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Africa's Pulse

OCTOBER 2018 | VOLUME 18

AN ANALYSIS OF ISSUES SHAPING AFRICA'S ECONOMIC FUTURE

WORLD BANK GROUP

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Executive Summary

- Economic growth in Sub-Saharan Africa is estimated to have picked up to 2.7 percent in 2018 from 2.3 percent in 2017, barely above population growth. The region's economic recovery continues but at a slower pace than expected (0.4 percentage points lower than the April forecast), due to downward growth revisions in the three largest economies in the region. The road ahead is bumpy. On the supply side, the moderate recovery reflected higher oil prices and better agricultural conditions following droughts. On the demand side, growth was supported by consumer spending amid eased inflation and public investment—especially among non-resource-rich countries.
- The external environment became less favorable for Sub-Saharan Africa. Global trade and industrial production lost momentum. Metals and agricultural prices fell due to concerns about trade tariffs and weakening demand prospects, while oil prices were on an upward trend. The tightness of oil supply suggests that oil prices are likely to remain elevated through the rest of the year and into 2019. Metals prices have been lower than previously forecasted and may remain subdued in 2019 and 2020 amid muted demand, particularly in China. Financial market pressures intensified in some key emerging markets and developing economies. Concern about dollar-denominated debt has risen among emerging markets amid a stronger U.S. dollar.
- The sluggish expansion in Angola, Nigeria, and South Africa—the region's three largest economies—is weighing on economic activity in Sub-Saharan Africa. Lower oil production, due to capacity constraints, offset the positive tailwinds from higher oil prices in Angola and Nigeria. In South Africa, contractions in agriculture, mining, and construction held the economy back.
- Growth in the rest of the region was broadly steady, but performance varied across countries. Economic activity remained solid in the fast-growing non-resource-rich countries, such as Côte d'Ivoire, Kenya, and Rwanda, supported by agricultural production and services on the production side, and household consumption and public investment on the demand side. Several oil exporters in the Economic and Monetary Community of Central Africa saw an uptick in growth, helped by higher oil prices and an increase in oil production. Despite increased mining production, growth among metals exporters remains subdued.
- Looking ahead, growth in the region is expected to rise to 3.3 percent in 2019, reflecting a rebound in oil production in Nigeria and Angola. Economic activity in South Africa is expected to remain subdued, as high unemployment and slow credit growth weigh on household demand, and fiscal consolidation limits government spending. Economic activity in the rest of the region is expected to continue to expand at a solid pace. Nevertheless, average growth per capita will remain weak, pointing to continued slow progress in poverty reduction. Structural constraints hinder a stronger rebound in the region's largest economies, and growth is expected to rise moderately in 2020 to reach 3.6 percent.
- Public debt levels remained high and continued to rise in some countries. Changes in the composition of debt—characterized by growing liabilities owed to non–Paris Club governments and private creditors—have increased the vulnerability of public debt sustainability to weaker currencies and higher global interest rates. While the external positions of oil exporters improved, they weakened in metals exporters and non-resource-rich countries. Tighter global financial

conditions and the change in investor sentiment toward emerging markets contributed to a reversal in capital inflows and higher financing costs. Reflecting these vulnerabilities, risks to the growth outlook are tilted to the downside. Key external risks include an unexpectedly sharp decline in commodity prices, an abrupt tightening of global financial conditions, and escalating trade tensions between major economies. The main domestic risks are fiscal slippage, domestic conflicts, and weather shocks.

- The composition of capital flows into Sub-Saharan Africa has changed gradually over the past decade. The occurrence and interplay of three large external shocks (the 2007–08 global financial crisis, the 2011–12 European sovereign debt crisis, and the 2014–15 plunge in commodity prices) have reshaped the composition and structure of financing in the region. Although foreign direct investment and foreign aid remain the major components of capital inflows, portfolio investment (through international bond issuances) has experienced an uptick since 2013.
- The change in the composition of capital flows has a higher risk content, as captured by greater vulnerability to commodity prices, global interest rates, and currency movements. Policies and reforms that build resilience to these risks and use foreign capital to raise medium-term potential growth are needed. Securing stable flows of foreign capital would help sustain growth. Strengthening fiscal frameworks to preserve macroeconomic stability attracts foreign capital and plays a role in the development of financial systems (especially local currency securities markets) that can intermediate capital flows and reduce currency risks and mismatches. Economic diversification provides a wider set of economic opportunities to foreign investors and hence promotes growth and resilience. Policies that improve the business environment would attract sustainable foreign financing to productive private sector activities.
- The special topic of this issue of *Africa's Pulse* argues that the lower labor productivity in Sub-Saharan Africa is explained by inefficiencies in the allocation of resources across firms and farms. Despite the rapid growth experienced since 1996, Sub-Saharan Africa has made slow progress in converging to the living standards and productivity levels of more advanced countries.
- Labor productivity differences between Sub-Saharan Africa and the United States, for example, have remained considerably large, and this gap has also increased sharply relative to East Asian countries. However, the relative importance of the factors driving these differences has changed over time. Lower stocks of physical and human capital in Sub-Saharan Africa from the 1960s to the 1980s explained the gap in output per worker relative to the United States. Although the capital stock still plays an important role, gaps in the efficiency with which the region combines its factors of production increasingly explain the differences in output per worker from 2000 to 2014. This finding implies that misallocation (inefficiencies in the use of technologies) has become relatively more important than undercapitalization (low capital stock) in driving these productivity differences.

- Inefficiencies in the allocation of resources across firms and farms in Sub-Saharan Africa have an impact on labor productivity. For instance, small and medium-size manufacturing enterprises in Côte d'Ivoire employ about 90 percent of the labor force in manufacturing. The most productive firms are seven times as productive as the least productive firms in the country, which indicates the coexistence of many less productive firms with few very productive firms. Shifting the actual allocation of resources to the efficient one would increase total factor productivity by 31 percent.
- Inefficiencies in the allocation of resources across agricultural farms and manufacturing firms in Sub-Saharan Africa are linked to human capital misallocation. Policies that lead to this misallocation have static and dynamic effects on labor productivity. From a static perspective, policies may deliver inefficient occupational choices by individuals, driving them away from their most productive use. For instance, high-productivity entrepreneurs may be unable to join the formal sector, and less productive farmers may not be able to opt out of agriculture to work in non-agricultural activities. Labor market regulations, barriers to human capital investment, social norms and their interplay may lead to misallocation of human capital, hence, lower productivity.
- From a dynamic perspective, policies and institutions have larger effects on aggregate output and productivity by changing the productivity distribution through mechanisms that affect further accumulation of human capital. Misallocation will likely influence producers' decisions to invest in new technologies or methods of production and their decisions to enter or exit the industry. The responses through investment and the level of productivity of entrant firms, in turn, have an impact on future productivity.
- An illustration of the static and dynamic effects of misallocation is the impact of restrictions on land allocation. Insecure property rights or lack of depth of rental markets may prevent farmers from working in higher productivity non-agricultural activities, such as manufacturing and knowledge-based services. Inefficiencies in land markets also discourage the most productive farmers from adopting new technologies and reduce the scope of knowledge spillovers and learning-by-doing effects.

Section 1: Recent Trends and Developments

1.1 GLOBAL TRENDS

Global growth is moderating. Global growth was 3.1 percent in 2017 and remained robust in the first half of 2018 (figure 1.1). More recently, incoming data suggest that global activity is slowing as investment and trade lose momentum. The deceleration in most industrial economies as well as China is expected to be gradual, with the notable exception of the United States, where growth continues to accelerate due to substantial procyclical fiscal stimulus. The euro area has slowed significantly since the beginning of the year, with economic sentiment falling for eight consecutive months, although growth remains above its long-term average. Escalating protectionism poses a risk to growth in China, but a recent shift toward looser fiscal and monetary policy is expected to support domestic demand in the near term. Activity in India is accelerating despite currency pressures, prompting tighter monetary policy. The recovery in Brazil is progressing slowly, most recently due to a truckers' strike in May. Argentina and Turkey are in the midst of serious crises. Commodity-exporting emerging markets and developing economies (EMDEs) are expected to continue recovering from the downturn in commodity prices in 2015–16, and growth in many other EMDEs, such as India, remains robust, but many countries have shown signs of slower momentum amid rising borrowing costs and currency depreciation (figure 1.2). In general, in recent months, prospects for global growth in 2018 and 2019 have worsened and external headwinds have intensified.

FIGURE 1.1: Global GDP Growth

Global growth picked up in 2017 and is expected to remain robust in 2018

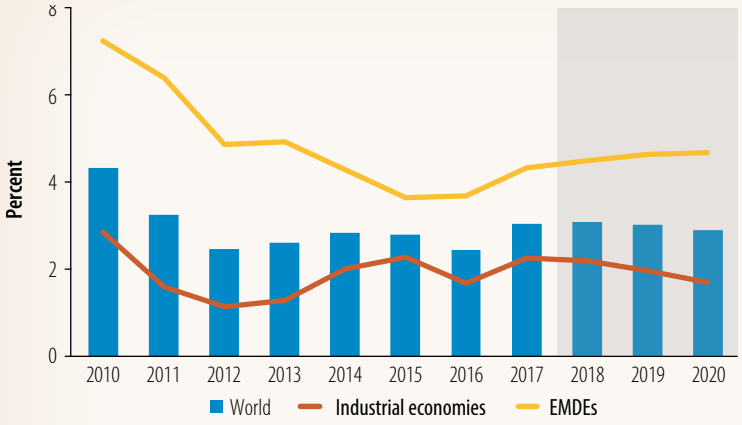
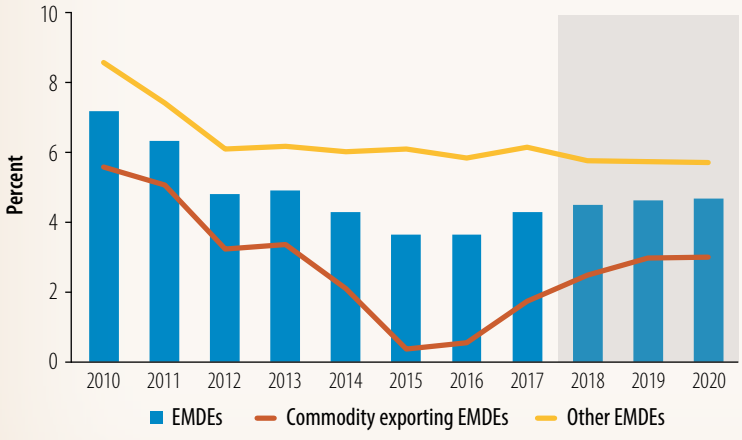


FIGURE 1.2: EMDE GDP Growth

Growth in commodity-exporting EMDEs is recovering, while growth in other EMDEs has remained steady

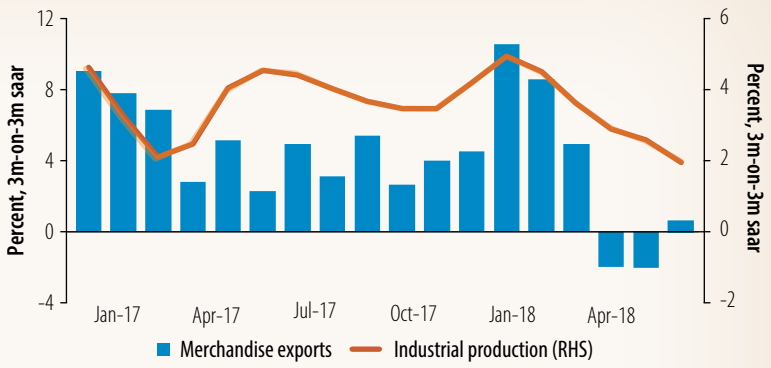


Source: World Bank.

Note: The shaded area indicates forecasts. Aggregate growth rates are calculated using constant 2010 U.S. dollar gross domestic product weights. EMDEs = emerging markets and developing economies.

Global trade and industrial production have decelerated

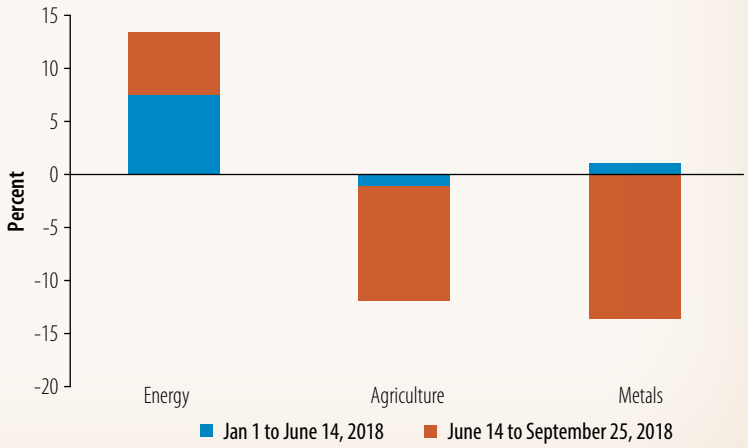
FIGURE 1.3: Industrial Production and Merchandise Exports



Sources: CPB World Trade Monitor; Haver Analytics.

Commodity prices remained volatile, with diverging trends between energy, agriculture, and metals prices

FIGURE 1.4: Changes in Commodity Prices



Source: Bloomberg.

Global trade also appears to be decelerating in an environment of rising protectionism. In 2018Q2, global goods trade was stagnant for the first time in two years, partially reflecting weakness in global industrial production (figure 1.3). Global Purchasing Managers' Index (PMI) export orders have fallen every month since January and are stabilizing at a level consistent with weak growth. Since the beginning of the year, the United States has imposed tariffs on about $300 billion of its imports, equivalent to about 10 percent of the total, with other countries retaliating with tariffs on about $125 billion worth of U.S. exports, equivalent to about 5 percent of the total. September 24th marked the most recent escalation of trade tensions, with U.S. tariffs on $200 billion of imports of goods from China taking effect and China promising to respond with duties on $60 billion of its imports from the United States. Additional tariffs on the remainder of U.S. imports of goods from China and global automotive imports remain a possibility, and uncertainty about trade policy remains exceptionally high.

Commodity prices have been volatile in 2018, with growing divergence between energy and metals prices. A variety of shocks have affected demand and supply conditions. Energy prices have increased over the course of the year, but the prices of metals and agricultural commodities have declined, particularly in the second half of the year (figure 1.4). After rising 23 percent in 2017, oil prices have increased by an additional 36 percent over 2018 so far relative to 2017, with prices averaging US$70/barrel this year, in line with World Bank forecasts. Supply-side factors, including declining production in the República Bolivariana de Venezuela and the reintroduction

of sanctions on the Islamic Republic of Iran by the United States, have been the main drivers of the increase in oil prices, although demand has also remained robust. The pace of growth in global demand is roughly equal to the increase in non–Organization of the Petroleum Exporting Countries (OPEC) supply, primarily from increases in U.S. production. As such, any shortfall in production arising from geopolitical events, including in the Islamic Republic of Iran and the República Bolivariana de Venezuela, but also other countries such as Libya, will need to be met by spare capacity from OPEC countries. The tightness of oil supply means that prices are particularly susceptible at present to shocks, and implies that risks are firmly to the upside. Oil prices are likely to remain elevated through the rest of the year and into 2019.

After rising 5.4 percent in 2017, non-energy commodity prices were stable until June, when they fell sharply following the announcement of tariffs by the United States on Chinese imports and related market concerns about a global trade slowdown. Metals prices in 2018 so far are up 15 percent compared to the same period in 2017. However, prices have fallen 12 percent since the announcement of tariffs in June. All base metals saw a decline in prices, with zinc, lead, and copper experiencing the sharpest falls. Iron ore prices were relatively unaffected, with pollution-driven cuts in supply in China acting to support prices. For 2018 as a whole, metals prices are likely to be weaker than the World Bank previously forecasted and may remain subdued in 2019 and 2020 amid muted demand, particularly in China. Agricultural prices are also down in 2018, with a similar impact from tariffs, although wheat prices have been supported by harvests hit by poor weather in Europe and the Russian Federation. Agricultural prices are expected to remain stable in 2019 and 2020.

