(govt C)	–4.0	9.1	1.0	10.1	0.0	9.1	3.0	12.2
Δln(tele lines)	7.2	1.1	7.2	2.2	3.6	1.6	14.4	4.2
Stabilization:								
Δln(inflation)	5.2	18.4	0.0	18.4	–10.0	6.4	4.0	27.2
Δln(exch rate)	1.6	39.7	1.6	46.5	0.0	39.7	3.2	54.4

Note: The assumed percent changes do not imply that underlying percentage values change by the depicted percentage points, but by the percentage. To illustrate, a 4 percent increase of an inflation rate of 10 percent leads to an inflation rate of 10.4 percent, not 14 percent.

has delivered an unprecedented growth acceleration over the past decade. This is the spirit behind scenario A: 'Business as usual'. To sketch this scenario, we assume continued public infrastructure investments and improvements in education that are in line with developments observed over the last decade. Public investment projects come at the cost of private sector crowding-out in the credit market, the buildup of inflationary pressures due to supply constraints, and, a policy of continued real exchange rate appreciation (to keep capital imports cheap). Public consumption increases in this scenario for the purpose of (imperfectly) capturing the growth drag of accumulating public debt to finance infrastructure investments (see Loayza et al. 2005).

Scenario B: 'The strategy of the past may not bring growth in the future'. It is equally legitimate to ask whether the current growth strategy needs to be adjusted today to enable it to deliver tomorrow. Scenario B simulates a reform which aims to promote accelerated private sector investment and reduce macroeconomic imbalances. Specifically, the pace of public infrastructure investment slows down but is partially substituted by private sector involvement, reflected in a modest increase in infrastructure and unchanged government consumption (implying no additional growth drag from public debt). Increased fiscal space is used to finance an expansion in secondary education, which would then approach current average LMIC secondary enrollment rates in the Early 2020s.[47] Increased private sector development is facilitated by an increase in private credit to GDP, which would then be slightly below the current LMIC average in the Early 2020s. Macroeconomic stabilization leads to a decline of inflation, a realignment of the exchange rate,[48] and more trade openness which reflects increased competitiveness from the exchange rate and private sector development.

Scenario C: 'If it worked so well the past, let's do more of it in the future'. Scenario C represents

[47] World Bank (2013) identifies additional resources as a key determinant of expansion of secondary education. The assumed values for education expansion in the 3 scenarios benefitted from input from Bank education specialists.

[48] We assume an unchanged exchange rate in this scenario, as the exchange rate is currently overvalued but due to a Balassa-Samuelson effect (assumed in all scenarios), an appreciation of the exchange rate is expected in developing economies. The scenario thus assumes that those two effects cancel each other out.

TABLE 6.3: Illustrative Scenarios and Growth Projections until Early 2020s

		Scenario A: Business as Usual		Scenario B: Private Sector Reform		Scenario C: Accelerated Public Investment	
	Parameter	Change	Predicted effect	Change	Predicted effect	Change	Predicted effect
Persistence	**0.786**	**0.045**	**3.14%**	**0.045**	**3.14%**	**0.045**	**3.14%**
Structural:			**1.00%**		**1.05%**		**1.49%**
Δln(schooling)	0.023	0.033	0.11%	0.045	0.14%	0.020	0.06%
Δln(credit/GDP)	0.072	–0.005	–0.13%	0.013	0.13%	–0.020	–0.25%
Δln(trade)	0.082	0.000	0.00%	0.007	0.08%	0.000	0.00%
Δln(govt C)	–0.266	0.020	–0.37%	0.000	0.00%	0.030	–1.11%
Δln(tele lines)	0.140	0.072	1.40%	0.030	0.70%	0.120	2.79%
Δln(institutions)	–0.002	0.000	0.00%	0.000	0.00%	0.000	0.00%
Stabilization:			**–0.14%**		**0.17%**		**–0.35%**
Δln(inflation)	–0.012	0.040	0.00%	–0.007	0.17%	0.080	–0.07%
Δln(exch rate)	–0.063	0.025	–0.14%	0.000	0.00%	0.030	–0.28%
Δln(bank crisis)	–0.040	0.000	0.00%	0.000	0.00%	0.000	0.00%
External:			**0.00%**		**0.00%**		**0.00%**
Δln(TOT change)	0.117	0.000	0.00%	0.000	0.00%	0.000	0.00%
Δln(commodity exp prices)	10.507	0.000	0.00%	0.000	0.00%	0.000	0.00%
Predicted average annual GDP per capita growth rate			**4.00%**		**4.35%**		**4.28%**

Source: Authors' calculation.

an accelerated public infrastructure investment scenario. While the direct growth benefits hereof are positive, as illustrated in the benchmarking exercise, this would need to be weighed against a number of growth-inhibiting factors, including private sector crowding-out, more detrimental effects from elevated public consumption and higher inflation, for the above mentioned reasons.

The three scenarios are highly illustrative and we do not claim a great degree of precision in their identification. The exact numerical specification of each of the scenarios is fraught with a number of difficulties. Chief amongst these is the lack of quantitative estimates of the policy trade-offs. To illustrate, we do not know with precision the functional relationship between the public infrastructure variable and the private credit-to-GDP ratio.[49] As a result, we do not claim internal consistency within each scenario nor do we pay great attention to the specific numerical results. With those caveats in mind, we find the following results.

All three policy scenarios yield comparable real GDP per capita growth rates of about 4 percent per year. While there are some nuances in the projected growth rate of each scenario, the differences are not

[49] We tried estimating these using the available cross-country data, but this did not produce meaningful results. Instead, the choice of specific numerical values were based largely on the historical values and relationships observed in Ethiopia complemented with LMIC benchmark values.

substantial enough to merit attention. A number of insights emerge from this exercise. First, none of the three policy scenarios stand out as superior to the others in terms of growth outcomes, suggesting that either the model has limitations in terms of policy guidance or that there are indeed alternative ways to reach the same outcome. Second, the simulations suggest that it will be challenging for Ethiopia to grow at a rate necessary to reach middle income status by 2025. Third, projected per capita growth of about 4 percent is nonetheless a strong performance in light of international experience. Finally, sensitivity analyses indicate a range of per capita growth outcomes in the interval of 3 to 6 percent per year in the three illustrative scenarios. We detail these points below.

All scenarios suggest that it will be challenging for Ethiopia to grow at a rate necessary for reaching middle income status by 2025. Calculations undertaken by the World Bank (2013) show that Ethiopia would need to grow by 10.7 percent per year until 2025 to reach middle income status, as measured by GNI per capita (Atlas Method). This would be equivalent to 8.0 percent real GDP per capita growth. Since the growth variable used here is log transformed, we note that the MIC target is equivalent to 6.5 percent per capita. None of the three policy scenarios come close to achieving this growth rate even under assumptions of a more supportive external environment.[50] The intuition behind this result is the presence of policy trade-offs in all scenarios: positive growth effects of high public infrastructure investment are outweighed by negative effects from public consumption increases, private credit and competitiveness. Moreover, where growth benefitted from low government consumption in the past, all three scenarios assume that this variable would have to rise (or stay constant) in the future reflecting a higher public debt burden. In all cases, public consumption is unlikely to fall further going forward, implying that Ethiopia cannot rely on this variable as a growth driver like in the past.

All scenarios, if realized, would nevertheless represent a remarkable growth performance for Ethiopia by historical and international standards. A per capita growth rate of 4 percent is clearly not as high as the 6.5 percent rate Ethiopia achieved in the Late 2000s. On the other hand, it is still one standard deviation higher than the global historical average since 1950 of 2 percent calculated by Summers and Pritchett (2014). It is also higher than any of the growth rates observed in Ethiopia in the post-WW2 period. Thus, in an international context, a slowdown in Ethiopia's per capita growth rate to 4 percent still represents a better-than-average long term growth performance.

Sensitivity analysis suggest that the range of projected future per capita growth rates lie in the interval between 3 and 6 percent.[51] The lower bound of this estimate is given by the persistence effect which adds about 3 percentage points to growth. While it is feasible to design scenarios with negative growth rates arising from set-backs in terms of banking crisis, institutions, the external environment or economic policy mix, we do not consider such scenarios realistic. The upper bound of about 6 percent, in turn, is derived by assuming away any policy trade-offs under the accelerated public investment scenario C.

6.7 Summary

We conclude by summarizing the insights of various approaches to aligning our expectations of Ethiopia's future growth. Table 6.4 presents an overview. First, international experience suggest a likely range of 2 to 8 percent per capita. Second, the historical experience since 1991 suggest a similar range. Third, simulation outcomes using our growth regression model suggests growth rates around 3½–4

[50] For example, an annual terms of trade improvement of 1.2 percent (similar to the historical average) would add only another 0.2 percentage points to the annual growth rate.

[51] The regression model allows for fairly flexible growth outcomes for Ethiopia within reasonable intervals. For instance, we derive a range of 0.43 to 10.6 percent per capita growth when every single variable grows at its least or most favorable pace observed over the last three 5-year intervals, respectively. Similarly, if we take the average of the median growth rate and the minimum or maximum over the same period, respectively, we get an interval of 3.7 to 8.8 percent for per capita growth.

TABLE 6.4: Summary of Growth Expectations for Ethiopia

	Real GDP Per Capita		Real GDP	
Approach	Lower bound	Upper bound	Lower bound	Upper bound
International experience	2.0	8.0	4.5	10.5
Historical (Ethiopia)	2.0	8.0	4.5	10.5
Simulations (outcome)	4.0	4.4	6.5	6.9
Simulations (sensitivity)	3.0	6.0	5.5	8.5
Overall	**2.0**	**8.0**	**4.5**	**10.5**

Note: Assuming population growth of 2.5 percent per year.

percent with more extreme assumptions increasing this range to 3 to 6 percent. When combined, these alternative approaches suggest a plausible overall range of between 2 and 8 percent per capita growth.

How does this range compare to other available long term growth projections for Ethiopia? Growth projections using a measure of 'economic complexity' fall within the lower bound of our proposed range. The decadal (2013–23) real GDP forecast of Harvard University for Ethiopia is 4.4 percent per year. The highest projection is made for India (7.9 percent) followed by a group of four East African countries (Uganda, Kenya, Malawi and Tanzania) in the 6.5–7.0 percent range. Ethiopia's growth rate was 27th of 124 countries. The authors use a measure economic complexity that captures the productive capabilities embedded in a country's exports (Hausmann, Hidalgo et al, 2014).

ETHIOPIA'S FINANCING CHOICE: PUBLIC INFRASTRUCTURE OR PRIVATE INVESTMENT?

7

To sustain high economic growth, Ethiopia faces a critical choice: Should it continue to direct the bulk of domestic financing towards infrastructure or should it allocate more to support private investment? We argue that since firms appear more constrained in credit than in infrastructure, it may be time to focus more on alleviating credit constraints. This view is supported by empirical estimates indicating relatively higher marginal returns to private investment in Ethiopia. A range of policy options are considered. Within Ethiopia's existing financial repression model, policy makers could simply avail more credit to the private sector thereby resembling more closely the Korean model. Another approach would be to initiate a process of interest rate liberalization, which would enhance the overall savings pool to the benefit of both infrastructure and private investment. Infrastructure investment is critical for growth, but it needs to be financed in a way that reduces trade-offs with private investment, which is equally critical for growth.

7.1 Introduction

Few policy choices are more critical and more contested in Ethiopia than the allocation of domestic credit to public infrastructure and private use. Ethiopia's system of financial repression and quantity rationing (as described in Chapter 2, Box 2.1) lends itself to a relatively straightforward question: Suppose you had an additional unit of saving or credit and you wished to get the highest growth return. Should you finance an infrastructure project, such as a road, or, should you channel it to finance the expansion of capacity in a private firm? The road project may crowd-in private sector activity if an infrastructure bottleneck is alleviated. At the same time, it denies access to credit of another firm that is ready to expand and create jobs. Striking the right balance is a delicate task and economic analysis can only take you so far. However, such analysis can give help policy makers think through the opportunity costs of financing infrastructure.

This chapter addresses the following questions: Is Ethiopia's current level of public infrastructure investment optimal vis-à-vis private investment? What are the marginal returns to public infrastructure and private investment in Ethiopia? What is the biggest constraint for Ethiopian firms: credit or infrastructure? What domestic finance reform options are relevant for Ethiopia if the objective is the enhance finance to the private sector? If infrastructure remains so important for future growth, then how else can it be financed?

The chapter is structured as follows: Section 7.2 estimates the marginal return to public infrastructure and private investment. Section 7.3 examines briefly examines the constraints faced by firms. Section 7.4 explores options for making more credit available to the private sector. Section 7.5 explores alternative options for financing infrastructure.

7.2 Is Ethiopia's Current Level of Public Infrastructure Investment Optimal?[52]

We begin by stressing the importance of infrastructure development for Ethiopia's growth. A key result from our regression model in Chapters 3 and 6 is that infrastructure has driven economic growth in the past and must continue to be an important driver of growth in the future. This is because of the high economic

[52] This section presents the key findings of a research paper prepared Eden and Kraay (2014a) and discusses its application to Ethiopia. Interested readers are encouraged to consult this work for further technical details of the underlying theoretical and empirical models.

returns to infrastructure and the fact that Ethiopia's infrastructure deficit is one of the largest in the world. So when we ask the question of whether the current level of public investment in infrastructure is optimal, this is not a question of whether we need more infrastructure or not. Clearly, in the long run, we need much more. The problem, however, arises when there is a financing constraint. Especially, when financing infrastructure imposes a trade-off via domestic credit markets to private investment financing. So to phrase the question more carefully: is Ethiopia's current level of public infrastructure investment optimal compared to the current level of private investment? To address this question we draw upon a comprehensive theoretical and empirical analysis contained in the background papers prepared for this report by Eden and Kraay (2014ab) and Eden (2015b).

The recent surge in public investment in Ethiopia has prompted renewed research interest regarding the optimal scope of public investment. It gives rise to the question of whether Ethiopia is investing too much in public capital, or whether other developing countries investing too little. The work by Eden and Kraay (2014a) suggests that both questions can be answered affirmatively: the vast majority of low income countries are investing too little in public capital. However, it is likely that Ethiopia may be over-investing in public capital relative to the optimal level, which also takes into account the marginal returns to private investment.

An important aspect of this debate relates to the potential spillovers from public investment to private investment. Part of the benefits of public investment may come from raising the productivity of private investment. However, public investment may also crowd out private investment, either by reducing the supply of savings or by directly substituting for private enterprises. While the relationship between public and private investment is important for determining the optimal scope of public investment, the relationship is more nuanced than simply crowding in vs. crowding out, which has tended to dominate policy discussions in Ethiopia.

Consider an example in which public and private capital are perfect substitutes. In this case, public capital will always crowd out private capital. However, this does not necessarily mean that public investment is undesirable, since it may be more productive than private capital because of some comparative advantage that the government has relative to the private sector (for example, the government may have a comparative advantage in providing security through the police rather than private security services). Similarly, consider a case in which public investment fully complements or crowds-in private investment. This does not necessarily mean that more public investment is desirable, since there is an optimal level of investment (both public and private), which depends on the cost of financing.

From a policy perspective, the right question is whether the returns to public investment exceed the costs of financing. Optimality requires that the return to public investment is equated with the interest rate, and this is true regardless of the effect of public investment on private investment. In Ethiopia, the supply of credit may be effectively fixed: the economy is relatively closed and the external borrowing constraint of the government is somewhat binding. Under a binding credit constraint, the government can be thought of as jointly choosing the bundle of public and private investment, subject to an external credit constraint. This is because the choice to increase public investment corresponds to a reduction in private investment through the increased availability of credit for the private sector (i.e. the oft-cited crowding-out effect in Ethiopia).

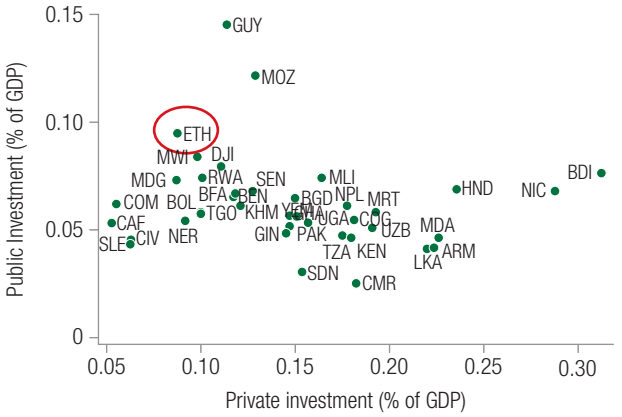
When a theoretical model is developed, it emerges that the marginal product of public capital should equal the marginal product of private capital, in the optimum. To shed more light on whether public investment levels are optimal in Ethiopia, we use a theoretical model for that is adequately calibrated with data relevant for Ethiopia. The parameters of the model presented in Annex A7.1 were calibrated using empirical estimates of (a) the extent to which public investment increases private investment, and

(b) the extent to which public investment increases output. Estimates were derived from a sample of 39 IDA-eligible low-income countries using a small open economy framework.[53] Intuitively, the response of private investment is informative regarding the degree of substitutability between public and private investment (σ): if they are more substitutable, public investment will have a larger crowding out effect on private investment (or a lower crowding in effect). Similarly, the higher the estimate for the relative productivity of public investment (γ), the larger is the first-order effect on output. It turns out that the parameters σ and are jointly determined by the equilibrium responses of private investment and output.

To estimate the effect of public investment on private investment and output, the exogenous variation from predetermined disbursement of loans from official creditors is exploited. Empirically, focusing on changes in public investment induced by predetermined disbursement of official loans is useful for establishing a causal relationship, because it abstracts from changes in public investment that are either (a) responses to changes in private investment, or (b) responses to changes in the economic environment that affect both public and private investment. Using the predetermined disbursement as an instrument for public investment, two variables are estimated: the marginal increase in private investment induced by a change in public investment (β), and, the marginal increase in output induced by a change in public investment ($\beta\gamma$). Data on predicted disbursements of loans from official creditors is taken directly from Kraay (2013), while GDP and investment data is from the World Bank and the IMF, respectively, and originally based on national sources.

Ethiopia stands out among low income countries for having a relatively high public investment rate and a relatively low private investment rate. Figure 7.1 plots the average investment ratios for the 1980–2012 period. Public investment rates vary widely across countries ranging from as low as 2.5 percent of GDP in Cameroon to nearly 15 percent in Guyana. There is also a weak correlation across

FIGURE 7.1: Public and Private Investment in Low Income Countries (1980–2012)



Source: Eden and Kraay (2014a).

countries with countries with higher public investment rates also having lower private investment rates.

The empirical analysis finds general evidence of 'crowding-in' of public investment among low-income countries. The main regression results derived in Eden and Kraay (2014) are summarized in Annex 7.2. On average, an extra dollar of public investment raises private investment by roughly two dollars and output by 1.5 dollars. These results are derived from a two-stage least squares estimates and subjected to various sensitivity tests. The calibrations show a strong degree of complementarity between public and private capital. However, while the estimates are positive, the analysis produces large standard errors. The 95 percent confidence intervals are large in both cases. For that reason, it is important to consider a wider range of the parameter estimates in the calibration of the model beyond the point estimates.

The estimated marginal returns of public investment in Ethiopia are among the lowest observed in low income countries. We define 'the excess return' as the marginal impact of public investment on output less the sum of the interest rate and the rate of depreciation. In this exercise,

[53] This assumption is appropriate for most countries in the sample, although it is somewhat less appropriate in the case of Ethiopia.

