



NAMIBIA

SELECTED ISSUES

February 2014

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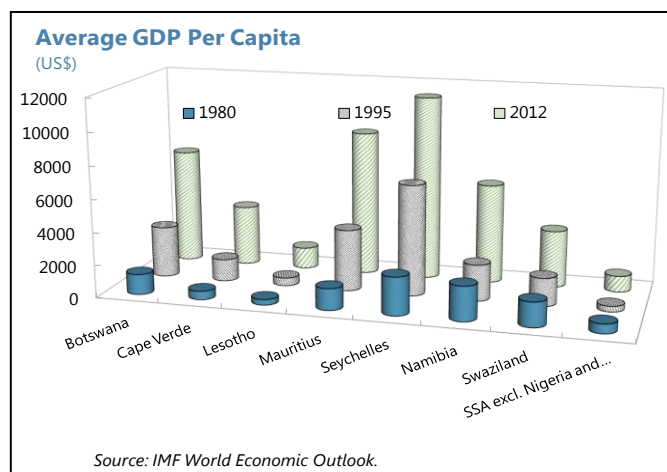
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POLICIES THAT CAN RAISE POTENTIAL GROWTH IN SMALL MIDDLE-INCOME-COUNTRIES OF SSA

Many small middle-income countries (SMICs) in sub-Saharan Africa (SSA) have experienced a moderation in trend growth in recent years in a volatile and an uncertain external environment. Although factor accumulation, most notably capital deepening, was crucial to the success of many SMICs historically, this growth model appears to have run its course. The analysis in this chapter suggests that the decline in the contribution of total factor productivity (TFP) to growth is largely responsible for the slowdown in trend growth in many SMICs, which highlights the need for policy actions to reinvigorate productivity growth. The chapter explores the question of what kind of structural policies could boost productivity growth in SMICs, including Namibia, and the political-economy factors that may be contributing to the slow implementation of these critical reforms in these countries. The findings suggest that although macroeconomic stability and trade openness are necessary for productivity growth, they are not sufficient. SMICs need to improve the quality of their public spending, most notably on education to minimize the skill mismatch in the labor market, reduce the regulatory burden on firms, improve access to finance by small and medium-sized enterprises and create the enabling environment to facilitate structural transformation in these economies. Given the short-term cost of these reforms, the timing and sequencing of reforms and, the role of quick wins is important in implementing reforms. In some case, a social bargain can be a mechanism to generate consensus around a package of mutually reinforcing reforms.

A. Introduction

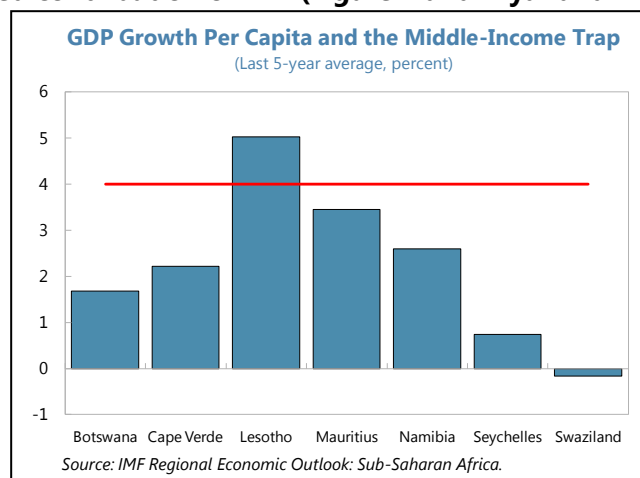
1. Prudent macroeconomic management and improved institutional settings in many of the SMICs in SSA delivered impressive economic performance in the last few decades.¹ A prolonged period of strong growth has raised overall incomes and delivered good economic outcomes. GDP per capita of SMICs of SSA on average increased by more than 5 times over the last 30 years compared to only 1.7 times increase for the SSA average excluding South Africa and



¹ The following SMICs are included in the analysis of this chapter: Botswana, Cape Verde, Lesotho, Mauritius, Namibia, Seychelles, and Swaziland.

Nigeria (text chart on page 3). The governments of these countries have generally been effective in addressing the countries' development challenges, including narrowing the infrastructure gap and facilitating access to education and health.

2. However, in many of the SMICs, as in middle-income countries in other regions, growth rates are slowing, reflecting reduced contribution of TFP (Figure 1 and Aiyar and others (2013)). Per capital real GDP growth for most of these countries has fallen short of the 4 percent average needed to escape from the so called "Middle-Income-Trap" (text chart).² The growth moderation in many of these countries reflects the slowdown in the contribution of TFP to growth that has reduced their potential to graduate from middle-income status into high income status. This highlights the importance of SSA MICs reinvigorating policies to boost TFP growth.



3. This chapter thus focuses on identifying policy reforms that would increase productivity growth—a key driver of long-term growth prospects.³ The paper explores policy options that could boost productivity growth in SSA MICs based on the analysis of the role of productivity in the growth dynamics of these countries using a cross-country study. The chapter adds to the existing growth literature in two ways: (i) it looks not only at the level of education but at its quality by introducing the index of skill-mismatch as an indicator explaining TFP growth and (ii) looks at the impact of macro-stability friendly forms of financial inclusion on productivity growth.

4. Our analysis suggests that structural reforms are needed to foster TFP growth and to accelerate convergence to higher income levels. In particular, boosting productivity growth would require reforms in the banking sector, reducing regulatory barriers on firms, improving the quality of public spending most notably on secondary and tertiary education to reduce skill mismatch, alleviating infrastructure bottlenecks, deepening capital markets, and investing in research and development and new technologies. In addition we find that there is a limit on how

² For more detail see J. Felipe, 2012, "Tracking the Middle-Income Trap: What is It, Who is in It, and Why?" Asian Development Bank.

³ While the paper does not formally test the role of exchange rate regimes, the stylized facts suggest that exchange rate regimes do not play a discernible role on the evolution of growth, which is broadly consistent with the body of work in the literature stating that by and large the exchange rate regime by itself does not determine economic outcomes (see for example the recent Fund paper by J. G. Stotsky et al (2012)).

much the government can close the infrastructure gap by borrowing, because after a certain threshold, government debt's marginal impact on productivity growth becomes negative.

5. The chapter also touches on the question of the political economy considerations in the implementation of structural reforms. The implementation of structural reform is not an easy task in any country. Up-front economic and political costs—including lower growth, redistribution of income, frictional unemployment⁴, and the erosion of oligopoly rents—means there is usually a strong constituency of stakeholders that favor the status quo since they stand to lose from structural reforms. Creative solutions must be found in SMICs to overcome these obstacles.

6. The rest of the chapter is organized as follows: Section B provides the literature review; Section C discusses stylized facts; Section D presents the empirical analysis; and Section E discusses the conclusions and the policy implications for SMICs and future areas of research.

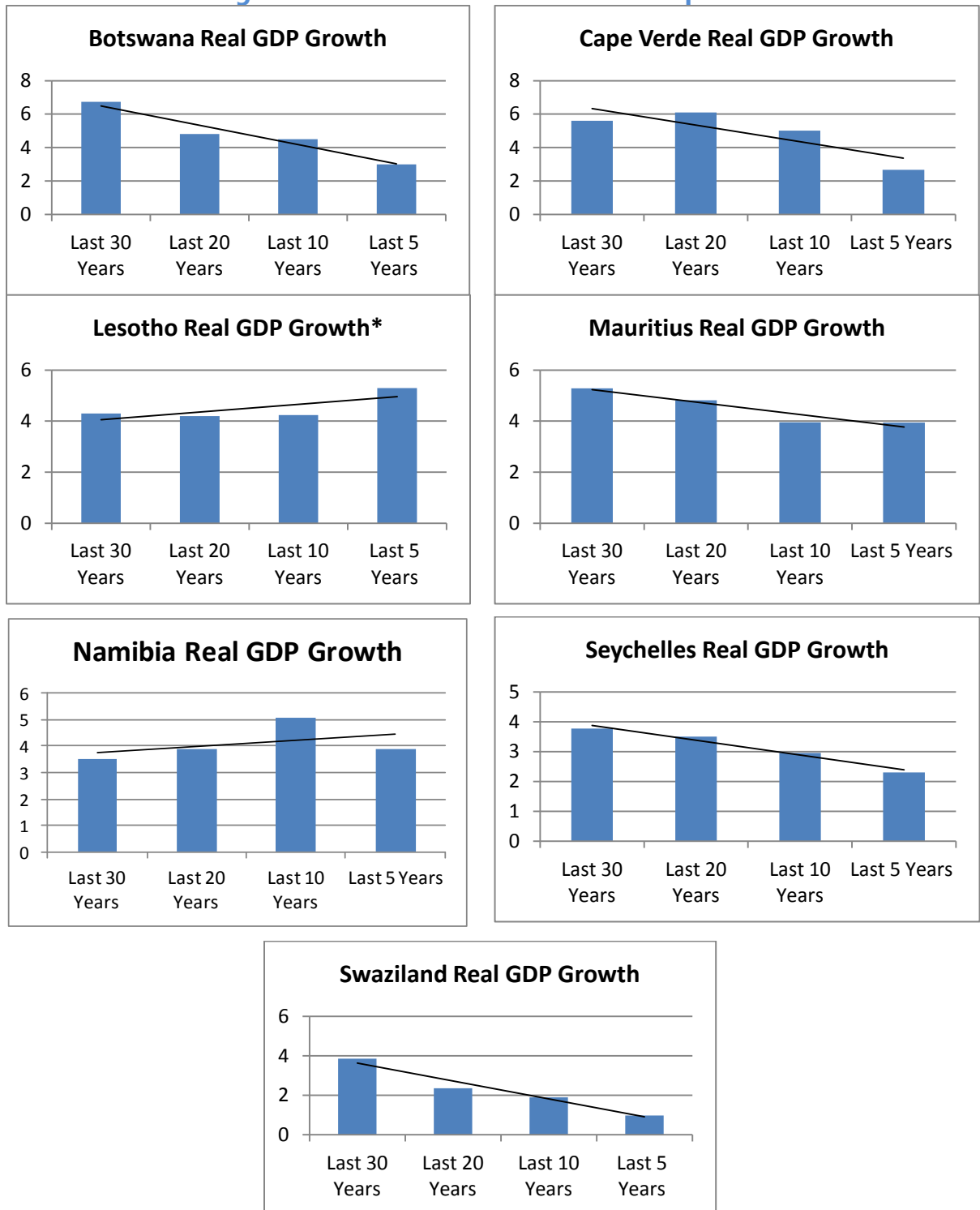
B. Literature Review: Determinants of Total Factor Productivity

7. This section reviews the main determinants of TFP from the relevant literature. TFP is related to economic growth through improvement in resource allocation, innovation, and productivity of each of the factor inputs, providing an opportunity to grow more efficiently and sustainably in the long run. Based on the existing theoretical and empirical literature, a number of determinants have an impact on TFP's contribution to growth. These determinants of TFP can be summarized into several conceptual variables as follows.

8. Macroeconomic variables: A number of macroeconomic factors could play a role in determining the TFP and its growth as they may influence both input use and allocative efficiency. The two macroeconomic variables often discussed in the literature are inflation and size of government. The relationship between inflation and productivity growth is found to be negative in a number of cross-country empirical studies (see for example, Fischer (1993); De Gregorio (1993); Ghosh and Phillips (1998); Loko and Diouf (2009); Espinoza (2012); and Barro (2013)). While the role of government is potentially an important factor in growth performance, the relationship between these two variables remains ambiguous. The size of the public sector can both foster and hinder productivity growth (Ranis, 1989). Provision of basic public goods and economic infrastructure would enhance overall productivity (Ghali, 1999). On the other hand, a number of studies point to the negative effect of government spending on economic growth, owing to government inefficiencies and low quality of public spending (see for instance, Barro, (1991); Sala-i-Martin, Doppelhofer, and Miller, (2004); Loko and Diouf, (2009), Danquah, Moral-Benito, and Outtara, (2013)).