Financing conditions remain accommodative in industrial economies but have deteriorated in EMDEs. Government bond yields in the United States stabilized over the summer amid strong safe-haven flows from EMDEs. U.S. long-term yields have hovered around 2.8-3.0 percent since mid-2018, up only slightly relative to levels prior to the start of the U.S. tightening cycle, despite cumulative policy interest rate hikes of 200 basis points. Strong demand for risk-free assets has compressed the U.S. yield curve despite rising inflation and a swelling fiscal deficit in the United States. Safe-haven flows and rising short-term policy rate differentials between the United States and other major economies have contributed to a broad-based appreciation of the U.S. dollar, especially relative to EMDEs.

Financial conditions have tightened in EMDEs amid concerns about dollar-denominated funding, escalating trade tensions, and rising policy uncertainties. Financial market turmoil has been especially pronounced in Turkey and Argentina, where external financing needs are particularly

EMDEs are financing large capital outflows and rising financing cost

FIGURE 1.5: Equity and Bond Portfolio Flows

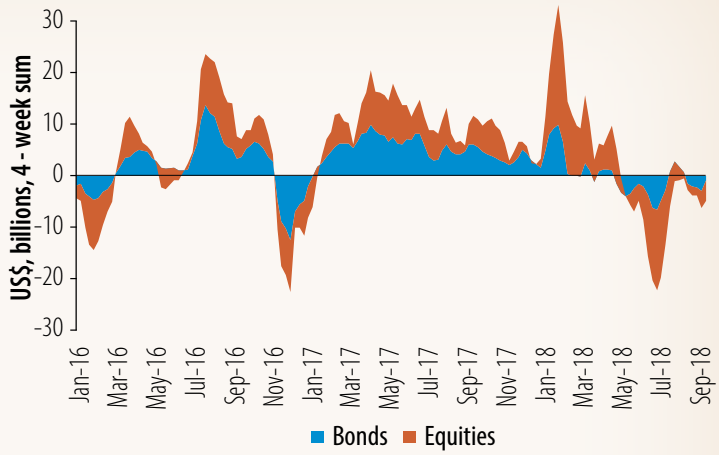


FIGURE 1.6: Emerging Market Sovereign Global Bond Spreads

Sources: JPMorgan; World Bank.

Note: Values are for net flows into EMDE bond and equity funds. The last observation is September 19, 2018.

large, but several other major EMDEs, including Brazil, South Africa, Russia, India, and Indonesia, have also suffered from currency pressures, tighter borrowing costs, and broad-based capital outflows (figures 1.5 and 1.6). A growing number of EMDE central banks, including in Argentina, Turkey, Russia, India, and Indonesia, have responded to currency pressures with interest rate hikes or interventions in foreign exchange markets. From June to August, sovereign and corporate bond issuances were down 65 percent from the previous year, as EMDEs such as Argentina, Mexico, Russia, and Turkey have avoided the international bond market in recent months. As global interest rates continue to rise, external financing conditions are expected to become more challenging, and capital flows to EMDEs are expected to remain weak, particularly among more vulnerable economies.

1.2 SUB-SAHARAN AFRICA

RECENT ECONOMIC DEVELOPMENTS

Growth slowed in the large economies but was broadly steady in the rest of the region

Average growth in the region is estimated to have risen from 2.3 percent in 2017 to 2.7 percent in 2018, barely keeping up with population growth, partly due to weaknesses in Nigeria, South Africa, and Angola—the region's three largest economies (figure 1.7). Nigeria's recovery faltered in the first half of the year. Oil production fell, partly due to pipeline closures (figure 1.8). The agriculture sector contracted, as conflict over land between farmers and herders disrupted crop production, partially offsetting a rebound in the services sector and dampening non-oil growth. Real gross domestic product (GDP) growth slowed from 2 percent (year over year) in 2018Q1 to 1.5 percent in 2018Q2 (figure 1.8). Meanwhile, a decline in oil production, due to underinvestment and key fields reaching maturity, weighed on growth in Angola—the region's second largest oil exporter. South Africa's economy slipped into a technical recession following two consecutive quarters of contracting economic activity, with agriculture, mining, and construction acting as major drags on economic growth. Manufacturing sector growth was subdued (figure 1.9).

FIGURE 1.7: GDP Growth, Sub-Saharan Africa

Average GDP growth in Africa is low, impeded by weak performance in large resource economies

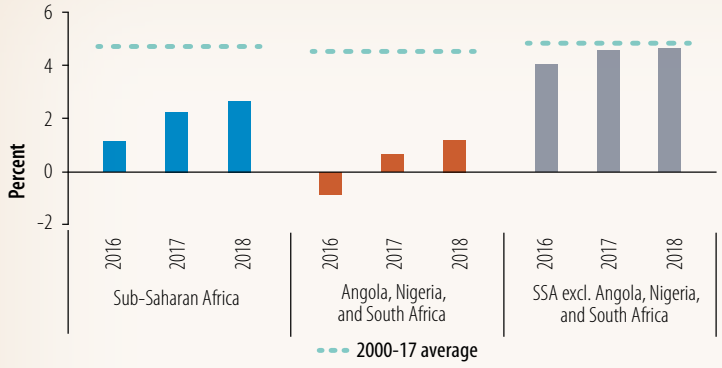


FIGURE 1.8: Real GDP Growth, Nigeria

Nigeria's recovery slowed because of lower oil production

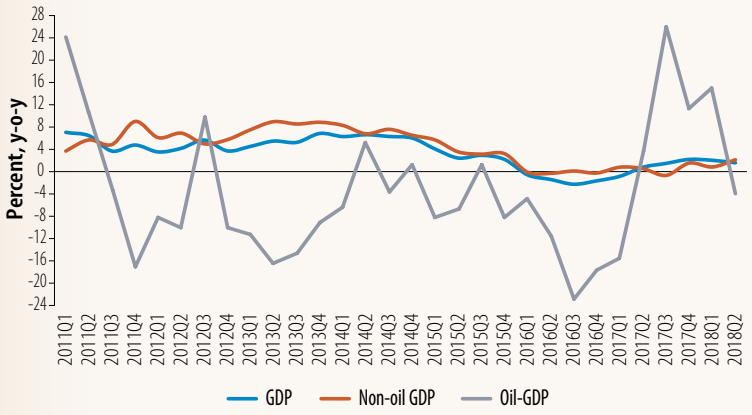
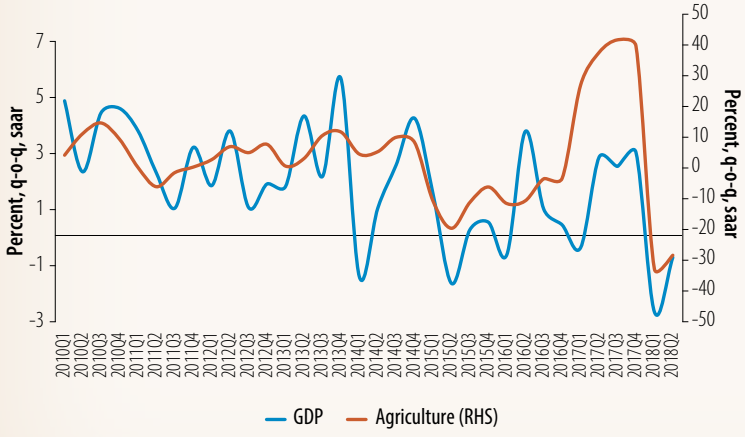


FIGURE 1.9: Real GDP Growth, South Africa

In South Africa, weakness in agriculture, mining, and construction dragged the economy into recession

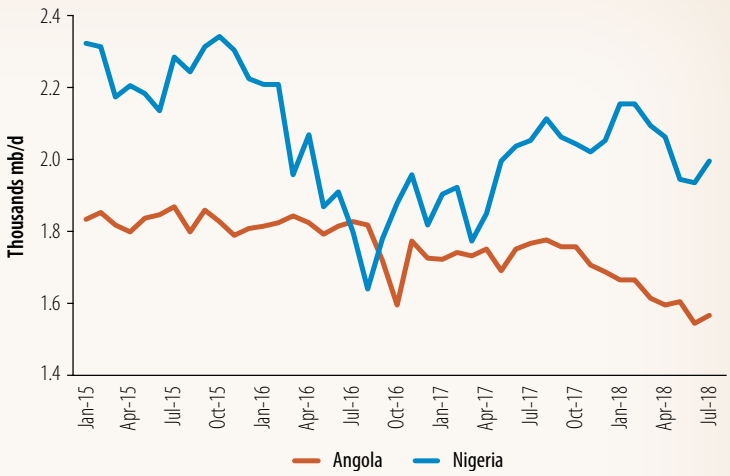


Sources: National Bureau of Statistics, Nigeria, August 2018; Statistics South Africa, Statistical Release, GDP Second Quarter 2018; World Bank staff estimates.

Note: GDP = gross domestic product; q-o-q = quarter over quarter; saar = seasonally adjusted annual rate; SSA = Sub-Saharan Africa; y-o-y = year over year.

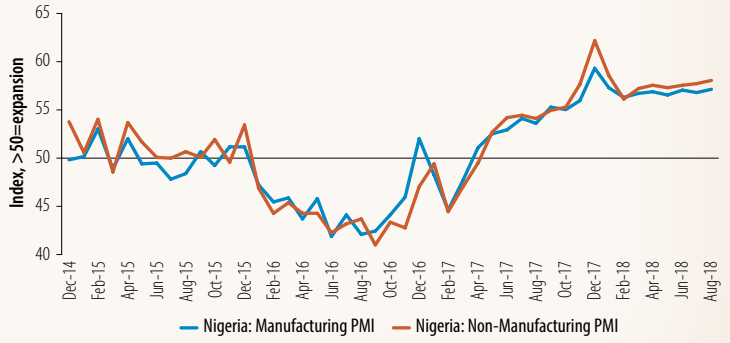
Despite some recovery, crude oil production remained below expectations in Angola and Nigeria

FIGURE 1.10: Oil Production: Angola and Nigeria



In Nigeria, the manufacturing and nonmanufacturing PMI rose moderately in recent months.

FIGURE 1.11: Activity Indicators: Nigeria PMI



Sources: Central Bank of Nigeria, August, 2018, https://www.cbn.gov.ng/documents/PurchManIndex.asp.

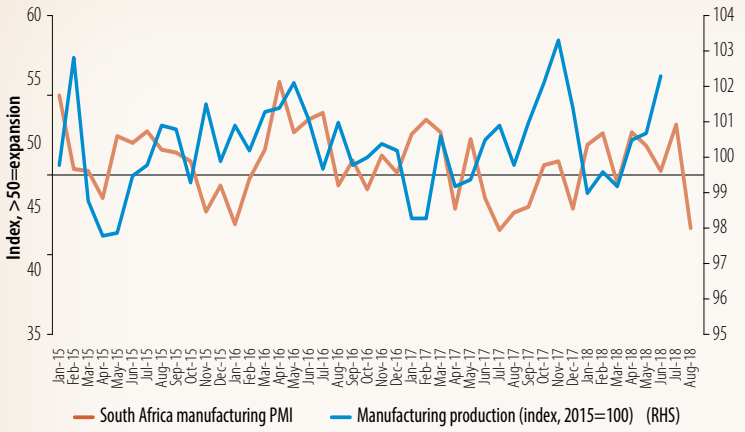
Note: PMI = Purchasing Managers' Index; mb/d = million barrels per day.

Incoming data point to a modest pickup in activity in all three economies in the second half of the year. In Nigeria, oil production has increased in recent months, and the manufacturing and non-manufacturing PMI rose (figures 1.10 and 1.11). However, these gains would have to be sustained to feed into stronger business confidence. In South Africa, retail trade, manufacturing, and mining picked up at the start of 2018Q3. However, low business confidence suggests that economic activity is likely to remain under pressure, and survey data suggest that the momentum may have faded. The manufacturing PMI fell sharply in August, and business confidence has remained low (figures 1.12 and 1.13). Against this backdrop, the government announced a plan to stimulate economic activity. The economic effect of the stimulus plan is likely to be limited, as it mostly consists of already-committed public spending. However, planned reforms—including on mining regulation and utility pricing—will improve the business environment and encourage investment. In Angola, crude oil production has remained below expectations, as the output of maturing oil fields continues to decline rapidly.

Excluding Nigeria, South Africa, and Angola, growth in the rest of the region has been broadly steady, although performance varied across countries (figure 1.14). Several oil exporters in the Economic and Monetary Community of Central Africa (CEMAC) saw an uptick in growth, with Chad and the Republic of Congo expected to exit recession, helped by higher oil prices and an increase in oil production. Growth in non-resource-rich countries remained solid, supported by agricultural production and services on the production side, and household consumption and public investment on the demand side. Several countries in the West African Economic and Monetary Union (WAEMU) grew at 6 percent or more, including Benin, Burkina Faso, Côte d'Ivoire, and Senegal, although growth softened in some. A strong rebound in agriculture in Kenya, Rwanda, and Uganda, following drought, underpinned the pickup in economic activity in East Africa. Nevertheless, growth has been showing signs of slowing in Ethiopia, as foreign exchange

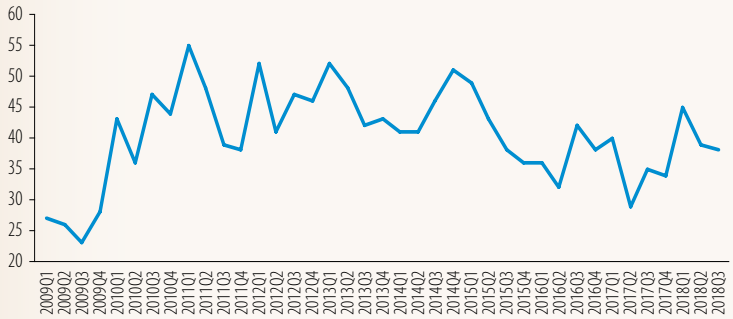
shortages continue to weigh on construction, and manufacturing, and in Tanzania due to a weak investment climate, and low public investment. Growth among metals exporters was subdued, despite an increase in mining production in some countries. Economic activity rebounded in Botswana and the Democratic Republic of Congo, and has been robust in Guinea and Niger, as a recovery in commodity prices helped boost mining production. However, heightened political uncertainty (Democratic Republic of Congo), weak fiscal dynamics (Zambia), and mine closures (Sierra Leone) weighed on growth in several countries.

FIGURE 1.12: Activity Indicators: South Africa



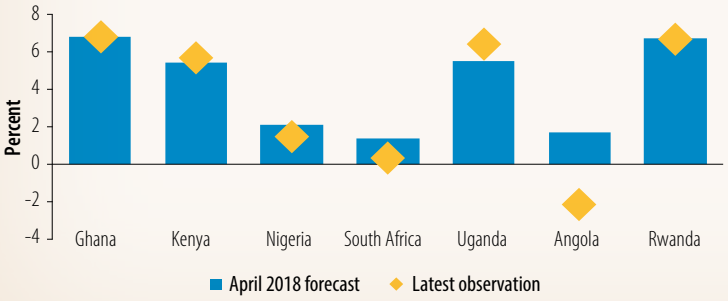
In South Africa, the sharp drop in the PMI and lower business confidence point to weaker growth in 2018Q3

FIGURE 1.13: Business Confidence Index: South Africa



Sources: Statistics South Africa, September, 2018, http://www.statssa.gov.za/publications/P30412/P30412July2018.pdf
https://www.ber.ac.za/BER%20Documents/RMB/BER-Business-Confidence-Index/?doctypeid=1050
Note: PMI = Purchasing Managers' Index; mb/d = million barrels per day.

FIGURE 1.14: GDP Growth, Selected Countries



Large disparity in growth performance across African countries

Sources: World Bank staff estimates.