TABLE 7.1: Estimated Excess Returns of Public Investment

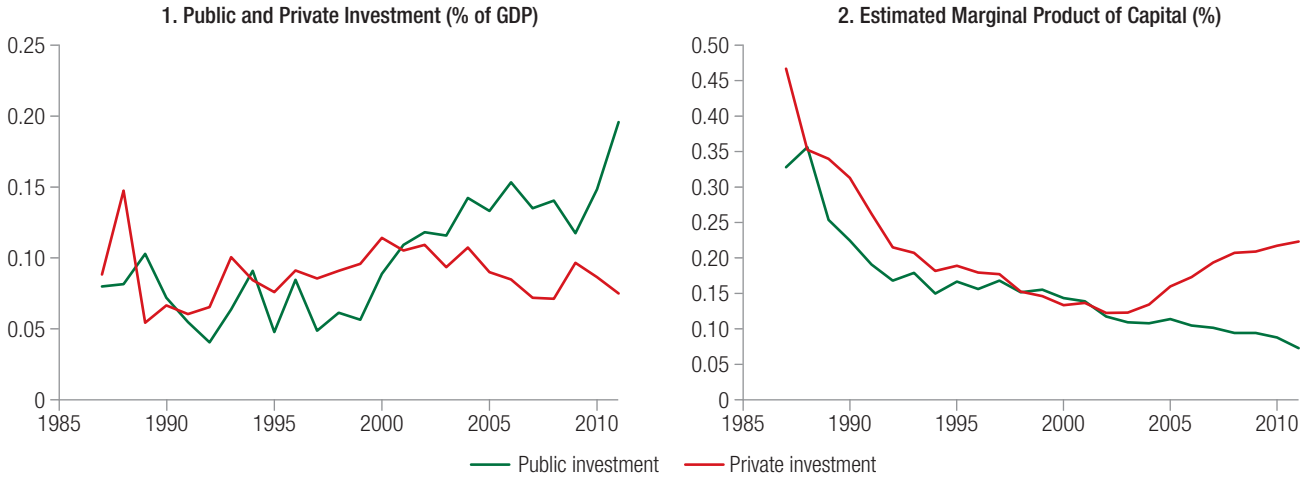
Rank	Country	λ (ratio of private and public investment)	Excess returns (%)	Rank	Country	λ (ratio of private and public investment)	Excess returns (%)
1	Cameroon	7.31	1074.88				
2	Sri Lanka	5.39	506.36	21	Mali	2.22	47.16
3	Armenia	5.39	505.51	22	Cambodia	1.96	31.51
4	Sudan	5.13	448.69	23	Senegal	1.87	26.78
5	Moldova	4.91	401.68	24	Benin	1.78	22.32
6	Nicaragua	4.24	277.37	25	Burkina Faso	1.77	21.83
7	Burundi	4.09	253.29	26	Togo	1.75	20.96
8	Kenya	3.85	216.11	27	Bolivia	1.73	19.79
9	Uzbekistan	3.75	202.69	28	Niger	1.68	17.61
10	Tanzania	3.70	194.92	29	Sierra Leone	1.43	7.71
11	Honduras	3.43	160.52	30	Djibouti	1.39	6.38
12	Congo	3.32	147.06	31	Côte d'Ivoire	1.38	5.83
13	Mauritania	3.32	146.60	32	Rwanda	1.35	5.00
14	Guinea	3.00	112.08	33	Madagascar	1.19	0.26
15	Uganda	2.95	107.07	34	Malawi	1.17	–0.36
16	Nepal	2.90	102.38	35	Mozambique	1.06	–3.11
17	Pakistan	2.85	97.66	36	CAR	0.99	–4.64
18	Ghana	2.70	83.42	37	**Ethiopia**	**0.92**	–5.93
19	Yemen	2.61	76.37	38	Comoros	0.88	–6.59
20	Bangladesh	2.33	54.61	39	Guyana	0.78	–8.28

Note: β =2 and βy=1.5 World Bank data for public and private investment. Source: Eden and Kraay (2014).

a 3 percent interest rate and a 10 percent depreciation rate is used. For most low income countries in the 39 country sample, the excess returns to public investment fall in the range between 5 and 170 percent, as illustrated in Table 7.1. However, for some countries that already have high public investment rates, the return to further investment is below the world interest rate (implying negative excess returns). The excess return public investment in Ethiopia is estimated at –5.93 percent and the ratio of private to public investment is 0.92.

The empirical analysis further indicates that Ethiopia's growth performance could benefit from increasing its private capital stock by 12–20 percent relative to the current size of the public capital stock. This result is derived by comparing the optimal ratio of private to public capital of 1.18 derived in Annex A7.1.3 with alternative estimates of Ethiopia's actual ratio of private to public capital from two different data sources. In the first approach, World Bank data for public and private investment is used as a proxy resulting in an actual private to public capital ratio of 0.92 (Table 7.1). Using the formulas of the theoretical model, it can be concluded that the public capital stock is 12 percent too high in Ethiopia. The second approach uses the Penn World Tables (PWT) estimates of public and private capital stocks for Ethiopia and yields a private to public capital ratio

FIGURE 7.2: Ethiopia: Public and Private Investment and their Returns



Note: Figure 7.2.1 uses World Bank data. Figure 7.2.1 uses PWT data. Source: Eden and Kraay (2014).

of 0.75, which (using the relevant formula) suggest that the stock of public capital is 20 percent 'too high'.

The results reflect the fact that the marginal product of private capital is substantially higher than public capital in Ethiopia. Figure 7.2 supports the intuition behind these results. Since the early 2000s, the public investment rate in Ethiopia has soared, while private investment gradually declined (Figure 7.2.1). Using the estimated production function, the marginal product of public and private capital can be computed using PWT data. The marginal product reflects the effect on production from a one dollar increase in either form of capital expressed in percent. Figure 7.2.2 reveals that marginal products of public and private capital were roughly equalized in the 1987–2003 period, implying that an adequate balance was struck between public and private investment. Starting in 2004, as the Ethiopian economy took off, the marginal product of private capital increased substantially, while the marginal product of public capital continued to decline. In 2011, the marginal product of private investment was 22.5 percent compared to the marginal product of public investment of 7.5 percent.

Similar results can be obtained from a methodology that relies only on Ethiopia data. Eden (2015b) shows that if the rate of return on private capital is greater than 3 percent, then the marginal return to public investment is lower than the marginal return to private investment. The approach builds on the methodology developed in Caselli and Feyrer (2007), which decomposes national income into labor and capital income. Given an assumption on the private rate of return to investment, capital income can be decomposed into income attributed to private capital and income attributed to public capital. A higher assumed rate of return on private capital implies a lower estimated rate of return to public capital. The advantage of this approach is that it measures the returns to public investment without relying on cross-country analysis. The disadvantage is that the results are sensitive to assumptions regarding the labor income share, which is assumed to be 0.67 (as in countries comparable to Ethiopia).

7.3 Firm-level Constraints: Infrastructure or Credit?

Firms depend on a range of high quality inputs to be competitive. Macroeconomic and political stability together with a conducive business environment are some of the basic ingredients. Firms also become

TABLE 7.2: Most Binding Constraints to Doing Business in Ethiopia, Various Rankings

	Enterprise Survey 2011	Consultations on National Business Agenda 2015	Doing Business 2015	Global Competitiveness Index 2014–2015 Constraints	Non-Farm Enterprises 2013/14	Large and Medium Scale Manufacturing 2012/13
1.	**Credit**	Taxes	Starting a business	Government Bureaucracy	Access to markets	Raw materials
2.	Land	**Credit**	**Credit**	Foreign exchange	**Credit**	Access to markets
3.	*Energy*	Land	*Trade logistics*	**Credit**	*Trade logistics*	**Credit**
4.	Taxes	Energy	Protecting minority investors	Corruption	Taxes	*Energy*
5.	*Trade logistics*	Unfair competition	Registering property	*Energy*		

Source: World Bank Doing Business Report (2016); Global Competitiveness Report (2014 and 2015); National Business Agenda (2014); World Bank Enterprise Survey (2011); CSA LMSMI (2012/13); GHS (2013/14). Note: Language has been harmonized across surveys for ease of comparability. Credit in bold. Infrastructure underlined.

more productive with higher quality infrastructure such as roads, energy, telecom and water. In addition, firms rely on a range of financial services, including access to credit, foreign exchange and insurance. They also need a range of business services (accounting, auditing, financial advice) to thrive. At any point in time, one or several of these inputs will be the binding constraint that prevents a firm from growing or being competitive.

Ethiopian firms appear to be more constrained in terms of access to credit compared to infrastructure. Table 7.2 draws upon six different surveys which shed light on the constraints to doing business in Ethiopia from the perspective of firms. It is noteworthy that access to credit is mentioned as a greater concern or obstacle for doing business than infrastructure (energy and trade logistics) across all six surveys. Additional infrastructure investment may also only address firm needs partially. Good trade logistics outcomes is a function of 'hardware' (roads and rail), but also importantly of 'software' (e.g. customs procedures). Reliable energy supply for firms depends not just on total energy generation capacity, but also on investments and rehabilitation of the existing distribution network and the establishment of dedicated power lines to industrial parks.

In Ethiopia, firms that are fully credit constrained exhibit poorer performance and productivity. According to World Bank (2014), firms in Ethiopia are more likely to be fully credit constrained than global comparators, including SSA countries. Nearly half of firms in Ethiopia are fully credit constrained.[54] For firms, being credit constrained means poorer performance and less productivity. In Ethiopia, a credit constrained firm has 15 percentage points lower sales growth, 5 percentage points lower employment growth, and 11 percentage points lower labor productivity growth than firms who are not credit constrained. Instead, investment decisions of manufacturing and services firms in Ethiopia are heavily dependent on cash flows.

This is indicative that the economy would benefit from a shift of domestic credit towards private firms. If the ultimate purpose of government policy

[54] Fully credit constrained firms are those without external financing and which were either rejected for a loan or did not apply even though they needed additional capital. It should be noted that credit constraints can be a function of both lack of overall credit in the system, and, a reflection of firm characteristics (some firms are not credit worthy).

is to enhance the productivity of private firms, then it is important to understand what the firm level constraints are. If firms really need credit more than access to new roads or better telecommunication to grow and prosper, then government policy would need to support the alleviation of the credit constraint at the firm level. Since public infrastructure investment is partially financed via the same domestic savings pool, it is clear that infrastructure financing competes directly with the financing of private investment projects. In addition, there may be other factors affecting firm credit constraints, such as high collateral requirements, which the government can also seek to alleviate.

7.4 Domestic Finance Reform

The trade-off between financing public infrastructure versus private projects arises from the way in which the Ethiopian financial sector is designed. As explained in Chapter 2, key characteristics include: (1) below market-clearing interest rates; (2) market dominance by a state-owned bank, Commercial Bank of Ethiopia (CBE), which effectuates a policy of giving public investment projects the funding priority. In the economic literature, such a system is referred to as 'financial repression' (McKinnon, 1973; Shaw, 1973). The literature itself is divided on to whether financial repression is good or bad for economic growth as discussed in Box 7.1. In addition, it is important to note that the capital account is closed and that there are no foreign banks operating in the Ethiopian financial sector.

In this section we consider two policy reforms that could help alleviate the private sector credit constraint in Ethiopia. One policy reform would be to continue the existing system of financial repression, but to direct more credit towards private firms at the expense of public infrastructure projects.[55] Another policy reform involves a gradual move towards a more liberalized financial system in which interest rates reflect the demand and supply for savings/credit. The latter approach does not necessarily imply opening up the domestic banking sector to foreign competition nor does it require liberalization of the capital account. It is also noted that the two policy reforms analyzed here can be considered as pure extremes on a continuum of policies and that they can be mixed as needed. A shift towards more private sector credit within the existing financial repression model would see public investment fall by a similar magnitude. The deposit and lending rates of banks would remain unchanged. For simplicity of exposition it may be helpful to think of savings as being relatively unchanged, even if reality can be more complex.[56]

Financial repression with a strong private sector emphasis is a model that was effectively practiced by South Korea. Like Ethiopia, the South Korean government intervened extensively in the pricing and allocation of credit. Unlike Ethiopia, the Koreans directed the bulk of the credit towards priority private sector activities. 'Specifically, it ensured that priority sectors, mainly export-oriented industry such as steel, electronics, ship-building, automobile manufacturing etc., received preferential treatment as far as access to inexpensive bank credit was concerned' (Demetriades and Luntel, 2001). Private sector credit to GDP averaged around 30 percent in Korea in the 1970s compared to around 20 percent in Ethiopia today (Nguyen et al (2015). While Ethiopia also favors some priority private sector activities, particularly in manufacturing, the bulk of total domestic credit is currently directed towards public infrastructure projects. To truly emulate Korea in this aspect, Ethiopia would need to shift more of credit to priority private sectors.

Introducing a more liberalized financial sector with market-determined interest rate would be

[55] As more domestic credit is directed towards the private sector, it is particularly important to serve the small and medium enterprise (SME) segment. Ethiopia is characterized by a 'missing middle' phenomenon, whereby small enterprises are more credit constrained than either micro or medium/large enterprises. This represents a key challenge because typically young firms are a great source of job creation but this trend is not seen in Ethiopia, where more established firms dominate the net job creation, suggesting that there is a lack of competitiveness and innovation in the private sector (See World Bank, 2014, for details).

[56] In the theoretical model developed later, savings may change even if the interest rate does not because future consumption depends on the mix of public and private investment.

BOX 7.1: Literature Review: Does Financial Repression Inhibit or Facilitate Economic Growth?

Economists are divided on the impact of repressive financial policies on economic growth. A large number of studies identify possible mechanisms through which financial liberalization promotes growth, including facilitating financial development, improving allocative efficiency, inducing technological progress and enhancing financial stability (Shaw, 1973; Levine, Loayza and Beck, 2000). Many empirical analyses also confirm this positive correlation (Levine, 2005; Trew, 2006). Other studies, however, cast doubts on this relationship. Kose et al. (2009) find no clear-cut relationship between financial globalization and economic growth in a global dataset of emerging market economies. Stiglitz (2000) attributes increasing frequency of financial crisis during past decades to financial liberalization in the developing world. He argues that developing countries might be more able to manage money supply and financial stability under repressive financial policies.

While repressive financial policies would reduce economic efficiency, they might enable the authorities to better deal with problems of market failure and financial risks. This lead some authors to argue that this is essentially an empirical question, influenced by a list of factors such as conditions of financial institutions, markets, regulators and the government.

Case study analysis, especially of East Asian countries tend to be supportive some financial repression, especially at the early stages of development. In China, Huang and Wang (2011) find empirical evidence that repressive polices helped economic growth in the 1980s and 1990s thanks to the prudent liberalization approach. However, the effect turned negative in the 2000s as lending to the state sector, interest rate regulation and capital account controls constrained growth. Demetriades and Luintel (2001) develop a theoretical model which predicts a positive association between financial development and the degree of state control over the banking system and mild repression of lending rates. They use data from Korea to derive empirical findings that are consistent with this theoretical prediction. Ang (2009) studies the links between financial policies and private investment. In the case of Malaysia, high reserve and liquidity requirements exerted a positive influence on private investment. However, in the case of India, the effect was negative.

Recent cross-country panel regression results are largely supportive of financial sector reforms. A large body of literature suggests that a well-developed financial sector promotes economic growth (e.g. Levine, 2005). However, relatively few studies tries to assess the impact of financial sector reforms on economic growth. Bakaert, Havery, and Lundblad (2005) finds that foreign equity ownership increases growth. Quinn and Toyoda (2008) document that capital account liberalization is positively associated with growth. Prati et al. (2013) finds strong positive effects of financial sector reforms on growth. Finally, Cristiansen et al. (2013) find that domestic financial reforms are robustly associated with growth.

Some authors argue that a time series approach is more fruitful than a cross-section approach, though the use of instruments could potentially overcome this methodological criticism. Arestis and Demetriades (1997) worry that the question of causality cannot be satisfactorily addressed in a cross-section framework. Their criticism, in turn, has given rise to the series of cases studies mentioned above. They show uni-directional causality in Germany from financial development to real GDP, but insufficient evidence of such effects in the US, with abundant evidence of reverse causality. While modern econometrics has developed in recent decades, the problem of causality (or more generally, endogenity) continues to be a challenge in this sub-set of the cross-section / panel approach in this literature, which implies that it often refers to association rather than causality between variables. The work by Prati et al. (2013) represents an attempt to overcome this challenge as the authors use the Difference GMM estimator which relies on internal instruments in the form of lagged dependent variables.

Source: Author's compilation.

expected to induce higher savings. Through a gradual increase in the deposit interest rate, households and firms would find it relatively more attractive to use formal deposit accounts for their informal savings. The expected result would therefore be an increase in deposits. The ensuing competition between banks would drive up the deposit rates and attract savings. The magnitude of this increase depends on the elasticity of domestic savings with respect to the deposit rate. It would no longer be possible for the government to direct credit to the public infrastructure sector (neither via loans nor bond purchases).

The exact consequences of these two reforms are hard to predict with accuracy. Under interest rate liberalization, we would expect private investment to rise. The deposit rate would increase, attract more savings and there would be no targets for public infrastructure investment. Higher interest rates will

TABLE 7.3: Predicted Effects of Financial Sector Reforms

Predicted Effect	(1) Financial repression with more private credit	(2) Interest rate liberalization
Private investment	+	+
Public investment	–	?
Total investment	0	+
Savings	0	+
Financial repression revenue	–	– –
Tax revenue from private activity	+	+
Rents of savers	0	+
Public debt sustainability	0	–

improve the allocation of capital within the private sector as private projects with low returns will cease to demand credit, freeing up additional credit for more productive projects. What would happen to public investment under a more liberal model? Given higher borrowing cost, it is advisable to reduce public investment and finance a greater share of it from other sources, such as higher tax revenues. Finally, it is expected that total investment would rise given that total savings have increased. Table 7.3 summarizes the predicted effects.

The two policy reforms would have different implications for government finances and the surplus of savers. To begin with, it is important to realize that financial repression yields implicit government revenues, as documented by Giovanni and de Melo (1993). In Ethiopia, the revenue arises because government infrastructure spending can be financed at below-market interest rates giving rise to interest payment savings. Moreover, if credit is rationed in favor of infrastructure projects then government gets access to additional credit which it would not have had access to in a market-based system. On the other hand, both policy reforms support a much more dynamic private sector which would ultimately enhance the tax base and yield higher tax revenues. Which of the two effects dominate is ultimately an empirical question. In the 'financial repression with more private credit' reform, government would maintain some implicit revenue as interest rates are unchanged. However, implicit revenues would fall as less public projects are financed. Under the liberalization approach, government financial repression revenues would eventually disappear as interest rates approach their market-based levels. Finally, since financial repression involves a transfer of resources from savers to borrowers the effects differ under each reform. Financial repression continues to involve a resource transfer from savers, but now directed to private firms instead of government. Interest rate liberalization involves a transfer from government back to savers.

The effects on the sustainably of public debt can be challenging under a more liberalized system, while continued financial repression keeps this challenge at bay. It is important to be aware that current public debt levels are deemed sustainable under the assumption that real interest rates do not rise (IMF and World Bank, 2015). However, since interest rate liberalization implies a rise in the real interest rates, it is clear that there would be concerns about whether public debt can remain sustainable under a more market-based system of setting interest rates.

DSA simulations suggest that an increase in the real interest rate by 7 percent would make public debt unsustainable. The current baseline assumption of the DSA is a real interest rate of –5.7 percent. If the

real interest rate increases to a positive level of 1.3 percent then there would be a substantial and protracted breach of the PV Debt-to-GDP ratio in the baseline scenario. The associated increase in interest payments for the Federal Government and SOEs would be from 0.5 percent of GDP to 3.4 percent of GDP.

Given that each policy reform has pros and cons, neither of them is superior to the other. Policy makers that weigh in concerns about debt sustainability and find a gradualist approach to reform appealing would find financial repression with more private credit most attractive. On the other hand, policy makers concerned about Ethiopia's demonetization trends and who want to see a strong expansion of credit to the private sector would find liberalization more beneficial. If so, such an option would need to be combined with additional taxation of the private sector which would help address implicit government revenue losses and the challenges of public debt sustainability.