⁴ Frictional unemployment is when workers leave their jobs to find better ones. It is usually thought of as a voluntary exit, but can also occur as a result of a layoff or termination with cause. The time, effort and expense it takes to find these new jobs is known as friction.

Figure 1. SMICs in SSA: Growth Development



* As a new entrant into the SMIC group, Lesotho's relatively strong growth pattern in recent years probably reflects a base effect that other more established SMICs have also experienced. In addition, strong performance in the diamond and textiles sectors, which benefited from a favorable external environment and preferential trade treatment also helped. Over time, one would expect the convergence process to set in, which will likely lead to the growth slowdown pattern seen in the other SMICs.

Source: IMF World Economic Outlook.

Figure 2. SSA SMICs' Growth Decomposition



Source: Penn World Tables and IMF staff calculations.

1/ We used the human-capital augmented growth accounting framework to derive the contribution of total factor productivity to growth.

- 9. Openness and technology creation and transfer:** Openness to the world economy is another important factor explaining total factor productivity growth. Trade openness increases international contacts and can be a source of learning—as technology is often embodied in goods (Lewis, 1979; Grossman and Helpman, 1993; Sachs and Warner, 1995; Sala-i-Martin et al, 2004; and Dollar and Kraay, 2004). FDI is also a key channel for the transfer of advanced technology and research and development (R&D) knowledge from industrialized to developing countries. In addition, Loko and Diouf (2009) emphasized that the level of FDI reflects the macroeconomic environment of a country.
- 10. Quality of labor input and efficient allocation:** An increase in human capital base can have a positive impact on TFP growth by facilitating structural change and technological improvement (Romer, 1990; Barro, 2001). In addition, human capital can help to absorb positive externalities from international trade and FDI (Loko and Diouf, 2009). The gaps between the supply of and demand for skills could account for the decline in TFP growth (Acemoglu and Zilibotti, 2001).
- 11. Female labor force participation:** Higher labor force participation, particularly among women, may increase TFP growth if technological progress and the female labor force are complementary (Galor and Weil, 2000; and Madsen and Ang, 2013). However, some of these show that the impact of increased female labor force participation on productivity growth is likely to be concave and decline over time (McGuckin and Van Ark, 2005).
- 12. Sectoral composition and structural change:** Many studies address the importance of structural change, captured by sectoral production or sectoral employment, in determining TFP growth. A transition from concentration in less productive to more productive sectors would positively affect aggregate productivity growth (Lewis, 1954; Ranis and Fei, 1961). While most of the literature finds a positive relationship between structural change and TFP growth at the cross-country level (see for example, Poirson (2000); Jaumotte and Spatafora (2007); Loko and Diouf (2009)), some specific country studies show ambiguous results owing to the pre-conditions on market institution, openness, and labor market mobility (Lu, 2002). A less diversified economy could portend risk and vulnerability, which will in turn undermine TFP growth.
- 13. Monetary and financial development:** The positive impact of financial sector development on productivity has been well documented (see for instance, Roubini and Sala-i-Martin, (1992); King and Levine, 1993; and Aghion, Howitt and Mayer-Foulkes, 2005). The main intuition is that financial markets enhance productivity through efficient capital reallocation and that financial development also brings in technological innovation.
- 14. Institutional and regulatory factors:** Many recent papers have shown that institutional factors can enhance productivity growth by ensuring resource reallocation efficiency and encouraging a good economic environment for investment, (see for example, Hall and Jones (1999); Acemoglu, Johnson and Robinson (2004); Glaeser and others (2004); Acemoglu and Johnson (2003); Easterly (2006)).

The table below presents a summary of the key influential factors from the literature and the variables, which will be used in the qualitative and quantitative analyses of this chapter.

Summary of TFP Determinants and Variables Used in SMICs Analysis	
TFP determinants from the literature	Variables
1. Macroeconomic conditions	Inflation, government debt, public employment
2. Openness, and technology creation and transfer	Trade, FDI, R&D, infrastructure
3. Quality of labor inputs and efficient allocation	Years of schooling, skill mismatch
4. Female labor force participation	Female labor force participation rate
5. Sectoral composition and structural change	Sector shares of output, economic diversification
6. Monetary and financial development	credit, market capitalization
7. Institution and regulatory factors	Labor and business regulation indices, doing business indicators, income inequality,

C. Stylized Facts

15. This section presents the stylized facts on the factors that could explain the evolution of TFP in SMICs. Although these economies have made strides towards upgrading their infrastructure networks and attracting FDI, the relative lack of diversification of their production and trade base has often increased their vulnerability to external shocks such as oil price hikes. The analysis of the stylized facts shows a two-stage trend in TFP and thus growth.

- In earlier decades, during periods of relatively supportive global economic environment, SMICs generally used capital deepening in the form of infrastructure investment programs and higher FDI to bolster their productivity and thus growth.
- However, in the last few years, in the face of a less favorable external environment, the growth momentum in many SMICs waned because structural reforms that would sustain the growth of TFP such as a diversified economic base with a business friendly environment were not fully in place in many SMICs. In addition, the nascent regulatory system often impinged on their institutional setup and prevented their TFP from rising further, although this issue is being addressed in many SMICs, albeit at different pace.

A further analysis of the stylized facts is presented below.

Infrastructure Investments and the Role of FDI

16. Reliance on FDI inflows in key sectors has been crucial for enhancing productivity growth and for boosting growth potential in many SMICs.

- Good management of natural resources, following years of significant FDI inflows into the mining sector, allowed Botswana to transform revenues from natural resources into sustained boosts to TFP by being effectively re-invested in infrastructure, health and

education. Namibia's TFP has been highly correlated with FDI in the mining sector. In 2008, for instance, the re-opening of two copper mines by Weatherly Mining, the Skorpion zinc mine and other smaller metal mines were the catalysts that encouraged capital inflows by international and private investors. The country's liberal Foreign Investment Act of 1990 provided guarantees against nationalization, allowed freedom to remit capital and profits abroad, facilitated currency convertibility, and instituted a process for settling disputes equitably.

- Mauritius, likewise, carefully addressed the infrastructure gap in the 1980s by ensuring country-wide coverage of basic infrastructure services such as electricity, water and telecommunications network. Mauritius' strong legal and institutional framework attracted massive inflows of FDI during the late 1980s / early 1990s. More recently, the government has sought public-private partnerships with foreign investors to invest in the electricity generation and port infrastructure. The country benefited enormously from the investment, expertise, and technical know-how of Hong Kong and Chinese businessmen who took textile and apparel manufacturing to new heights and kindled the country's Export-Processing Zone (EPZ) industrialization phase. The country's attractive fiscal regime and the Double Taxation Treaty signed with India, have been powerful incentives for attracting foreign businesses and for stimulating the offshore sector. In Seychelles, massive investments in the country's infrastructure network have constituted the bedrock of productivity growth in years in which this growth materialized. Seychelles and Cape-Verde, which have a smaller economic base and are relatively more dependent on tourism, have experienced increasing TFP in years in which FDI flowed into construction and tourism sectors.
- Before the expansion of its industrial base, Lesotho's productivity growth in the late 1980s and early 1990s was primarily driven by the large public sector investments in basic infrastructure. Since late 2000, foreign investment in diamond mining by foreign mining companies helped support Lesotho's TFP, against a backdrop of growing concerns regarding emerging weaknesses in its textile manufacturing output.

Economic Concentration

17. The lack of diversified production and trade base, which might also be a by product of development, often intensifies the vulnerability of many SMICs to external developments, and thus undermines TFP contribution to growth. High economic concentration is a common feature among many SMICs in SSA.

- The slowdown in global growth accompanied by lower commodity prices also undermined productivity growth in Botswana and Namibia, both of which are highly dependent on production of mining such as diamonds and uranium.
- In Seychelles, tourism is the leading sector ahead of tuna fishing, accounting for 25 percent of GDP, generating 70 percent of foreign currencies, and employing 40 percent of the labor force. Cape-Verde, likewise, is highly dependent on the tourism

sector, which accounts for about 20 percent of GDP. TFP in both Seychelles and Cape-Verde, has been declining in recent years following the euro crisis, as their tourism industry took the hit during those years. Mauritius' gradual diversification into textiles, tourism, and financial services in the 1980s and 1990s, helped build resilience through a balanced production and trade structure. The Mauritian economy nonetheless suffered a few setbacks in 2008–10 when the euro crisis peaked and an important trade preferential agreement, the Sugar Protocol, was eroded in 2009. Another preferential agreement in textiles, the Multi-Fiber Agreement, was dismantled in 2004. The Mauritian TFP declined in 2004 and during 2008–10.

- Uncertainties about possible extension of the Africa Growth and Opportunity Act (AGOA) undermined growth of Lesotho's textile manufacturing sector in the late 2000s.

Exogenous shocks

18. Exogenous shocks often undermine productivity growth in SMICs and thus growth.

Externally generated shocks have had material effects on TFP (and subsequently on growth potential). The unfolding of the crisis in Europe in 2008–10 weakened potential growth in many SMICs.

- In the resource-rich SMICs, Botswana and Namibia, the 2008–09 global shock led to growth contraction despite the use of countercyclical measures including increase in capital spending to smooth the impact of the global shock.
- In Mauritius and Seychelles external shocks undermined economy-wide productivity, including in tourism. Seychelles potentially is also exposed to risks such as piracy in the Indian Ocean and hazardous events such as tsunamis or changes in climate-related factors that may affect the quality of fish stock, thereby affecting the tuna fishing and artisanal fishing. Given the economy's high dependence on oil for its primary energy needs, the economy also remains vulnerable to international oil price hikes. Cape Verde's similar exposure to oil shocks potentially explained the decline in TFP in 2004–05. This was aggravated by a lower-than-average rainfall in that year (which had negative impacts on agricultural productivity).
- Weather-related conditions have often affected Lesotho's agriculture, which, despite its relatively low contribution to GDP growth, makes up a relatively large part of the livelihood in the country. Swaziland also experienced negative contribution of TFP to growth for a few years since the early 2000s, because of weather-related drought that affected its agricultural sector. The rapid spread of HIV/AIDS has undermined human capital in Swaziland which remained in 2007, the most affected country in the world, according to the United Nations. By lowering life expectancy, and reducing supply of labor, HIV/AIDS deterred human capital accumulation in Swaziland and reduced productivity growth during that period.

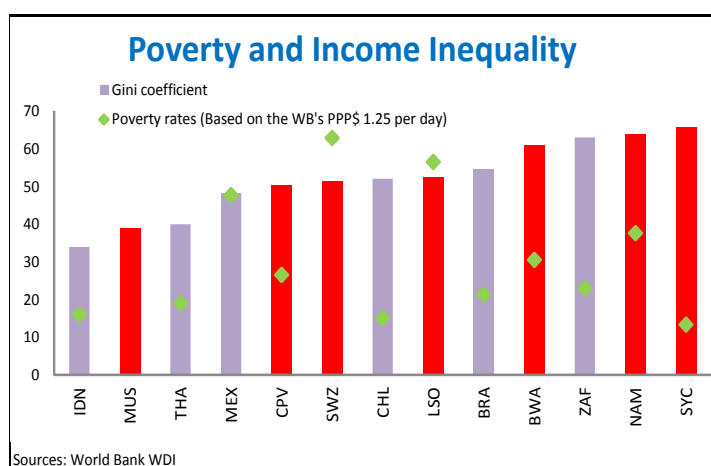
Regulatory Barriers, Structural Transformation and Political-Economy Considerations

19. The confluence of a less favorable external environment and barriers to private sector development also negatively affected productivity growth in many SMICs. While most countries in our study have been making strides towards addressing the major regulatory constraints in the last decade, the presence of some regulatory barriers continues to impinge on their growth potential.