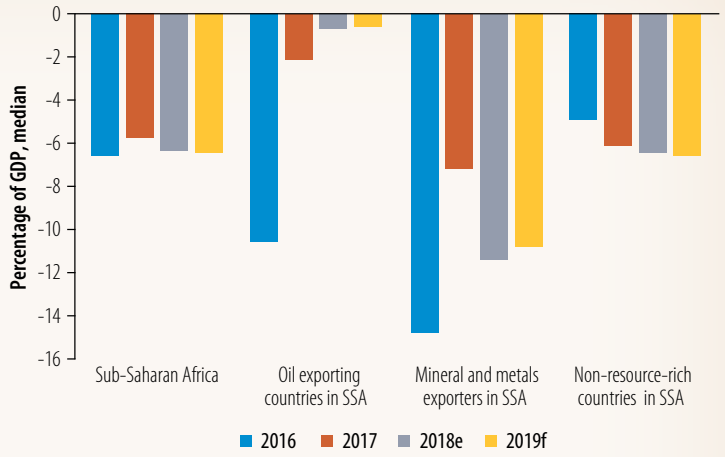
External positions weakened

Median current account deficits are estimated to have widened from 5.8 percent of GDP in 2017 to 6.5 percent in 2018 (figure 1.15), but significant differences persist between countries. For large oil exporters (Angola and Nigeria), external balances improved noticeably, helped by higher oil prices and weak import demand due to slow growth. The current account deficit also narrowed significantly in CEMAC. In some countries, this improvement reflected the strong external adjustment to the 2014 oil price shock, reinforced by the recovery in oil prices. In others, the narrowing of the current account deficit was supported by a pickup in non-oil exports.

By contrast, external balances in metals exporters deteriorated. The current account deficit is estimated to have increased from 7.2 percent of GDP in 2017 to 11.5 percent in 2018 (figure 1.15). This deterioration reflects a range of factors, including weaker exports in some countries, and stronger import growth and higher interest payments on government debt in others. In non-

Current account deficits widened in 2018, except among oil exporters

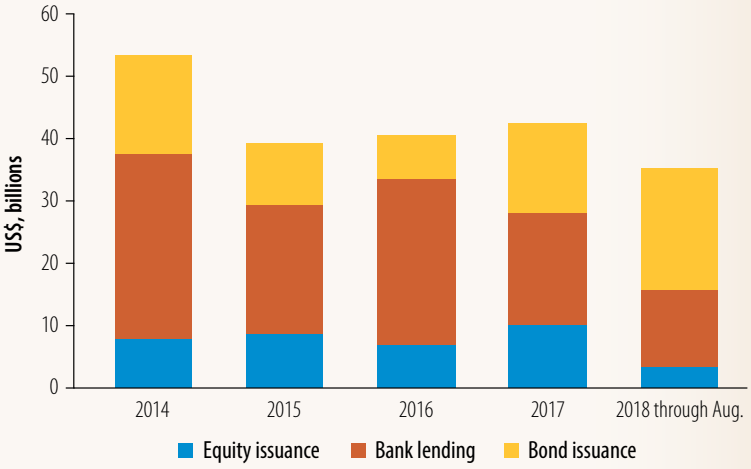
FIGURE 1.15: Current Account Balance



Source: World Bank staff calculations.
Note: GDP = gross domestic product; SSA = Sub-Saharan Africa.

Tighter global financial conditions and change in investors' sentiment contributed to a decline in capital flows in the region

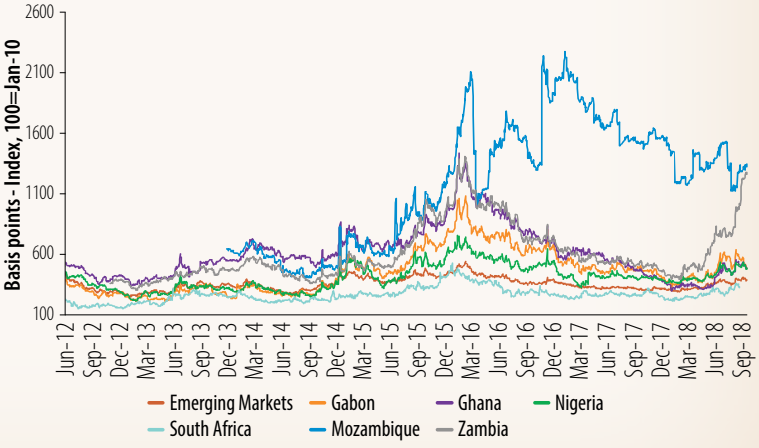
FIGURE 1.16A: Capital Flows



Sources: Bloomberg; World Bank.

The sovereign bond spread rose rapidly in vulnerable countries

FIGURE 1.16B: Sovereign Bond Spreads



Source: Bloomberg.

resource-rich countries, current account deficits remained elevated due to high fuel and capital goods imports related to public infrastructure projects.

Portfolio investment inflows helped finance the current account imbalances in oil-exporting countries. Metals exporters and non-resource-rich countries financed their current account deficits through foreign direct investment (FDI) and external borrowing in some cases. Portfolio investment flows surged in Nigeria after the central bank introduced the Investors' and Exporters' FX Window in 2017, and continued to rise in the first half of 2018, attracted by high yields. Portfolio inflows also increased in South Africa at the start of the year, as business confidence improved following the change in political leadership. However, tighter global financial conditions and the change in investor sentiment toward emerging markets contributed to a reversal in capital inflows, higher financing costs, and exchange rate pressures in some countries (figures 1.16A and 1.16B). Eurobond issuance slowed markedly in the second half of the year, while FDI inflows remained subdued.

Partly reflecting the slowdown in capital inflows, the buildup in international reserves

moderated in the region. Nevertheless, the level of reserves remained high in Nigeria and Angola, helped by the recovery in oil prices. In CEMAC, international reserves continued to recover, aided by fiscal consolidation efforts. Elsewhere, Eurobond issuances by Côte d'Ivoire, Senegal, and the West African Development Bank helped boost reserves in WAEMU. However, reserve coverage fell below the three-months-of-imports benchmark in several countries, reflecting net capital outflows in some (Zambia) and a decline in foreign aid in others (Liberia and Sierra Leone). Reserve coverage remained very low in some fragile countries, at less than two months of imports (Burundi, Democratic Republic of Congo).

Exchange rates depreciated, inflation eased

Currencies in the region depreciated amid tighter global financing conditions, the strengthened U.S. dollar, and falling investor sentiment toward emerging markets (figures 1.17 and 1.18). South Africa's relatively wide current account deficit exposed the country to fluctuations in portfolio investment flows. The sharp fall of the Turkish lira in July and August 2018 spilled into South African financial markets, provoking a rapid sell-off of the South African rand. More recently, the Zambian kwacha came under pressure and depreciated rapidly on investors' concerns about the country's rising debt level. Elsewhere in the region, the pace of currency depreciation has been relatively slow. In Angola and Nigeria, higher oil prices and portfolio inflows improved foreign exchange availability and helped narrow the parallel market exchange rate premium.

Inflation has eased across the region in 2018 (figures 1.19 and 1.20), due to falling food prices and the slow pace of currency depreciation in many countries. The median annual inflation rate in the region is estimated to have declined from 5.2 percent in 2017 to 4.6 percent in 2018. The number of countries with a two-digit inflation rate decreased. Among oil exporters, inflation fell in Nigeria and Angola, although it remained in double digits. At their September 2018

FIGURE 1.17: Nominal Exchange Rate: LCU/US$, Percentage Change Since January 1, 2014

Exchange rates depreciated across the region in 2018

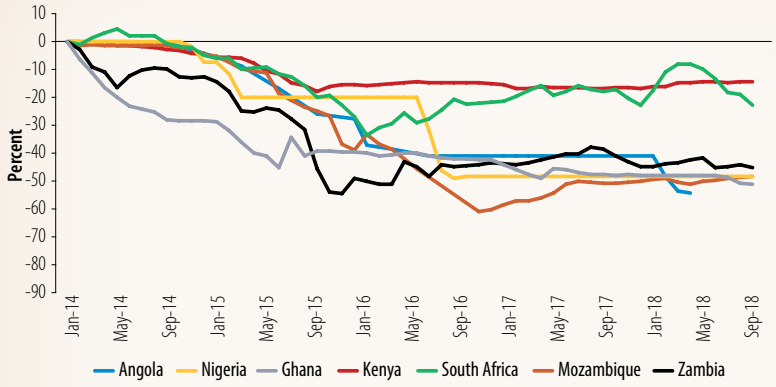
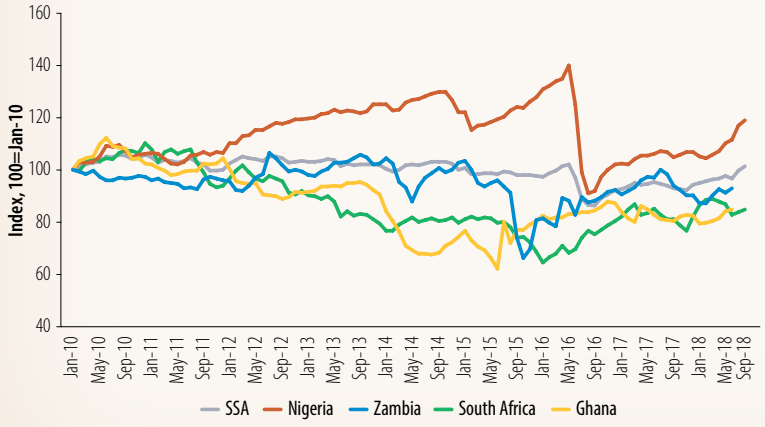


FIGURE 1.18: Real Effective Exchange Rate



Sources: World Bank; Haver Analytics.
Note: LCU = Local currency unit; SSA = Sub-Saharan Africa.

In most African countries, inflation is receding

FIGURE 1.19A: Inflation: Selected Countries

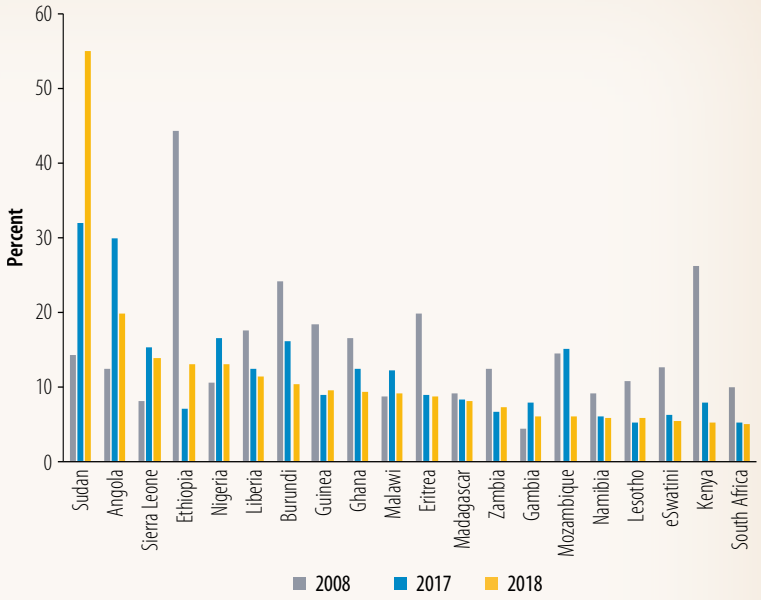
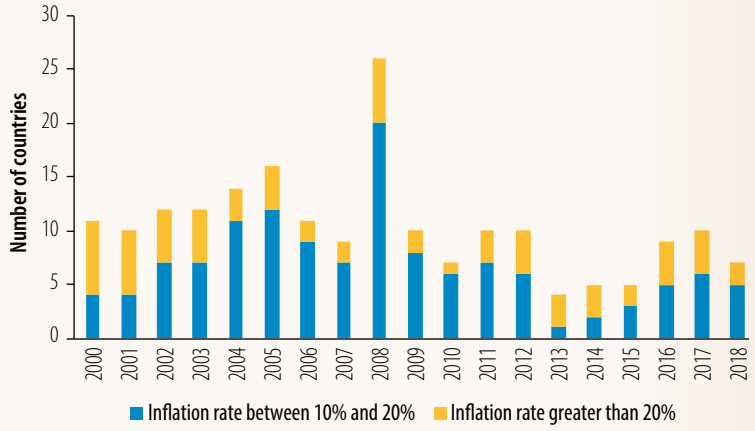
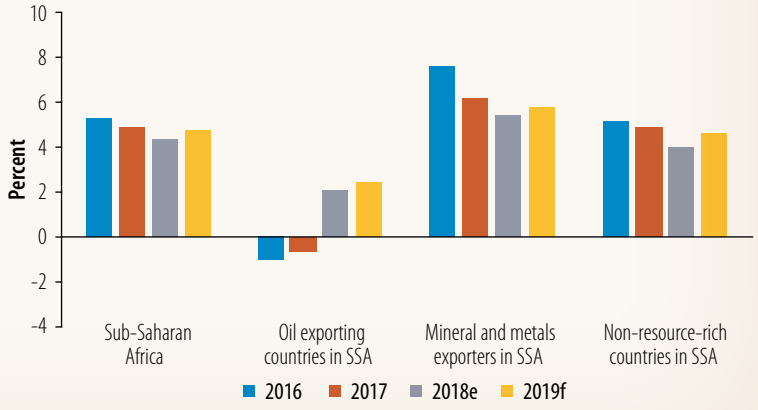


FIGURE 1.19B: Number of SSA Countries with Two-Digit CPI Inflation Rate



Leading to, on average, lower inflation rates in the region in 2018

FIGURE 1.20: Inflation, by Country Group, Sub-Saharan Africa



Source: World Bank staff calculations.

policy meetings, the Central Banks of Angola and Nigeria left their key interest rates unchanged. Meanwhile, several CEMAC countries saw an uptick in inflation as the pace of recovery picked up.

Inflation receded among metals exporters and non-resource-rich countries. In South Africa, inflation remained well within the 3 to 6 percent target range, despite the recent weakening of the South African rand, helped by lower food price inflation. At its recent monetary policy meeting, the central bank left interest rates unchanged. Elsewhere, Liberia and Sierra Leone continued to have inflation over 10 percent, as their currencies depreciated rapidly against the U.S. dollar amid falling export revenues. The Bank of Sierra Leone raised interest rates to contain inflationary pressures. Among non-resource-rich countries, inflation rose sharply in Ethiopia and Sudan. In Ethiopia, the rapid increase in inflation reflected an expansion of credit to the public sector, pass-through of currency devaluation, and political disruptions. In Sudan, the monetization of a large fiscal deficit caused inflation to rise rapidly.

Fiscal positions improved

The median fiscal deficit for the region is estimated to have narrowed from 4.2 percent of GDP in 2017 to 3.6 percent in 2018, with fiscal balances improving in most countries (figure 1.21). The fiscal deficit in oil exporters improved sharply, reflecting a marked decline in the deficits in Angola and the CEMAC countries. The narrower deficit in Angola stemmed from higher oil prices, and the CEMAC countries substantially reduced their fiscal deficits through cuts in capital expenditures. By contrast, the fiscal deficit remained elevated in Nigeria, due to low revenue collection.