In theory, the policy choice should be informed by two criteria: the relative returns of public and private investment, and, the savings rate. Box 7.2 summarizes a simple partial equilibrium model developed by Eden (2015) specifically for the purposes of this study. The model provides a useful framework within which to analyze Ethiopia's current situation. In particular, it becomes clear that financial repression with more private emphasis becomes attractive in situations where the marginal return to private investment is much higher than the marginal return to public investment. Moreover, if the saving rate of the country is quite low, then the model suggests that welfare would enhance by increasing the deposit rate towards more market-determined levels as in the liberalization reform. Ultimately, which of the two constraints are more binding would be an empirical question.

The available empirical evidence suggests that Ethiopia has a challenge in both dimensions, implying that both types of reform would enhance welfare. First, as shown in Section 7.2, marginal returns to private investment appear higher than those of public investment. Second, as shown in Chapter 2, Ethiopia has experienced a demonetization trend over the past decade as reflected by a declining share of total credit to GDP. Given Ethiopia's preference for financial repression, the less radical reform may be to maintain this system, but to follow South Korea's footsteps and direct the bulk of the credit to the private sector.

7.5 Complementary Infrastructure Financing Options

Continued infrastructure development remains one of Ethiopia's best strategies to sustain growth, but the current financing model may not be sustainable. Infrastructure was the most important driver of economic growth during the growth acceleration. This is because the economic returns to infrastructure are high and the physical infrastructure expansion in Ethiopia was substantial. But infrastructure expansion was financed via a range of mechanisms that will begin to show their limits in the future.

Low domestic resources mobilization, including savings and tax revenue is a chief vulnerability. To overcome it and deliver high public infrastructure investment in the past, policy makers engaged in a series of creative financing mechanism. Going forward, inherit policy trade-offs will eventually catch up with this strategy. Public and external indebtedness are gradually rising as is the cost of financing and risks of debt distress. The lack of access to credit and foreign exchange of the private sector holds back an important driver of growth. An overvalued exchange rate hurts external competiveness. At some point one of these constraints will become binding and limit Ethiopia's ability to deliver public infrastructure with the current model. Going forward, Ethiopia needs more infrastructure, but it would need new mechanisms to finance it.

In this section we briefly review the range of alternative infrastructure financing options available to Ethiopian policy makers. In doing so we distinguish between policy proposals that are broadly in line with existing government strategy and thinking

BOX 7.2: A Theoretical Model of Financial Repression and Interest Rate liberalization[a]

A theoretical framework was developed to support the analysis of Ethiopia's financial sector reform options. This approach has the advantage of ensuring logical consistency of argument, clarifying the underlying assumptions while also yielding additional insights that may not be immediately intuitive. To illustrate the key ideas, we utilize the two period version of a more general model developed by Eden (2015) for this report. The main features of the model are described below.

The model has two periods and four agents: Households, firms, government and the government bank.

Output depends positively on private capital and infrastructure (as complementary inputs) and exhibits diminishing returns.

Private capital is produced by firms. They borrow from the government bank in the first period to finance capital in the second period and maximize profits given the borrowing interest rate and the returns to capital (which depend positively on infrastructure).

Supply of savings. Households receive income from firms and pay taxes. Utility is derived from consumption in both periods and is maximized taking into account the subjective discount rate and the deposit interest rate. In equilibrium, household savings depend positively on the deposit rate.

The government has four policy instruments: infrastructure, taxes, the policy deposit rate, and, the lending rate. The government objective is to maximize household welfare. It collects lump sum taxes in both periods and there is a cost associated with collecting taxes.

The model has three interest rates. The policy rate is an upper bound on the deposit rate faced by households. The deposit rate is the return on household saving and represent the borrowing cost to the government bank. Under financial repression, the policy rate is equal to the deposit rate. If there is no financial repression then the policy rate can be higher than the decentralized equilibrium rate. The borrowing rate is what firms pay to borrow and it represents a revenue for the government bank. The spread is equal to the borrowing rate less the deposit rate and is a net revenue for government.

The optimal policy consists of some financial repression because this reduces the costs associated with collecting taxes. The lower deposit interest rate (equal to the policy rate) associated with government debt allows the government to economize on tax collection costs, in both periods. In optimum, the marginal return to private capital is equal to the returns of infrastructure, net of the marginal costs associated with raising taxes (in period 2). The model abstracts away from costs associated with the collection of private debt. If these costs are equal to tax collection costs, then it is optimal to equalize the returns to government and private capital, as in Eden and Kraay (2014ab). Optimality requires that the marginal costs of taxation are also equalized across periods.

In optimum, the government sets a positive interest spread. Given the depressed deposit rate, the government can either ration credit to the private sector or set a spread so that the market for private credit clears. The latter alternative is superior because the spread generates revenues for the government without further distorting private investment. This allows the government to economize on costs associated with tax collection. Furthermore, the price mechanism guarantees that private credit is allocated to the private projects with the highest return. Credit rationing, on the other hand, requires some guess work regarding where are the highest-return projects: since the interest rate is depressed, inefficient projects may find it optimal to request financing. At a higher borrowing rate, only the more productive projects will be profitable.

Policy Scenario 1 (financial repression with more private credit) can be illustrated in the model by simulating alternative values of the government infrastructure variable. The properties of the theoretical model can be illustrated by assuming plausible functional forms, including Cobb Douglass production and utility functions and a quadratic tax collection cost function. Figure 1 illustrates the effect of alternative values of government infrastructure (k_g) on other variables in the model.

There is an optimum level of government infrastructure, k_g^*, namely the level that maximizes welfare. For $k_g < k_g^*$ there is insufficient crowding-in of infrastructure and production and consumption is too low. For $k_g > k_g^*$ infrastructure crowd-out private capital via the credit markets and this lowers production and consumption as well.

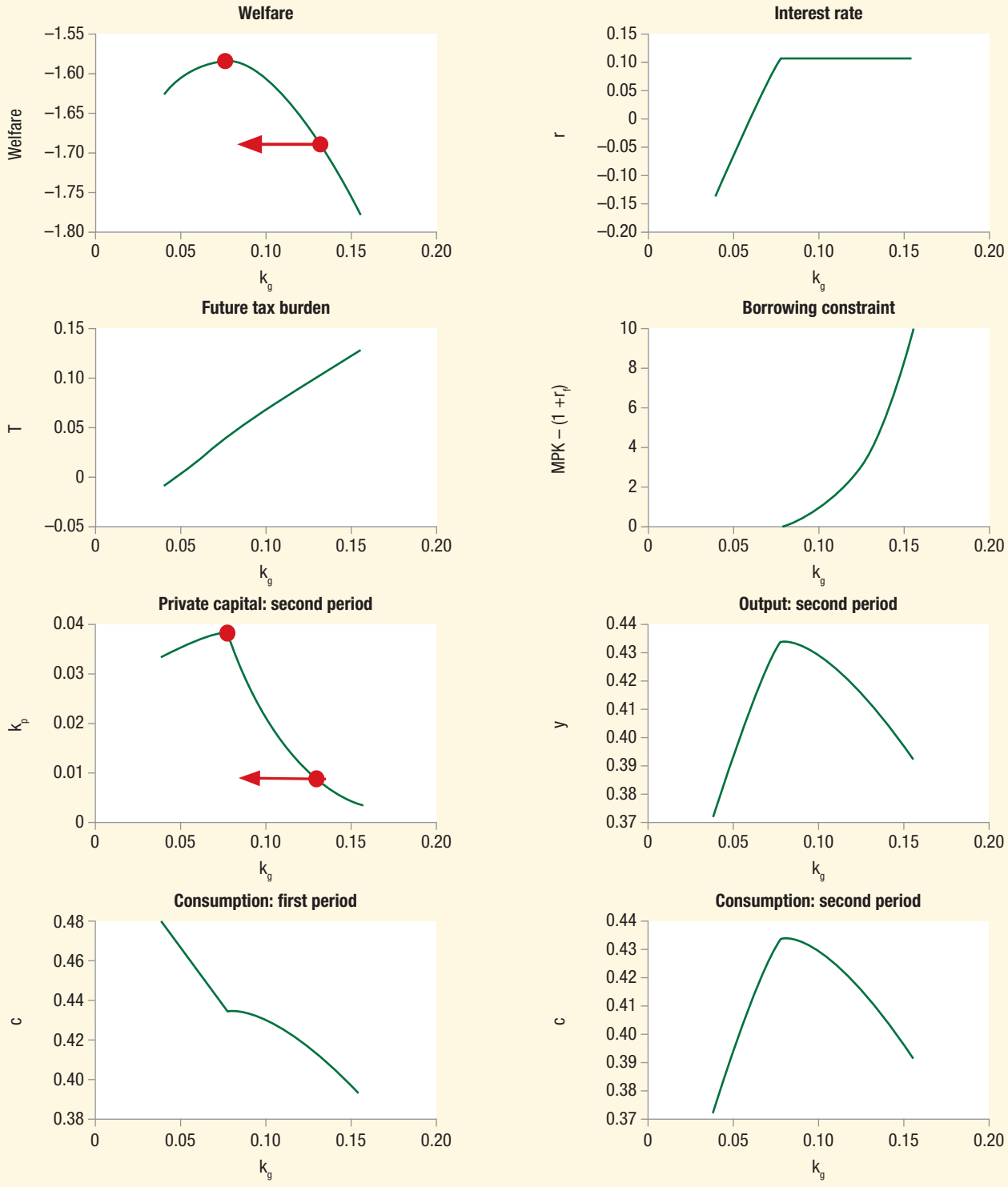
The following additional results hold: First, the future tax burden is rising in government infrastructure. Second, any decrease in government infrastructure will be compensated by a corresponding increase in private capital. Third, the deposit interest rate is rising in infrastructure up to the optimum, but unaffected thereafter.

An increase in private credit would be welfare enhancing if there is currently too much government infrastructure. In Figure 1, this situation can be illustrated by considering a situation where we are at a point to the right of optimum and reduce the level of government infrastructure investment. As also illustrate, this would result in an increase in private capital. As long as government infrastructure is not reduced too much, welfare is enhanced as more private capital can be invested. At the margin, additional private investment boosts production and consumption more than the resulting loss from lower infrastructure investment.

(continued on next page)

BOX 7.2: A Theoretical Model of Financial Repression and Interest rate liberalization[a] *(continued)*

FIGURE 7.3: Numerical Simulations with Alternative Values of Government Infrastructure



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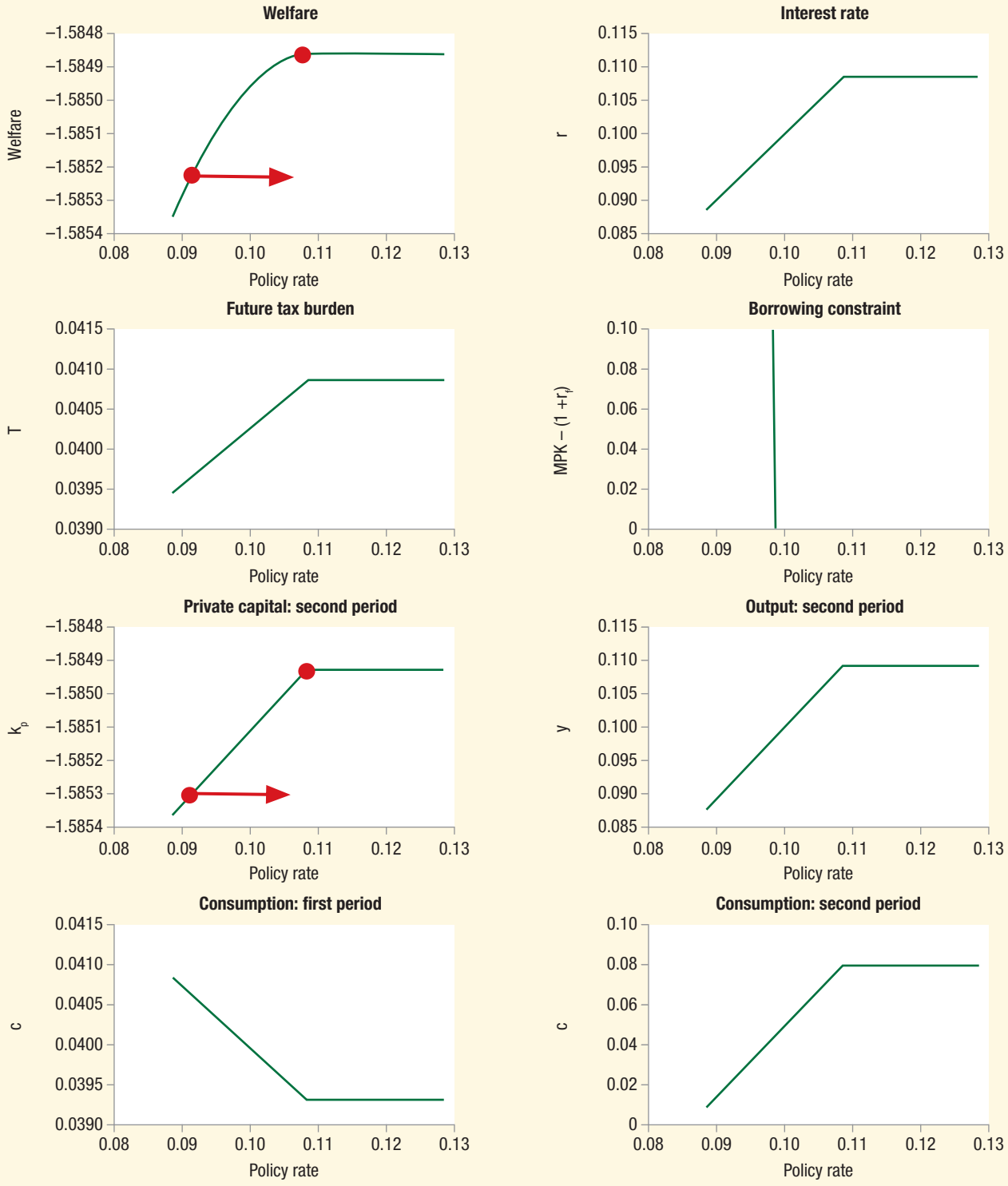
BOX 7.2: A Theoretical Model of Financial Repression and Interest rate liberalization[a] *(continued)*

FIGURE 7.4: Numerical Simulations with Alternative Values of the Deposit Rate



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BOX 7.2: A Theoretical Model of Financial Repression and Interest rate liberalization[a] *(continued)*

Policy Scenario 2 (interest rate liberalization) can be illustrated in the model by simulating alternative values of the deposit rate. Recall that the deposit rate is the return on household saving and represent the borrowing cost to the government bank.

There is an optimum level of the deposit rate, r*, namely the level that maximizes welfare. Consider very low levels of the deposit rate, say zero. As the policy rate increases so does the return to household savings. This encourages households to save rather than consume and the total pool of savings increases in the economy. However, since the government must pay the deposit rate to borrow from households, the borrowing cost to finance government infrastructure is rising. The first effect continues to dominate the second effect until welfare is maximized at the point indicated in the welfare graph below. Beyond this point, the deposit rate becomes ineffective as a policy tool as further increases in the rate are matched by additional savings which ultimately drives down the decentralized equilibrium rate, r, to its maximum level.

The following additional results hold: First, the future tax burden is rising in the deposit rate because higher taxes compensate for the increased borrowing cost of government. Second, private investment is rising in the deposit rate as more savings is made available to finance it.

Interest rate liberalization will be welfare enhancing if the deposit rate is currently too low. The larger deposit rate encourages household savings and enhances the amount of private investment that can be financed.

However, government revenues will decline. The government bank earns a revenue from the difference between the borrowing rate and the deposit rate. As the deposit rate rises, the spread diminishes, and eventually disappears.

[a] This Box summarizes the theoretical model developed by Eden (2015) for the purposes of this study.

and policy options which would require a change in policy and mind set. Table 7.4 refers.

Ethiopia's tax revenue-to-GDP ratio is low compared to peers and there is substantial scope for raising it further. At 14 percent of GDP, tax revenues in Ethiopia are on the low side. The country urgently needs a revenue-enhancing tax reform which broadens the base and increases the tax rates. Consistent with Ethiopia's lagging performance in terms of reforms, the last major tax reform can be traced back to 2002/03 when the sales tax was replaced by the Value Added Tax. In addition to concerns about low levels of tax collection, one may add the heavy reliance on foreign taxes, which account for almost a third of tax revenues. If Ethiopia decides to take forward additional trade reforms, then such revenues would gradually diminish. In light of the country's high appetite for public infrastructure investment, it is hard to justify the current low levels of revenues. Further analysis would be needed to identify concrete policy recommendations. That said, a good place to start could be through an examination and evaluation of existing tax incentives and subsidies, currently resulting in forgone tax revenues to the tune of 4 percent of GDP. Some of these so-called 'tax expenditures' may provide good value for money, while the costs of others may outweigh their benefits.

Increased involvement of the private sector in infrastructure provision and maintenance can help

TABLE 7.4: Alternative Infrastructure Financing Options

Consistent with current strategy and thinking	Options that would require a change in policy
1. Raising tax revenues	4. Increasing domestic savings and developing capital markets
2. Increasing private sector financing of infrastructure investments and maintenance	5. More selectivity and prioritization of investments
3. Improving public investment management	6. Securitization of infrastructure assets
	7. Improved pricing of infrastructure services, such as electricity

reduce financing requirements of the public sector. Ethiopia has made recent progress in this direction. The most prominent example is the 1,000MW, US$4 billion geothermal energy project at Corbetti, where a private foreign investor consortium will sell energy to the national grid according to a Power Purchasing Agreement (PPA). There have also been discussions about an oil pipeline project potentially financed by Black Rhino, although agreements are yet to be signed. Aside from direct provision of infrastructure, there are also recent examples of private user contributions in road projects, such as the Addis-Adama Toll Express Way. Ethiopia currently does not have a Public Private Partnership (PPP) Framework which prevents a holistic approach to addressing the challenge.[57] An important lesson from Corbetti is that ad hoc negotiated deals are not the way to go. PPPs or pure private solutions are important alternatives to public provision of infrastructure that must be kept in mind. If private finance is going to play a significant role then the government needs to be proactive and systematic in its approach. (Interested readers can consult IMF (2014) for further details).

Improved public investment management can help ensure that Ethiopia gets as much infrastructure for the public money that it spends. Since weakness in public investment management can negate the core argument that impressive rates of public investment are necessary for a country to sustain rapid economic growth, attention to the processes that govern project selection and management is critical. Encouragingly, Public Investment Management (PIM) in Ethiopia is better than expected given its level of development. An international comparison of PIM capacity across a sample of 71 poor and middle income countries conducted by the IMF and World Bank, places Ethiopia at the median, while it is the eleventh poorest countries in the world (Dabla-Norris et al. 2010). Of the four dimensions measured in the study, Ethiopia scores above the median in 'management' and 'appraisal', at the median in 'evaluation' and below the median in 'selection'. On the other hand, such indices may lack precision about individual countries, and must thus be interpreted with a great deal of caution and should not be a cause for complacency. To illustrate, Ethiopia continues to register significant time and cost overruns in some public infrastructure projects (see World Bank, 2013). A detailed country study of Ethiopia's PIM performance is currently not available. In all cases, further progress in all four dimensions of Ethiopia's PIM capacity would undoubtedly enhance the positive economic returns expected from publically financed projects. (See World Bank 2015 for more details on this topic).