- In both Botswana and Namibia, delayed policy action on easing the doing business and the regulatory burden on firms, inhibited the pace of private sector development and thus affected their rankings in global economic competitiveness in recent years. Both countries also experienced skill mismatch in the labor market, which continues to contribute to their persistently high structural unemployment.
- In Cape-Verde, the gradual removal of regulations that hindered the development of the private sector helped explain the rise in TFP in the 1990s. However, the country's international competitiveness in tourism and other industries dropped significantly owing to restrictive labor market regulations, inefficient logistics, and high transportation costs in 2008–11, resulting in a declining TFP. In Seychelles (the only country in the list to have undergone an economic crisis recently), the restrictive labor market regulations and high infrastructure access costs are stumbling blocks to improving the country's productivity and competitiveness. If left unaddressed, this may continue to undermine the competitiveness of its export industries.
- The need for structural transformation and laying the enabling environment for factors to move from low return sectors to high return sectors (see Table in Box 1) and consistently experimenting and innovating through the implementation of new ideas are also important ingredients in lifting up potential growth in an environment characterized by structural impediments (see Box 1).

20. Political economy considerations in the implementation of structural reforms are also important. The implementation of structural reform is not an easy task in any country. Up-

front economic and political costs—including lower growth, redistribution of income, frictional unemployment, and the erosion of oligopoly rents—means there is usually a strong constituency that favors the status quo. Creative solutions must be found to overcome these obstacles and SMICs are no exceptions to these trade-offs. In some cases a competitive social and political bargain where no major stakeholder



in the economy has veto power and each interest group has an incentive to come to the table for

mutually beneficial solutions, can be a mechanism to generate consensus around a package of mutually reinforcing reforms. Mauritius has been the archetype of such compromises, where a potentially divisive ethnical mix gave birth to successive coalition governments and generous social benefits for all. This approach has been successful with the country embarking on successive waves of structural reforms. The question is why have other SMICs not been able to replicate such a social and political bargain mechanism to speed up the implementation of productivity-enhancing reforms? Are these related to capacity constraints? Or is the dual nature of these SMIC economies (highly unequal societies with poverty rates reminiscent of large emerging markets—see text chart⁵) making it difficult to generate “consensus” in terms of implementing such productivity-enhancing structural reforms? In some cases, the desire to promote more public investment clashes with social aspirations towards more public services or redistribution, especially in highly unequal societies with poverty rates reminiscent of low-income countries (LICs) (for example Lesotho and Swaziland).

⁵ In the chart, IND represents Indonesia, MUS is Mauritius, THA is Thailand, MEX is Mexico, CPV is Cape Verde, SWZ is Swaziland, CHL is Chile, LSO is Lesotho, BRA is Brazil, BWA is Botswana, ZAF is South Africa, NAM is Namibia and SYC is Seychelles.

Box 1. Structural Transformation in Selected SMICs in SSA—Mauritius and Namibia

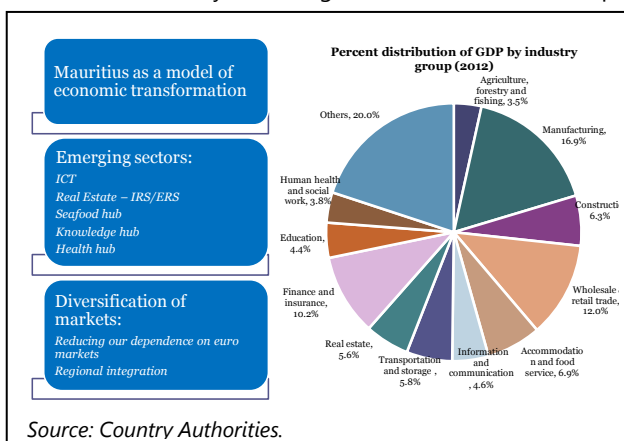
The reallocation of economic activity from low to high productivity activities lies at the heart of the rapidly growing work on structural transformation. An alternative view is that drivers of growth cause both growth and structural change to move simultaneously. The period 1995 to 2010 was characterized by high growth for a significant number of countries in SSA, most of which have experienced some degree of their structural transformation, albeit at different speeds. Although there

	Change in Output, Employment Shares, and GDP per Capita, 1990–2011						
	Output Shares			Employment Shares ¹			Average GDP Per Capita (PPP, 2005 constant USD)
	Agriculture	Industry	Services	Agriculture	Industry	Services	
Asian countries:							
Bangladesh	-0.5	0.5	0.0	-0.3	0.4	-0.1	3.6
Cambodia, 1998–2010	-1.8	0.7	1.0	-1.5	0.8	0.8	5.6
Vietnam	-0.7	0.8	-0.1	-1.2	0.5	0.6	5.5
Indonesia, 1993–2011	-0.2	-0.1	0.3	-0.9	0.3	0.6	3.2
India	-0.7	0.0	0.7	-0.7	0.4	0.3	4.8
SSA MICs, 1995–2010 unless indicated otherwise:							
Botswana	-0.5	-0.1	0.1	0.9	-0.4	-0.1	3.0
Cape Verde	-0.4	-0.2	0.1	-0.2	-0.1	0.2	7.2
Lesotho	-0.3	0.4	-0.1	...	...	...	2.7
Mauritius, 2000–2010	-0.3	-0.2	0.1	-0.3	-0.3	0.3	3.4
Namibia	-0.4	0.0	0.1	-0.2	0.2	0.1	2.3
Seychelles, 2004–2010	-0.4	-0.1	0.0	...	...	...	2.9
Swaziland	-0.1	-0.1	0.2	...	...	...	1.1

Sources: Haver Analytics; WDI; and IMF staff calculations.
¹ Employment shares data for Botswana was calculated through period of 1996-2006, Cape Verde (1995-2007), and Namibia (2000-2011).

has been some reduction in the share of agriculture in the GDP in SSA SMICs, employment has not moved from agriculture into industry or services. This contrast with Asian economies that have registered strong growth over the years (text Table). Empirical study by Dabla-Norris et al (2013) suggests that product and labor market reforms, openness to trade, and access to finance are factors that explain the variation in sectoral shares across countries.

Mauritius is often paraded as a successful structural transformation story in the region. Several factors underpin the Mauritian success: (i) a diverse and competitive political system supportive to the economic reforms, and (ii) better sequencing of reforms, particularly investing in appropriate education and training, which enhanced the absorptive capacity and buttressed the authorities' resolve to create new sectors. In addition, flexibility in acquiring necessary skills in the labor market, attracting FDI (DTT with India), and coherency in many aspects of micro and macro policies are other factors contributing to the success of Mauritius transformation.

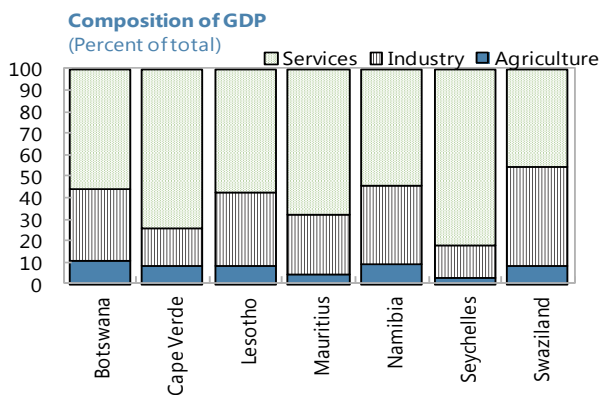


However, they also face some challenges including public sector administration and efficiency of public service. The authorities plan to accelerate the transformation of the island into a cyber-state while leveraging various opportunities offered by the vast potential of ocean-based resources.

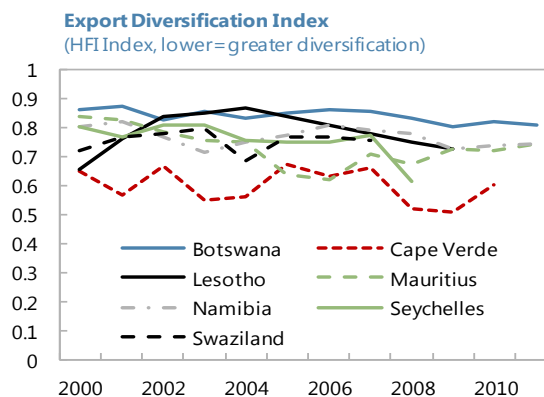
As a relatively young nation, Namibia has been successful in achieving political and macroeconomic stability, which has helped improve the living standards of the population. The country is also very active in enhancing the diversification process where a focus on business-oriented infrastructure and support contributed to rising manufacturing activities. However, Namibia's exports relied on mining. The Namibian authorities embarked on an export diversification strategy through several measures such as the creation of export processing zones (EPZ) and the establishment of small-and-medium enterprise development programs. Given the relative lack of success of these policies, the Namibian authorities current strategy is to develop commodity-based value chains to enhance growth and economic diversification. This said, Namibia still faces the key challenge of lack of skills in its labor market. The difficulties in obtaining working permits is a challenge that faces the private sector. In addition, the economy of Namibia is characterized by high regulations. This combined with the socioeconomic challenges of a dual economy, create difficulties to open the labor market further to pave the way for the high skills that are needed to boost its economy-wide productivity and thus potential growth.

Figure 3. Factors Affecting Productivity in Selected SMICs in SSA

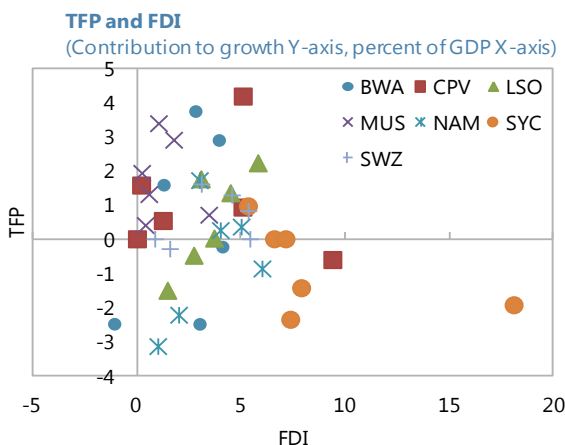
With the exception of Swaziland, the production structure of most SMICs is concentrated in the tertiary sector....



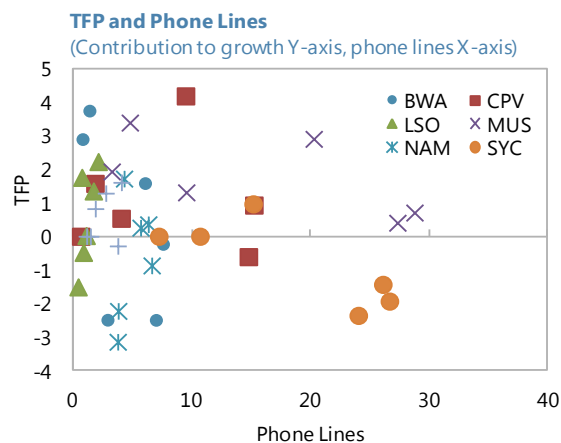
...and there is low diversification in their exports....