FIGURE 1.21: Fiscal Balance

Fiscal deficits narrowed further in the region in 2018

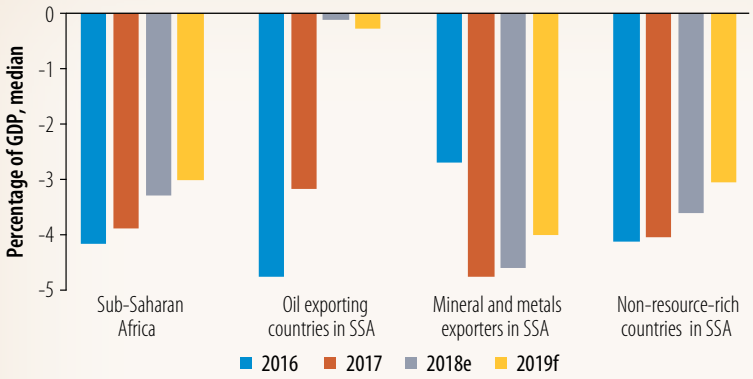
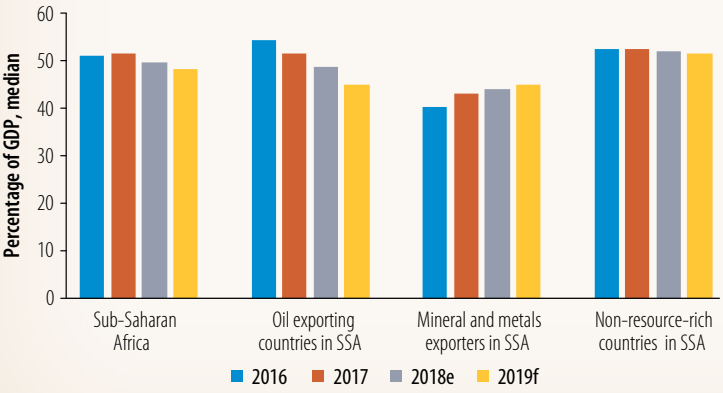


FIGURE 1.22: Public Debt

Public debt levels remain high



Source: World Bank staff estimates.
Note: GDP = gross domestic product; SSA = Sub-Saharan Africa.

In metals exporters, the median fiscal deficit is estimated to have narrowed moderately from 4.8 percent of GDP in 2017 to 4.6 percent in 2018, due to high spending levels in some countries. In non-resource-rich countries, the median fiscal deficit is estimated to have declined from 4.1 percent of GDP in 2017 to 3.6 percent in 2018, helped by an increase in domestic revenue mobilization.

Debt vulnerabilities remained high[1]

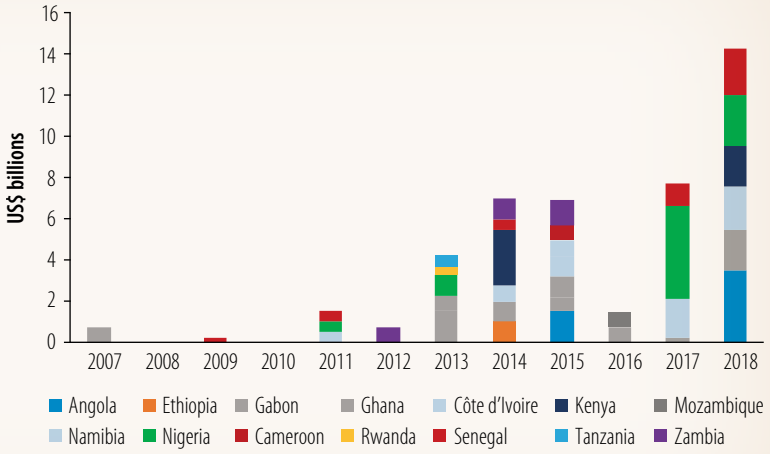
With fiscal deficits narrowing, government debt levels appear to have stabilized, but vulnerabilities remain (figure 1.22). Compared to 2012–13, the median public debt level remains high, especially among oil exporters and non-resource-rich countries. During 2012–17, government debt is estimated to have increased by more than 20 percentage points in the region. Debt rose in about two-fifths of the countries in 2017 and was above 60 percent of GDP in one-third of the countries. Exchange rate depreciations (Zambia), negative growth (Chad, the Republic of Congo, and Equatorial Guinea), and the reporting of previously undisclosed debt (the Republic of Congo and Mozambique) contributed to the deterioration in debt-to-GDP ratios.

During 2018, government debt rose rapidly in Angola and Zambia, partly due to continued currency depreciations. Chad finalized the restructuring of its oil-collateralized debt, which

1 The drivers of recent increase in public debt, associated vulnerabilities, and emerging risks in the region were discussed in detail in April 2018 issue of the Africa's Pulse.

In the first half of 2018, six frontier economies in the region raised a record US$14.3 billion in Eurobonds

FIGURE 1.23: International Bond Issuances on LICs and LMICs in SSA



Source: Bloomberg.
Note: LICs = low-income countries; LMICs = lower-middle-income countries; SSA = Sub-Saharan Africa.

would reduce the country's debt service payments. In addition to the rise in debt ratios, change in the composition of debt has made many countries vulnerable to changes in financing conditions. As countries have gained access to international capital markets and nonresident participation in domestic debt markets has expanded, non-concessional debt has increased. Non-concessional financing accounted for more than 50 percent of total public debt in six countries (Côte d'Ivoire, Ghana, the Republic of Congo, Sudan, Zambia, and Zimbabwe) and more than 30 percent of total public debt in several other countries (including Chad, Senegal, Mozambique, and Ethiopia) (figure 1.23).

The share of foreign currency-denominated public debt increased by about two-fifths from 2010–13 to 2017 in the region and averaged about 60 percent of total debt in 2017. The recent increase partly reflects the surge in Eurobond issuance (box 1.1). Although interest rates on foreign currency-denominated debt are generally lower than domestic interest rates in Sub-Saharan Africa, the increased reliance on foreign currency borrowing has heightened refinancing and interest rate risk in debtor countries. Furthermore, the rise in nonresident participation in domestic debt markets has exposed some countries (Ghana and Nigeria) to the risk of sudden capital outflows, which could trigger large currency depreciations. In some countries (Chad and the Republic of Congo), sizable loans to state-owned enterprises, backed by commodity exports, have increased exposure to commodity price shocks.

Debt sustainability has deteriorated in several countries in the region. At the end of 2017, eight countries (Chad, Eritrea, Mozambique, the Republic of Congo, Somalia, South Sudan, Sudan, and Zimbabwe) were classified as in debt distress under the World Bank–International Monetary Fund Debt Sustainability Framework. Additionally, the previous moderate ratings for The Gambia, Zambia, and Ethiopia more recently were changed to high risk of debt distress.

GROWTH RESILIENCE: TAKING STOCK

The resilience of growth trajectories across Sub-Saharan African countries took a toll amid a less favorable external environment and rising macroeconomic vulnerabilities during 2015–17. In the April 2017 issue of *Africa's Pulse,* 45 Sub-Saharan African countries were categorized into four groups based on comparison of their average annual GDP growth rates during 1995–2008 and 2015–17. The categorization has been revisited using growth rates for 2015–18. This more recent period better captures the resiliency of countries to the 2014–15 commodity shock, their reduced macroeconomic policy space, rising public debts, and the adequacy of the policy response. The thresholds used to classify the countries remain the same: the top and bottom terciles of the average annual growth rate of the 45 countries between 1995 and 2008—that is, 5.4 and 3.5 percent, respectively.

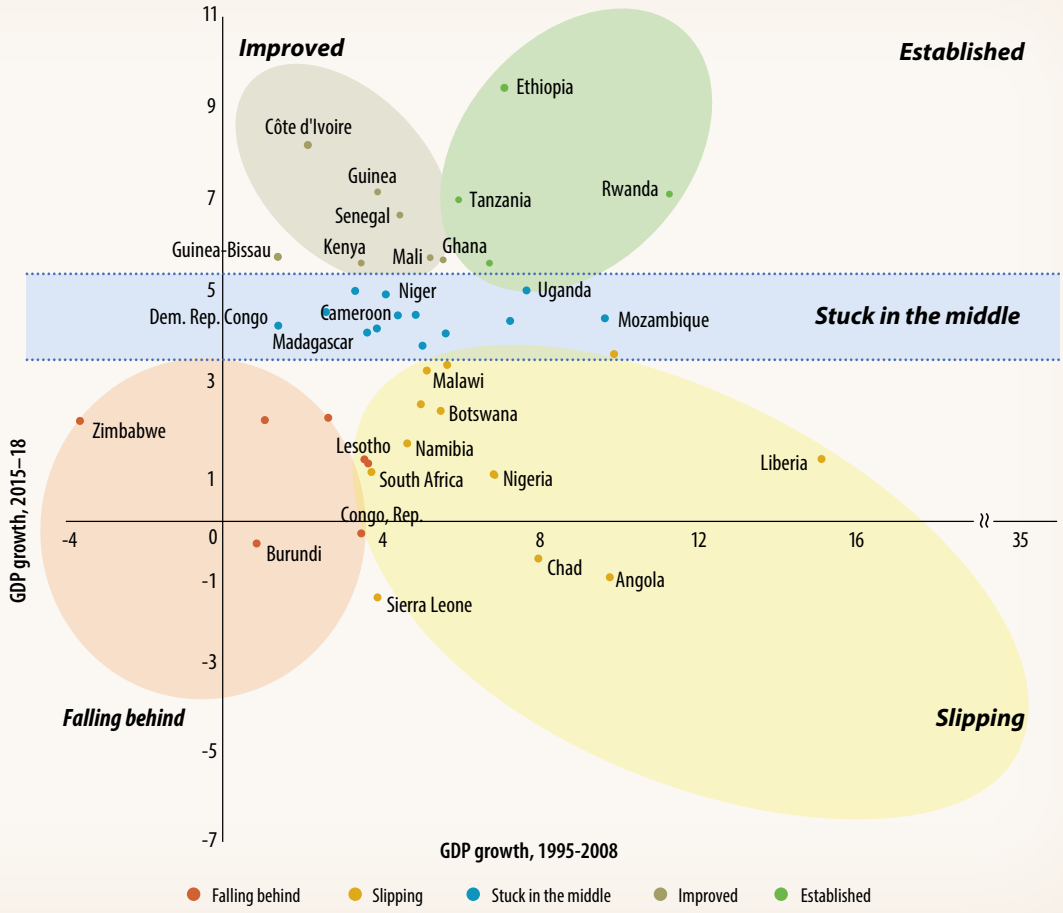
The latest data reveal that 11 countries experienced growth rates above 5.4 percent in 2015–18 (as opposed to seven countries in the April 2017 issue of *Africa's Pulse*). The 11 countries are Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Mali, Rwanda, Senegal, and Tanzania (figure 1.24). These countries house nearly one-third of the region's population and account for 20 percent of the region's total GDP. Growth of the high-performing countries in the region (established and improved countries) was supported by higher aggregate demand (private consumption and public investment), higher commodity exports, and improved agricultural output. The countries in the established group (Burkina Faso, Ethiopia, Rwanda, and Tanzania) are not resource abundant; their (median) annual growth rate was about 7 percent per year in 2015–18; and their (population-weighted) average GDP per capita amounts to US$807.

The countries that are stuck in the middle failed to exceed an annual growth rate of 5.4 percent in 2015–18. GDP growth in this group of countries was mostly driven by consumption (private and public). This group of countries houses nearly 30 percent of the region's population and accounts for 17 percent of the region's total GDP. The (population-weighted) average GDP per capita of this group is U$955.

Countries with economic performance that lost steam in 2015–18 relative to 1995–2008 represent about one-third of the region's population and nearly 60 percent of its economic activity. Their median rate of GDP growth decelerated from 5.4 percent per year in 1995–2008 to 1.2 percent per year in 2015–18. This group includes the three largest countries in the region (Nigeria, South Africa, and Angola), comprises many commodity exporters, and has an average GDP per capita of about US$2,696. The group of slipping countries includes the largest number of countries with macroeconomic vulnerabilities—that is, restricted macroeconomic policy space, low external buffers, and rising debt.

Eleven countries continue to have annual average growth rates in 2015–18 that exceed the top tercile of the regional distribution in 1995–2008

FIGURE 1.24: Growth Taxonomy



Source: World Bank staff calculation based on the WDI database.

Finally, seven countries (Burundi, the Comoros, the Republic of Congo, eSwatini, Gabon, Lesotho, and Zimbabwe) continued to register poor growth performance in 1995–2008 and 2015–18. They are a small group of countries that represent less than 5 percent of the population and economic activity in the region. Their median growth rate decelerated from 2.6 percent in 1995–2008 to 1.3 percent in 2015–18. Some of these countries are oil exporters (the Republic of Congo and Gabon), while some others are fragile countries (Burundi and the Comoros). Investment deceleration and rising public debt are weighing on the economic performance of these countries. The (population-weighted) average GDP per capita of this group is about US$1,340.

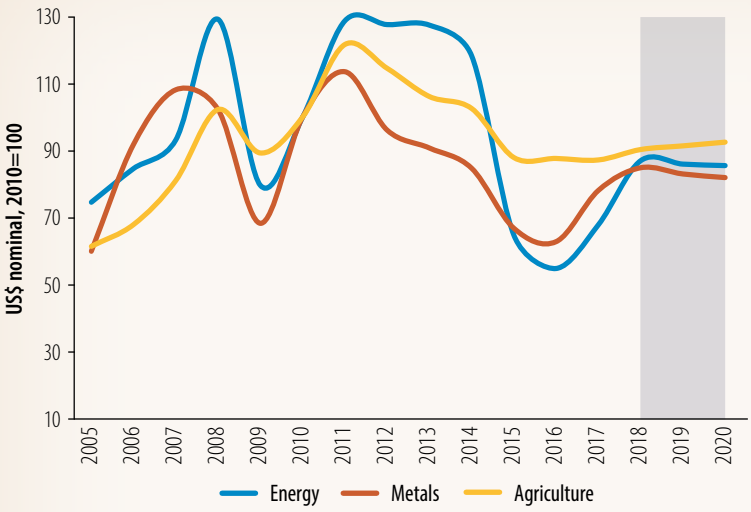
ECONOMIC OUTLOOK

Economic recovery in the region is set to continue but at a more gradual pace

The external environment facing Sub-Saharan Africa has become more challenging, including due to moderating economic growth among its main trading partners, the stronger U.S. dollar, heightened trade policy uncertainty, and tightening global financial conditions. While the tightness of oil supply suggests that oil prices are likely to remain elevated through the rest of 2018 and into 2019, metals prices have been softer than previously forecasted and may remain subdued in 2019 and 2020 amid muted demand, particularly in China (figure 1.25).

Against this backdrop, the economic recovery in Sub-Saharan Africa is expected to continue at a gradual pace, supported by a modest uptick in oil prices, the easing of drought conditions that had depressed agricultural output, and a rise in domestic demand as policy uncertainty of the past year recedes and investment rises. Growth in the region is projected to increase from 2.7 percent in 2018 to 3.3 percent in 2019, rising to 3.6 percent in 2020, slightly below April forecasts (figure 1.26). Per capita income growth would remain well below its long-term average in many countries, highlighting the need for comprehensive policy measures to raise potential output (figure 1.27).

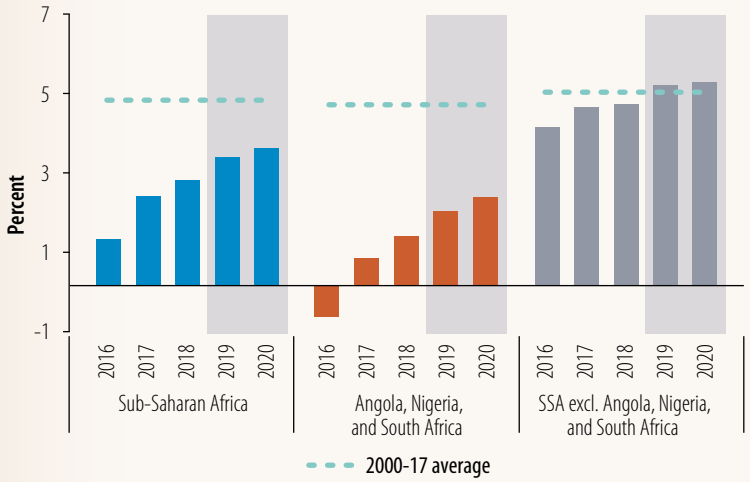
FIGURE 1.25: Commodity Price Forecasts



Source: World Bank.