Further resources could be raised through domestic savings mobilization and the eventual establishment of capital markets. The government has been actively aiming to raise domestic savings, among others through bank branch expansions. As documented in the Second Ethiopia Economic Update (World Bank, 2013), this policy has indeed had a demonstrable effect on domestic savings in the formal banking system. However, as shown in the same analysis, a key determinant of domestic savings is the real deposit interest rate. Since this rate is currently negative, households have strong incentives to channel monetary savings into informal savings mechanisms. A negative real interest rate is also a major obstacle for the development of a secondary market for treasury bills as investors would not earn a sufficient return for voluntary purchase of such assets. On the other hand, the negative real interest rate is a part of an overall financial repression strategy which yields other important benefits for government, including the cheap access to finance for public infrastructure investment.

Selectivity and prioritization in public investments. In theory, the Government should finance the projects with the highest expected economic return, but in practice such calculations are seldom available. Based on the limited information available, most public investment projects would potentially have an important positive long term impact on exports and

[57] The Government, together with the African Development Bank, is in the process of developing a PPP Framework and a PPP Unit.

growth. However, not all projects (whether infrastructure or productive) have an equally compelling merit of financing. Thus, to free overall resources for priority infrastructure investment, the government could reduce financing of marginal projects that do not have a demonstrable strong economic rationale.

Securitization of infrastructure assets is another potential source of public investment financing. Ethiopia has a series of prominent, successful, and profitable State Owned Enterprises, including Ethiopian Airlines, Ethio Telecom and Commercial Bank of Ethiopia. These enterprises are currently 100 percent owned by Government. Securitization refers to a process whereby a small share of these assets were sold to the general public. This approach has been successfully used in countries such as China and Colombia.

A final proposal include the cost-based pricing of infrastructure services, such as electricity. Households and firms currently pay energy tariffs that are below the cost of providing such services. At the same time, Ethiopia is investing billions of dollars in new energy generation. By charging more for energy services, consumers could help finance such energy investments. Moreover, raising tariffs would be a progressive policy, as it is the better-off households that have access to electricity and benefit from the implicit subsidy currently in place. (See World Bank 2015ab for more details).

In summary, this chapter has argued that to sustain high growth, Ethiopia needs to explore ways of financing private investment while also finding complementary ways of financing infrastructure. This is because both infrastructure investment and private investment are needed, as the experience of high-growth economies show. Ethiopia's financing choice currently has a clear bias in favor of public infrastructure investment. Infrastructure investment enhances the productivity of the private sector, but only when lack of infrastructure itself is constraining growth. Ethiopian firms appear to be more constrained in credit and empirical estimates suggest that, at the margin, credit could yield better growth returns in the private sector. This suggests some reduction in public infrastructure financing would be beneficial for long-term growth. To ensure continued support for infrastructure finance, this chapter presented a menu of policy options for consideration.

Annex 7.1 Public and Private Investment Model: The Model

Consider the following problem, in which the government takes the rental rate of capital as given and chooses public and private capital stocks, subject to a constraint on the total capital stock:

$$\max_{k_g,k_p} F\left(k_g,k_p\right)-r\left(k_g+k_p\right) \quad s.t. \quad k_g+k_p=I$$

Where F is a strictly positive, increasing production function, that has decreasing returns in both arguments, is the per capita public capital stock, is the per capita private capital stock, is the interest rate, and is the constraint on the total capital stock.

This simplified problem captures a static representation of the dynamic problem in Eden and Kraay (2014), in which the government maximizes welfare subject to a binding aggregate credit constraint. (In the dynamic setting, is pinned down as the sum of depreciated capital stocks and availability of credit). Substituting in the constraint, the optimization problem can be rewritten as:

$$\begin{aligned}&\max_{k_g} F\left(k_g,I-k_g\right)-r\left(k_g+I-k_g\right)\\&=\max_{k_g} F\left(k_g,I-k_g\right)-rI\end{aligned}$$

The first order conditions of this problem yields:

$$\frac{\partial F}{\partial k_g}=\frac{\partial F}{\partial k_p}$$

In other words, the marginal product of public capital equals the marginal product of private capital and the levels of public and private capital are determined by the aggregate credit constraint.

It is worth noting that the optimality condition does not depend on the assumption of a binding aggregate credit constraint, as a similar optimality condition can be derived without this assumption (see Eden and Kraay (2014) for details). The difference between the two cases is in the implications for the levels of the capital stocks: in the constrained case, aggregate capital should equal *I*, and the marginal returns to investment may exceed the world interest rate. In contrast, in the unconstrained case, the levels of investment are determined by the condition that the marginal return to (both types of) investment is equated with the world interest rate. In both cases, the marginal products of public and private capital should be equalized, which is the only condition used for the analysis that follows. Consider next the following functional form (Constant Elasticity of Substitution, CES):

$$F\left(k_g,k_p\right)=A\left(\gamma k_g^{\sigma}+(1-\gamma)k_g^{\sigma}\right)^{\frac{\infty}{\sigma}}$$

where $0\le\gamma\le1$ and $\sigma\le1$ and *A* represents aggregate productivity. This functional form is quite flexible: depending on parameters, public and private capital can be substitutes or compliments, and have different levels of relative productivity. As special cases, this functional form nests the cases of perfect substitutes ($\sigma = 1$), Cobb-Douglas ($\sigma = 0$), and perfect complements (also known as Leontief, and given by $\sigma = -\infty$). This functional form implies that the optimality condition is given by:

$$\lambda^{*}=\frac{k_p^{*}}{k_g^{*}}=\left(\frac{1-\gamma}{\gamma}\right)^{\frac{1}{1-\sigma}}$$

Here, λ^* is the optimal ratio of public and private capital. It depends both on the elasticity of substitution between public and private capital, σ, and on the relative productivity parameters γ and $1-\gamma$. Thus, to determine the optimal allocation of credit between public and private capital, a quantitative sense of γ and σ is needed. It is useful to note that λ^* is the optimal ratio of public and private capital, regardless of the extent to which the credit constraint is binding. However, in general, if the constraint is binding, the aggregate capital stock is too low, and there may be positive excess returns to both types of capital (marginal output effect less the interest rate and depreciation).

Annex 7.2 Public and Private Investment Model: Empirical Results

TABLE A7.2.1: The Response of Private Investment to Public Investment

	All IDA Countries			IDA Countries in Sub-Saharan Africa		
	All Observations	Excluding Influential Observations	Control for Lagged Dependent Variable	All Observations	Excluding Influential Observations	Control for Lagged Dependent Variable
Panel A: Ordinary Least Squares (Dependent Variable is Change in Private Investment)						
Change in Government Investment	–0.0858 (0.125)	–0.113 (0.116)	–0.0780 (0.126)	–0.0900 (0.167)	–0.108 (0.148)	–0.0778 (0.166)
Panel B: Two-Stage Least Squares (Dependent Variable is Change in Private Investment)						
Change in Government Investment	1.881* (1.066)	2.298* (1.297)	1.892* (1.059)	1.891 (1.526)	1.668 (1.204)	1.939 (1.557)
Panel C: First-Stage Regression (Dependent Variable is Change in Government Investment)						
Change in Predicted Disbursements	0.290*** (0.0778)	0.270*** (0.0750)	0.290*** (0.0775)	0.248** (0.0918)	0.326*** (0.0732)	0.246** (0.0915)
First-Stage F-Statistic	13.94	12.98	14.00	7.30	19.88	7.24
Weak Instrument Consistent 95% Confidence Interval for β	[0.583, 4.863]	[0.772, 6.275]	[0.594, 4.878]	[0.137, 9.526]	[0.292, 5.219]	[0.180, 9.854]
Number of Observations	916	908	916	611	607	611

Notes: This table reports the results from a series of regressions of changes in private investment on changes in public investment, with country and year fixed effects. All changes are in constant local currency units and are scaled by lagged GDP. The sample consists of IDA-eligible countries (first three columns) and IDA-eligible countries in Africa (second three columns). Panel A reports OLS estimates, Panel B reports 2SLS estimates, and Panel C reports the corresponding first-stage regressions. Weak instrument-consistent confidence intervals are based on the Moreira Likelihood Ratio statistic. Changes in predicted disbursements on loans from official creditors are used as an instrument for changes in government investment in Panel B. Heteroskedasticity-consistent standard errors clustered at the country level are indicated in parentheses. * (**) (***) indicates significance at the 10 (5) (1) percent level.

TABLE A7.2.2: The Response of Output to Public Investment

	All IDA Countries			IDA Countries in Sub-Saharan Africa		
	All Observations	Excluding Influential Observations	Control for Lagged Dependent Variable	All Observations	Excluding Influential Observations	Control for Lagged Dependent Variable
Panel A: Ordinary Least Squares (Dependent Variable is Change in Output)						
Change in Government Investment	0.190*	0.148*	0.0911	0.184	0.127	0.0982
	(0.0994)	(0.0757)	(0.0830)	(0.122)	(0.0928)	(0.107)
Panel B: Two-Stage Least Squares (Dependent Variable is Change in Output)						
Change in Government Investment	1.418*	1.248	1.267	2.580**	1.684*	2.439*
	(0.797)	(0.819)	(0.783)	(1.177)	(0.831)	(1.305)
Panel C: First-Stage Regression (Dependent Variable is Change in Government Investment)						
Change in Predicted Disbursements	0.290***	0.255***	0.269***	0.248**	0.308***	0.211**
	(0.0778)	(0.0720)	(0.0786)	(0.0918)	(0.0663)	(0.0967)
First-Stage F-Statistic	13.94	12.57	11.71	7.3	21.59	4.74
Weak Instrument Consistent 95% Confidence Interval for β	[–0.046, 3.933]	[–0.336, 4.160]	[–0.293, 4.035]	[0.346, 11.943]	[0.109, 5.713]	[–0.168, 25.653]
Number of Observations	916	907	916	611	606	611

Notes: This table reports the results from a series of regressions of changes in real GDP on changes in public investment, with country and year fixed effects. All changes are in constant local currency units and are scaled by lagged GDP. The sample consists of IDA-eligible countries (first three columns) and IDA-eligible countries in Africa (second three columns). Panel A reports OLS estimates, Panel B reports 2SLS estimates, and Panel C reports the corresponding first-stage regressions. Weak instrument-consistent confidence intervals are based on the Moreira Likelihood Ratio statistic. Changes in predicted disbursements on loans from official creditors are used as an instrument for changes in government investment in Panel B. Heteroskedasticity-consistent standard errors clustered at the country level are indicated in parentheses. * (**) (***) indicates significance at the 10 (5) (1) percent level.

Annex 7.3 Public and Private Investment Model: Calibration

Table A7.3.1 presents the calibrated values of the parameters of the CES production function (σ and γ,) as a function of the empirical estimates of the response of private investment to public investment (β) and the response of output to public investment (β_y). The excess returns to public investment for $\lambda = 3$ and $\lambda = 1$ implied by this calibration are calculated using $r^* + \partial = 0.13$ under the assumption that credit constraints are not binding. The last two columns present the threshold level of

$$\lambda^* = \frac{k_p^*}{k_g^*},$$

above which there are positive excess returns to public investment, and the percent of countries in the sample for which λ is above the threshold. The bolded row represents the calibrated values for the point estimates of $\beta = 2$ and $\beta_y = 1.5$ derived from the regression model in Annex 2. What do these results imply for the optimal level of the public capital stock in Ethiopia?

The first approach using World Bank investment data indicates that Ethiopia may benefit from reducing its public capital stock by 12 percent. The point estimate in Table A7.3.1 suggests that optimal ratio of public and private capital is given by $\lambda^* = 1.18$. By comparison, the average ratio of private and public investment in Ethiopia is $\lambda = 0.92$. As a first step, it is assumed that average ratio of public and private investment roughly corresponds to the ratio of capital stocks. The observed ratio $\lambda = 0.92$ is a little bit low compared to the estimated optimal ratio (1.18):

$$\lambda = \frac{k_p}{k_g} = \frac{I - k_g}{k_g} \Rightarrow I = k_g(1+\lambda) \Rightarrow \frac{I}{1+\lambda} = k_g \Rightarrow$$

$$\frac{k_g^*}{k_g} = \frac{1+\lambda}{1+\lambda^*} = \frac{1+0.92}{1+1.18} = 0.88$$

An alternative approach using estimated capital stock indicates that public capital stock in Ethiopia

TABLE A7.3.1: Calibration Results

Empirical estimates		Calibrated parameters		Excess return to public investment			
β	β_y	σ	γ	$\lambda = 3$	$\lambda = 1$	λ^*	Countries (%)
Private inv. response	Output response	Degree of substitutability	Relative productivity	Optimal ratio	Optimal ratio	Optimal ratio	Optimal ratio
1	0.5	–0.35	0.4	0.25	–0.04	1.35	82%
1.5	0.5	–1.19	0.17	0.17	–0.10	2.06	54%
1.5	1	–0.67	0.49	0.66	–0.01	1.02	90%
1.5	1.5	–0.54	0.65	1.17	0.11	0.67	100%
1.5	2	–0.48	0.73	1.7	0.22	0.51	100%
2	0.5	–3.18	0.02	0.11	–0.13	2.54	49%
2	1	–1.72	0.22	0.6	–0.09	1.59	72%
2	**1.5**	**–1.43**	**0.4**	**1.11**	**–0.04**	**1.18**	**85%**
2	2	–1.32	0.5	1.5	0	1.00	90%
2.5	0.5	–10.48	0.00	0.05	–0.13	2.92	38%
2.5	1	–4.96	0.007	0.54	–0.13	2.30	51%
2.5	1.5	–4.13	0.03	1.05	–0.13	1.97	54%
2.5	2	–3.8	0.06	1.56	–0.12	1.77	54%

should be about 20 percent lower. One limitation of the previous approach is that 85 percent of the countries in the sample exhibit a ratio of private and public capital which is too high relative to the optimum. The estimate based on average investment rates is imperfect, because the ratio of capital stocks depends both on the timing on investment and on the initial capital stocks. An alternative, and possibly more accurate, measure of the ratio of public and private capital stocks in Ethiopia is therefore computed by complementing data on government and private investment with estimated capital stocks from the Penn World Tables (PWT). The series are computed using a 3 percent annual depreciation rate, which is significantly lower than the 10 percent used in Eden and Kraay (2014). This difference is not important for the calibration of the parameters σ and γ, but is important when computing excess returns. To compute public and private capital stocks in Ethiopia, it is assumed that the initial public capital stock in 1987 (when the investment data start) is equal to half of the aggregate capital stock reported in PWT. Public and private capital stocks are then cumulated forward using the investment rates Figure 2.1 to arrive at a series of public and private capital stocks. The estimated production function is then used to compute the marginal returns to public and private capital over the past two decades. The estimates suggest that, in 2011, Ethiopia's ratio of private and public capital was $\lambda = 0.75$. Using the formula above, this estimate suggests that the public capital stock should be about 20 percent lower. Given the short length of the series, the estimates of the capital stocks may be sensitive to the specification of initial conditions. To address this concern, the analysis was repeated under the alternative assumption that the initial public capital stock in 1987 is zero. It is noted that a lower initial public capital stock implies higher returns to public investment. Even under this highly conservative assumption, roughly the same gap in marginal products is derived for 2011, suggesting a fairly robust conclusion.

8 GROWTH AND STRUCTURAL REFORMS[58]

Using illustrative cross-country simulations at the macro and firm levels, this chapter shows that even modest structural reforms may yield substantial growth pay-offs for the country. In terms of reform sequencing, Ethiopia has already followed international best practice through its 'trade-first' approach, although it has proceeded relatively slowly. Recommended next steps include the completion of trade reforms by also opening up services followed by a liberalization of the domestic financial sector while being cognizant of potential risks to reform efforts. Such reforms may be important contributors to Ethiopia's future growth given their effect of improving the efficiency of resources allocation and enhancing productivity.

8.1 Introduction

Economists have long debated whether reforms promote growth. The discussion between proponents and opponents of the Washington Consensus is a classical illustration hereof. Because economic theory does not reach clear conclusions on the conditions that best support income catch-up, researchers have sought to draw lessons from the experience of a broad segment of countries using cross-country, industry, and firm level evidence.

There is a growing consensus that both macro- and microeconomic reforms can lead to improvements in resource allocation, productivity, and growth. In particular, higher quality and quantity of infrastructure and human capital, trade openness, efficient and well-developed financial systems, appropriate tax and expenditure policies, and sound economic institutions (e.g. strong rule of law, and avoidance of overly stringent regulation of product and labor markets) that promote competition, facilitate entry and exit, and encourage entrepreneurship and innovation have been variously found to increase productivity growth (Dabla-Noris et al. 2014).

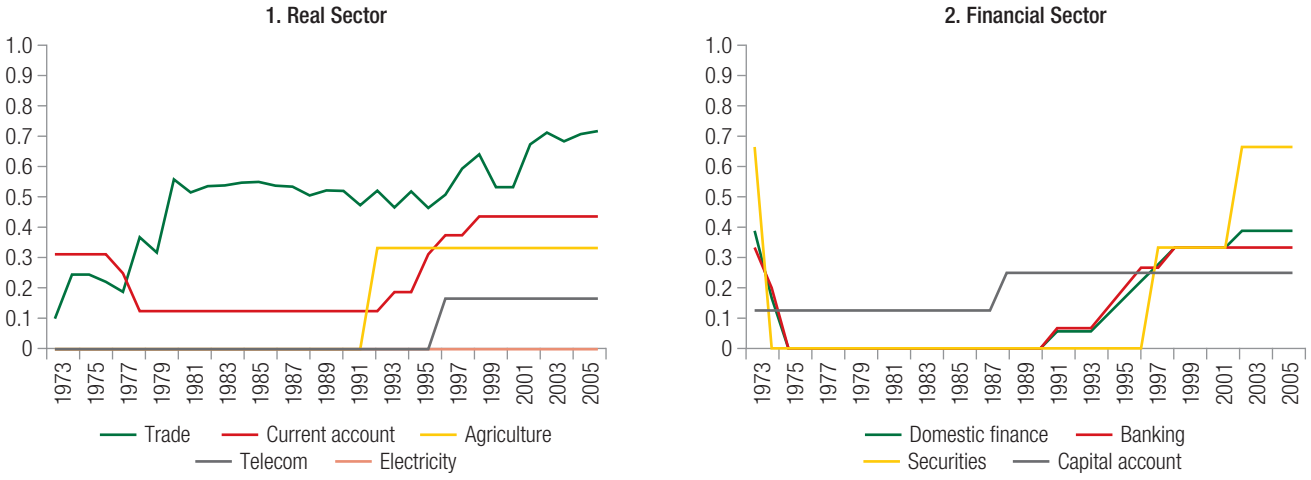
Ethiopia's reform effort was substantial in the 1990's, but few reforms took place in the 2000s. The period immediately following the overthrow of the communist Derg in 1991 was characterized by deep and wide-ranging reforms, including trade, agriculture, exchange rate, banking, taxation and privatization. However, reform effort slowed down towards the end 1990s and has not picked up since. Although regulatory improvements were made to domestic competition, investment, customs and business licensing/registration, reforms were fewer and less deep in the 2000s. Indeed, the absence of concurrent major structural reforms is a curious characteristic of the growth acceleration episode.

This experience raises an important question about what the relationship between growth and reform is for Ethiopia. Arguably, the market-oriented reforms of the 1990s provided a necessary foundation for the subsequent economic take-off in 2004. As documented in World Bank (2007), the changes that occurred since 1992 constituted the first stages of a major, and potentially, long lasting transition to institutional arrangements which were much more conducive to the pursuit of long-term prosperity than earlier conditions. In other words, growth was not necessarily 'reform-less'. At the same time, continued or concurrent economic reforms could not have been a major driver of sustained growth in the 2000s precisely because the reform effort slowed down at the same time.

Does this mean that Ethiopia does not need to reform to grow fast? In this chapter we argue that it could be erroneous and complacent to reach

[58] This chapter draws upon the background papers prepared by Haile (2015) and Hollweg, Rojas and Varela (2015).