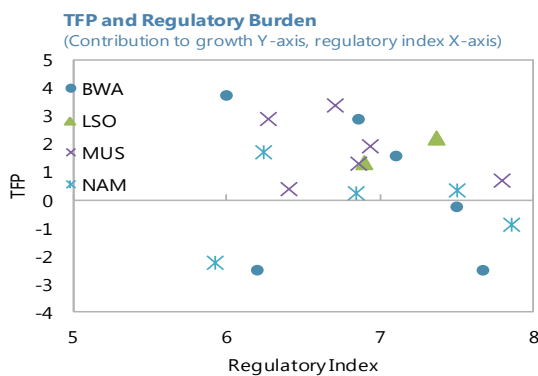
TFP has been generally higher in those years in which FDI inflows have also been high



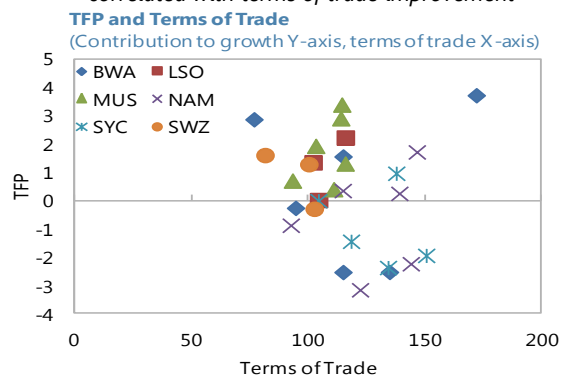
The relationship between infrastructure development and contribution of TFP to growth, in general, is positive



....but negatively correlated with regulatory constraints.....



....and the contribution of TFP to growth is positively correlated with terms of trade improvement



1/ The Herfindahl index computes the sum of squared shares of the total exports attributed to the i-th industry. It lies between 0 and 1 where being close to 0 indicates well diversified exports.

Table 1. Structural Impediments to Productivity Enhancement in SMICs

	Macroeconomic Environment	Labor Market	Financial Sector	Public Sector	Environment
Resource-Rich MICs					
Botswana	Lack of economic diversification	High reservation wage and skill mismatch	High concentration of bank loans to households	Effectiveness of tax system; quality of public spending	
Namibia	Lack of economic diversification	Lack of skill	High concentration of bank loans to households, in particular mortgages	Quality of public spending (not getting value for money) and large public sector	
Non Resource-Rich and Non-Island MICs					
Lesotho	Lack of economic diversification	High and persistent structural unemployment; HIV prevalence among labor force	Small and inefficient, high lending rates; large risk premiums	Large and ineffective public sector distorts labor market incentives and creates unfavorable business environment	Droughts; soil degradation
Swaziland	Lack of economic diversification; depressed capital accumulation; uncompetitive business environment			Large expansion with no clear evidence of high fiscal multiplier	
Non Resource-Rich and Island MICs					
Cape Verde	Lack of economic diversification; reliance on imports for food, fuel, manufacturing items, and capital goods	Low labor market efficiency owing to restrictive labor market regulations and shortage of technical skills	Predominantly bank-based, high concentration (four systematic banks account for more than 80 percent); sizeable exposure to the real sector	Large public investment in infrastructure financed by borrowing, leading to deteriorating fiscal balance and high public debt	
Mauritius	Although economy is relatively diversified, there is still reliance on European markets for trade and tourism	Structural labor market problems, including youth unemployment		Environmental degradation and weather-related disasters	
Seychelles	Lack of economic diversification; reliance on imports for food, fuel, manufacturing items, and capital goods	Structural problems including shortage of adequate skills and expertise; complex procedures for hiring qualified foreign workers	Lack of financial deepening	Inefficient public investment; presence of large parastatals operating in quasi-monopoly environments	Environmental degradation and weather-related disasters
Source: IMF staff.					

D. Empirical Analysis

Methodology

22. This section assesses empirically the relationship between macroeconomic, structural and institutional variables and TFP growth in SMICs. In addition to the standard factors and channels identified in the literature (Section B), this chapter also looks at two relatively less explored areas. First, it goes beyond the level of education and looks at its quality, because in many of SMICs, while the literacy rates are high and government spends significant portion of budgetary resources on education, lack of skills that are in demand in the labor market has contributed to the persistently high unemployment. Second, the paper looks at the relationship between stability-friendly forms of financial inclusion (see also the next chapter) and TFP growth.

23. We use several panel data techniques to identify the determinants of TFP growth and estimate their impact. The following methods are used: (i) dynamic panel estimation, which allows the lag-dependent variable to affect the dependent variable and controls for the endogeneity; (ii) panel cointegration for heterogeneous panels, which deals with cross-sectional biases and in which all variables are endogenously determined; and (iii) binary response models, which measures the extensive margin effects to get a bigger picture of what structural policy factors contribute to positive TFP (Appendix I).

Data issues

24. Our dataset comes from five primary sources: The Penn World Tables (PWT), the IMF's World Economic Outlook (WEO), the World Bank's World Development Indicators (WDI), the Economic Freedom of the World (EFW) project, and the Barro-Lee database. Our dataset covers 33 upper-middle-income countries for the period 1980–2010. For TFP we used data calculated by the latest PWT for 30 of the countries in our panel data. The sample size was driven by the paper's focus on middle-income countries and the availability of data across this group. We derived TFP for Cape Verde, Seychelles, and Swaziland with the latest available country data using a growth accounting tool from the World Bank's Economic Policy and Debt Department. TFP derived this way closely matches TFP from the PWT for other countries in our panel data. We constructed a skill-mismatch index, following (Estevão and Tsounta, 2011) methodology (Appendix I).

25. For many of the SMICs in our study, a known issue we faced here is the availability of data and quality of those statistics. For example, Swaziland has not published national accounts data in a number of years and the data used to calculate TFP comes from data published in the WDI database.

Empirical Results

26. The results across different methods depict a broadly consistent picture (Table 2). Some of the traditional variables such as trade openness and macroeconomic stability have a significant and positive impact on productivity growth. The index of skill-mismatch has statistically significant and negative impact on productivity growth, which highlights the need to have a demand oriented education system. Another important factor is government debt, which has a concave relationship with TFP growth: at low levels, debt has a positive impact on TFP growth, while at high levels its impact on TFP growth becomes negative.

Table 2. Summary of the Empirical Results

	Short-Run	Long-Run	
	Dynamic Panel	Cointegration	Panel Probit
Government debt to GDP	(-) or Concave *	(-) or Concave *	(+)/(-) or Concave *
Trade to GDP	(+)	(+)*	(-)
FDI to GDP	(+)	(+)/(-)*	
Credit to GDP ¹		(+)/(-) ¹ *	(+)
Share of agriculture sector in GDP		(-)*	
Share of manufacturing sector in GDP			(+)*
Female labor force participation	(+)/(-)	(+)/(-) ² *	
Inflation	(+)/(-)	(-)*	(-)*
Years of education	(+)	(+)*	
Skill mismatch	(-)*	(-)*	(-)*
Credit market regulation index	(+)		(+)*
Labor market regulation index			(+)*
Goods market efficiency index	(+)/(-)		
SMEs with credit line			(+)*

(+)/(-) indicates ambiguous results; * indicates statistical significance at least at the 10 percent level.
¹This probably reflects the high number of countries in our sample that have experienced financial crisis.
²The impact of female participation becomes positive after controlling for the share of agriculture in GDP.

System Generalized Method of Moments (GMM)⁶

27. The dynamic panel estimation is done at the country and year-levels (i.e. the estimates do not represent long-run effects). Various specifications are estimated on account of limited data for some variables for the SSA SMICs. First, the impact of government debt on the TFP contribution appears to be concave. Second, skill mismatches negatively affects the TFP growth. The selected results are presented in Table 3.⁷

28. The estimation results suggest that skill-mismatch and government debt have statistically significant effects on TFP growth (Table 3, Columns 2-A and 2-B).⁸ The TFP growth significantly declines as the level of skill mismatches increases. For every 100-point increase in the skill-mismatch index, TFP growth tends to decline by about 0.3 percentage points. The relationship between government debt and TFP appears to be concave.⁹ This implies that a higher level of government debt reduces the TFP growth, and the negative impacts are increasing with the level of debt. In addition, this suggests that some initial government debt may improve TFP growth.

⁶ See Arellano and Bond (1991), and Blundell and Bond (1998).

⁷ To avoid the problem of over-identification, the instrument set was restricted by (i) creating one instrument for each variable and lag distance (collapsing instrument set) and (ii) restricting the number of components from the principal component analysis on the instrument set. By doing so, all the dynamic panel regression analysis survives the over-identification tests (namely the Hansen P-values are strictly less than 1).

⁸ This model includes four SSA SMICs of interest: Botswana, Cape Verde, Mauritius, and Namibia.

⁹ While the relationship between TFP growth and government debt is negative and concave, the coefficient estimates on government debt are not statistically significant for some specifications (Table 3, Columns 1-A and 1-B). In the last two specification, the coefficient estimates on government debt become negative for the linear term, and insignificant for the square terms. This could be due to the fact that too many variables are added to the specification, while the number of panel observations (countries) reduces substantially.

However, its positive impact on TFP growth, if it exists, declines with the level of debt. These results are robust even after controlling for variables for infrastructure development.¹⁰

29. Based on the results where both the linear and quadratic terms of the government debt to GDP ratio are statistically significant, the level of government debt, at which the positive returns to government debt will decline to zero, is 80 percent. That is, given that the specifications are correct, the additional government debt yields a positive return to TFP growth, but this positive return declines as the debt level increase, and will become negative when the debt is above 80 percent of GDP.¹¹

30. The impact of economic freedom/efficiency indicators on the TFP growth is ambiguous (Table 3, Columns and 3-B).¹² Better credit market regulation seems to be positively correlated, albeit statistically insignificant, with the TFP growth. The effects of goods market efficiency on TFP growth are ambiguous and are not robust to changes in model specification and the inclusion of a lagged dependent variable.

	(1-A)	(1-B)	(2-A)	(2-B)	(3-A)	(3-B)
L.tfp		0.131 (0.091)		-0.165 (0.234)		0.139 (0.452)
govdebt_gdp	0.031 (0.070)	0.004 (0.059)	0.222* (0.120)	0.254* (0.132)	-0.441* (0.238)	-0.364* (0.185)
(Debt/GDP) ² /100	-0.041 (0.036)	-0.026 (0.030)	-0.141* (0.068)	-0.155** (0.068)	0.320 (0.215)	0.248 (0.185)
trade_gdp	0.010 (0.034)	0.004 (0.021)	0.097 (0.088)	0.106 (0.084)	-0.018 (0.059)	-0.009 (0.042)
fdi_gdp	0.110 (0.168)	0.033 (0.099)	0.037 (0.242)	0.130 (0.256)	0.201 (0.261)	0.235 (0.187)
Female Participation	-0.390 (0.239)	-0.327 (0.204)	-0.155 (0.598)	-0.391 (0.596)	-0.318 (0.221)	-0.231 (0.181)
inflation	0.079 (0.059)	0.047 (0.047)	-0.028 (0.060)	-0.056 (0.065)	0.621 (0.421)	0.506 (0.319)
Years of Schooling			1.599 (2.745)	0.416 (2.914)	0.384 (1.492)	-0.268 (0.743)
skillmismatch_100			-0.279* (0.152)	-0.304** (0.135)	-1.715 (2.567)	-1.079 (1.649)
creditreg_efw					2.696 (2.230)	2.390 (2.680)
gmkt_efw					-0.993 (4.635)	0.639 (4.569)
_cons	13.686 (9.097)	13.094 (7.956)	-13.495 (18.461)	0.938 (20.017)	-5.572 (68.703)	6.809 (56.218)
N	434	433	265	265	73	73
Countries	30	30	23	23	19	19

One-step GMM estimation method. Standard errors in parentheses.
* p<0.1, ** p<0.05, *** p<0.01

¹⁰ The results of the regressions with a telephone line indicator as an additional explanatory variable are not shown here.