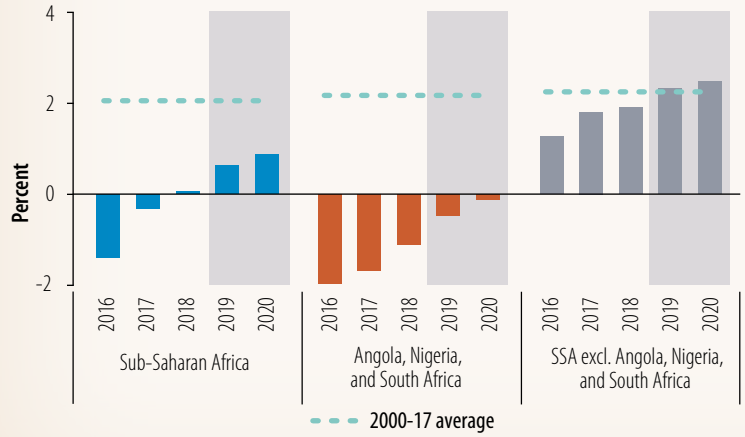
Commodity prices are projected to soften, partly on account of slow growth in the euro area and China

FIGURE 1.26: Growth Forecast: GDP



The outlook for GDP growth and per capita GDP growth in the region is projected to be positive and improving

FIGURE 1.27: Growth Forecast: GDP per Capita



Source: World Bank.
Note: GDP = gross domestic product; SSA = Sub-Saharan Africa.

Per capita growth is expected to remain below its long-term average

- Growth in Nigeria is estimated to have increased from 0.8 percent in 2017 to 1.9 percent in 2018 (0.2 percentage points lower than April forecast). Growth is expected to rise further to 2.2 percent in 2019, reaching 2.4 percent in 2020. These forecasts are unchanged from April and assume that oil production will peak below government targets, while a slow recovery in private demand will constrain growth in the non-oil industrial sector. In Angola, an increase in oil production is expected to boost growth to 2.7 percent in 2019 and 3.7 percent in 2020, along with a pickup in activity in the non-oil sector as reforms help improve the business environment. These forecasts are 0.5 and 1.3 percentage points higher than in April, respectively.

- Growth in South Africa is expected to recover slowly from 1.0 percent in 2018 to 1.3 percent in 2019 before rising to 1.7 percent in 2020. These forecasts 0.4, 0.5, and 0.2 percentage points are lower than in April. Growth is expected to remain subdued in 2019, as domestic demand is constrained by high unemployment and slow growth in credit extension to households, and fiscal consolidation limits government spending. The higher growth in 2020 reflects the expectation that the government's structural reform agenda will gradually gather speed, helping to boost investment growth, as policy uncertainty recedes.

- Excluding Nigeria, South Africa, and Angola, growth in the rest of Sub-Saharan Africa is expected to continue to rise at a solid pace, although with significant variation between country groups. Economic activity in CEMAC is expected to pick up, supported by higher oil production and a modest increase in domestic demand as the drag from fiscal tightening gradually eases.

- Growth is expected to rebound moderately among metals exporters, as non–mining sector activity remains subdued due to a range of factors, including weak fiscal dynamics, accelerating inflation, and low business confidence in some countries.

- Among non-resource-rich countries, economic activity is expected to remain robust in the fast-growing countries, such as Côte d'Ivoire, Kenya, and Rwanda, boosted by public investment and strong agricultural growth, and in smaller economies, such as Madagascar, on the back of exports. Growth is expected to moderate in Ethiopia as the government implements fiscal consolidation measures to stabilize public debt.

Inflation is expected to pick up across the region in 2019, due to an increase in price pressures among metals exporters and non-resource-rich countries. Inflation is expected to continue to recede in Nigeria and Angola but at a slower pace, as the pickup in growth boosts demand. Elsewhere, price pressures are likely to intensify in several countries—including Kenya, Tanzania, and Uganda—as elevated international oil prices contribute to fuel price inflation. Headline inflation would remain in double digits in Liberia, Sierra Leone, and Sudan.

Current account positions are expected to stabilize in 2019, as external balances in metals-exporting countries improve, due to a compression in non-oil imports in some countries. Although current account deficits are expected to continue to narrow among oil exporters, Nigeria's current account surplus is likely to fall gradually as the economic recovery boosts demand for imports. The current account deficit in non-resource-rich countries is expected to remain broadly unchanged, as capital goods imports remain high.

Fiscal balances are expected to improve further, reflecting fiscal consolidation efforts among the large oil exporters (Angola and Nigeria) and continued adjustment in oil exporters in CEMAC. Policy tightening is expected to yield smaller fiscal deficits in metals exporters, while fiscal deficits in non-resource-rich countries should continue to narrow as public investment spending slows to stabilize public debt.

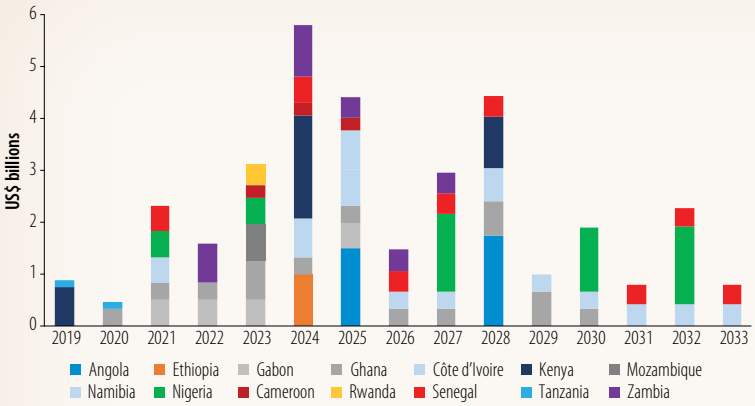
RISKS TO THE OUTLOOK

External risks: Slower than projected growth in the euro area and China, which have strong trade and investment links with Sub-Saharan Africa, would adversely affect the region. A substantial slowdown in China could affect not only commodity prices and export demand, but also FDI flows. Although most commodity exporters would feel some fallout from a prolonged trade war between the United States and China, Sub-Saharan African countries that produce metals but import oil are likely to be hit the hardest, as metals prices are likely to fall faster than oil prices (box 1.2). Moreover, a faster than expected normalization of monetary policy in the United States could result in sharp reductions in capital inflows, higher financing costs, and rapid exchange rate depreciations, especially in countries with weaker fundamentals or higher political risks. Sharper than anticipated currency weaknesses could make the servicing of foreign currency denominated debt, already a rising concern in the region, more challenging (figures 1.28 and 1.29).

Domestic risks: Political uncertainty and the concurrent weakening of economic reforms will continue to weigh on the economic outlook in many countries in the region. An increase in political violence or instability could derail the reform agenda, as policy makers focus on security rather than potentially painful reforms. In countries holding elections in 2019, domestic

FIGURE 1.28: Selected International Bond Redemptions in SSA

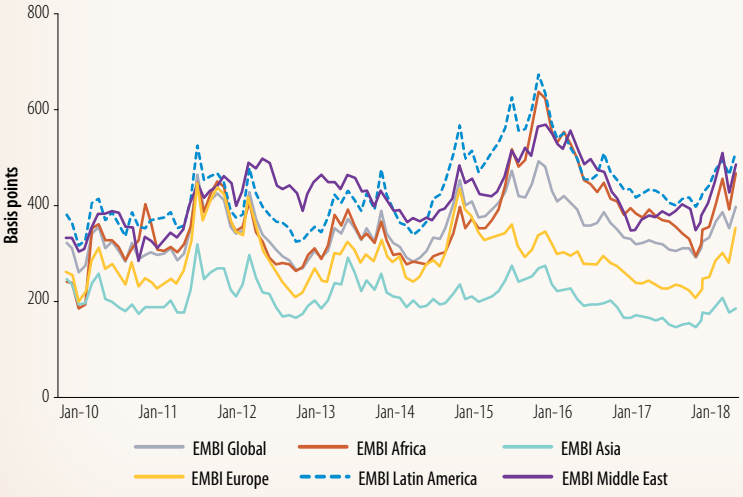
Large Eurobond repayments from 2021 could pose significant refinancing risk in the region



Source: Bloomberg.

FIGURE 1.29: EMBI Bond Spreads

The gap between the global and Africa spread has widened



Source: Bloomberg.
Note: EMBI = emerging market bond index.

political considerations could undermine the commitments needed to rein in fiscal deficits or implement structural reforms, especially in countries where public debt levels are high and rising. Insurgencies, with their adverse effects on agricultural production and private sector activity in urban areas, remain an important risk in several countries. Weather shocks, including prolonged drought spells and flooding, and rising financial sector stress are additional domestic risks.

BUILDING RESILIENCE IN AFRICAN COUNTRIES

Although the baseline forecast for Sub-Saharan Africa points to continued recovery in 2019–20, its pace is weaker than previously anticipated. Moreover, medium-term per capita growth is expected to remain well below its long-term average. Against this backdrop, there is a great need for policy makers in the region to advance policies and reforms that can extend and bolster the current expansion, strengthen resilience to risks, and raise medium-term potential growth. Improving the growth resilience of African countries entails adopting policies that help manage not only adverse but also favorable external shocks and enable the international conditions that mitigate rather than exacerbate shocks to the outlook. African countries need to deepen reforms that build resilience from two perspectives: (a) the regional level, and (b) the domestic level.

Fostering intraregional trade to reduce the effects of trade tensions outside Africa

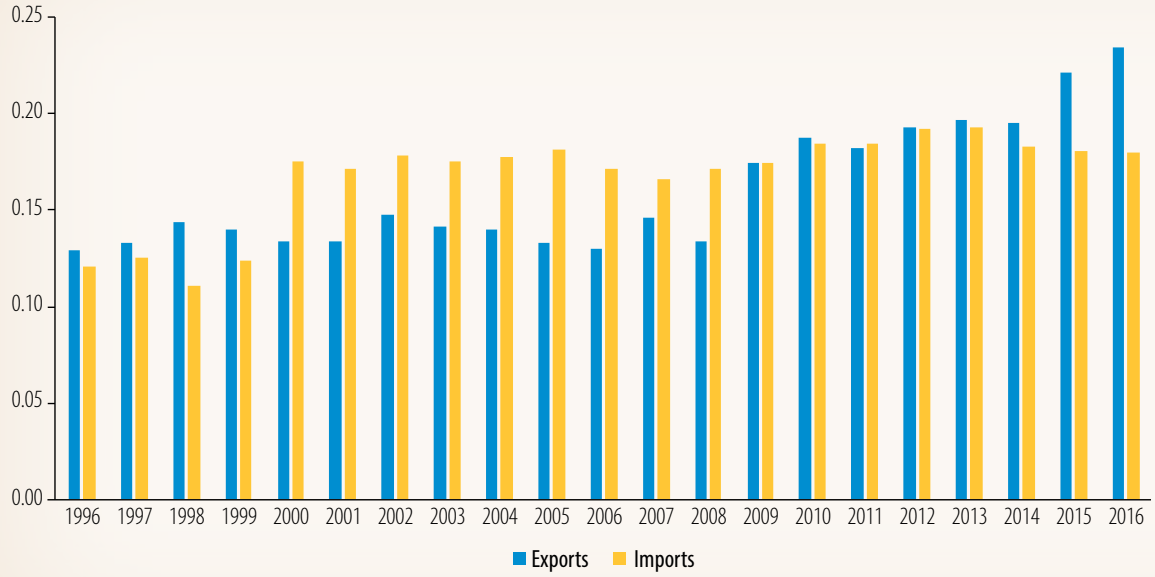
Policies that foster international trade integration can create growth opportunities, but they can also entail risks. If trade openness is not appropriately managed, it could expose the country to lower growth and greater instability and inequality. Market and institutional imperfections, concentration in extractive activities, and specializing away from technologically advanced sectors can curtail the gains from trade. In contrast, if trade integration is properly managed, it becomes a tool for sharing the risks that emerge from international macroeconomic shocks, facilitates the diffusion of technology and managerial practices, and helps reduce the anticompetitive practices of domestic firms.

Regional trade integration in Sub-Saharan African can enhance connectivity across markets in the region—especially the linkages between smaller economies with larger markets. It can also be a risk management mechanism to protect Sub-Saharan African countries from trade tensions outside the region and/or economic downturns in world's larger markets. Intraregional trade in the region—as captured by the (weighted average of the) ratio of exports within Sub-Saharan Africa to total exports across countries—has increased over the past two decades (see figure 1.30). The region's total exports in 2016 were about 3.5 times as large as those in 1996, whereas intraregional exports in 2016 were more than six times the exports within the region in 1996. The share of regional exports in total exports rose from 0.13 in 1996 to 0.23 in 2016. An equivalent measure of intraregional trade intensity using imports shows that the share of regional imports in total imports increased from 0.12 in 1996 to 0.18 in 2016.

Intraregional trade in Sub-Saharan Africa is highly concentrated. About two-thirds of the regional demand for intraregional exports is accounted for by 10 countries—including South Africa and some of its neighboring countries, Côte d'Ivoire, and the Democratic Republic of Congo. More

FIGURE 1.30: Intraregional Trade in Sub-Saharan Africa, 1996–2017 (regional trade as a ratio to total trade)

Intraregional trade in the region has increased over the last two decades



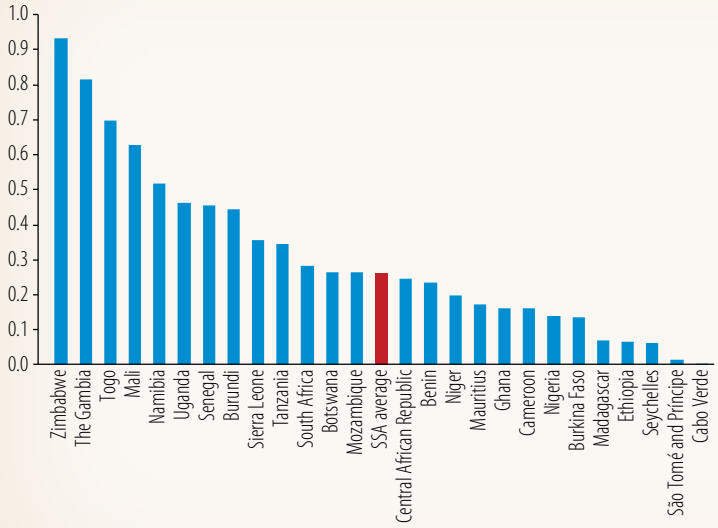
Source: International Monetary Fund, Direction of Trade Statistics (DOTS) database.
Note: Exports are denominated in FOB prices whereas imports are valued in CIF terms.

generally, trade within the region is dominated by trade within rather than across regional blocs. This finding is empirically corroborated by an examination of bilateral trade linkages across African countries conducted by Arizala, Bellon, and MacDonald (2018): bilateral trade is more intense across countries that are closer (in distance) and have common sociocultural characteristics. In this context, the signing of the African Continental Free Trade Agreement should aim at boosting trade across the continent's sub-regional blocs.

Sub-Saharan African countries exhibit different degrees of trade integration within the region (see figure 1.31). For instance, intraregional exports in small open economies like Togo and the Zambia accounted for more than 70 percent of total exports in 2016. Intraregional export shares can also be large with respect to the size of the economy—Botswana and Namibia (members oof the Southern African Customs Union and the Southern African Development Community) as well as Zimbabwe have

FIGURE 1.31: Intraregional Exports in Sub-Saharan Africa, 2016 (Country exports to the region as a ratio to total country exports)

Sub-Saharan African countries exhibit different degrees of trade integration



Source: World Bank, World Integrated Trade Solutions (WITS) database.
Note: Exports are denominated in FOB prices whereas imports are valued in CIF terms.

intraregional export shares that exceed the (weighted) average of the region (that is, more than 10 percent of GDP).

Closer trade linkages between African countries could provide an additional driver of growth and productivity—especially because they may enable countries to expand their markets and firms to operate at economies of scale. Greater synchronization of economic activity among trading partners will enable fast-growing countries to pull their main trading partners along with them. In an environment where trade tensions have escalated between the United States and its Western allies and China, the region can protect itself through greater intraregional integration.