FIGURE 8.1: Ethiopia: Structural Reform Indices, 1973–2005



Source: Based on data from Prati et al. (2013).
Note: Values cannot be compared across indices (see Box 8.1).

such a conclusion. Ethiopia was able to sustain high growth in the past because of earlier reforms and, as documented in previous chapters, because it 'got infrastructure right' at the early stage of development. However, as shown in this chapter, even for countries such as Ethiopia, there are substantial growth benefits to further reforms. This implies that structural reforms offer a growth potential, an opportunity that Ethiopia can tap into when needed. If growth slows down, as we have argued in Chapter 6 is a real possibility, reigniting the structural reform agenda may well become necessary to sustain high growth.

This chapter seeks to address the following questions: How has Ethiopia's reform effort evolved over time and how does it compare to other countries? What are the potential growth benefits to reforming? Which reforms are most potent? How does the country's nascent reform sequencing compare with international best practice? What are the risks of reform? Are there alternatives to the 'trodden path of reform'? What would be the logical next reform step for the country?

This chapter is structured as follows: Section 2 examines Ethiopia's structural reform status and trends, and compares with peers. Sections 3 and 4 examine the economic impact of reforms. Section 3 evaluates its impact on economic growth using macro level data while Section 4 estimates the impact on firm productivity. Section 5 summarizes international best practice on reform sequencing and relates it to Ethiopia's experience. Section 6 highlights potential risks of reform. Section 7 concludes by sketching the broad direction of future reform efforts in Ethiopia. Finally, Section 8 sets up a framework for monitoring the sustainability of Ethiopia's growth model.

8.2 Trends and Status in Structural Reforms

Structural reform indices illustrate that Ethiopia's reform effort accelerated since 1991 and slowed down in the late 1990s. Figure 8.1.1 illustrates this point for the real sector and Figure 8.1.2 for the financial sector. Box 8.1 contains details on data and definitions. Prior to 1991, there were few reforms, as illustrated by relatively low levels of the reform indices. After 1991, most indices exhibit a rising trend, indicating reform progress. From the late 1990s onwards, most indices exhibit a flat trend, suggesting that reforms came to a halt. Trade is an important exception to this overall trend as tariffs were

BOX 8.1: Structural Reform Indices: Data and Definitions

The data on structural reforms cover more than ninety developed and developing countries, and span a fairly long period of time, namely 1973 to 2006. These data are taken from Prati *et al*. (2013), which are in turn based on databases constructed by Abiad *et al*. (2008) and Ostry *et al*. (2009). The indices of structural reforms are categorized into two groups: real sector and financial sector reforms.

The reform indicators in the real sector comprise openness to international trade and domestic product market liberalization. Openness to international trade is measured along two dimensions: average tariff rates and restrictions (or lack thereof) on current account transactions (including payments and receipts on exports and imports of goods and services). The average tariff index takes the value 0 if average tariff rates are 60 percent or higher, the value 1 if tariff rates are zero, and varies linearly for intermediate tariff rates. The degree of reforms in the product market is captured by two different indices. The first corresponds to the agricultural sector and measures the extent of state intervention (i.e. the presence of export marketing boards and price controls) in the market for the country's main agricultural export commodity. The second captures the degree of liberalization (i.e. the extent of competition and regulatory quality) in the networks (telecommunications and electricity) sector.

Financial sector reforms are captured by two indices measuring domestic finance and capital account liberalization. The indicator of domestic financial reform is derived as the average of six sub-indices. Five of them involve the banking system: (i) credit controls, such as subsidized lending and direct credit; (ii) interest rate controls, such as floors or ceilings; (iii) competition restrictions, such as entry barriers and limits on branches; (iv) the degree of state ownership; and (v) the quality of banking supervision and regulation. The sixth sub-index focuses on the securities markets and measures the degree of legal restrictions on the development of domestic bond and equity markets, and the existence of independent regulators. The index of capital account liberalization measures the intensity of restrictions on financial transactions for residents and nonresidents, as well as the use of multiple exchange rates. We use both the aggregate indicator of capital account reforms and two sub-indices of external capital account openness for resident and nonresident. The two sub-indices capture the degree of legal restrictions on residents' versus nonresidents' ability to move capital in and out the country.

All reform indices range between 0 and 1: the higher the rating, the greater the degree of liberalization. We note that variations in the values of each index over time and across countries reflect differences in the absolute degree of economic liberalization *within* each sector. As the indices were constructed using different methodologies, quantitative differences in the values of the indices across sectors do not provide an exact measure of whether one sector is more liberalized than another.

Source: Prati et al. (2013).

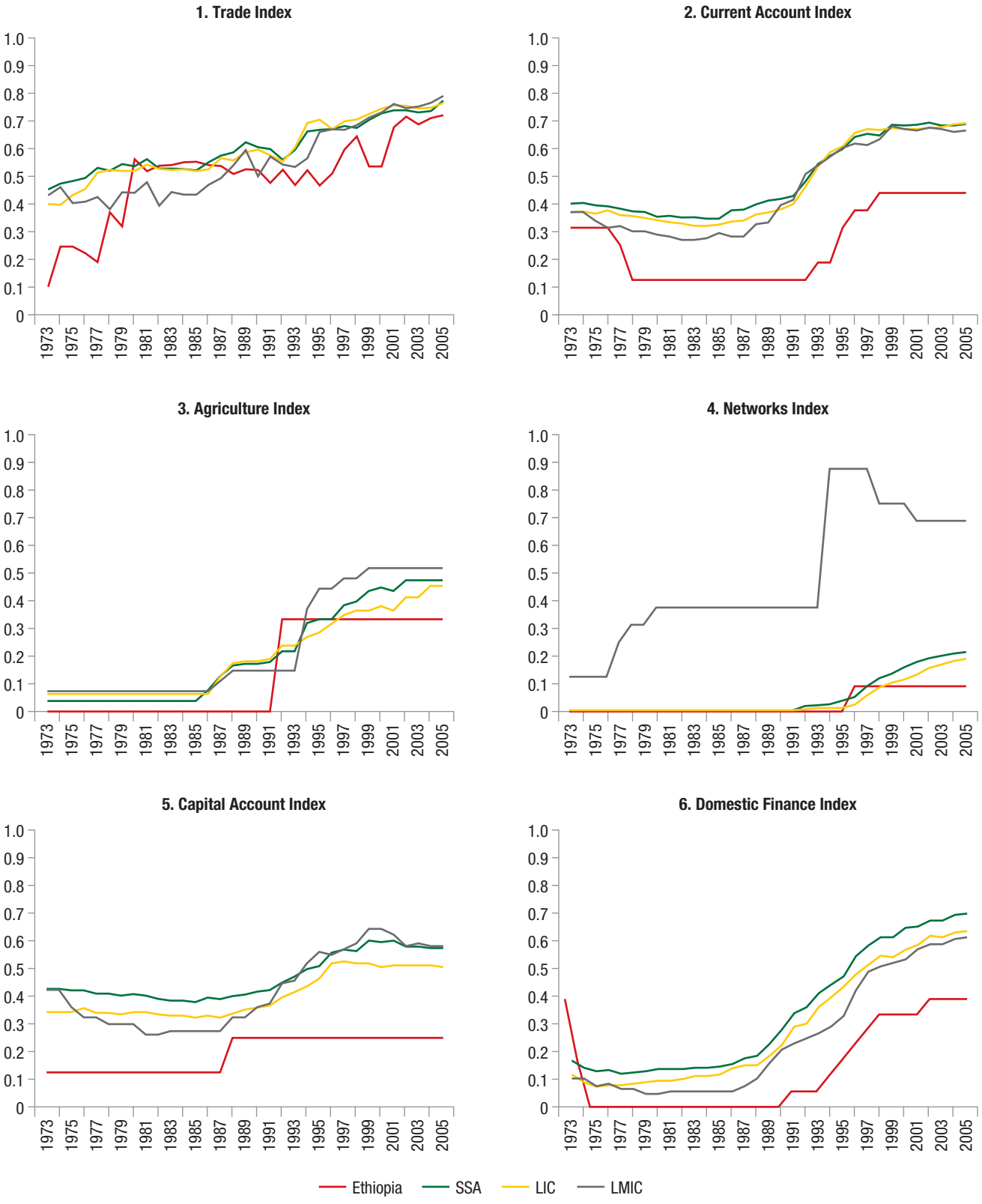
reduced throughout the period of analysis. Electricity is another exception as no reforms were observed throughout the 1993–2006 period.

Ethiopia lags behind in most dimensions of reform, especially in domestic finance, the current account and the capital account. Figure 8.2 compares Ethiopia's reform experience with the averages for Sub-Saharan Africa (SSA), Low Income Countries (LIC) and Lower Middle Income Countries (LMIC). It draws upon the reform indices of Prati et al. (2013) described in Box 8.1. Ethiopia has done well in reducing tariffs, implying that its trade reform index is comparable to peers. The reform gaps in domestic finance, the current account and the capital account are substantial. Gaps in agriculture reform and networks are less pronounced.

Ethiopia maintains a high level of regulatory restrictiveness towards foreign services providers. The World Bank Services Trade Restrictions Database shows that Ethiopia exhibits high levels of restrictiveness across all modes of supply, scoring higher than a relevant set of comparator countries in each (Figure 8.3). Mode 3, or commercial presence, is in fact the most restrictive form for foreign providers to supply services in Ethiopia. Ethiopia is substantially more restrictive than its comparators in mode 1 (cross-border supply), mode 2 (consumption abroad) and mode 3, but only slightly more restrictive than comparators in mode 4 (movement of natural persons), traditionally the most protected mode of supply.

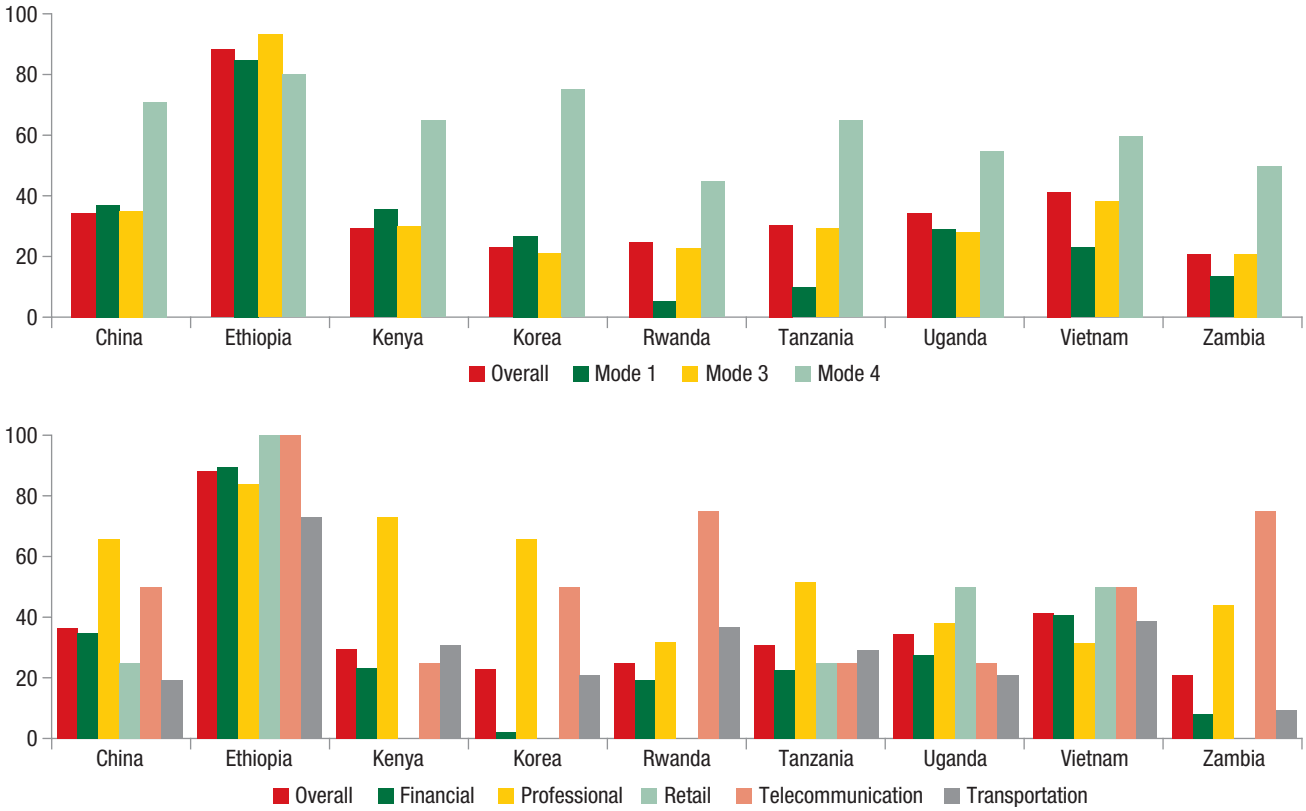
Ethiopia also exhibits high restrictiveness when considering five key services sectors—financial,

FIGURE 8.2: Structural Reform Indices by Country and Income Groups



Source: Based on data from Prati et al. (2013).

FIGURE 8.3: Services Trade Restrictiveness Index by Sector and Mode



Source: World Bank Services Trade Restrictions Database.

professional, retail, telecommunications and transport services. As illustrated in Figure 8.3 Ethiopia is completely closed in retail and telecommunications, and almost entirely closed (with a score above 75 percent) in transportation, professional, and financial services.

8.3 The Potential Growth Impact of Reforms

Overview

What would be the potential impact on growth of structural reforms in Ethiopia? To address this question, we perform a benchmarking exercise based on the cross-country growth regression model in Prati et al. (2013), using the data set described in Box 8.1. Effectively, we simulate the growth effect of closing Ethiopia's reform gap relative to relevant peer groups, including Sub-Saharan African, low income, and lower middle income countries. We also include selected countries for illustrative purposes. This includes Uganda and Tanzania as examples of structural peers, and Ghana and Sri Lanka as examples of aspirational peers. The main results are summarized below and explained in detail subsequently. Annex 8.1 details the methodology and Annex 8.2 summarizes the robustness checks.

Overall, the results indicate that even modest reforms that close gaps with Sub-Saharan Africa peers would potentially have considerable impact on GDP per capita growth. In particular, the largest potential growth payoffs could be reaped from closing gaps in domestic financial reforms, the current account and the capital account.

We acknowledge upfront that these results are only indicative. The results shed light on the potential

growth payoffs that reforms could deliver but do not constitute a comprehensive appraisal of reforms that have actually been introduced. Among other shortcomings, the exercise does not control for external factors that may affect the link between structural reforms and growth. It focuses exclusively on the impact on economic growth, thereby ignoring other important dimensions. Finally, by focusing on 'average effects' rather than statistical tail events the results also tend to overlook the potential risks of reform, as discussed later the chapter.

Detailed Results and Discussion

Owing to the slowdown in reform effort in the late 1990s, Ethiopia's reform gap with peers has increased. Table 8.1 presents the average values of the structural reform indices for Ethiopia and comparator groups and countries over the periods 1973–2006 and 2000–06. Prior to 2000, Ethiopia lagged behind all peer groups, except in trade reform. After 2000, the gap increased because many of the comparator countries and groups, unlike Ethiopia, implemented considerable reforms. Reform gaps for Ethiopia are most substantial in the capital account, domestic finance, electricity, and the current account and smallest in trade. This trend is also visible in Figure 8.2.

The relationship between economic growth and reform is derived using a cross-country growth regression model. Table 8.2 presents the results of an ordinary least squares regression (OLS) in which real GDP per capita growth is regressed individually on the values of real GDP (in logs) and the respective reform indicator (both lagged) using country and year fixed effects.[59] The results are similar to those presented in Prati et al. (2013), except we re-estimated the original model by disaggregating the network index into electricity and telecommunications to gain further insights about these sub-sectors.

The baseline regression results conform to our expectations. All coefficients are positive and statistically significant at conventional critical values, except the networks index (including electricity and telecommunications sectors). To illustrate the results, consider the growth effect of liberalizing trade: for every unit of increase in the trade reform index, the real GDP per capita growth rate would increase by 0.019 percentage points the subsequent year. This is a dynamic effect, so a similar growth boost would take place the subsequent year at a diminishing rate until the growth effect eventually vanishes. This cumulates into long term effect, which we examine later.

The potential impact of structural reforms on GDP per capita growth is estimated based on the reform gaps for the period 2000–2006. Because the averages for the period 1973–2006 are likely to smooth out significant fluctuations in the reform indices over time, the discussion focuses on the reform gaps for the more recent period, which better reflects the countries' recent reform trends. Although the reform gaps for the most recent period, namely 2006, would be more relevant, in some cases we might end up capturing anomalies.

The results suggest that closing Ethiopia's reform gaps would generally be associated with significant increases in economic growth. Table 8.3 presents the results of the benchmarking exercise. We illustrate the results by using the trade liberalization example. Suppose Ethiopia were to close the gap with the Sub-Saharan African average in this dimension. The reform gap is calculated as 0.738–0.672= 0.066, as per Table 8.1. The resulting growth effect, in turn, is derived by multiplying the reform gap with the coefficient derived in Table 8.2, i.e. 0.066*0.019 = 0.13%. In other words, Ethiopia's per capita growth rate would be 0.13 percentage points higher in the first year after the reform if it could close the trade reform gap with SSA. This growth effect would persist for a while, but gradually decline over time.

The most substantial growth impacts would be realized by reforming the domestic financial sector, the current account and the capital account. Generally speaking, the growth effects depend on

[59] There are no major differences in results if the regression is estimated using a multivariate approach, i.e. considering all reforms simultaneously. See Haile (2015) for details.

TABLE 8.1: Average Values of Structural Reform Indices

Structural reforms	Ethiopia	Uganda	Tanzania	Sri Lanka	Ghana	SSA	LIC	LMIC
	2000–2006							
Real sectors								
Trade	0.672	0.778	0.746	0.828	0.764	0.738	0.750	0.755
Current account	0.438	1.000	0.750	0.698	0.646	0.683	0.675	0.664
Agriculture	0.333	1.000	0.667	0.667	0.333	0.464	0.413	0.519
Network	0.091	0.545	0.212	0.212	0.636	0.192	0.158	0.310
Electricity	0.000	0.600	0.033	0.267	0.800	0.119	0.106	0.334
Telecommunications	0.167	0.500	0.361	0.167	0.500	0.254	0.203	0.280
Financial sectors								
Domestic finance	0.370	0.685	0.815	0.713	0.537	0.671	0.606	0.581
Banking	0.333	0.756	0.867	0.722	0.511	0.709	0.636	0.594
Securities	0.556	0.333	0.556	0.667	0.667	0.483	0.461	0.519
Capital account (CA)	0.250	1.000	0.375	0.500	0.375	0.586	0.512	0.602
CA (resident)	0.250	1.000	0.250	0.250	0.250	0.551	0.461	0.552
CA (non-resident)	0.250	1.000	0.500	0.750	0.500	0.638	0.547	0.689
	1973–2006							
Real sectors								
Trade	0.507	0.459	0.507	0.459	0.507	0.459	0.507	0.459
Current account	0.250	0.544	0.250	0.544	0.250	0.544	0.250	0.544
Agriculture	0.146	0.364	0.146	0.364	0.146	0.364	0.146	0.364
Network	0.028	0.124	0.028	0.124	0.028	0.124	0.028	0.124
Electricity	0.000	0.127	0.000	0.127	0.000	0.127	0.000	0.127
Telecommunications	0.052	0.121	0.052	0.121	0.052	0.121	0.052	0.121
Financial sectors								
Domestic finance	0.125	0.347	0.125	0.347	0.125	0.347	0.125	0.347
Banking	0.123	0.390	0.123	0.390	0.123	0.390	0.123	0.390
Securities	0.135	0.131	0.135	0.131	0.135	0.131	0.135	0.131
Capital account (CA)	0.195	0.492	0.195	0.492	0.195	0.492	0.195	0.492
CA (resident)	0.250	0.477	0.250	0.477	0.250	0.477	0.250	0.477
CA (non-resident)	0.141	0.508	0.141	0.508	0.141	0.508	0.141	0.508

Source: Staff estimates based on data from Prati *et al*. (2013).

two factors: First, the size of the reform gap: the larger the gap, the larger the growth effect of closing it (Table 8.1). Second, the size of the general impact of the reform in question with respect to growth, as reflected by the size of the estimated coefficient (Table 8.2). We note that the first factor is country-specific, while the second factor is an average effect estimated for all countries in the sample.[60] To illustrate, additional domestic financial liberalization

[60] Prati *et al.* (2013) and Haile (2015) show how the estimated coefficients are broadly similar across income groups.