¹¹ This interpretation of the coefficient estimates is different from that of Reinhart and Rogoff (2010) and Herndon et al (2013), which emphasize on the 90 percent threshold of government debt to GDP. First, our study includes only middle income countries during the year 1980 to 2010, and controls for other heterogeneous structural characteristics across countries. Second, our interpretation of the estimates is based on the concept of marginal returns to government debt on TFP contribution to economic growth.

¹² The model includes only three SSA SMICs (Botswana, Mauritius, and Namibia).

Cointegration Analysis¹³

31. Cointegration analysis allows us to identify and estimate the long-run relationship between TFP growth and its determinants.¹⁴ This approach assumes heterogeneity among countries in the panel and adjusts for potential endogeneity and cross-sectional dependence. Given the data-intensive nature of this approach and limited data availability for middle-income countries in our sample, we estimate various specification of the model. Some of the findings are consistent with the literature, while some of them differ from the results found in the other studies.

32. Cointegration analysis confirms the importance of skill-mismatch for productivity growth and the concave relationship between government debt and TFP growth.^{15 16} The results suggest that skill-mismatch has statistically significant and negative impact on TFP growth in the long-run, which underscores the importance of the quality of education (Table 4). An increase in the index by 100 points reduces the long-run TFP growth by about 2 percentage points. This result is quite robust to the different model specifications. The results also suggest that at a lower level of debt to GDP ratio the impact of government debt on TFP growth is positive, probably reflecting the positive impact of public borrowing to finance infrastructure spending. However, when debt exceeds 32 percent of GDP the marginal impact of government debt on TFP growth becomes negative in the long-run. In addition, the debt threshold increases to 55 percent of GDP when we control for market capitalization. An alternative interpretation of the concavity could be given through government debt's impact on the financial sector. At the initial stage, issuance of government debt contributes to the development of the financial market, which positively affects productivity growth. However, at a high level of government debt, it starts to crowd out private investments and pushes long-run interest rates up, which has negative implications for productivity. These results broadly confirm the thrust of the findings of the system GMM analysis. The estimated threshold of debt to GDP ratio obtained in the cointegration analysis is lower than the one obtained in the dynamic GMM analysis because it represents long-run relation, while dynamic GMM estimates are short-run effects.

33. Consistent with other studies, we found that macroeconomic stability, small agricultural sector, and trade openness are conducive to TFP growth. The results suggest that high inflation and a large agricultural sector reduces TFP growth, while high FDI and large foreign trade relative to GDP support TFP growth. An increase in FDI to GDP ratio by one percentage point increases TFP growth by about 0.1 to 0.6 percentage points in the long-run. However, when we include the share of foreign trade in GDP with FDI, the impact of FDI becomes negative. Also reducing the relative size of the agricultural sector would improve long-run TFP growth.

34. The analysis reveals some ambitious results as well. In particular, we found a negative relationship between female participation in the labor force and TFP growth. However, when we

¹³ For more detail see P. Pedroni (2000) and (2004).

¹⁴ In the cointegration analysis we used codes which were kindly provided by Peter Pedroni.

¹⁵ The presence of cointegration is tested by Pedroni's seven statistics. The results for all specifications reject the no cointegration hypothesis at least with four out of seven statistics, including the group mean Augmented Dickey Fuller test.

¹⁶ The consistent set of explanatory variables cannot be applied across the three methodologies due to limited data information (the selected econometric approaches require more data intensive and we cannot afford to lose more degree of freedom). In particular, the panel cointegration approach requires more time series relative to probit or system GMM methods.

control for the share of agricultural sector in GDP, the impact of female participation turns positive in this specification. This may suggest that the negative coefficient in the first specification could reflect the fact that in many of our countries women are more involved in the low productive agricultural sector. Another interesting result is that the impact of credit to GDP ratio is negative in some specifications. Some of the countries in our sample including Latin American and Asian countries, experienced credit expansion followed by financial crisis, which could be driving this result. This may also highlight the negative long-run effect of financial crisis on TFP growth, which generally makes recovery from a financial crisis long drawn out and harder.

Table 4. Panel Group Mean Fully Modified OLS Results

	(I)	(II)	(III)	(IV)	(V)	(VI)
Skill mismatch	-1.92*** 0.017	-1.87*** 0.019	-1.30*** 0.015	-1.62*** 1.59E-12	-0.14*** 1.23E-03	
Inflation	-3.32*** 0.247	-4.23*** 0.234	-7.99*** 0.360			0.09 0.074
Female participation	-1.89*** 0.413	0.64*** 0.096	-3.08*** 0.178	-0.84*** 2.63E-12	-0.3 0.60	-2.31*** 0.278
FDI to GDP	0.34*** 0.073	0.59*** 0.033	-2.56*** 0.378	0.11** 0.044	-0.15*** 0.01	-0.02** 0.008
Credit/GDP	0.09*** 0.018	-0.44*** 0.025		-1.06*** 9.30E-13		-0.07*** 0.015
Openness			1.44*** 0.066			
Debt/GDP				1.41*** 1.54E-12	0.24*** 0.02	
(Debt/GDP) ² /100				-2.17*** 1.62E-12	-0.22*** 0.01	
Market capitalization					0.01*** 0.00	
Years of schooling						6.45*** 1.706
Tertiary education						-1.01*** 0.094
Share of agric in GDP		-0.99*** 0.265				

* p<0.1, ** p<0.05, *** p<0.01

Panel Probit Analysis

35. In this section, we report the results from a panel probit analysis on the binomial response variable of TFP (1 if TFP contributes positively to growth, 0 otherwise) using five-year data averages. This section further explores the role of the regulatory environment in the product and labor markets, as well as the financial sector for productivity growth in the long run. Using the last data point for each country this section also provides estimates of the country-specific predictive probabilities for TFP contribution to growth based on various model specifications.

36. The results broadly support the findings in the system GMM and panel cointegration long-run analysis (Table 5). In particular, a higher skill mismatch index decreases the chance of TFP increasing growth in the long-run. In line with the previous empirical analysis, higher inflation decreases the probability of TFP contributing to growth. A one percentage point increase in inflation reduces the probability of TFP contributing to growth by about 2 percent in the long-run. We also find that the link between the probability of the TFP contributing to growth and the government debt is concave, although the coefficients are not always statistically significant.

37. The results suggest that less strict regulations in credit and labor markets and higher access to finance by SMEs increases the likelihood of TFP adding to growth (Table 5). Less strict regulations on the labor market boosts the chance of TFP contributing to growth significantly. Lowering the index of labor regulations by one point is associated with a 34 percent increase in the probability of positive TFP contribution to growth. This suggests that reforms aimed at increasing flexibility of the labor market have the potential to boost economy-wide productivity and thus potential growth. The credit market variables are found significant with less strict credit regulations and a higher percent of SMEs with a credit line increasing the likelihood of TFP increasing growth.

38. The predictive probabilities for TFP in SMICs are provided in Table 6. The predictive estimates based on the first model specifications, where we have mostly macroeconomic variables are largely similar for our SMICs showing higher chances for positive contribution of TFP to growth. This suggests that these countries have generally managed to achieve macro-stability, which contributed to their good economic performance and historically strong growth. However, the estimated predictive probabilities based on the last three specifications, where we added structural variables, like regulatory burden on firms and skill-mismatch in the labor market, reduces the probability of TFP contributing to GDP growth significantly for all our SMICs except for Mauritius. This highlights the need for structural reforms to unlock the productivity growth in many of our SMICs and the better outcomes in Mauritius relative to other SMICs in SSA.

Table 5. Panel Probit Analysis, TFP

	(1)	(2)	(3)	(4)	(5)
Inflation	-0.0183** (0.00858)	-0.0222* (0.012)	-0.0265*** (0.00746)	-0.0315 (0.154)	-0.0300*** (0.0111)
Government Debt (%GDP)	-0.00522 (0.00897)	-0.00249 (0.00812)	0.0630** (0.0293)	0.0820* (0.0474)	0.0151 (0.033)
Government Debt (%GDP squared)	0.000745 (0.00455)	-0.000225 (0.00417)	-0.0323 (0.0239)	-0.0476 (0.0339)	0.00377 (0.0293)
Manufacturing Output (%GDP)		0.0381* (0.0199)			0.0133 (0.0364)
Trade (%GDP)		-0.0176 (0.0422)			
Private Sector Credit (%GDP)		0.00016 (0.00435)			
Labor Regulation Index			0.344* (0.181)		
Skill Mismatch Index (/100)			-0.0511** (0.021)		-0.0308* (0.017)
Credit Regulation Index				0.570*** (0.164)	0.166 (0.237)
SMEs with credit line (% total)				0.0332** (0.0162)	
Constant	0.729** (0.349)	0.0668 (0.457)	-2.119 (1.418)	-8.784 (0)	-0.815 (2.566)
Observations	112	107	49	22	53
Number of Countries	33	32	20	22	20

Standard errors in parentheses.

* p<0.1, ** p<0.05, *** p<0.01

Table 6. Predictive Probabilities

	(1)	(2)	(3)	(4)	(5)
Botswana	69.1	57.5	11.8	13.8	35.3
Cape Verde	63.3	62.0			
Lesotho	63.9	63.8		93.7	
Mauritius	64.5	68.0	71.3	86.6	65.9
Namibia	69.3	63.4	11.3	12.8	34.6
Seychelles	48.2	29.0			
Swaziland	69.4	92.0			

E. Conclusions

39. This chapter has looked at factors that could boost total factor productivity and thus potential growth in SMICs in SSA, including Namibia. Our findings suggest that, in SMICs, productivity growth is an important intermediate objective that serves to improve economic welfare and to accelerate convergence to higher income levels. Although macroeconomic stability and trade openness are necessary for productivity growth, they are not sufficient. SMICs need to improve the quality of public spending, most notably on education to minimize the skill mismatch in the labor market, reduce the regulatory burden on firms, and improve access to finance for SMEs.

40. Our case studies suggest that there is a room for SMICs to facilitate structural transformation to raise their potential growth. Overall, Mauritius fared better than other SMICs in this area (see paragraph 38 and Box 1). Several factors underpin the Mauritian success: (i) a diverse and competitive political system supportive of the economic reforms, and (ii) better sequencing of reforms, particularly investing in appropriate education and training, which enhanced the absorptive capacity and buttressed the authorities' resolve to create new sectors. In addition, policy innovation and the flexibility in acquiring necessary skills in the labor market¹⁷, attracting FDI, and coherency in many aspects of micro and macro policies are other factors that contributed to the relative success of Mauritius's structural transformation.

41. The chapter also touches on the political economy considerations in the implementation of productivity-enhancing structural reforms. The implementation of structural reforms is not an easy task in any country, including in Namibia. The up-front short-term economic and political costs means there is usually a strong constituency who favor the status quo. The timing and sequencing of reforms and, the role of quick wins are important in achieving success in the implementation of reforms. In some cases, a social bargain can be a mechanism to generate consensus on a package of mutually reinforcing reforms.

42. This chapter, by no means, exhausts the factors that could boost potential growth in SMICs thus begging the question—what are the possible areas of future research on how to boost potential growth in SMICs? Clearly one area relates to the tools that can best help SMICs to overcome political-economy constraints and thus speed up the implementation of structural reforms. Perhaps another possible topic of future research is how SMICs can leverage global supply chains (GSCs) to boost their potential growth. GSC offers opportunities for developing countries to benefit from trade integration, and is at the heart of the East Asian success story.

¹⁷ This is broadly in line with the findings in Behar A. (2010).