Enhancing resilience through financial sector development

The composition of capital inflows to Sub-Saharan Africa have gradually changed over time. The occurrence and interplay of three large external shocks such as the 2007–08 global financial crisis, the 2011–12 European sovereign debt crisis, and the 2014–15 plunge in commodity prices have reshaped the composition and structure of financing in the region. Foreign direct investment and foreign aid are still the major components of capital inflows for many countries in the region. However, portfolio investment inflows have seen an uptick since 2013 thanks to international bond issuances.

The change in composition of capital flows has a greater risk content, as reflected by their sensitivity to commodity prices, global interest rates, and currency fluctuations. Policymakers need to implement reforms that build resilience to these risks and use foreign capital to raise medium-term potential growth. As discussed in section 2, strengthening fiscal frameworks to preserve macroeconomic stability helps attract foreign capital. Economic diversification provides a wider set of economic opportunities for foreign investors and fosters growth and resilience.

Managing currency risks becomes an important part of the policy agenda amid rising foreign-currency-denominated debt. Policies should foster the development of local currency debt markets to reduce currency risks and mismatches. The empirical evidence presented in section 2 shows that financial openness would attract all types of capital inflows, suggesting that a priority for Sub-Saharan Africa would be to develop domestic financial markets. Fostering the development of local currency bond markets in Sub-Saharan Africa would also require a stable macroeconomic environment. Finally, FDI and foreign aid are the main sources of financing in many countries in the region—especially in those where public sector participation in the economy is larger than that of private sector business activity. Policies that improve the business environment for domestic private sector firms in these countries would attract sustained foreign financing in productive activities.

Enhancing growth resilience through policies that boost productivity

Catching up with the living standards of industrial countries and other developing countries requires sustained growth in the region. Foreign capital can be leveraged to raise medium-term potential growth while favorable growth prospects can help attract larger and stable capital inflows. To accelerate the pace of economic growth and improve the living standards of the population, Sub-Saharan African countries need to boost the productivity of their economies.

Growth in the region has been overwhelmingly driven by factor accumulation, while the contribution of total factor productivity growth has been modest. However, the pace of growth in the region has been insufficient to gain ground relative to the United States in terms of living standards and productivity levels. These large and persistent differences in output per worker between Sub-Saharan Africa and the United States are increasingly attributed to the low total factor productivity in the region. In turn, this low productivity is explained by inefficiencies in the allocation of factors of production across producers. The misallocation of resources reflects lack of access to credit, underdeveloped land markets, insecure property rights, and discretionary government interventions, among other policies.

Section 3 argues that the misallocation of resources is linked to the misallocation of human capital through inefficiencies in the occupational choice of individuals, barriers in the adoption of technology, reduced learning by doing effects and knowledge spillovers. It also argues that policies that alleviate misallocation may help boost productivity. For instance, the adoption of market mechanism to allocate land may improve efficiency in agriculture across Sub-Saharan countries. It accelerates the structural transformation process by enabling the most productive farmers to have larger farms and other farmers to work in non-agricultural activities. Market mechanisms to rent/purchase land may also influence agricultural productivity by encouraging the adoption of new technologies and investment in fertilizers, tractors, and animals. Overall, securing property rights on land and boosting efficient mechanisms to allocate land may improve decision-making on: (a) firms' technology adoption and (b) individuals' occupational choices between farming and non-agricultural activities.

Finally, improving access to finance can boost labor productivity by fostering technological adoption and correcting distortions in the entry and exit of the industry. Well-designed asset grant programs may help increase entrepreneurial activity, including entry, survival, employment, and profits. Evidence from Nigeria shows that firms that were awarded these grants tended to innovate more and earned higher sales and profits. They also acquired more inputs without changes in business networks, mentors, self-efficacy, or use of other sources of finance (McKenzie 2017).

BOX 1.1: Eurobond Issuances in Sub-Saharan Africa: Update

In the first half of 2018, six frontier economies in the region (Angola, Côte d'Ivoire, Ghana, Kenya, Nigeria, and Senegal) raised US$14.3 billion—an amount already greater than the US$7.8 billion issued by Sub-Saharan African frontier markets in 2017. In May 2018, Angola and Ghana were the only frontier economies in the region that issued Eurobonds along with South Africa, the only emerging market economy in the region. No international bond issuances took place between June and August, as market sentiment toward emerging markets and frontier economies deteriorated.

The appetite for emerging market bonds was reduced due to the stronger U.S. dollar and higher returns on U.S. bonds—the 10-year bond yield surpassed the 3 percent threshold in May. Concerns about the escalation of trade tensions between the United States and China resulted in outflows from emerging market funds and lower Eurobond prices—including for Sub-Saharan African countries. The performance of Eurobonds has been dismal in the countries with the greatest perceived macroeconomic vulnerabilities—Argentina, Turkey, and Zambia.

Four common features emerge from Eurobond issuances in Sub-Saharan Africa in the first three quarters of 2018. First, Eurobond issuances substantially exceeded those in prior years. Second, countries were able to continue lengthening the maturities of their Eurobond issuances. Sovereign issuers in 2018Q2 went to the markets with a two-tranche issue, including 30-year bond issuances. For instance, Angola raised US$1.75 billion in 30-year Eurobonds, and Ghana raised US$1 billion in Eurobonds of similar maturity. Nigeria was the first Sub-Saharan African country (aside from South Africa) to issue an international bond with a maturity of 30 years; it issued an amount of US$1.5 billion in 2017. Third, the demand for Eurobonds was still high for the countries that issued in May 2018: Angola's issuance of US$3.5 billion attracted about three times that in the value of orders from investors. In the case of Ghana, the issuance of US$2 billion in bonds was four times oversubscribed (US$8 billion in offers received). Fourth, Sub-Saharan African countries have continued issuing at favorable terms. For instance, Ghana sold sovereign Eurobonds of US$1 billion each of the 10- and 30-year notes at 7.625 and 8.625 percent, respectively.

The increase in amounts issued and the lengthening of maturities took place against a worsening of sovereign credit ratings. From 2016 onward, more than 12 Sub-Saharan African countries experienced at least one downgrade by a major credit rating agency (Fitch, Moody's, and S&P). At the end of 2018Q3, none of the Sub-Saharan African international bond issuers held an investment grade rating by any of the major rating agencies. Although most countries are currently rated at a speculative/highly speculative grade, Gabon, Mozambique, and Zambia are rated as substantial risk. Angola issued U$3 billion (US$1.75 billion of 10-year bonds with a yield of 8.25 percent and US$1.25 billion of 30-year bonds with a yield of 9.375 percent), despite having been downgraded by Moody's from B2 to B3 at the end of April. However, the outlook for the country's sovereign debt was changed from negative to stable.

The April 2018 issue of *Africa's Pulse* pointed out that Africa's emerging bond index spread was roughly aligned with JPMorgan's global emerging market bond index spread (Global EMBI) over the U.S. Treasury until mid-2015. Since then, African countries have issued repeatedly above the Global EMBI spread—and significantly above Asian emerging economies. In the first five months of 2018, the gap between the global and African spreads narrowed, as countries in the region issued international bonds at favorable conditions. However, unfavorable market sentiment

toward emerging market and developing country bonds—triggered by the macroeconomic imbalances in Argentina and Turkey—may have widened again the gap between the African and global spreads.

Finally, large repayments beginning in 2021, some of them in bullet structure, pose substantial interest and refinancing risks for issuers. Issuing in international markets allows Sub-Saharan African countries to diversify their investor base and raise large amounts in a short time span, effectively supplementing low domestic savings rates. However, international bond issuances pose interest rate risk to issuers, exposing them to potentially higher interest rates when bonds are rolled over, due to changes in market sentiment, risk assessment, and global liquidity conditions. Additionally, large bullet repayments may affect investors' confidence in a country's ability to refinance its debt successfully, and apply additional upward pressure on interest rates.

BOX 1.1: *Continued*

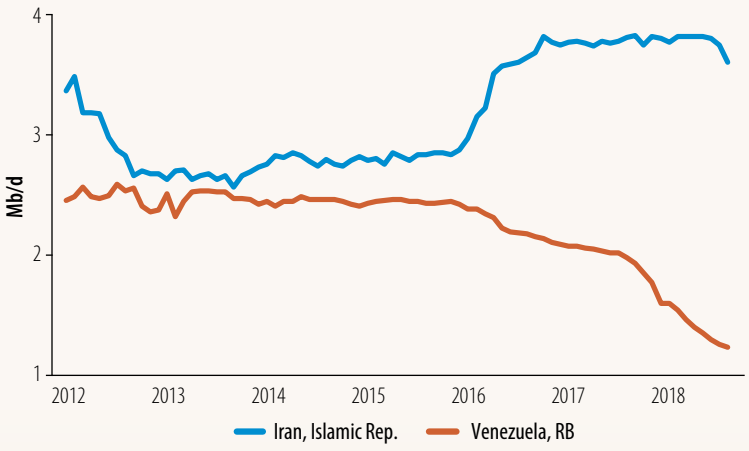
Oil Prices

BOX 1.2: Implications of Tariffs for Commodity Markets

Although trade tensions have weighed on energy prices, particularly for crude oil, these have been offset by concerns about oil supply. Production in the República Bolivariana de Venezuela has declined steadily over the course of 2018, with output dropping to 1.2 million barrels per day (mb/d) in August, roughly half the level of production in 2016. Production has been on a continuous decline as a result of the ongoing economic and humanitarian crisis in the country, and is expected to decline further, to around 1 mb/d by the end of 2018. There is a risk that production could drop much more rapidly if the situation continues to deteriorate.

The impending reintroduction of sanctions on the Islamic Republic of Iran by the United States has led to further supply concerns. When sanctions were previously implemented, they resulted in a reduction in exports and production of around 1 mb/d. Although there is considerable uncertainty about the effect sanctions may have this time, a reduction between 1 and 1.5 mb/d is feasible when the sanctions come into effect in November. Iranian exports have already fallen by 0.5 mb/d relative to their peak in April 2018. Although other Organization of the Petroleum Exporting Countries (OPEC) countries and the Russian Federation have increased their oil production to compensate for some of these declines, it

FIGURE B1.2.1: Oil Production in the Islamic Republic of Iran and the República Bolivariana de Venezuela



Sources: Energy Information Administration; International Energy Association; World Bank.
Note: Mb/d = million barrels per day.

Oil production in the República Bolivariana de Venezuela has declined steadily in 2018

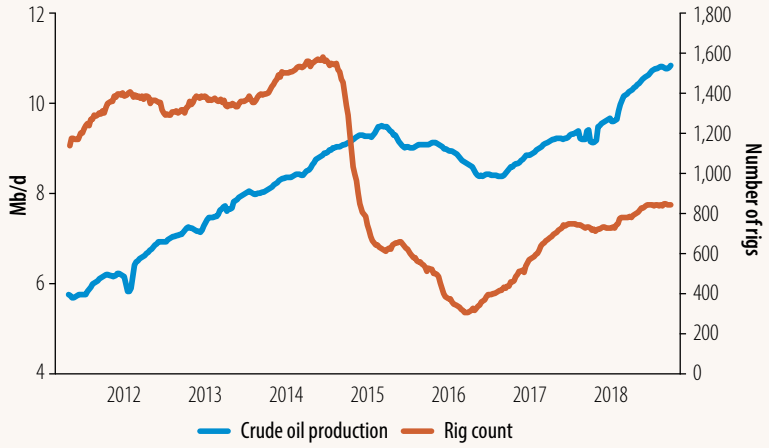
BOX 1.2: *Continued*

is not clear whether they will be able to meet immediately any additional declines in production in the Islamic Republic of Iran and the República Bolivariana de Venezuela (figures B1.2.1). The International Energy Agency (IEA) estimates that OPEC has spare capacity of 2.7 mb/d, but there are doubts about the speed at which this can be accessed and whether it will be the type required by refiners.

Given these constraints, a key question for oil prices is what the prospects for production are in the United States. U.S. production has continued to rise, and it is estimated to have overtaken Russia as the world's largest crude oil producer in August. Production has risen much faster than the rig count, due to efficiency and productivity improvements, which has also lowered break-even prices for producers (figure B1.2.2). U.S. production is expected to rise further next year, with the U.S. Energy Information Administration forecasting an increase to 11.5 mb/d. Global oil demand has been robust, and the IEA expects this to continue, despite rising global uncertainty and trade tensions. The pace of growth in global demand is roughly equal to the increase in non-OPEC supply, primarily due to increased U.S. production. As such, any shortfall in production arising from geopolitical events, including in the Islamic Republic of Iran and the República Bolivariana de Venezuela, but also other countries such as Libya, will need to be met by spare capacity from OPEC countries. The tightness of oil supply means that prices are particularly susceptible at present to shocks and implies that the risks are to the upside.

Crude oil production in the United States has increased rapidly

FIGURE B1.2.2: U.S. Oil Production and Rig Count



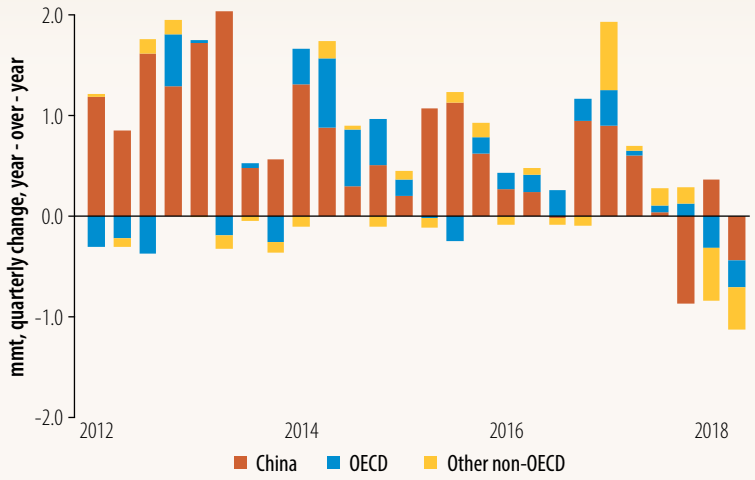
Sources: Energy Information Administration; International Energy Association; World Bank.
Note: Mb/d = million barrels per day.

Metals Prices

In contrast to oil, demand for metals has fallen in recent quarters, with broad-based weakness across industrial economies and emerging markets and developing economies (EMDEs) (figure B1.2.3). The fall in metals prices following the announcement of tariffs by the United States on Chinese imports suggests that markets may have reassessed the prospects for demand for metals. Escalating trade tensions have raised concerns about global growth, trade, and investment prospects, all of which worsen the demand outlook for commodities. Industrial metals are

particularly responsive to concerns about trade tensions, given their many uses in the manufacture of tradable goods. Notable exceptions are iron ore and steel, which have not seen equivalent declines in price, primarily due to pollution-related cuts in supply in China.

FIGURE B1.2.3: Global Metals Demand



Demand for metals has fallen in recent quarters across industrial and emerging market and developing economies

Source: World Bureau of Metal Statistics.

Note: Values are demand for all base metals, including aluminum, copper, lead, nickel, tin, and zinc. mmt = million metric tons; OECD = Organisation for Economic Co-operation and Development.

The Role of China

The response of commodity prices to the imposition of tariffs on China and broader emerging market growth concerns is due in part to the growing importance of EMDEs, especially China, in commodity demand. Over the past two decades, China has accounted for 83 percent of the global increase in metals consumption and 48 percent of the increase in energy consumption. China now accounts for roughly half of global demand for metals and coal. Given its direct impact on the demand for commodities and indirect impact through trading partner growth, a sharper than expected slowdown in China could have additional repercussions for commodity markets and, hence, commodity exporters. The impact is likely to be largest for commodities where China is particularly important, such as metals, compared with those where it accounts for less global consumption, such as oil and natural gas. Regions with large resource wealth, such as Sub-Saharan Africa, may be particularly affected by a slowdown in China.