TABLE 8.2: Baseline Growth Regressions (Dependent variable: Real GDP Per Capita, Growth Rate)

Regressions	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Real sectors												
Trade (*t*–1)	0.019 (1.9)*											
Current account (*t*–1)		0.033 (4.1)***										
Agriculture (*t*–1)			0.018 (2.3)**									
Network (*t*–1)				0.004 (0.4)								
Electricity (*t*–1)					0.007 (1.41)							
Telecom (*t*–1)						0.001 (0.43)						
Financial sector												
Domestic finan. (*t*–1)							0.064 (4.6)***					
Banking (*t*–1)								0.050 (4.2)***				
Securities (*t*–1)									0.037 (4.6)***			
Capital account (*t*–1)										0.021 (2.3)**		
Capital^{resident} (*t*–1)											0.015 (2.14)**	
Capitalnon^{resident} (*t*–1)												0.016 (2.00)**
Log (GDP per capita) (*t*–1)	–0.048 (6.9)*	–0.051 (5.7)***	–0.036 (5.1)***	–0.045 (5.6)***	–0.042 (5.3)***	–0.041 (5.1)***	–0.047 (5.9)***	–0.051 (5.7)***	–0.049 (5.4)***	–0.051 (5.7)***	–0.045 (5.6)***	–0.044 (5.7)***
Observations	3,418	3,530	3,390	3,796	2,653	2,653	2,653	3,530	3,556	3,530	3,846	3,814
R-squared	0.19	0.14	0.17	0.15	0.20	0.19	0.20	0.14	0.14	0.14	0.15	0.15

Source: Prati *et al*. (2013) and staff estimates.
Note: *t*-values (computed based on robust standard errors clustered at country level) in parentheses. All specifications are estimated by OLS and include country and year fixed effects. The regressions include only one indicator of structural reform at a time. Annual data over 1973–2006 when available. GDP in real terms and PPP adjusted. ***, **, * indicate statistical significance at the one, five, and ten percent.

in Ethiopia, up to a point where it reaches the average SSA country level, would increase the real per capita GDP rate by 1.92 percentage points the first year after reform with marginally declining rates in subsequent years. We defined financial liberalization broadly here as a higher index value in the six dimensions of financial sector reform defined in Box 8.1

The potential long-run effects of reforms are substantial. These effects can be estimated effectively as the cumulative sum of the gradually declining short-run effects. The results are reported in Table 8.4. If we focus exclusively on the effect of Ethiopia catching up with the Sub-Saharan Africa average, the results would be as follows: In the case of domestic financial reforms, Ethiopia's

TABLE 8.3: Coefficient Estimates and Potential Growth Impact of Reforms

Structural reforms	Coefficient estimates*	Predicted effect on Ethiopia's real GDP per capita, growth rate (%)						
		Uganda	Tanzania	Sri Lanka	Ghana	SSA	LIC	LMIC
Real sectors								
Trade	0.019	0.20	0.14	0.30	0.17	0.13	0.15	0.16
Current account	0.033	1.86	1.03	0.86	0.69	0.81	0.78	0.75
Agriculture	0.018	1.20	0.60	0.60	0.00	0.23	0.14	0.33
Network	0.004	0.18	0.05	0.05	0.22	0.04	0.03	0.09
Electricity	0.007	0.42	0.02	0.19	0.56	0.08	0.07	0.23
Telecommunications	0.001	0.03	0.02	0.00	0.03	0.01	0.004	0.01
Financial sectors								
Domestic finance	0.064	2.01	2.84	2.19	1.07	1.92	1.51	1.35
Banking	0.050	2.11	2.67	1.94	0.89	1.88	1.51	1.30
Securities	0.037	–0.82	0.00	0.41	0.41	–0.27	–0.35	–0.14
Capital account	0.021	1.58	0.26	0.53	0.26	0.71	0.55	0.74
Capital (resident)	0.015	1.13	0.00	0.00	0.00	0.45	0.32	0.45
Capital (nonresidents)	0.016	1.20	0.40	0.80	0.40	0.62	0.48	0.70

Source: Author's computation based on data from Prati *et al*. (2013).

TABLE 8.4: Coefficient estimates and Potential Long-run Growth Impact of Reforms

Structural reforms	Long-run multiplier*	Predicted effect on Ethiopia's real GDP per capita, growth rate (%)						
		Uganda	Tanzania	Sri Lanka	Ghana	SSA	LIC	LMI
Real sectors								
Trade	0.396	4.20	2.91	6.18	3.64	2.61	3.06	3.28
Current account	0.647	36.40	20.22	16.85	13.48	15.85	15.35	14.66
Agriculture	0.500	33.33	16.67	16.67	0.00	6.52	4.00	9.26
Network	0.089	4.04	1.08	1.08	4.85	0.90	0.59	1.95
Electricity	0.156	9.33	0.52	4.15	12.44	1.85	1.65	5.20
Telecommunications	0.023	0.76	0.44	0.00	0.76	0.20	0.082	0.26
Financial sectors								
Domestic finance	1.524	47.97	67.72	52.20	25.40	45.80	35.98	32.14
Banking	1.220	51.49	65.04	47.43	21.68	45.76	36.86	31.77
Securities	0.787	–17.49	0.00	8.75	8.75	–5.72	–7.44	–2.92
Capital account (CA)	0.412	30.88	5.15	10.29	5.15	13.84	10.77	14.51
CA (resident)	0.306	22.96	0.00	0.00	0.00	9.21	6.45	9.25
CA (nonresidents)	0.314	23.53	7.84	15.69	7.84	12.18	9.31	13.78

Source: Author's computation based on data from Prati *et al*. (2013).
Note: SSA, Sub-Saharan Africa; LI, Low-income countries; LMI, Lower-middle-income countries. *Coefficient estimates obtained through a simple manipulation of the coefficient estimates in Tables 2 and 3. The figures in the last seven columns are in percentages and represent the growth payoffs from closing the reform gaps between Ethiopia and the respective benchmark country in the second row. † Potential growth payoffs from getting closer to the technology frontier for the period 2000–2006.

real GDP per capita would be 46 percent higher in the long run.[61] Current account reform, to the level observed for the average SSA country, would yield a real GDP per capita for Ethiopia that is 16 percent higher. For capital account reform, the effect is 14 percent.

In summary, we get the following results (ranked in order of importance):

- **Domestic financial reforms would yield the most substantial growth pay-off.** This type of reform is generally the most potent in terms of growth (coefficient: 0.064) and the reform gap in this sector is the second largest that Ethiopia is facing. To illustrate, if Ethiopia were to catch up with the average Sub-Saharan country in terms of financial liberalization, its per capita growth rate could be boosted by 1.9 percentage points in the first year after the reform. This effect pertains primarily to the banking sector.
- **Current account reform has the second largest growth effect.** Current account reform has the second largest growth coefficient (0.033) and Ethiopia's gap is sizable. Catching up with the SSA average would potentially add 0.8 percentage points to Ethiopia's annual per capita growth rate. Current account reform would involve a reduction of restrictions on payments and receipts on exports and imports of goods and services. Examples on such restrictions include rules associated with import permits.
- **An opening of the capital account has a growth potential comparable to that of a current account reform.** This is a reflection of the fact that Ethiopia lags substantially behind in this area (largest gap observed) even if the growth coefficient is not particularly large (0.021). Closing the capital account gap with the Sub-Saharan Africa average yields an additional growth rate of 0.7 percentage points, in the short term. This would involve a reduction of restrictions on financial transactions for residents and non-residents.
- **The growth payoffs from agriculture reform are modest.** In agriculture, growth could be 0.2 percentage higher by catching up with SSA as a reflection of moderate growth coefficient (0.018) and reform gaps. The long term effect would be a real GDP level that would be 6 percent higher. Agriculture reform would involve a reduction of state interventions the market for the country's main agricultural export commodity.
- **The estimated electricity and telecom reforms yield negligible growth gains (see below).** This is primarily the result of very small growth coefficients. Electricity and telecom reforms refer to increasing the extent of competition and improving the regulatory quality in these sectors.

The lack of reform data for the recent period since 2006 is not necessarily a shortcoming for the findings as reform gaps and coefficients are unlikely to have changed significantly: First, Ethiopia's reform gap may arguably even have widened since 2005. Even if we don't have data for this period, a qualitative assessment strongly suggests that there have been no major reforms in Ethiopia over this period. Moreover, given the historical trend for comparator countries, it is reasonable to expect that these countries may have maintained or continued their reform efforts and this would also be consistent with the available qualitative evidence. Second, the coefficient estimates for reform are quite robust, implying that they are not sensitive to the omission or inclusion of additional observations. In particular, the robustness checks shown in the Annex show that the potential impact of reforms for the sub-periods 1973–1989 and 1990–2006 are generally consistent with each other, which might suggest that expanding the sample period with few more observations would not have a substantial impact on the empirical estimates.

Growth benefits to telecom and electricity reforms may be positive for Ethiopia, even if the results do not show this. A notable exception to the above explanation about the robustness of coefficient estimates to new data is telecom and electricity

[61] The long term effect is estimated over a 33 year period (1973–2006). This is potentially indicative that the long run effect may be around thirty years.

TABLE 8.5: Reforms, Growth, and Distance to the Technology Frontier

Structural reforms	Coefficient estimates*		Reform gap	Predicted effect on Ethiopia's GDP per capita growth (%)		Growth payoff from getting closer to the technology frontier
	First quartile	Second quartile		First quartile	Second quartile	
Real sectors						
Trade	0.041	0.027	0.156	0.641	0.422	–0.219
Current account	0.028	0.054	0.260	0.729	1.406	0.677
Agriculture	0.010	0.041	0.333	0.333	1.367	1.033
Network	0.025	0.006	0.121	0.303	0.073	–0.230
Electricity	0.022	0.015	0.267	0.575	0.402	–0.173
Telecommunications	0.013	–0.008	0.000	0.000	0.000	0.000
Financial sectors						
Domestic finance	0.026	0.109	0.343	0.891	3.734	2.844
Banking	0.017	0.083	0.389	0.661	3.228	2.567
Securities	0.030	0.075	0.111	0.333	0.833	0.500
Capital account	0.006	0.038	0.250	0.150	0.950	0.800
Capital (resident)	0.016	0.022	0.000	0.000	0.000	0.000
Capital (nonresidents)	–0.008	0.030	0.500	–0.400	1.500	1.900

Source: Author's computation based on data from Prati *et al*. (2013).

reforms. Since such reforms are relatively recent, it is possible that their growth effect is not accurately estimated (see Prati et al., 2013 for details). Most likely, the growth effect would be larger than the baseline estimates suggest. Since Ethiopia has not reformed these two sectors, it can be conjectured that closing the reform gap with other countries could also yield growth benefits for the country.

The growth effect of reform generally increases as countries develop. Prati et al. (2013) find that both real and financial sector reforms are positively associated with higher growth. However, their results also suggest that reforms are more effective when markets and institutions are not at their infancy but at a somewhat more advanced stage in their process of development. A similar result is reached by Christiansen et al. (2013), who find that financial and trade reforms are robustly associated with economic growth, but only in middle income countries.

To illustrate this general result, we simulate the growth impact for Ethiopia if it were to move closer to the technology frontier. To test whether the simulated growth impacts of reforms in Ethiopia are affected by the country's distance to the technology frontier, the countries in our sample are first assigned to different quartiles depending on their respective distances to the technological frontier.[62] The regression model is then estimated for each quartile. Ethiopia is currently in the first quartile and we estimate the hypothetical effect if it were in the second quartile.

If Ethiopia were more developed, predicted growth payoffs would be even higher. Table 8.5

[62] Following Prati *et al.* (2013), we use the ratio of each country's per capita GDP to that of the United States as a proxy for its distance to the technology frontier in a given year. Note that the regression model estimated here includes a one-year lag of the ratio of each country's GDP per capita to that of the United States instead of per capita income lagged one period.

presents the growth payoffs from getting closer to the technology frontier. If Ethiopia had the same distance to the technology frontier as the countries in the second quartile, closing gaps in current account and agriculture reforms would yield an additional 0.68 and 1.03 percentage points increase in GDP per capita growth, respectively. Similarly, closing the gaps in domestic finance and capital account liberalizations would increase income per capita growth rate by an additional 2.84 and 0.80 percentage points. This is not, however, the case for openness to international trade (as measured by average tariff rates) and reforms of the networks sector, the growth effects of which are larger for countries in the first quartile (the farthest from the technology frontier) than for those in the second quartile. In sum, the results suggest that additional domestic financial liberalization would provide the largest growth gain, followed by agriculture sector reforms, if Ethiopia moved closer to the technology frontier.

This simulation underscores a fundamental point: Even if growth payoffs are higher at higher levels of development, they are sufficiently high at Ethiopia's current level of development. In other words, there is sufficient incentive even for low income countries, such as Ethiopia, to initiate reform efforts at an early stage of development.

8.4 Productivity Impacts of Services Trade Liberalization

In this section, we consider the microeconomic impact of services trade reform. Section 3 made use of the cross-country structural reform data set by Prati et al. (2013) to estimate the economic growth impact of reform at the macro level. In this section we make use of the World Bank Enterprise Survey data to estimate the economic impact of services sector liberalization on firm productivity.

Openness in the services sector is part and parcel of a comprehensive trade policy reform package. The benefits of opening up the services and goods markets are 'multiplicative' or mutually reinforcing, the full potential of each not being realized without adequate openness in the other (Duggan et al., 2013). Increased openness in the service sector not only implies increased foreign presence, but more broadly, it implies encouraging entry and inducing increased competition between foreign and domestic providers alike.

Services liberalization differs from goods trade liberalization in its effects on domestic activity in the import-competing sector. Indeed, as pointed out by Mattoo et al. (2006), for the case of services, liberalization implies increased scale of domestic activity in import competing sectors because foreign factors tend to locate domestically or domestic competition increases by more effective regulation. These dynamics of competition will lead to better and more reliable provision of existing services, new varieties of services, and competitive pricing.

The benefits of a more competitive services sector typically have economy-wide effects.[63] In fact, the inefficient supply of services inputs acts as a tax on production of goods that use these services. Firms in any industry rely on financial services, on energy, on telecommunications, on transport, on professional services, etc. An efficient and well-regulated financial sector is necessary to transform saving to investment efficiently, to ensure that resources are deployed where they have the highest returns. Improved efficiency in telecoms generates economy-wide effects as they are crucial for the dissemination of knowledge. Transport services contribute to an efficient distribution of goods within a country and beyond. Professional accounting services, for example, are key in reducing transaction costs—one of most significant impediments to growth in Africa (Collier and Gunning, 1999). However, access to good quality, reliable services varies substantially across SSA and even across regions in Ethiopia.

A vast literature documents the links between services sector reform and economic performance. The existing work linking service sector reform and

[63] A vast literature documents the links between services sector reform and economic performance. (See Hollweg et al. 2015 for details).

performance focuses on different channels: (i) services reform and economy wide gains, (ii) services reform and services sector performance, (iii) services reform and manufacturing export competitiveness, and (iv) services reform and manufacturing productivity. (See Hollweg et al. 2015 for details).

International experience suggest that the effects of liberalizing services trade on firms' efficiency are sizable. Because burdensome regulations and restrictiveness to services trade affect firms' input choices, they are also typically associated with productivity costs for firms in downstream sectors. A more open regime to services trade brings about increased FDI in the services sector (currently almost negligible in Ethiopia) that increases competition and leads to improved performance. This is backed both by systematic econometric and case-study evidence that point to three mechanisms at work when services trade is liberalized. First, services product variety increases. Second, quality improves. Third, services input prices fall. These mechanisms are in turn associated with improved firms' productivity and export competitiveness.

We exploit cross-country data on industrial dynamics (including Ethiopia), to gauge the cost in terms of productivity of poor service provision. Table 8.6 summarizes the results and Annex 7.3 details the methodology. We find that productivity performance is heterogeneous across firms. As typically found in the literature, firms that are more integrated in the global marketplace show productivity premia when compared to others in the same country, same

TABLE 8.6: Labor Productivity Determinants Based on Perception of Services' Performance

Dep. Var. Labor Productivity	Regional Average All firms	Regional Average All firms	Regional Average All firms	Regional Average All firms	Regional Average Africa	Regional Average Africa	Regional Average Africa	Regional Average Africa
Exporter	0.113*** (0.017)	0.113*** (0.017)	0.113*** (0.017)	0.115*** (0.017)	0.172*** (0.058)	0.169*** (0.058)	0.170*** (0.058)	0.151** (0.066)
Firm size	0.101*** (0.009)	0.102*** (0.009)	0.102*** (0.009)	0.104*** (0.009)	0.096*** (0.029)	0.101*** (0.029)	0.100*** (0.029)	0.088*** (0.032)
Firm age	–7.9e–5 (0.0004)	–7.5e–5 (0.0004)	–8.2e–5 (0.0004)	–0.0002 (0.0004)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.005*** (0.001)
Finance Obstacle	–0.07*** (0.03)				–0.165* (0.09)			
Transportation Obstacle		–0.08*** (0.03)				–0.03 (0.128)		
Electricity Obstacle			–0.036 (0.025)				–0.03 (0.09)	
Telecommunications Obstacle				–0.08*** (0.024)				–0.113 (0.117)
Constant	1.983*** (0.175)	1.985*** (0.174)	1.934*** (0.180)	1.927*** (0.169)	2.232*** (0.270)	1.939*** (0.308)	1.971*** (0.324)	2.031*** (0.253)
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,456	41,456	41,456	39,169	6,596	6,596	6,596	5,254
R-squared	0.172	0.172	0.172	0.176	0.195	0.194	0.194	0.218

Source: Hollweg *et al*. (2015). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

sector and same size class. For example, exporters in the sample are 12 percent more productive than non-exporters, when looking across the 127 countries in the sample and focusing on labor productivity (their TFP is 17.5 percent higher), and about 18.5 percent more productive when focusing on African firms only (their TFP is 22 percent higher). Larger firms are 10 percent more productive than medium-size firms, and this premium is homogeneous for all firms African firms. The premium on old firms is only significant for African firms and suggests that each extra year of experience is associated with half a percentage point extra of labor productivity.

Firms' productivity is affected by poor services provision. Evidence suggests that the quality of financial, transport, electricity and telecommunications services provided to downstream firms, measured through firm's perceptions affects firm's performance significantly, both from a statistical point of view and from an economic point of view. The finding is relatively robust when using alternative measures of performance (labor productivity or TFP). When focusing on African firms only, the negative effect of poor services provision on performance is blurrier, likely due to the smaller sample of firms, but still negative.