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Appendix I. Methodologies for Modeling Total Factor Productivity

Summary: This chapter has used three methodologies to empirically assess the factors that determine total factor productivity (TFP) in SMICs and thus their potential growth.

Underlying model for 1.-3.

$$y_{i,t} = \gamma y_{i,t-1} + X_{i,t}\beta + \theta_t + (u_i + e_{i,t})$$

where $y_{i,t}$ is total factor productivity (TFP) obtained from the growth decomposition exercise; $X_{i,t}$ is a vector of time-varying country-specific characteristics (including structural policy factors and other factors influencing the TFP); θ_t is the time effects; u_i is the time-invariant country fixed effects (both observed and unobserved); and $e_{i,t}$ is the unobserved error term which are time-varying.

1. Dynamic Panel Estimation: Dynamic-Panel Generalized Method of Moments (Difference and System GMM)¹

Pros:

- (i) The dynamic-panel GMM allows the lag-dependent variable ($y_{i,t-1}$) to affect the dependent variable.
- (ii) It can control for the endogeneity issues arising from both the time-varying and time-invariant unobservable.

Cons/Assumptions required:

- (i) The coefficient estimates are consistent only when $N \rightarrow \infty$, and requires $T \geq 3$.
- (ii) The model requires an additional assumption on the error terms, which depends on the selected instrumental variables.²
- (iii) The estimation requires the included variables to be stationary.

Note 1: When data are persistent (which is likely to be in our case), System-GMM has been shown to outperform Difference-GMM (Blundell and Bond, 1998; Bond et al. 2001). This is because System-GMM additionally uses the cross-country variations to identify the effects of interests.

2. Panel Co-integration Analysis

We test for the presence of cointegration using Pedroni's seven statistics: (i) pooled variance ratio statistic (nonparametric), (ii) pooled rho-statistic (semi-parametric), (iii) pooled t-statistic (semi-parametric), (iv) pooled t-statistic (parametric), (v) group mean rho-statistic (semi-parametric), (vi) group mean t-statistic (semi-parametric), and (vii) group mean t-statistic (parametric).

¹ See Arellano and Bond (1991), and Blundell and Bond (1998).

² See Roodman (2009) for the criteria of instrumental variables used.

Cointegration tests:

$$y_{i,t} = a_i + \beta_i X_{i,t} + e_{i,t}$$

where $y_{i,t}$ is total factor productivity (TFP) obtained from the growth decomposition exercise; $X_{i,t}$ is a vector of time-varying country-specific characteristics (including structural policy factors and other factors influencing the TFP); and $e_{i,t}$ is the unobserved error term which are time-varying.

Individual cointegration OLS regression is estimated for each country and depending on the type of the test pooled or group mean tests are computed based on the estimated residuals. Then appropriate adjustment terms are used to turn the statistics into standard normal distribution (the adjustment terms defer depending on the type of the test and the number of regressors).³

Group Mean Fully-modified Ordinary Least Squares (FMOLS):

FMOLS estimates the same regression by OLS for each country individually and uses the estimated residuals to compute country specific long-run covariance matrix. This long-run covariance matrix is used to compute country specific adjustment terms to adjust individual FMOLS estimates and t-statistic for country specific serial correlation dynamics and endogeneity. Group mean FMOLS estimators and t-statistics are calculated based on country specific adjusted FMOLS estimates and t-statistics.⁴

Pros:

- (i) The estimations are more suitable to non-stationary data and allow for unit-root regressor processes.
- (ii) Allows both heterogeneous dynamics and heterogeneous cointegration vectors.
- (iii) Allows heterogeneous cointegrating slopes with straightforward interpretation.
- (iv) FMOLS provides estimates (only) for the long-run dynamics.
- (v) Good small sample size and power properties.
- (vi) Accounts for serial correlation dynamics and endogeneity.

Cons/Assumptions required:

- (i) FMOLS estimator is computationally complex.
FMOLS estimators depend on the assumption of exact unit roots for all the regressors.

3. Binary or multinomial response model: Probit/Logit estimation

$$I_{i,t} = f(X_{i,t}, u_i, e_{i,t})$$

where $I_{i,t}$ is an index indicating whether the TFP contribution is positive/negative (i.e. $1\{y_{i,t} \geq 0\}$), or whether TFP is fall in a specific range; $X_{i,t}$ is a vector of time-varying country-specific characteristics (including structural policy factors and other factors influencing the TFP); u_i is the time-invariant country fixed effects (both observed and unobserved); and $e_{i,t}$ is the unobserved error term which are time-varying.

³ For more detail see P. Pedroni (2004).

⁴ See P. Pedroni (2000).

Pros:

- (i) The probit/logit estimations allow for non-linear effects of the explanatory variables.
- (ii) An index variable can mitigate the problem of measurement errors in the TFP contribution.

Cons/Assumptions required:

- (i) The dependent variable contains less information (as we convert a continuous dependent variable to be a discrete dependent variable).
- (ii) The choice of thresholds in the multinomial response model can be very arbitrary.
- (iii) The estimations are a bit more complicated when there is an endogenous regressor and/or a lagged dependent variable.

In addition to the empirical methodologies, the paper also looked at sectoral shift analysis⁵. This approach uses ideas of structural transformation in economies and shift to dynamic sectors that often leads to a boost in TFPs.

Pros:

- (i) The sector shift analysis identifies how each sector contributes to the total productivity growth.
- (ii) This is a decomposition exercise. So, it is not subject to any econometrics assumptions.

Cons:

- (i) The analysis requires information on sectoral productivity and employment.
- (ii) It may not fully answer our questions of interests. The policy implementation related to this would be labor force reallocation, and labor market flexibility (not how public sector size affects the TFP contribution).

⁵ See World Bank (2008)'s *Unleashing Prosperity*, pp.176-177.

4. Construction of the Skill Mismatch Index

As discussed in Leigh and Flores (2011), skill-mismatch could be one of the reasons for high structural unemployment in many of the SSA SMICs. For our analysis, we constructed a skill-mismatch index, following (Estevão and Tsounta 2011), to determine if changes in TFP could be captured by country differences in matching supply and demand for skills. The skills mismatch index is calculated by taking the difference between the skill demand and supply for each country in the sample. Following Estevao and Tsounta (2011), the skills mismatch index for each country i at time t is constructed using equation:

$$\text{Skill Mismatch Index}_{it} = \sum_{j=1}^3 (S_{ijt} - M_{ijt})^2$$

in which j is the skill level; S_{ijt} is the percentage of the population with skill level j at time t in country i (skill level supply), and M_{ijt} is the percentage of employees with skill level j at time t in country i (skill level demand).

- *Skill level supply.* World Bank educational attainment data are used to construct skill level supply using primary education (as low skilled), secondary education (as semi-skilled), and college and tertiary education (as high skilled).
- *Skill level demand.* Skill level demand is approximated by the percentage of employees in three key sectors: mining and construction (to proxy low-skilled workers), manufacturing (for semi-skilled workers), and government and financial services (for high-skilled workers).⁶

⁶ Although the Estevao and Tsounta (2011) method of estimating skill supply is reasonably robust based on educational attainment, the measures of skill demand and skill intensity does have some weaknesses, including treating mining sector as low skilled in the skill-intensity spectrum when most of the mining sector employees in SMICs are at least medium to high skilled.

FINANCIAL INCLUSION AND STABILITY IN AFRICA'S MIDDLE-INCOME COUNTRIES INCLUDING NAMIBIA ¹

The financial sectors of middle-income countries (MICs) in sub-Saharan Africa (SSA) continue to evolve and recent global regulatory reforms will likely steer funding structures further towards equity and deposits. This chapter examines two questions. What is the financial landscape (stability and inclusion) in SSA MICs relative to emerging market economies (EMs)? How do financial inclusion and shifts in funding structure of banks affect financial stability? Our findings suggest that: (i) financial stability and access to finance for households in SSA is comparable to EMs, while access to finance for small and medium-sized enterprise (SMEs) lags behind those of EMs; (ii) SME access to finance and/or savings-oriented financial inclusion enhances financial stability, while overly consumption-oriented financial inclusion likely undermines financial stability; and (iii) a more equity and deposit-based funding structure enhances financial stability.

A. Introduction

1. The rapidly expanding financial sectors in MICs in SSA, including Namibia, plays a critical role in the general economy of these countries. Given that this role is also expected to expand over time, the financial environment itself must be understood in greater detail. First, as we know, the financial sector is becoming more and more important in IMF surveillance. Thus, it is important to have a better knowledge of how the financial landscapes of SSA MICs compares with those of EMs.

2. While financial stability has been central to the IMF's work, over the recent years, financial inclusion/access to finance has become increasingly important. Financial stability and financial inclusion are often considered to be conflicting goals, just as fighting inflation and maximizing growth are often at odds in a central bank's objective function. For example, financial stability focuses on asset quality. This means that credit institutions (including banks) need to be more selective about whom they lend and provide financial services. In contrast, financial inclusion focuses on quantity such as size of assets and the number of customers (in percent of population). This often means that credit institutions should lower their standards for lending and reduce the minimum balance requirement or fees associated with opening or maintaining a bank account. A natural question therefore is how different types of financial inclusion tend to affect financial stability.

¹ This chapter was prepared by Yibin Mu and Jenny Lin (a summer intern during 2013). The key findings were presented to the Namibian authorities by Andrew Jonelis during the 2013 Article IV consultation mission.

- 3. The current global regulatory reforms will likely encourage banks' funding structures to shift towards greater holdings of equity and deposits.** This raises the question will this funding structure shift impact financial stability in SSA MICs?
- 4. In this chapter, we address each of the above issues by exploring the following questions:** How has the financial landscape in SSA MICs evolved? How does the financial landscape (stability and inclusion) in SSA MICs compare to that of EMs? How do financial inclusion and funding structure shifts affect financial stability?
- 5. Our findings suggest the following:** (i) financial stability and financial inclusion for households in SSA MICs are comparable to a group of EMs while financial inclusion for SMEs lags behind that in EMs;² (ii) aspects of financial inclusion that focuses on expanding SMEs access to finance and individuals' access to savings accounts enhances financial stability, while financial inclusion that focuses purely on expanding the percentage of individuals with credit undermines financial stability; and (iii) a more equity and deposit based funding structure enhances financial stability.

B. Literature Review

- 6. This chapter explores the nexus between financial inclusion and stability.** Much work has been done in the literature on financial sector stability and a growing body of ongoing work is focusing on financial access as well. Here, we present an overview of the literature, as it relates to this chapter, and give a sense of the limited work available on exploring the interactions between financial stability and access.
- 7. The literature on financial stability is vast and diverse, with most of it focused on measures and indicators for financial stability (FSIs).** Demirgüç-Kunt and Detragiache (1998), Kaminsky (1998), and Bordo and Schwartz (2000), among others, pioneered early warning indicators on macro-financial stability based on risk spreads, and market liquidity. The primary FSIs cover a few key banking areas: capital adequacy, asset quality, management effectiveness, earnings, liquidity, and sensitivity to market risks.
- 8. Work has also been done to look at predictors of banking crises.** Demirgüç-Kunt and Detragiache (1997) use a multivariate logit estimation to identify determinants of banking crises in a panel of developing and industrialized countries. They found that weak macroeconomic environments with low growth, high inflation, high real interest rates, explicit deposit insurance schemes and weak law enforcement were particularly vulnerable to economy-wide banking crises.

² The definition of SMEs is the same across all countries as the paper's uses the World Bank Enterprise Survey definition on this.

Demirgüç-Kunt and Detragiache (2005) survey the body of work done on crisis prediction and identify two main methodologies of the cross-country empirical work in this field based on the signals approach and the multivariate probability model.