Section 2: International Financial Flows to Sub-Saharan Africa

2.1 INTRODUCTION

This section documents recent trends in gross capital inflows and the shifting structure of financing in Sub-Saharan Africa, from lower cross-border loan disbursements owed to traditional creditors to more direct investment and international bond issuances. The section analyzes total gross capital inflows as defined by the sum of foreign direct investment (FDI) inflows, portfolio investment (PI) inflows, and other investment (OI) inflows across Sub-Saharan Africa. The analysis of the trends and changing in composition of these foreign financing inflows is conducted by country groups classified by their extent of natural resource abundance (oil and metals and minerals vis-à-vis non-natural resource abundant countries), condition of fragility (fragile versus nonfragile countries), and level of income (low, lower-middle, and upper-middle income). Cumulative net errors and omissions are about 16 percent of gross domestic product (GDP) for the region as a whole during 2002–17; consequently, a large portion of the capital flowing into a country is not recorded and exits the economy. Box 2.1 presents an estimate of capital flight in the region and drivers and strategies to address this phenomenon.

The regression analysis presented in this section examines the determinants of gross capital inflows and investigates the relative importance of global vis-à-vis domestic factors in driving gross inflows to the region. It is crucial to identify the key drivers of capital inflows: understanding drivers of rising capital flows will help in designing policies that address the macro-financial risks arising from these flows. Box 2.2 estimates the linkages between capital inflows and macro-financial risks and draws some policy recommendations from the analysis. Despite the heterogeneity of economic structures and composition of flows across Sub-Saharan African countries, the empirical analysis provides some major directions for African economic development. These results suggest effective priorities and focus on sustainable development in the region. Global capital inflows were severely affected by the global financial crisis, whereas three key external shocks have changed the structure of financing (the debt structure) and channels of transmission in Sub-Saharan Africa, namely, the 2008–09 global financial crisis, the 2011–12 European sovereign debt crisis, and the drastic drop in oil prices in 2014–15.

These three external shocks have played a role in shifting the current structure of financial flows toward greater OI inflows (captured by rising liabilities from non–Paris Club members) and PI inflows that reflect greater international bond issuances. For instance, the global financial crisis and sovereign debt crisis led Sub-Saharan Africa to look for other financing opportunities in non–Paris Club governments such as China and private creditors. Many economies in Sub-Saharan Africa historically had strong ties with industrial countries, especially European countries; however, these two crises caused changes in their financing structure. At the same time, an increase in the international supply of crude oil, due to non–Organization of the Petroleum Exporting Countries (OPEC) countries (such as the Russian Federation) and technological innovation in the U.S. shale oil industry, triggered a drastic drop in oil prices that started in the second half of 2014. Consequently, many Sub-Saharan African countries, especially oil and commodity exporters, had to seek funds to finance larger deficits, and hence accumulated debts.

The favorable financing conditions due to lax monetary policies (quantitative easing) in industrial countries enabled Sub-Saharan African countries to demand greater external borrowing from other sovereigns (non–Paris Club countries) and private creditors in foreign currency and at lower interest rates.

The main message of this section is that the occurrence and interplay of the external shocks changed the composition of capital inflows and the structure of financing in the region. FDI and foreign aid are the most dominant financial flows into the Africa region. PI inflows are not as large, given the underdevelopment of domestic financial markets (i.e. stock markets and domestic bond markets) in most Sub-Saharan African countries. The analysis of the determinants of capital flows suggests that pull and push factors are the driving forces of capital inflows, especially better economic performance, a sound general government primary balance, and greater degree of trade and financial openness.

What policy recommendations would result from the regression analysis for the region? It is important to diversify the economic and export structure to mitigate the output effects of volatility in oil and commodity prices, develop domestic financial markets that provide domestic financial instruments to attract investors, and implement policies that enhance the business environment and create investment opportunities for foreign and domestic investors. According to the empirical evidence, financial openness would attract all types of capital inflows; therefore, a priority should be to develop the domestic financial markets in Sub-Saharan Africa. FDI and foreign aid are the main sources of financing in some countries in the region —especially where public sector participation in the economy is larger than private sector business activity. Therefore, policies that improve the business environment for domestic private sector firms will foster sustained foreign financing in productive activities.

The major components of capital inflows in Sub-Saharan Africa are FDI and foreign aid (on average, 3.36 and 3.35 percent of GDP, respectively, in 2000–17), while remittance inflows account for 2.26 percent of GDP (World Bank 2018b). Among the three external shocks influencing the evolution and shifting of the structure of capital flows in Sub-Saharan Africa, the 2011–12 European sovereign debt crisis may have caused a larger decline in flows to Africa than the global financial crisis. For example, OI inflows to Sub-Saharan Africa increased after 2007, while PI inflows increased after the global financial crisis in non-resource-rich and resource-rich countries in the region. However, the underdevelopment of domestic financial systems in fragile countries may not attract much PI inflow—therefore, the activities in those markets are very limited. Domestic and external factors are important to attract capital inflows, especially domestic economic growth, the primary balance, and trade openness. The results from the regression analysis show that financial openness is one of the significant determinants of gross capital inflows, FDI, PI, and OI inflows in Sub-Saharan Africa. The behavior of capital inflows across Sub-Saharan African countries is heterogeneous, given the country differences in the size and structure of the economy, different availability of resources, level of development, and political systems and regulations.

This section consists of two sections: one, overviews the trends in gross capital inflows in Sub-Saharan Africa, and another, investigates the relationship between capital inflows and the main macroeconomic variables, using mean/standard deviation equality tests and regression analysis.

The regression analysis estimates the importance of the drivers of gross capital inflows to the region. It distinguishes the role of these drivers in the different components of aggregate gross inflows, such as FDI, PI, and OI. The estimations are conducted for country groups according to their extent of natural resource abundance; fragility, conflict, and violence; and income. The analysis also examines whether the sensitivity of capital flows to global vis-à-vis domestic factors has changed in the post-crisis period. The capital flows data are gross capital inflows, which capture not only the real channels, but also the financial channels of transmission of shocks. Consequently, gross inflows would identify the different channels, because net and gross inflows have significantly diverged since the mid-1990s.[1]

2.2 TRENDS IN INTERNATIONAL FINANCING FLOWS IN SUB-SAHARAN AFRICA

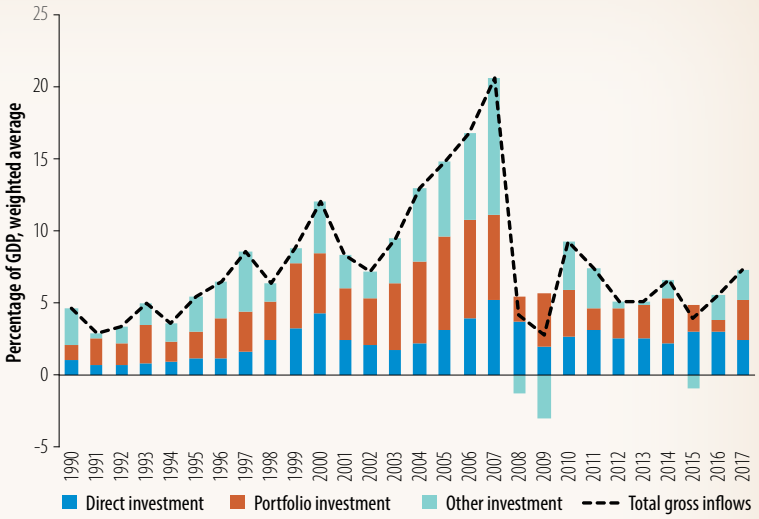
This sub-section overviews the recent trends in gross capital inflows and the structure of financing in Sub-Saharan Africa. It focuses on the period from the 2000s, when gross and net capital flows started to diverge significantly. The global financial crisis severely influenced the behavior of global capital inflows. Although the global financial crisis and the European sovereign debt crisis affected Sub-Saharan Africa, the latter crisis hit harder the amount of foreign financing in Sub-Saharan Africa. Oil and commodity prices are the third key factor that might have influenced the evolution of capital flows across African economies, as FDI commodity-related channels of transmission appear to have been more important than financial channels in Sub-Saharan Africa: almost 80 percent of FDI flowed into resource-rich countries and those FDI projects were mainly commodity related.

The evolution of gross capital inflows to Sub-Saharan Africa did not comove strongly with that of global capital flows in the first half of the 2000s (figures 2.1 and 2.2). World capital inflows grew steadily since the beginning of the 2000s until the global financial crisis in 2007. Capital inflows to Sub-Saharan Africa caught up after 2006, when the oil price hit about US$65 per barrel—which may have constituted a breakeven point for oil projects in the region. FDI (mainly in crude oil projects) has become the main source of capital inflows to the region rather than the PI and OI of the 2000s: the average share of FDI inflows in total inflows grew from 24 percent in the 1990s to 75 percent in the 2000s. In terms of stocks, half of the inward stock of FDI in Sub-Saharan Africa is in South Africa and Nigeria, and the top 10 destinations for FDI stocks account for almost 80 percent of the total stock. Nigeria is a natural resource abundant (oil-rich) country, and South Africa is an emerging market economy that is relatively deeper and more diversified compared with the economies of other Sub-Saharan African countries. Domestic financial markets are mostly underdeveloped in Sub-Saharan Africa. Although gross capital inflows in the world started to pick up between 2002 and 2003, gross inflows for Sub-Saharan Africa did not increase until 2006, when oil prices increased. Oil prices exceeded US$60 per barrel in 2006; hence, many oil-related projects became more profitable in Sub-Saharan Africa and a large amount of FDI started to flow into the region.

1 Net and gross capital flows moved together like a mirror image until the mid-1990s. Those flows have started to diverge since then, and gross financial flows have rapidly expanded. Net and gross capital inflows have behaved differently, especially since the 2000s.

Global gross capital inflows experienced a large retrenchment due to the 2008–09 global financial crisis

FIGURE 2.1: Evolution of Global Capital Inflows

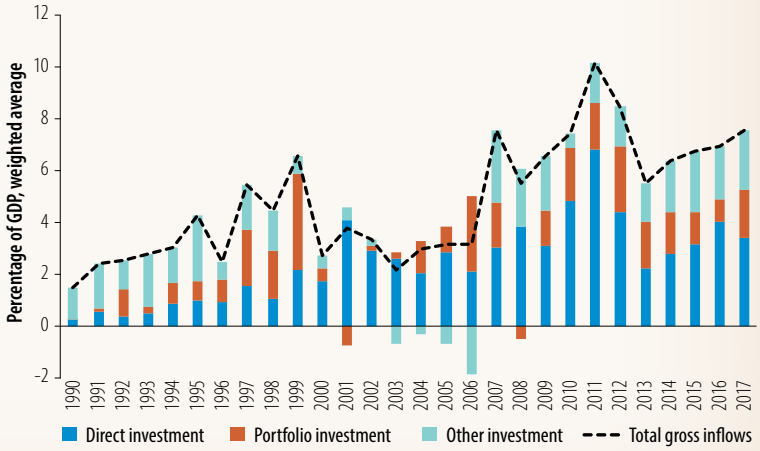


Source: International Monetary Fund Balance of Payments BPM 6.0.

Note: Aggregate figures represent GDP-weighted averages of the ratio of gross capital inflows to GDP across countries in the world. GDP = gross domestic product.

Compared with the global financial crisis, the European sovereign debt crisis hit Sub-Saharan Africa harder

FIGURE 2.2: Evolution of Gross Capital Inflows to Sub-Saharan Africa



Source: International Monetary Fund Balance of Payments BPM 6.0.

Note: Aggregate figures represent GDP-weighted averages of the ratio of gross capital inflows to GDP across countries in Sub-Saharan Africa. GDP = gross domestic product.

Natural resources are an integral part of the economy in Sub-Saharan Africa. Consequently, foreign investments in resource-based activities are the main FDI inflows to most of Sub-Saharan African countries. For instance, according to South African Reserve Bank (2018), the mining sector in South Africa is the region's largest recipient of FDI, which accounted for 20 percent of total FDI in the region in 2016. This amount is comparable to FDI inflows to their manufacturing sector. Almost half the value of those announced FDI greenfield projects is allocated to natural resource–based industries (UNCTAD, 2018). By contrast, in Nigeria, the share of inward FDI stocks in extractive industries (oil and gas) were about 41 percent, and that of manufacturing was 27 percent in 2012 (Doguwa et al. 2014). More than half the value of announced FDI greenfield projects was invested in natural resource–based industries in 2012 (UNCTAD, 2018).

It has been argued that, for instance, capital flows may propel economic growth and development through various channels: (a) greater access to foreign capital may lift credit constraints and enable firms to undertake more productive and riskier investments (Acemoglu and Zilibotti 1997); (b) higher FDI inflows may facilitate the diffusion of technology and managerial practices as well as create incentives to raise the demand for skilled labor (Grossman and Helpman 1991; Haskel, Pereira, and Slaughter 2007); (c) greater international financial integration may raise the depth and scope of domestic financial markets by improving efficiency and enhancing access to financial services (Chinn and Ito 2006, 2008; Calderón and Kubota 2009); and (d) the free flow of foreign capital may have a discipline effect on macroeconomic policy—although the effect appears to be more robust for monetary rather than fiscal policy (Tytell and Wei 2005; Kose et al. 2009).

It has also been argued that the inherent volatility of (certain) foreign capital flows may bring instability and uncertainty. Business cycles might become amplified, relative prices might be distorted, and crises might happen more frequently. All these effects could have a negative impact on long-run income levels. Rising international financial integration appears to increase the frequency and severity of currency and banking crises (Kaminsky and Reinhart 1999). Furthermore, the procyclicality of capital inflows has a perverse effect on macroeconomic stability. Consumption and government expenditure tend to grow excessively during periods of capital flow bonanza, and they tend to adjust drastically when foreign capital stops flowing into the domestic economy. The lack of access to global capital markets during bad times may restrict the ability of policy makers to conduct countercyclical fiscal policies (Kaminsky, Reinhart, and Vegh 2005; Calderón and Schmidt-Hebbel 2008; Reinhart and Reinhart 2009).

The 2007–08 global financial crisis brought to a halt the protracted rise in international financial integration. The crisis changed the direction and composition of capital in the world. For example, global capital flows retrenched dramatically, from 20.7 percent of GDP in 2007 to 2.78 percent of GDP in 2009. However, the retrenchment was smaller for Sub-Saharan African countries, from 7.5 percent of GDP in 2007 to 5.5 percent of GDP in 2008. The transmission of the global crisis to Sub-Saharan Africa took place through the trade channel, as exports—and more generally trade—collapsed for countries in the region while for commodity exporting nations, the collapse came along with the plunge in international commodity prices. The financial channel did not fully work through most Sub-Saharan African countries—as most domestic financial systems were underdeveloped and did not intermediate a significant proportion of the foreign flows into these countries. Figure 2.2 show that the retrenchment of gross inflows for industrial countries was attributed to the plunge in gross OI inflows, while there was a sharp decline in OI and PI across non–Sub-Saharan African developing countries. In 2008, there was a small decline in gross PI in Sub-Saharan Africa, because global stock and bond issuance markets not only were shut down for the region, but also these markets were not as deep and liquid. In the aftermath of the global financial crisis, however, there was substitution of gross PI inflows in detriment of gross OI inflows in the region.

The regional average recovery of capital inflows was faster than the global average thanks to the recovery in oil prices, which faced a drastic drop, from US$160 per barrel in June 2008 to US$50 per barrel in January 2009 and increased afterward. The recovery of the temporary (but large) drop in oil prices was attributed to the adverse demand shock being transitory. Then the post-crisis recovery of oil prices may have boosted capital flows into Sub-Saharan Africa. However, global capital inflows were struggling to recover to their pre-crisis averages. In the period that preceded the global financial crisis (the Great Moderation), looser monetary and financial conditions were transmitted across the border through rising banking sector capital flows. The increased leverage of global banks played a key role in the crisis transmission (Cetorelli and Goldberg 2011; Acharya and Schnabl 2010; Kalemli-Ozcan, Papaioannou, and Perri 2013). During this period, the external position of industrial economies was "long equity, short debt," while that of emerging and developing economies was "short equity, long debt" (Lane and Milesi-Ferretti 2007).