There are considerable gains to be reaped from services sector liberalization in Ethiopia, especially in credit access, energy and transport services. The largest effects of services provision on firms' performance are found on these two services. Slightly below is the estimated effects of access to finance services, while the estimated effect of electricity services is slightly less than half the size of the average of the previous effects. For electricity, the effect is not well-determined. To get a sense of the economic size of the effect, we combine the estimated coefficients for each of these services with firms' perceptions about the quality of their provision in Ethiopia, and simulate the productivity-impact of reforms that would make firms perceive the same level of service provided in comparator countries. For example, if Ethiopia's access to finance conditions were to match those of Rwanda, then firm labor productivity would increase by 4.3 percent, keeping all else equal. Similarly, if electricity conditions were to also match those of Rwanda, the labor productivity gains would be close to a 2.2 percent. Finally, matching China's transportation services would imply productivity gains of 4.2 percent.[64]

8.5 Reform Sequencing: Best Practice and Ethiopia's Experience

The analysis thus far has revealed the potentially substantial economic benefits to liberalization, but is silent about reform sequencing. Economic benefits seem particularly large for domestic finance, current and capital account reform (section 4) as well as reforms in telecommunications and transport services (section 5). If policy makers were interested in pursuing reform, what would be the best place to start? We address this question by examining the normative guidance derived from theoretical and empirical work.

According to 'interest group theory' countries should liberalize trade and the capital account simultaneously and prior to liberalizing the financial sector. Rajan and Zingales (2003) argue that incumbent firms in a closed economy benefit from lack of financial development because it denies potential new competitors the financial resources to enter the market. Liberalizing trade and opening the capital account also disturbs the status quo by exposing incumbents to external competition and by allowing domestic entrants to tap international capital markets. Trade openness would expose incumbent firms to more competition and induce them to tap domestic financial markets more to survive, leading to more financial repression. That would be the case unless capital markets were opened simultaneously, thereby allowing incumbents to tap international markets. If so, liberalization of the domestic financial sector would face less political opposition.

[64] These effects are calculated as the product of the change in the perception indicator needed to match the comparator's perception about the given service and the estimated coefficient of the effect of the perception about the given service on firms' performance. This is essentially similar to the benchmarking approached adopted in Section 4.

TABLE 8.7: International Best Practice Guidance on Reform Sequencing

Method	Political Economy	Economic Theory	Empirical Analysis	Empirical Analysis	Empirical Analysis
Metric	Reform progress	Efficiency/growth	Growth	Macro stability	As observed
Approach	Normative	Normative	Normative	Normative	Positive
Step 1	Trade and Capital	Trade	Trade		Trade
Step 2	Financial	Financial	Financial, Capital	Financial	Financial/Capital
Step 3		Capital		Capital	
Source	Rajan & Zingales (1993)	McKinnon (1973, 1991)	IMF (2007, 2008)	IMF (2008)	IMF (2008)

Source: Own Elaboration.
Note: 'Normative' refers to guidance as to the reform sequence countries should follow while 'positive' is an analysis of what reform sequence countries actually pursue in practice.

A more popular strand in the literature, the normative order of economic liberalization, offers additional insights. McKinnon (1973, 1991) effectively argues for the following sequencing of reforms: (1) trade liberalization, (2) domestic financial sector, (3) opening the capital account.[65] If trade liberalization preceded capital account opening then the resulting capital inflows would undermine competitiveness through real exchange rate appreciation while also resulting in capital flight. The domestic financial sector should also be liberalized before the external capital account, McKinnon argues. If not, capital inflows would lead to over-borrowing in foreign currency, which a dysfunctional domestic financial sector would misallocate, and capital outflows could erode the domestic deposit base.

Empirical analyses is generally quite supportive of McKinnon's theory. The data shows that most countries tend to liberalize trade as their first reform step. As a second step, countries either liberalize the domestic financial sector or the capital account in about equal frequency with a weak statistical tendency for financial reforms to come first (Hauner and Prati, 2008). What is the impact on growth of alternative reform sequences? The trade-first sequence is generally good for growth as a liberal trade regime is involved in both igniting growth and sustaining it. There is also empirical support for liberalizing trade before the capital account as this yields a more favorable growth outcome than the reverse sequence. A 'trade first' strategy is also better for growth than a 'big bang' approach of liberalizing all sectors at once. While there are no clear growth effects of alternative sequences, additional empirical results can be derived with respect to macroeconomic stability: a liberalized financial sector enjoys lower macroeconomic volatility and experience lower incidences of sudden stops. Moreover, volatility and crisis risks in capital open economies are higher when domestic financial sector liberalization is low, suggesting that the financial sector should be liberalized before the capital account (IMF, 2008).

Ethiopia's reform sequence thus far has been consistent with international best practice even if the country has been a slow reformer. Table 8.7 summarizes this guidance based on alternative approaches. Accordingly, trade liberalization was the logical first step for Ethiopia.

8.6 Reform Risks

Although there are economic benefits to reforms as well as an emerging consensus about their sequencing, policy makers are often concerned about risks. This section briefly discusses some of the reasons why policy makers may hesitate to pursue reforms.

[65] Note that only 'trade liberalization first' would be consistent with Rajan and Zingales (1993).

In general, resistance to reforms can be attributed to a number of factors inherent to the reform process itself. This includes: uncertainty about the benefits of reform; implementation costs of reforms are usually paid upfront while benefits take time to materialize, and; some regulations tend to create rents which are shared among the beneficiaries of the regulation. To implement reforms, the government also needs to create consensus among the different actors of the economy. Finally, reforms suffer from 'collective action' challenges as their cost is concentrated on relatively small and well-defined interest groups, while the benefits tend to be thinly spread over a much larger and less organized population (Olson, 1965).

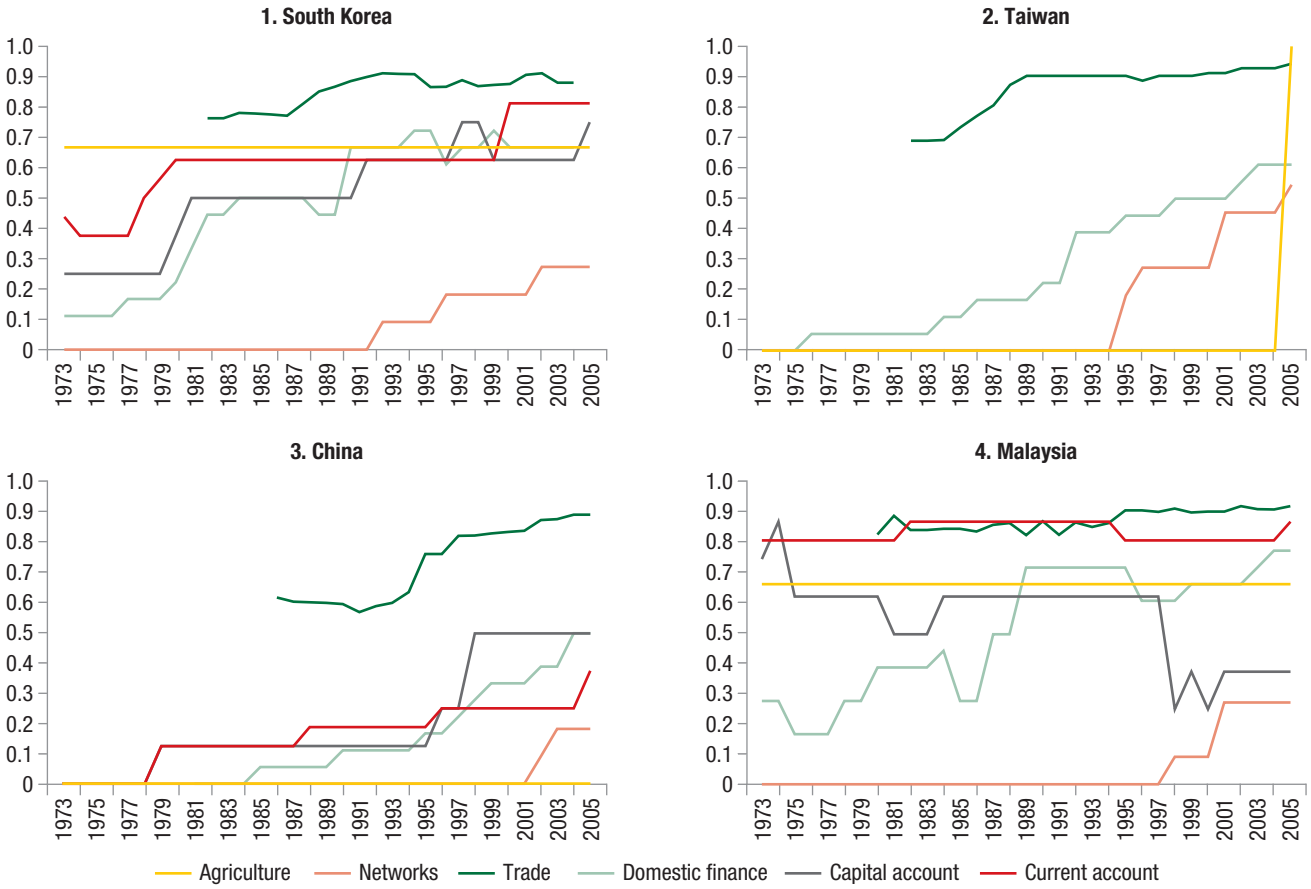
International experience with pursuing structural economic reforms also seem to be somewhat mixed, even if average long term net benefits are positive across countries. One way of interpreting the empirical results presented in the previous sections is to think of them as the average, long term effects of reform. Put differently, short term net benefits may be negative for some countries and not all countries necessarily achieve net benefits in the long term. Similarly, the emerging consensus around reform sequencing has developed on the basis of country experience and the lessons from the success and failures of early reformers. To illustrate, although financial liberalization reforms in Latin America in the 1980s were 'particularly painful' (Arestis and Demetriades, 1997), they eventually paved the way for robust financial institutions that successfully intermediated savings to support growth and were sufficiently robust to withstand the 2008/09 global financial crisis. Similarly, the 1997–99 East Asian financial crisis is often cited as the prime example for why countries need to be careful not to liberalize the capital account 'prematurely' (Stiglitz, 2000). While these experiences offer benefits to latecomers of reform, there is no guarantee that reforms will automatically bring strong positive net benefits to a country such as Ethiopia.

Putting in place an effective regulatory and supervisory framework is a pre-requisite to pursuing financial liberalization. Indeed, countries that strengthened their supervisory and regulatory frameworks prior to the introduction of liberalization fared better than those that liberalized first. The inadequate sequencing of reform measures had a lot to do with the disappointing results of liberalization in some countries. In the case of Ethiopia, it is often argued that the ability of the National Bank of Ethiopia (NBE) to regulate foreign banks and other financial institutions is limited. NBE may not be familiar with the services and products that foreign banks will bring with them and will therefore face difficulties in effectively supervising (partly or fully) foreign owned financial services providers (BKP, 2007).

In Ethiopia, potential reforms in the services sector would have negative implications for some SOEs and positive implications for consumers. Indeed, this is the expression of 'costs to a few and benefits to many', mentioned above. The potential introduction of more foreign competition in telecom, trade logistics or finance would reduce the market shares and profits of Ethio Telecom, ESLSE and CBE. At the same time, there would be benefits to millions of consumers in the form of lower prices and higher quality services. Government need not necessarily lose revenue as a result. In fact, it may earn more revenues from taxation and license fees of new entrants. Moreover, by preparing suitable regulation, Government can ensure that new entrants contribute substantially and meaningfully to social objectives such as serving rural or marginal customers. Similarly, there are many nuances to reform and designs can be identified that mitigate some of the risks. For instance, rather than posing a competitive threat to the domestic banking industry, regulation can be introduced that facilitates joint ventures between foreign and domestic banks with benefits to both sides.

Further detailed, sector-by-sector analysis would be needed if the Government were to be interested in re-initiating the reform agenda. Reforms in finance, telecom and trade logistics share common features, but obviously have their idiosyncratic features. Moreover, detailed studies already exist

FIGURE 8.4: Structural Reform Indices for East Asian Countries



Source: Own calculation's based on Prati *et al*. (2013).

for several of these sectors, although they may need to be updated (see BKP 2007 for an example in the financial sector). Such studies highlight the complexity and many nuances that need to be taken into account by policy makers. While the 'devil is in the detail', it is clear from their analysis that adequate reforms can be designed for a country such as Ethiopia in a way that maximizes potential benefits and minimize costs and risks.

In sum, Ethiopia would need to proceed thoughtfully and strategically if it is to reap the potential economic benefits of structural reforms. That said, the evidence and country experience is suggestive that the benefits of reform often outweigh their costs, but this is not to say that there are no risks involved nor that benefits are guaranteed.

8.7 *Quo Vadis* Ethiopia?

A good place to start embarking on reforms would be to complete the process of trade liberalization by also opening the services sectors to foreign firms. The analysis presented in Section 8.4 suggested that trade logistics and telecom reforms could be particularly beneficial to Ethiopian manufacturing firms. Domestic financial liberalization could be a useful subsequent step of the reform process, according to international best practice.

East Asian developmental states have also gradually moved towards market liberalization, although they did so at a slower pace and at a later stage of development. As discussed in Chapter 2, Ethiopia aims to pursue a developmental state

approach inspired by the experiences of the East Asian Tigers. This model involves considerable state intervention in the allocation of resources. Structural reforms often, but not always, implies the introduction of market-based mechanisms for resource allocation given that these are typically most efficient. This raises the question, then, of how the East Asia developmental states have progressed in terms of their structural reforms. Countries such as Korea, Malaysia and Taiwan, score quite highly in the reform indices developed by Prati et al. (2013). As illustrated in Figure 8.4, these countries tend to exhibit rising trends in all reform indices, reflecting increased liberalization efforts.[66] China, however, does not appear to be a big reformer in this data set though this is in contrast with received wisdom that sustained economic reforms were key to China's double digit growth acceleration that lasted for three decades (e.g. Knight and Ding, 2012). One potential explanation could be that several of China's reforms took place after the data set ends in 2006. In all cases, the resounding impression is that all countries seem to move towards gradually more liberalized markets, including the East Asian developmental states.

In light hereof, Ethiopia would eventually be expected to re-initiate its structural reform agenda. Ethiopia has been delaying a major reform effort for years, namely the process of joining the WTO and initiating the process of liberalizing its services sector. Our analysis of normative reform sequencing and country experiences leads us to conclude that i is exactly the right next step for Ethiopia to accede WTO and to make a credible services offer which is acceptable to WTO members. In doing so, Ethiopia would follow the trodden path of reform also followed by East Asian countries, which starts with trade liberalization and gradually embraces financial sector liberalization.

8.8 Growth Model Sustainability Monitoring

As policy makers are unlikely to initiate structural economic reforms in 'good times', it may be useful to keep an eye on when 'bad times' may be approaching. To that effect, in the subsequent and last section of the report, we propose a series of indicators that would be worth monitoring going forward. These indicators were designed to capture the many trade-offs that are embedded in the current growth strategy. At some point, we argue, the costs of pursuing the current policy would outweigh its benefits. E.g. the loss of competitiveness associated with an overvalued exchange rate would outweigh the benefits in the form of cheaper public capital imports. Policy makers would do well to anticipate such developments and act in time.

What would be the leading indicators that the current growth model is no longer sustainable? Even if Ethiopia has found a strong blue print to deliver economic growth, this blue print will have to evolve over time and adjust to circumstances. Indeed, what distinguishes successful countries from unsuccessful ones is their ability to adjust and adapt to evolving circumstances. How would policy makers in Ethiopia know that it is time to make such an adjustment? Ideally, adjustments would be made prior to the data showing a growth deceleration. In other words, we need not wait for the growth deceleration to come before policy action is taken.

The need to monitor the performance of Ethiopia's growth model arises from the presence of a number of policy trade-offs. Put differently, the model has both benefits and costs. As long as growth is promoted in a sustainable manner, the net benefits prevail. However, at some point the costs may be higher than the benefits and then it is time to change gear. For instance, publically financed infrastructure provision yields clear growth benefits, but has costs in terms of rising domestic and external debt as well as financial crowding out of the private sector. We consider each of these in turn as we propose a list of indicators to monitor (Table 8.8):

[66] The introduction of capital account restrictions in Malaysia in the mid-1990s is the only notable exception to this trends.

TABLE 8.8: Ethiopia Growth Model Sustainability Indicators

Main Indicator	Supplementary Indicators	Source
1. External Debt Sustainability	External risk of debt distress External debt to export ratio Sovereign risk premium Sovereign credit risk rating	IMF-WB DSA International bond markets Moody's, S&P, Fitch
2. Domestic public debt sustainability	Debt-to-GDP sensitivity analysis Nominal interest rate Inflation	IMF-WB DSA NBE CSA
3. External competitiveness	Real effective exchange rate Exports Trade and services balance Trade logistics performance FDI	IMF NBE NBE WB NBE
4. Private sector credit/forex shortage	Total outstanding private credit Black market premium Anecdotal evidence of shortage	NBE NBE
5. Marginal returns to public and private investment	Public and private investment Firm surveys	MOFED (National Accounts) WB Doing Business, WB Enterprise Surveys, Global Competitiveness Index, National Dialogue
6. Marginal cost of financing	Terms of external non-concessional loans	MOFED (Debt Directorate)
7. Inflation	Consumer prices Producer prices Nominal wages	CSA CSA CSA
8. Government recurrent spending	Capital and recurrent spending Operations and maintenance Public wage bill (real terms)	MOFED
9. Domestic resources mobilization	M2/GDP Domestic credit to GDP Domestic revenue to GDP	NBE NBE MOFED
10. Corruption	Corruption perception indices Anecdotal evidence	World Governance Indicators Transparency International Mo Ibrahim

i. **External Public Debt Sustainability.** The annual joint IMF-World Bank Debt Sustainability Assessment (DSA) offers insights into this indicator. Following HIPC and MDRI debt relief, Ethiopia's debt burden diminished considerably. To illustrate, the external risk of debt distress rating was classified as 'low' in the years 2011–13. However, in recent years, the authorities have increasingly resorted to external non-concessional borrowing to finance infrastructure investments. At the same time export growth started to slow down substantially. As a consequence, the risk rating was labelled 'low on the cusp to moderate' in 2014, and in 2015, the risk rating was downgraded to 'moderate'. The rising imbalance between the level of external debt and the poor export performance is a potential vulnerability that deserves careful monitoring, especially the Present Value (PV) of external debt-to-exports indicator.

ii. **Domestic Public Debt Sustainability.** The Joint IMF-Bank DSA also provides a good overview of public debt sustainability. While public debt is currently sustainable, this assessment is based on nominal interest rates on public sector borrowing remaining significantly below inflation. With inflation projected to remain at a single-digit level, under current policies interest rates on SOEs' domestic borrowing would be at negative real interest rate. Ethiopia's relatively benign public sector debt outlook hinges strongly on the continuation of these financing conditions. If the actual cost of borrowing were to rise above inflation, the debt indicators would worsen or fiscal adjustment would be required to maintain sustainability.

iii. **External competitiveness and the real exchange rate.** As explained earlier, Ethiopia has a policy preference for maintaining a strong real exchange rate. One important benefit hereof is that public capital imports are cheapened. The drawback of a strong currency, however, is that it affects export performance and the trade balance. Exports of goods and services have performed poorly over the past 3 years (FY13-FY15) hardly registering any growth compared with a normal annual growth rate of 20 percent. While the main culprit is lower international commodity prices, the real exchange rate also has an important impact on exports. Haile (2015) estimates that a 1 percent real devaluation would increase exports by half a percentage points. The effect is higher for manufacturing 1 percentage point than for agriculture 1/3 percentage points. Obviously, there are many other ways to promote exports (see World Bank, 2013), but the bottom line is that exports, trade balance, the real exchange rate, the black market premium are indicators to watch.

iv. **Private sector credit and forex shortage.** In light of the rationing of credit and foreign exchange in favor of public infrastructure projects, it is clear that the private sector is constrained. By monitoring the total outstanding credit by major sector, the government can keep an eye on the degree of crowding out in the financial markets. The shortage of forex is fluctuating over the year and the best two indicators would be: (a) the forex black market premium, and; (b) evidence from firms expressing that they lack forex or credit (see below).