9. Other stands of the literature on financial stability have looked at the central bank's role in financial sector stability (Nier 2009), bank competition and stability (Berger et al. 2009).³ Other work includes financial liberalization and crisis (Caprio and Summers 1993), external shocks and crisis (Eichengreen and Rose 1998), bank ownership and structure as related to crisis (La Porta, Lopez-de-Silanes, and Shleifer 2002) and the role of institutions and the political system in causing and preventing crises (Beck, Demirgüç-Kunt, and Levine 2004).

10. The literature on financial access focuses on the effect of individual access on income inequality, poverty, and GDP growth. The Global Financial Index (Findex) surveys on "how adults in 148 economies save, borrow, make payments, and manage risk" finds that high cost, physical distance, and lack of proper documentation are the most common barriers to household access to finance (WB GFDR 2013, Demirgüç-Kunt & Klapper 2012). "Policies and Pitfalls in Expanding Access" - Demirgüç-Kunt, Beck and Honohan. (2008) illustrates that financial access is quite limited around the world and identifies barriers that may be preventing small firms and poor households from using financial services. Based on this research, the report derives principles for effective government policy on broadening access. Beck, Demirgüç-Kunt, and Maksimovic (2003) explores the effects of firm-level financial access and find that financial constraints are strongest for small firms and weakening these constraints disproportionately benefits smaller firms.

11. The literature, is however, limited on the interactions between financial stability and access. Hannig and Jansen (2010) acknowledge that financial inclusion poses risks in terms of reputation and quality, low-income savers and borrowers maintained "solid financial behaviour" through crises periods and that the presence of "vulnerable clients" in the financial system has negligible risks. They show various graphical correlations such as a positive correlation between GDP per capita and inclusion, but stop short of establishing a causal quantitative relationship. Similarly, Khan (2011) provides a graphical correlation showing the positive relationship between financial

³ Under the traditional "competition-fragility" view, more bank competition erodes market power, decreases profit margins, and results in reduced franchise value that encourages bank risk taking. Under the alternative "competition-stability" view, more market power in the loan market may result in greater bank risk as the higher interest rates charged to loan customers make it more difficult to repay loans and exacerbate moral hazard and adverse selection problems. But even if market power in the loan market results in riskier loan portfolios, the overall risks of banks need not increase if banks protect their franchise values by increasing their equity capital or engaging in other risk-mitigating techniques. The Berger et al test these theories by regressing measures of loan risk, bank risk, and bank equity capital on several measures of market power, as well as indicators of the business environment, using data for 8,235 banks in 23 developed nations. The results suggest that - consistent with the traditional "competition-fragility" view - banks with a greater degree of market power also have less overall risk exposure. The data also provide some support for one element of the "competition-stability" view - that market power increases loan portfolio risk. The Berger et al show that this risk may be offset in part by higher equity capital ratios.

inclusion, as indicated by, and development as measured by World Bank development levels (High Income, Low Income, etc.). This, however, does not provide a causal link or direction of causation. Aduda and Kalunda (2012) explore financial inclusion and stability with reference to Kenya and postulate that it is very likely that banking performance, and the likelihood of crises, may depend on the structure and degree of development of the financial systems, which is one of the focal point in financial inclusion. However, there is no quantitative analysis performed in that paper and the observation is purely speculative.

12. The chapter addresses a different question and provides quantitative evidence on the impact of financial inclusion and funding structure shifts on financial stability. Rather than focusing on a qualitative or descriptive assessment based on correlations, we attempt to establish quantitatively whether a causal link exists among financial inclusion, funding structure and stability. We also look at whether and which types of financial inclusion exist that are stability friendly at the bank-level. This approach is taken in the context of SSA for several reasons. First, the banking sector in SSA is relatively small; with 227 banks in the sample, solvency and stability of each individual bank can have great ramifications for MICs in SSA. Second, financial access levels can have differing impacts on heterogeneous banks and a bank-level analysis can account for fundamental differences between individual banks that may be affecting stability, which helps to isolate the effect of each individual explanatory variable without use of aggregation and its resulting distortions.

C. Data

13. The dataset includes bank-level data for 227 banks in SSA, over the period 1998-2013. Eleven SSA MIC countries are covered: Botswana, Cape Verde, Ghana, Lesotho, Mauritius, Namibia, Senegal, Seychelles, South Africa, Swaziland, and Zambia. Country-level financial stability and access data for a group of EM countries is also included for 2011 for benchmarking purposes. The EM countries are: Argentina, Brazil, Chile, China, Colombia, Hungary, Indonesia, India, Republic of Korea, Mexico, Malaysia, Peru, Philippines, Poland, Romania, Russia Federation, Thailand, Turkey and Ukraine. The selection criteria of the EM group are based on the peer group of South Africa (South Africa 2013 Article IV Consultation Staff Report 13/303).

14. Our data sources include: bank-level financial data from Bankscope, macroeconomic indicators data from the World Bank Indicators and Bloomberg, individual financial access data from WB Development Indicators and Financial Access Survey and SME financial access data from the IFC SME Financial Access Survey.

D. Analytical Framework

15. The framework centers around two econometric models of the determinants of financial stability. The first is a baseline Probit model with the probability of bank distress because the dependent variable. The second is a standard OLS estimation with percentage deviation from bank insolvency as the dependent variable.

Baseline probit model

16. In this section, we attempt to explore the effects of financial access on financial stability and, particularly, whether households or SME financial access affects distress probability differently. Traditional measures of bank distress in the literature include the book-price ratio, analyst ratings and the Z-score. We focus on the Z-score measure of bank distress as it has become the most frequently used indicator, in addition to having greater data availability. The Z-score measure of bank stability equals the return on assets (ROA) plus the capital asset ratio (CAR) of each bank divided by the banks' standard deviation of return on assets. It proxies the risk of bank insolvency as it is the inverse of the probability that losses exceed equity; that is, a higher Z-score implies lower risk of insolvency (see Box 1 for details of its derivation).

17. The traditional factors affecting bank distress can be categorized by: (1) funding structure (e.g., Herfindahl funding diversity index, loans to customer deposits, short-term funding to assets, equity to assets, term deposits to assets), (2) profitability and asset quality (return on average assets, return on average equity, loan loss provisions to gross loans net interest margin), (3) size (total assets, asset growth) and (4) macroeconomic factors (e.g. inflation, output growth). Thus, in tackling our question, we must control for the effects of these other factors.

18. We proceed by first estimating a Probit model of probability of financial distress:

$$P\{\text{Distress}_{ijt} \mid X_{ijt-1}, W_{jt}\} = F(X_{ijt-1} \beta_{ij} + W_{jt} \beta_j) \quad (1)$$

where $P\{\}$ is the probability that bank y_i from country j will be in distress at time t , conditional on bank-specific and country-level characteristics X_{ijt-1} and W_{jt} . $P\{\}$ is based on the Z-score and is a decreasing function of the Z-score as higher levels of Z imply lower probability of distress. $F()$ is the standard normal distribution function that transforms a linear combination of the explanatory variables into the [0,1] interval. The estimations use lagged bank-level explanatory variables in order to reduce endogeneity concerns and report robust standard errors.

19. Distress_{ijt} is measured by bank-level Z-scores, with a threshold at the 10th percentile of Z-scores within the sample⁴, which is equivalent to being above the 10th percentile in probability of default (Box 1). The presence of bank-specific lagged explanatory variables, X_{ijt-1} , is primarily to reduce endogeneity concerns and report robust standard errors, but also to control for bank-level characteristics (e.g. size) that may make an individual bank particularly sensitive or insensitive to country-wide macroeconomic conditions. Finally country-specific explanatory variables, W_{jt} , must also be included to control for macroeconomic conditions that can obviously affect a given bank's default probability.

Baseline Logarithmic Model

20. We look at the relationship in levels and ensure that our Probit results are not sensitive to the choice of binary cutoff threshold by examining the impact of the explanatory variables on the percentage change in Z-score, that is, $\ln(\text{Z-score})$. We estimate a standard linear regression of bank-level explanatory variables, X_{ijt-1} , and macro-level stability variables, W_{jt} , on $\ln(\text{Z-score})$:

$$\ln(\text{Z-score}) = F(X_{ijt-1} \beta_{ij} + W_{jt} \beta_j) \quad (2)$$

21. In order to include observations corresponding to negative values of the Z-score, which cannot be log-transformed, we adjust additively relative to the minimum Z-score. This technique uses $\ln(\text{Z-score} + \min(\text{Z-score}) + 1)$ in order to keep all observations under the previous binary dependent variable estimation in this analysis as well. All other explanatory variables are kept the same. The estimation again uses lagged bank-level explanatory variables in order to reduce endogeneity concerns and report robust standard errors.

Variables

Probit

- $P\{Z < 10^{\text{th}} \text{ percentile}\}$ is a binary dependent variable representing the probability that a bank's Z-score is below the 10th percentile of Z-scores of regional banks, putting it at risk of default relative to other banks in the sample. As the Z-score represents the adequacy of a bank's capital to cover potential equity losses and thus is directly and inversely related to the probability of default, higher values of the Z-score correspond to greater solvency. This cutoff is equivalent to a bank's probability of a default being amongst the top 10 percentile of sample banks (Box 2). Thus positive coefficients on explanatory variables would indicate a negative contribution of that variable towards bank-level stability. The 10th percentile is chosen as a measure in line with the

⁴ The 10th percentile threshold was chosen in line with that of a recent estimation in the October 2013 Global Financial Stability Report using a similar model of probability of bank default. In that estimation, the 10th percentile of bank Z-scores for that sample was chosen.

convention in related literature (IMF's GFSR October 2013); other nearby cutoffs had very similar results for robustness.

ln(Z-score)

- *ln(Z-score)* is a continuous dependent variable representing the percentage increase relative to the lowest bank Z-score present in the sample. Under this dependent variable, positive coefficients on explanatory variables correspond to greater solvency and a decreased probability of bank default. This variable is secondary in our analysis because the true relationship between explanatory variables and bank stability and is likely piece-wise linear. Thus, beyond a certain point of high Z-scores, observed explanatory variables may have increasingly weak marginal impact on stability and unobserved variables may carry more weight. This can appear in an estimate as a weakening of the causal link between independent variables (summarized in Table 1) and stability.

E. Empirical Findings

22. Tables 2 and 3 present the key results of the estimates. All estimates distinguish between household financial savings versus borrowing as indicators for household financial access. Table 2 gives the Probit estimation results using the SME Access Constraint as self-reported by SMEs within each country in the IFC Enterprise Survey. Table 3 gives Probit results using percentage of small firms with a credit line among total small firms as the measure of SME financial access. Our analysis also provides marginal effects on the respective Probit estimations. We provide estimation results using *ln(Z-score)* as the dependent variable as a robustness check on whether our results are sensitive to chosen thresholds for our Probit analysis. However, this has limited utility because marginal differences in Z-score for already very high Z-score levels are unlikely to be significantly affected by changes in explanatory variables.

23. The Probit estimations under either measure of SME access are broadly similar. Under SME Access Constraint as reported in the World Bank Enterprise Survey, individual bank size, term deposits to assets, equity to assets, country legal index and both individual access as well as SME access variables are significant determinants for bank-level financial stability. The signs of these coefficients give a sense of their contribution to financial stability. Note that in the Probit analysis, our dependent variable is a measure of the likelihood of bank distress, that is, the inverse of financial stability. Bank size, measured as total assets, has a positive and highly significant effect on the probability of distress. The proportion of assets that are term deposits increases financial stability significantly.