v. **Marginal returns to public and private investment.** In an optimum, we would want to make sure that the marginal return to private investment is equal to the marginal return to public investment (Eden and Kray, 2014). As public infrastructure investment increases, it is reasonable to expect that their marginal benefits decline. But how would we know this in practice? A key problem is that two effects are conflated: (1) the short-term economic activity effect affecting aggregate demand in any given year; (2) the long-term effect of enhanced private sector productivity because of better infrastructure. It's the second effect we are interested in, but we don't have any hard data. On the flip side we are interested in the marginal return to private investment. Again, in the absence of hard data, we could analyze the constraints of doing business to gauge whether credit and forex is mention as bigger problems than public infrastructure shortages. There are four sources with alternative frequencies: DB, CGI, national consultations, and Enterprise survey data.

vi. **Marginal cost of financing.** In optimum, public investment should be financed as long as the marginal benefits equal the cost of financing (Eden and Kraay, 2014). In the absence of reliable information about the benefits of public investment, policy makers could monitor the external cost of financing. External non-concessional financing is arguably a good indicator of the marginal cost of financing. Arguably, the probability that the optimality condition holds is declining in the marginal cost of financing. In other words, the risks that public projects receive financing when they should not have been financed increases as the marginal financing cost increases.

vii. **Inflation.** There are several reasons to consider this indicator. From a macroeconomic perspective, it is clear that Ethiopia's growth model is supported by expansionary fiscal and monetary policies. Moreover, economic activity is very high. In this environment, we would also expect relatively high inflation rates. A model based on high public investment may also run into challenges associated with absorptive capacity constraints. High demand for construction services and material may drive up domestic prices and wages and hence induce inflation. High inflation has a number of economic disadvantages and is also a variable that directly affects the well-being of the population.

viii. **Recurrent government spending.** Ethiopia benefitted from keeping government consumption low as this created fiscal space to finance public investment. What government needs to make sure, however, is that public employment is adequately remunerated. While studies suggest that real civil servant salaries have declined over the decade (World Bank, 2015d) they also suggest that public employment is a good proposition for most urban workers (World Bank, 2015a). Still, experience from other countries suggest that corruptive practices are associated with low public sector remuneration. In addition, it is critical that government sets enough money aside for operations and maintenance. O&M helps preserve the value of the initial investment and it can become very costly if infrastructure facilities need to be re-built because they have not been properly maintained.

ix. **Domestic resources mobilization (savings and taxes).** Ethiopia maintains a low deposit real interest rate. This may explain the demonetization trend observed over the past decade where broad money and total outstanding credit have declined substantially as a share of GDP. In such an environment there is less money for both public and private investment. In addition, government revenue as a share of GDP has remained at low levels, although government has been able to finance public investment through implicit revenues arising from seignorage and financial repression. Raising savings rates and high tax revenues are critical to support the sustainability of the growth model.

x. **Governance and corruption.** Ethiopia does relatively well on indicators of corruption, including the World Wide Governance indicators. However, since construction is an activity which is inherently associated with corruption and Ethiopia is constructing more than even, it is reasonable to assume that challenges of corruption are rising. Indeed, this trend is consistent with anecdotal evidence. Corruption is a hard indicator to monitor in practice. In addition to relying on international indices, such as Transparency International and Mo Ibrahim indices, one would also need to rely on records of the Anti-Government Commission as well as anecdotal and evidence.

Annex 8.1 Methodology for Estimating Growth Impact of Reforms

We use the cross-country growth regression model in Prati *et al.* (2013). It examines the association between structural reforms and economic growth and takes the following form:

$$\Delta y_{i,t} = \beta_0 y_{i,t-1} + \beta_1 reform_{i,t-1} + \theta X_{i,t-1} + \eta_i + \nu_i + \varepsilon_{it} \quad (1)$$

where the subscripts i and t denote country and year respectively; $y_{i,t}$ is the log of real GDP per capita of country i at time t, hence the difference $\Delta y_{i,t}$ represents the annual growth rate of per capita income; $y_{i,t-1}$ stands for one-period lagged GDP per capita, with β_0 measuring the speed of convergence in income per capita across countries; $reform_{i,t-1}$ represents the indicators of structural reforms in the real and financial sectors; β_1 is the key parameter of interest and captures the effect of reforms on GDP per capita growth; $X_{i,t}$ is a vector comprising a set of control variables that may affect both $\Delta y_{i,t}$ and $reform_{i,t-1}$; η_i is a set of country fixed effects accounting for unobserved country-specific and time-invariant factors (such as geographical location, historical legacies, and legal origins) that may have significant bearing on both the introduction of reforms and economic growth; υ_i is a vector of time dummies capturing universal time trends; and finally, represents the error term. The analysis is based on data for more than ninety developed and developing countries covering the period 1973–2006.

The simulated growth impact of alternative values of the reform indices corresponding to the benchmark countries can be computed based on the following equation:

$$\underbrace{\Delta y_{i,t}^{bc} - \Delta y_{i,t}^{Eth}}_{growth\ payoff} = \delta_0 y_{i,t-1}^{Eth} + \delta_1 \underbrace{\left(reform_{i,t-1}^{bc} - reform_{i,t-1}^{Eth}\right)}_{reform\ gap} + \prod X_{i,t-1}^{Eth} + \eta_i + \nu_i + \varepsilon_{it}$$

where $\Delta y_{i,t}^{bc}$ is the annual growth rate of GDP per capita obtained based on the average value of the benchmark country's reform index, with bc denoting benchmark country; $\Delta y_{i,t}^{Eth}$ represents the annual GDP per capita growth derived using the average value of the reform index for Ethiopia; $reform_{i,t-1}^{Eth}$ and $reform_{i,t-1}^{bc}$ stand for the average values of the reform indices for Ethiopia and the benchmark country, respectively; *reform gap* is thus the gap in the average levels of sectoral reforms between the comparator country and Ethiopia; *growth payoff* is the change in GDP per capita growth associated with closing the aforementioned reform gap; and the remaining variables are as defined previously. Equation (2) shows that *ceteris paribus* the growth payoff from closing the reform gaps with the benchmark country is given by the product of the reform gap and the estimated coefficient $\hat{\delta}_1$.

Annex 8.2 Robustness Checks

In this section, we run a wide array of robustness checks to test the validity of our baseline findings. The sensitivity analysis is performed based on the original model of Prati et al. (2013), who also conduct several econometric exercises to investigate the robustness of their main results.

We first re-estimate the baseline regressions using the GMM estimator proposed by Arellano and Bond (1991).[67] This more or less circumvents the inconsistency of fixed-effect OLS estimates arising from the correlation between the lagged dependent variable and the lagged error term.[68] The simulation results based on the GMM estimates are reported in Annex Table A.1.[69] We note that the potential growth effects of closing reform gaps are qualitatively similar to the baseline outcomes, although the latter are in most cases quantitatively larger. This is to be expected as the GMM regressions, unlike the baseline specifications which examine the association between reforms and GDP per capita growth, look at the effects of reforms on GDP per capita.

Next we check that omitted variables are not biasing our results. We compute the predicted growth effects based on a regression that includes additional set of time-varying control variables: political institutions (proxied by the Polity IV indicator of democracy), terms of trade, and tertiary educational attainment. Annex Table A2 shows that the results are more or less in line with our previous findings. However, the sign of the coefficient for reforms in the networks sector (as well as the separate indices for reforms of the electricity and telecommunications sectors) turns out to be negative, which seems counterintuitive, albeit still statistically insignificant.

Another cause for concern is that the empirical results on the reform-growth nexus are heterogeneous across different time periods. Thus, Annex Tables 3 and 4 report the predicted growth effects for the periods 1973–89 and 1990–2006, which supposedly represent homogenous periods as most of the countries in our sample implemented major structural reforms in the 1990s and early 2000s. Overall, the main results for the full sample generally hold for the subsamples as well.

Finally, we conduced some sensitivity tests (not reported here). These indicate that the predicted growth impacts of reforms based on coefficient estimates from a regression that includes only emerging and developing economies are generally consistent with our baseline findings. Further, the main findings generally prove robust to using three- and five-year interval data instead of employing annual data, which are often considered to be prone to measurement error.

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[67] Note in passing, however, that the Arellano and Bond (1991) first-differenced GMM estimator may suffer from large finite-sample biases and poor precision when the time series are persistent. In such cases, the lagged levels of the series are weakly correlated with the lagged first differences, thereby making the instruments for the first-differenced equations weak (Blundell and Bond, 1998).

[68] For fixed N, OLS estimates are consistent only for $T \to \infty$. Although the number of time periods in our sample is not too small, the persistence of the lagged dependent variable can still render fixed-OLS estimates inconsistent (Wooldridge, 2010).

[69] Note that Equation (1) was rearranged before applying the GMM estimator. More specifically, the baseline specification is rewritten as a dynamic model where the lagged dependent variable appears in the right-hand-side of the equation:

$$y_{i,t} = \alpha_0 y_{i,t-1} + \alpha_1 reform_{i,t-1} + \theta X_{i,t-1} + \eta_i + v_i + \varepsilon_{it}, \text{ where } \alpha_0 = 1 + \beta_0.$$

TABLE A8.2.1: GMM Regression: Coefficient Estimates and Growth Impact of Reforms

Structural Reforms	Coefficient estimates*	Predicted effect on real GDP per capita, growth rate (%)						
		Uganda	Tanzania	Sri Lanka	Ghana	SSA	LIC	LMI
Real sectors								
Trade	0.031	0.33	0.23	0.48	0.29	0.26	0.20	0.24
Current account	0.054	3.04	1.69	1.41	1.13	1.22	1.32	1.28
Agriculture	0.055	3.67	1.83	1.83	0.00	1.02	0.72	0.44
Network	0.001	0.05	0.01	0.01	0.05	0.02	0.01	0.01
Electricity	0.018	1.07	0.06	0.47	1.42	0.59	0.21	0.19
Telecom	–0.014	–0.48	–0.28	0.00	–0.48	–0.16	–0.13	–0.05
Financial sectors								
Domestic finance	0.116	3.65	5.16	3.97	1.93	2.45	3.49	2.74
Banking	0.095	4.01	5.07	3.69	1.69	2.47	3.56	2.87
Securities	0.07	–1.56	0.00	0.78	0.78	–0.26	–0.51	–0.66
Capital account (CA)	0.037	2.78	0.46	0.93	0.46	1.30	1.24	0.97
CA (resident)	0.034	2.55	0.00	0.00	0.00	1.03	1.02	0.72
CA (nonresident)	0.024	1.80	0.60	1.20	0.60	1.05	0.93	0.71

Source: Author's computation based on data from Prati *et al*. (2013).
Note: Coefficient estimates obtained from regressing GDP per capita growth on lagged GDP per capita and the reform indices one at a time. All estimated coefficients are based on the Arellano and Bond (1991) first-differenced GMM estimator. Two and more lags of the independent variables are used as instruments. The figures in the last seven columns are in percentage points and represent the growth payoffs from closing the reform gaps between Ethiopia and the benchmark country in the second row.

TABLE A8.2.2: Control Variable Check: Coefficient Estimates and Growth Impact

Structural Reforms	Coefficient estimates*	Predicted effect on real GDP per capita, growth rate (%)						
		Uganda	Tanzania	Sri Lanka	Ghana	SSA	LI	LMI
Real sectors								
Trade	0.021	0.22	0.15	0.33	0.19	0.17	0.14	0.16
Current account	0.034	1.91	1.06	0.89	0.71	0.77	0.83	0.81
Agriculture	0.024	1.60	0.80	0.80	0.00	0.44	0.31	0.19
Network	–0.009	–0.41	–0.11	–0.11	–0.49	–0.20	–0.09	–0.06
Electricity	–0.001	–0.08	0.00	–0.04	–0.11	–0.05	–0.02	–0.02
Telecom	–0.013	–0.42	–0.25	0.00	–0.42	–0.14	–0.11	–0.05
Financial sectors								
Domestic finance	0.060	1.89	2.67	2.06	1.00	1.27	1.80	1.42
Banking	0.046	1.94	2.45	1.79	0.82	1.20	1.73	1.39
Securities	0.035	–0.78	0.00	0.39	0.39	–0.13	–0.25	–0.33
Capital account (CA)	0.022	1.65	0.28	0.55	0.28	0.78	0.74	0.58
CA (resident)	0.017	1.28	0.00	0.00	0.00	0.51	0.51	0.36
CA (nonresident)	0.016	1.20	0.40	0.80	0.40	0.70	0.62	0.48

Source: Author's computation based on data from Prati *et al*. (2013).
*Coefficient estimates obtained from regressing GDP per capita growth on lagged GDP per capita and the reform indices one at a time. The figures in the last seven columns are in percentage points and represent the growth payoffs from closing reform gaps between Ethiopia and the respective benchmark countries in the second row.

TABLE A8.2.3: Coefficient Estimates and Potential Growth Impact (1973–1989)

Structural reforms	Coefficient estimates*	Predicted effect on real GDP per capita, growth rate (%)						
		Uganda	Tanzania	Sri Lanka	Ghana	SSA	LIC	LMIC
Real sectors								
Trade	0.022	0.23	0.16	0.34	0.20	0.15	0.17	0.18
Current account	0.051	2.87	1.59	1.33	1.06	1.25	1.21	1.16
Agriculture	0.002	0.13	0.07	0.07	0.00	0.03	0.02	0.04
Network	0.102	4.64	1.24	1.24	5.56	1.03	0.68	2.24
Electricity	0.065	3.91	0.22	1.74	5.22	0.78	0.69	2.18
Telecom	0.062	2.07	1.21	0.00	2.07	0.54	0.22	0.70
Financial sectors								
Domestic finance	0.053	1.67	2.36	1.82	0.88	1.59	1.25	1.12
Banking	0.043	1.82	2.29	1.67	0.76	1.61	1.30	1.12
Securities	0.032	–0.71	0.00	0.36	0.36	–0.23	–0.30	–0.12
Capital acct. (CA)	0.054	4.05	0.68	1.35	0.68	1.81	1.41	1.90
CA (resident)	0.038	2.85	0.00	0.00	0.00	1.14	0.80	1.15
CA (nonresident)	0.037	2.78	0.93	1.85	0.93	1.44	1.10	1.63

Source: Author's computation based on data from Prati *et al*. (2013).
Notes: SSA, Sub-Saharan Africa; LIC, Low-income countries; LMIC, Lower-middle-income countries. *Coefficient estimates obtained from regressing GDP per capita growth on lagged GDP per capita and the reforms indices one at a time. The figures in the last seven columns are in percentage points and represent the growth payoffs from closing the reform gaps between Ethiopia and the respective benchmark countries in the second row.

TABLE A8.2.4: Coefficient Estimates and Potential Growth Impact (1990–2006)

Structural reforms	Coefficient estimates*	Predicted effect on real GDP per capita, growth rate (%)						
		Uganda	Tanzania	Sri Lanka	Ghana	SSA	LIC	LMIC
Real sectors								
Trade	0.022	0.19	0.13	0.28	0.17	0.12	0.14	0.15
Current account	0.051	2.19	1.22	1.02	0.81	0.96	0.93	0.88
Agriculture	0.002	3.13	1.57	1.57	0.00	0.61	0.38	0.87
Network	0.102	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.065	0.39	0.02	0.17	0.52	0.08	0.07	0.22
Telecom	0.062	–0.19	–0.11	0.00	–0.19	–0.05	–0.02	–0.07
Financial sectors								
Domestic finance	0.053	3.90	5.51	4.25	2.07	3.73	2.93	2.62
Banking	0.043	4.10	5.17	3.77	1.72	3.64	2.93	2.53
Securities	0.032	–1.40	0.00	0.70	0.70	–0.46	–0.60	–0.23
Capital acct. (CA)	0.054	1.28	0.21	0.43	0.21	0.57	0.44	0.60
CA (resident)	0.038	1.35	0.00	0.00	0.00	0.54	0.38	0.54
CA (nonresident)	0.037	0.15	0.05	0.10	0.05	0.08	0.06	0.09

Source: Author's computation based on data from Prati *et al*. (2013).
Notes: SSA, Sub-Saharan Africa; LIC, Low-income countries; LMIC, Lower-middle-income countries. *Coefficient estimates obtained from regressing GDP per capita growth on lagged GDP per capita and the reform indices one at a time. The figures in the last seven columns are in percentage points and represent the growth payoffs from closing the reform gaps between Ethiopia and the respective benchmark countries in the second row.

Annex 8.3 Estimating the Impact of Services Inputs Quality on Firms' Productivity

How does access to quality services inputs affect firms' performance? Answering this question requires access to a dataset on the basis of which we can obtain comparable measures of quality services input provision and of firms' performance. Then, it is necessary to test whether a systematic relationship exists between the two. Our approach follows that of Arnold, Mattoo and Narciso (2006).

The dataset comes from the World Bank Enterprise Surveys. Data from these surveys are available for a cross-section of firms from 188 country-year combinations (127 countries are surveyed, with some countries being surveyed in more than one year, of which 42 are African countries (including Ethiopia)). The surveys were undertaken between 2006 and 2013.

The measure of firm performance chosen is productivity. We use three alternative measures: (i) labor productivity (the ratio of output to total labor costs), (ii) total factor productivity (TFP) estimated in two as a residual of a Cobb-Douglas production function, with output as a function of the capital stock, labor and intermediate inputs; and (iii) TFP estimated as a residual from a translog specification in which output is expressed as a function of the capital stock, labor, intermediate inputs and their squared terms, and their cross-products.

The performance of services sectors is also obtained from the Enterprise Surveys. We used subjective measures of local services performance, which are firms' valuations as to how much of a constraint they consider electricity, telecommunications, transport, and access to finance for their businesses. Firms are asked to select, on a scale from 0 to 4, whether they consider each of these dimensions to be not an obstacle for their operations (0), a minor obstacle (1), a moderate obstacle (2), major obstacle (3) and severe obstacle (4).

The empirical strategy consists in regressing the measure of productivity on measures of the performance of services, controlling for factors relevant for firm performance. Factors typically identified in the literature include firm's export status, firm's size, and firm's age. In addition, we control for country-year fixed effects, to eliminate the potential of distortions due to changes in the relative values of the different currencies in which output, wages, intermediates and capital stock are expressed and to eliminate the effect of country-year unobservables that may affect both productivity and the perception of services' quality, as well as sector fixed effects to control for time-invariant and sector-specific unobservables.

Concerns about endogeneity arise because it is possible that poor performance affects firms' perceptions about the obstacles that services input provision represent. This would imply a bias upwards in the coefficient linking services performance with productivity. This makes a specification that links firm-level perceptions of services quality with firm-level productivity inappropriate. Our strategy, following Arnold et al (2006) consists in aggregating the individual firm's responses to the services-related questions on the right hand side at the regional level, within each country. This reduces the influence that an individual firm's performance has on the regressor. In addition, it is likely to better summarize the quality provision of services in a given region.

The chosen specification is as follows:

$$\mu_i = \alpha_{ct} + \gamma_s + \beta ServPerformance_r + \pi X_i + \varepsilon_i \qquad (1)$$

where μ is the indicator of productivity (labor productivity, residual from Cobb Douglas or residual from translog), α is a country-year fixed effect, is a sector fixed effect, ServPerformance is a vector of perception based indicators of obstacles represented by access to finance, electricity, transport, and telecommunications, that vary at the regional level, X is a vector of controls varying at the firm level, and ε is an error term assumed orthogonal to the regressors.

We focus on the impact on domestic firms, so all regressions are estimated on a sample of

domestic-owned firms or firms with less than 10% of foreign ownership. Results are presented for the entire cross-section of countries (188), and for the set of African countries, including Ethiopia (42). Specific models for Ethiopia were not fitted due to the insufficient size of the sample.

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