24. Our results give the directional impact of each explanatory variable on bank distress, and the statistical significance. Negative coefficients indicate the variable is associated with greater bank stability while positive coefficients indicate that the variable is associated with greater bank distress. In general, we find that higher equity to assets, term deposits to assets, and percentage of adults saving lead to an increase in financial stability. We also find that higher ratios of loans to customer deposits, percentage of adults borrowing, and percentage of SMEs facing

financial access constraints and less diverse funding sources lead to increased probability of banking sector distress.

25. The lagged equity to assets and ROA are used in the main empirical analysis to address potential endogeneity issues. However, our analysis also provides robustness checks to test the validity of our findings by taking out equity to assets and ROA. All our previous results are substantively unaffected.

26. Note that the signs of the Probit estimation coefficients give the direction of the effects, but the coefficients themselves do not give a sense of the magnitude of the effect. This is because the coefficient magnitudes are in the units of the standard errors. For a sense of true magnitude, we separately calculate the average marginal effects for the explanatory variables to obtain the discrete change in the probability of bank distress averaging across the sample values of the other predictor variables. For example, to calculate the average predicted probability of distress for a given percentage of adults saving, the predicted probability was calculated for each bank-year, using that bank's value explanatory variables for that year, and the average was taken across all these predicted probabilities.

27. The marginal effect on the households saving percentage tells us that the derivative of the mean expected probability of bank distress with respect to adults saving is -0.267. This suggests that if we had four banks and then increased the percentage of adults saving by 1 percent this would cause one bank to switch from being likely to default to being unlikely to. The 0.02655 coefficient on SME access constraint suggests that if we had 37 banks and then lowered the SME access constraint by 1 percent, one bank would switch from being likely to default to being unlikely to. The 0.4046 coefficient on percentage of adults borrowing suggests that, of just 2.5 high default probability banks, one would become more solvent and unlikely to default if adult borrowing decreased by 1 percent. The coefficient magnitudes where equity to assets and ROA are removed are nearly identical.

28. The analysis using the percentage small firm credit line variable as a measure of SME financial access shows the same directional effects on all variables but the magnitudes of the effects differ. Here, the marginal effect of the households saving percentage and small firm credit line percentage on the probability of bank distress are both equal to -0.039. This suggests that if we had 26 banks and either increased the percentage of adults saving or increased the percentage of small firms with a credit line by 1 percent this would cause one bank to switch from being likely to default to being unlikely to default. The 0.046 coefficient on adults borrowing suggests that, of the 21 high default probability banks, one would become more solvent and unlikely to default if adult borrowing decreased by 1 percent. The -0.0376 coefficient on percentage of small firms with a credit line suggests that a 1 percent increase in the percentage of small firms with a credit line leads to a 0.038 percent decrease in probability of distress. Removing equity to assets and ROA, column 4, gives nearly identical magnitudes.

29. Our analysis also shows the results obtained using the dependent variable $\ln(\text{Z-score})$, renormalized so that negative Z-score observations are also reflected. The first two columns

represent the estimation using the SME Access Constraint of firm-level financial access, while the last two columns utilize the small firm credit line percentage measure. The interpretation of these coefficients support the probit estimation results in both the directional effect and the magnitude effect of variables.

30. If we now turn to the SME access constraint measure, we find that a 1 percentage point increase in the percentage of households saving increases the Z-score, and thus improves bank level stability, by 0.0772 percent. A 1 percent increase in adults borrowing reduces the Z-score by 0.0422 percent and a 1 percent increase in SME access constraint is associated with a 0.0599 percent reduction in the Z-score measure of stability. Using the small firm credit line measure of SME financial access, we find consistent results. A 1 percent increase in percentage of adults saving is associated with a 0.0416 percent increase in Z-score-measured bank stability, a 1 percent increase in small firms with a credit line leads to a 0.018 percent increase in the Z-score, while a 1 percent increase in percentage of adults borrowing leads to a 0.0621 percent decrease in stability. As expected and consistent with the probit analysis, term deposits to assets, equity to assets and return on average equity all have positive and significant causal effects on bank stability, while banks' total asset growth has a negative impact on stability.

F. Conclusions

31. Main findings:

The results of the empirical analysis in this chapter suggest the following broad findings for selected MICs in SSA, including Namibia:

- First, the financial landscape in SSA MICs has deepened in past decades, as reflected in the increasing share of the stock of private credit to GDP and deposits as ratio to GDP. Furthermore, their return on assets has stabilized closer to the level of a group of EMs, reflecting a more mature and competitive financial sector in SSA MICs.
- Second, in many MICs in SSA, one reason for the low level of financial inclusion is SME's lack of access to finance. Our study shows that SME access to finance has a positive and significant impact on financial stability. Financial usage can have stabilizing effects on the financial sector by helping to increase financial sector depth. If borrowing tends to be used for investment or to finance asset purchases generating returns, overall this would be beneficial to the financial sector and the economy in general. Thus, financial inclusion focusing on enhancing SME access to finance tends to enhance financial stability.
- Furthermore, another reason for the low level of financial inclusion is that relatively poor households do not have access to bank accounts for various reasons such as the minimum balance requirement, fees for opening or maintaining a bank account with low balance, or low presence of financial institutions in lower-income communities. Therefore, financial inclusion focusing on improving households' access to bank accounts will likely enhance financial stability. Specifically, policy measures such as reducing or eliminating the minimum balance requirement or fees for opening/maintaining bank accounts with lower balance should increase inclusion.

Alternatively, using new technology such as e-banking or mobile banking will facilitate the population's access to finance.

- Moreover, financial inclusion that overly relies on increasing households' access to credit by lowering lending standards encouraging low quality creditors to take out unaffordable loans/mortgages can be destabilizing. In the short run, these policies may mechanically increase financial inclusion, but in the long run, this will likely jeopardize financial stability which will ultimately undermine financial inclusion.
- Finally, the primary components of global regulatory reforms will likely steer banks' funding structures further toward deposits and equity with less reliance on short-term wholesale funding. This funding structure will likely have a positive impact on financial stability.

32. Policy implications:

We draw the following key policy messages from our findings.

- First, policies promoting SME sector development should enhance financial stability. Second, reforms that facilitate households' access to savings accounts will also promote financial stability. However, mechanically expanding the number of people with credit may lead to over indebtedness. This could undermine financial stability. In a number of countries, the authorities tend to overly promote loans to households in pursuit of greater financial inclusion. This has led to over indebtedness of households. Finally, global regulatory reforms will likely have a positive impact on financial stability by shifting banks' funding structure more towards capital and deposits.
- However, our results and messages should be interpreted with some caution. There are no one-size-fits-all approaches to striking an appropriate balance between financial inclusion and financial stability. The policy of enhancing financial stability of each country has to consider its country-specific circumstances.

Table 1. List of Independent Variables

Bank-level Variables, X_{ijt}	Country-level Variables, W_{jt}
<p><i>Funding structure</i></p> <ul style="list-style-type: none"> • Herfindahl index of funding diversity • Loans to customer deposits ratio • Short-Term funding to assets ratio • Equity to assets • Term deposits to assets <p><i>Profitability and asset quality</i></p> <ul style="list-style-type: none"> • Return on Average Assets • Return on Average Equity • Loan loss provisions to gross loans • Net interest margin <p><i>Size</i></p> <ul style="list-style-type: none"> • Total Assets • Asset growth 	<p><i>Access/financial inclusion</i></p> <ul style="list-style-type: none"> • Adults saving to total adults • Adults borrowing to adults • Percent of SMEs identifying access to finance as a major constraint • Percent of small firms with a credit line <p><i>Macro and financial variables</i></p> <ul style="list-style-type: none"> • GDP per capita • GDP Growth • GDP Growth-Bank Size interaction • Interest rate spread • Inflation, GDP deflator • Banking regulatory quality and disclosure • Volatility of stock price index, 360-day Standard Deviation • Human Development Indicator

Table 2. Marginal Effects: Adults Saving versus SME Access Constraint

Marginal Effects: Adult Saving (%) vs. SME Access Constraint (%)

P(z<10th percentile)	(1) dy/dx	(2) dy/dx	(3) dy/dx
L.Herfindahl	0.00000*	0.00000*	0.00000*
L.Loans2CustDep	0.00063***	0.00076***	0.00063***
L.Equity2Assets	-1.38650***	-1.55519***	-1.40164***
L.TermDep2Assets	-0.0001	-0.00008	-0.00013**
L.ROE	-0.18761*	-0.03969	-0.19978**
Adults Saving %	-0.26690**	-0.26299**	-0.27211**
Adults Borrowing %	0.40460**	0.39869**	0.44858**
SME Access Constraint	0.02655**	0.02601**	0.03713*

* p<0.10, ** p<0.05, *** p<0.01

Table 3. Individual Access versus SME Access

Individual Access vs. SME Access				
	(1)	(2)	(3)	(4)
ln(Z-score)	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$
L.Loans2CustDep	-0.00025	-0.00025	-0.00001	-0.00003
L.Equity2Assets	0.70761**	0.70787**	0.63757**	0.46658*
L.TermDep2Assets	0.00055***	0.00055***	0.00031**	0.00031**
L.ROAE	0.33063**	0.33023**	0.28048***	0.10772
Adults Saving %	0.07722***	0.07735***	0.04165**	0.04127**
Adults Borrowing %	-0.04223*	-0.04237*	-0.06211**	-0.06245**
SME access constraint %	-0.05992***	-0.06000***		
Small Firm Credit %			0.01814**	0.01873**

* p<0.10, ** p<0.05, *** p<0.01

Box 1. Derivation of Z-Score

Banks' probability of distress is defined as the probability that it defaults, i.e. consolidated profit is less than consolidated equity:

Let the following notation hold: $p(\tilde{\pi} < -E) = p\left(\frac{\tilde{\pi}}{A} < -\frac{E}{A}\right)$

$$\tilde{r} \equiv \frac{\tilde{\pi}}{A} = ROA$$

$$k \equiv -\frac{E}{A} = -CAR$$

Then, assuming that the distribution of ROA satisfies $\tilde{r} \equiv \frac{\tilde{\pi}}{A} \sim N(\mu, \sigma) \Rightarrow \frac{\tilde{r} - \mu}{\sigma(\tilde{r})} \sim N(0,1)$

Then, probability of bank distress can be written as:

$$\begin{aligned} p\left(\frac{\tilde{\pi}}{A} < -\frac{E}{A}\right) &= p(\tilde{r} < k) \Rightarrow p\left(\frac{\tilde{r} - \mu}{\sigma(\tilde{r})} < \frac{k - \mu}{\sigma(\tilde{r})}\right) = \Phi\left(\frac{k - \mu}{\sigma(\tilde{r})}\right) \\ &= \int_{-\infty}^{\frac{k - \mu}{\sigma(\tilde{r})}} \phi(x) dx = \int_{-\infty}^{-Z} \phi(x) dx \end{aligned}$$

Thus the definition of the bank Z-score, $Z \equiv \frac{\left(\frac{E}{A} + ROA\right)}{\sigma(ROA)}$, is a direct inverse measure of the likelihood of bank distress.

Box 2. Derivation of Z-Score Threshold in Binary Estimation

Since Z-score is inversely related to p(distress), if we look at the case when the $p(\text{distress}) > p_{10}(\text{distress})$, the 10th percentile of default probabilities, then we have that:

$$\begin{aligned} p(\text{distress}) > \Phi(p_{10}) &\Rightarrow -p(\text{distress}) < \Phi(p_{10}) \\ &\Rightarrow -\Phi^{-1}[p(\text{distress})] < p_{10} \end{aligned}$$

And since $Z = -\Phi^{-1}[p(\text{distress})] \Rightarrow Z < p_{10}$, exploring the case of a 10 percentile threshold on distress probability, is equivalent to exploring the case when $Z < p_{10}(Z)$, i.e. $Z < 2.435$

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