The 2007–08 global financial crisis also led to a change in the drivers of global liquidity: syndicated loans plummeted while (sovereign and corporate) bonds were on the rise. The sharp retrenchment

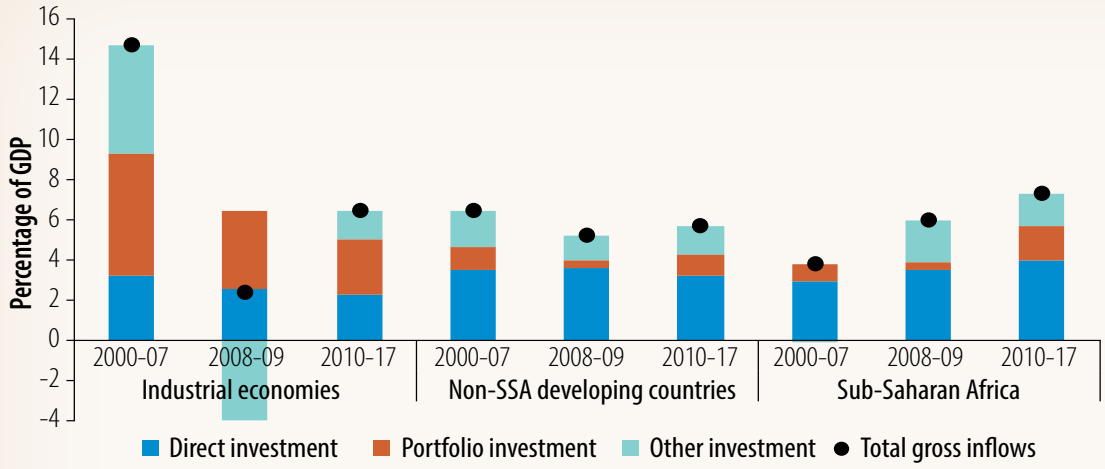
of global capital flows was followed by a swift recovery and a change in the composition of capital flows across countries worldwide (Milesi-Ferretti and Tille 2011; Shin 2014; Lane and Milesi-Ferretti 2017). A recent wave of global liquidity has taken place during the post–global financial crisis period; however, this has been characterized by global investors purchasing emerging market bonds. These investors were searching for yields in emerging market debt securities, which led to many international bond (and to a lesser extent equity) issuances at the sovereign and corporate levels (Shin 2014). Compared with Sub-Saharan Africa, figure 2.1 shows the dramatic decline in gross inflows across the world: they dropped from 18.8 percent of GDP in 2006–07 to 3.5 percent of GDP in 2008–09. This decline was driven by the collapse of cross-border banking flows: gross OI inflows plunged from 7.8 percent of GDP in 2006–07 to -2.1 percent in 2008–09. The other types of gross inflows, FDI and PI, also declined but at a slower pace.

Figure 2.3a presents gross inflows by type for Sub-Saharan Africa compared with the rest of the world for selected subperiods from 2000 to 2017. For instance, all types of gross inflows declined sharply among industrial countries during the global financial crisis—especially the collapse of gross OI inflows relative to the pre-crisis period. Gross OI inflows decreased from an average of 5.4 percent of GDP in the pre-crisis period to -4 percent of GDP in the crisis period. Gross inflows, on average, recovered in the post-crisis period (2010–17)—up to 6.4 percent of GDP from 2.4 percent in the crisis period. Therefore, this was characterized by the recovery of gross OI inflows, which was mainly driven by healthier balance sheets and increased cross-border activity in U.S. financial and nonfinancial institutions.

In the case of Sub-Saharan Africa, there was no decline in gross inflows across the region during the global financial crisis. Gross inflows increased from 3.8 percent of GDP in 2000–07 to 6 percent in the crisis period—and the increase was driven by gross OI inflows. Figure 2.3b confirms that gross OI inflows improved across resource-rich African countries: from -2.45 percent of GDP in the pre-crisis period to 2.02 percent in the crisis period. However, PI in the region decreased by a small portion: from 0.88 percent of GDP in the pre-crisis period to 0.38 percent in the crisis period, as shown in figure 2.3a, because the crisis was transmitted through the financial markets, which are mostly smaller in Sub-Saharan Africa. In the post-crisis period, gross inflows to the region continued to increase (to 7.3 percent of GDP in 2010–17) (figure 2.3a). Growing gross inflows in the aftermath of the global financial crisis were characterized by an increase in gross PI inflows (specifically driven by international bond issuances) and, to a lesser extent, higher gross FDI inflows.

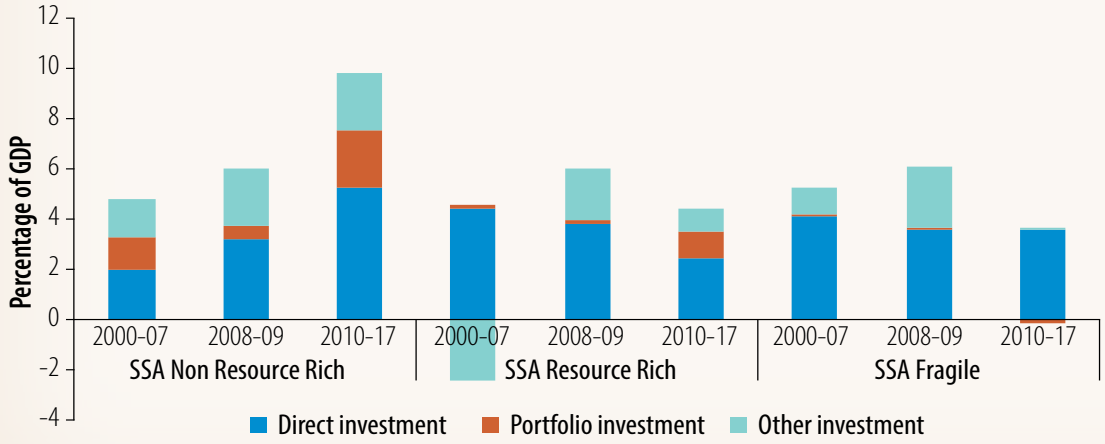
The European sovereign debt crisis hit the Sub-Saharan African economies deeper than the global financial crisis—as captured by the decline in gross OI inflows, that is, international loans. During the European debt crisis, gross capital inflows to the region declined by 4.6 percent of GDP (from 10.12 percent of GDP in 2011 to 5.5 percent in 2013 (figure 2.2). The decline was larger than the one experienced during the global financial crisis, which was about 2.0 percent (from 7.5 percent of GDP in 2007 to 5.5 percent in 2008) (figure 2.2). Along with the European debt crisis, the average annual international price of oil went below US$80 per barrel in 2012, from US$110 per barrel in 2011. Consequently, the reduction in international oil prices had an impact on oil projects—especially projects with a breakeven point price below US$80 to US$100 per barrel (some oil fields in Angola and Nigeria).

FIGURE 2.3a: Gross Inflows by Type: Sub-Saharan Africa and the Rest of the World



Average gross other investment inflows into industrial countries collapsed during the global financial crisis, but Sub-Saharan Africa did not experience any decline in average inflows

FIGURE 2.3b: Gross Inflows by Type: Sub-Saharan Africa country groups



Source: International Monetary Fund Balance of Payments BPM 6.0.

Note: Aggregate figures represent GDP-weighted averages of the ratio of gross capital inflows to GDP across industrial, developing, and Sub-Saharan African countries over their corresponding subperiods. GDP = gross domestic product; SSA = Sub-Saharan Africa.

The plunge in the international price of oil in 2014 was more persistent in nature than that in 2008–09. It was also driven by supply factors, such as an expansion of the oil supply from non-OPEC countries, technological innovations in the U.S. shale oil supply, and regional conflicts (in the Middle East and the República Bolivariana de Venezuela). These factors had an adverse impact on Sub-Saharan African countries—especially the oil exporting countries in the region.

As international oil prices hit a trough of US$30 per barrel in January 2016, oil became less attractive as an asset, and global investors shifted their demand to other assets (U.S. Treasury bills and stocks, among others), thus raising the returns of those assets. The lower oil prices also made it more difficult for commodity exporting countries (especially oil exporting countries) to borrow, as their capacity to repay deteriorated (due to lower fiscal revenues and lower economic activity). As a result, sovereign bond issuances decreased in Sub-Saharan Africa, as the prospects of oil operations were not favorable and external borrowing rates increased.

The retrenchment of flows into the region from traditional financing partners precipitated the need for other funding options, particularly for infrastructure financing, as bilateral loans and

grants from European countries and the United States declined. Sub-Saharan Africa's frontier economies had measured success in tapping global capital markets—especially international bond markets—during the post–global financial crisis period. Since then, several low-income countries in the region—especially lower-middle-income countries—have been issuing Eurobonds at an accelerating pace. For instance, there was a rapid rise in sovereign bond issuance between 2013 and 2015, when more countries in Sub-Saharan Africa had access to international capital markets. Sovereign debt issuance in the region increased from an average of US$6 billion during 2013–15 to US$8.2 billion since 2017 (World Bank 2018a). By 2018, 16 countries had issued bonds, several of them on a regular basis, with issuances of considerable size. Conditions for international bond issuances have been favorable, with high and steady demand from investors.

The shifting structure of global capital flows (and the associated changes in the composition of the flows into Sub-Saharan African countries) may be associated with changes in the relative importance of global vis-à-vis domestic factors driving capital inflows. For example, it has been argued that the new structure (and resulting volatility) of capital inflows to developing countries (including Sub-Saharan Africa) during the post–global financial crisis period may have increased their sensitivity (or vulnerability) to global (push) factors (Avdjiev et al. 2017). The empirical literature has established that global (push) and domestic (pull) factors are important drivers of capital flows—see, for instance, Calvo, Leiderman, and Reinhart (1993); Fernandez-Arias and Montiel (1996); and Chuhan, Claessens, and Mamingi (1998).

2.3 CAPITAL INFLOWS TO AFRICA: MEANS, VOLATILITY, AND COMOVEMENT WITH THE CYCLE

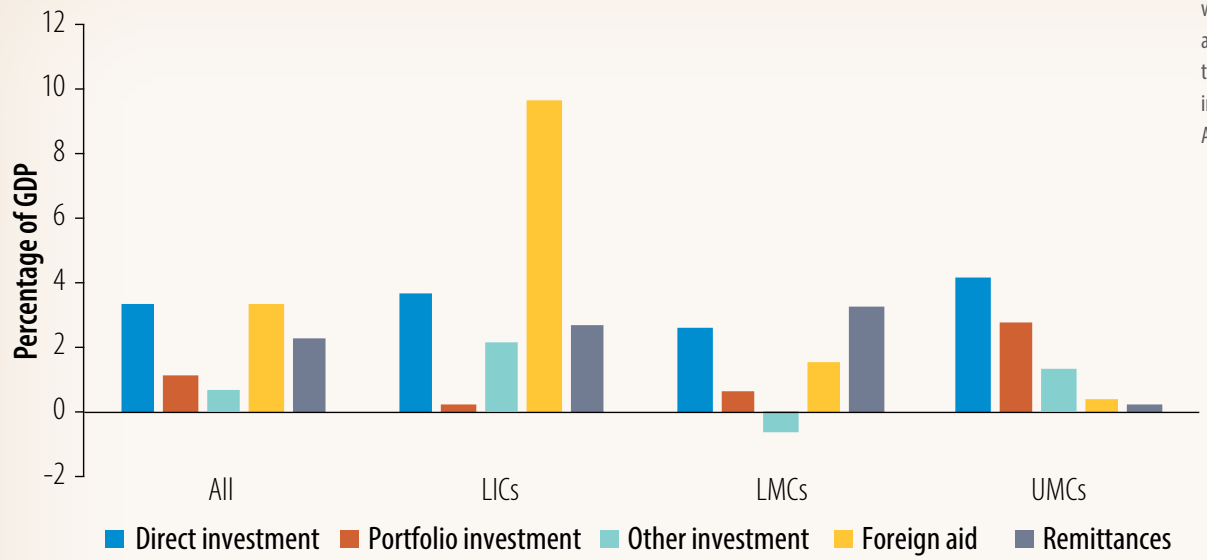
This sub-section compares trends in and moments of foreign financing flows into the region, distinguishing between observed trends and moments of gross capital inflows from the balance of payments—such as FDI, PI, and OI—vis-à-vis foreign aid and remittances. The sub-section first focuses on means and standard deviations for Sub-Saharan Africa as well as country groups classified by their income level, namely, low-income, lower-middle-income, and upper-middle-income countries.

Figure 2.4 shows the (GDP-weighted) average of the mean ratio for each type of foreign financing inflow as a percentage of GDP for the region and by income group. This figure shows that FDI, foreign aid, and workers' remittances are the largest types of inflows across Sub-Saharan Africa. FDI and foreign aid inflows each amounted to about 3.4 percent of GDP, whereas workers' remittances totaled 2.3 percent of GDP during 2000–17. Foreign aid was by far the largest type of inflow into low-income African countries—on average, it was 9.6 percent of GDP during 2000–17. For lower-middle-income countries in the region, workers' remittances were the largest financing inflow during 2000–17 (3.3 percent of GDP), followed by FDI inflows (2.6 percent of GDP). Finally, FDI and PI inflows were the most representative across upper-middle-income countries in the region during 2000–17 (with average ratios of 4.2 and 2.8 percent of GDP, respectively).

Figure 2.5 plots the volatility of the different types of foreign financing inflows to Sub-Saharan Africa as well as by income group. Volatility is captured by the (weighted average) of the

FIGURE 2.4: Foreign Financing Inflows to Sub-Saharan Africa, by Income Group, Averages, 2000–17

FDI, foreign aid, and workers' remittances are among the major types of gross inflows into Sub-Saharan Africa

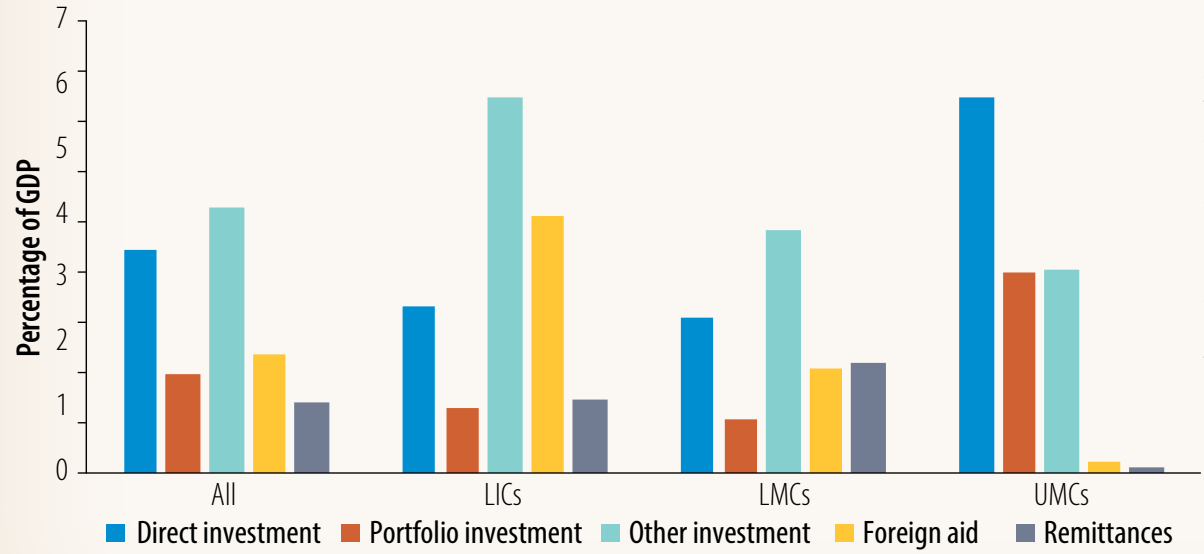


Source: International Monetary Fund Balance of Payments BPM 6.0.

Note: Aggregate figures represent GDP-weighted averages of the mean ratio of international financing flows to GDP into Sub-Saharan Africa and country groups in the region according to income level. GDP = gross domestic product; LICs = low-income countries; LMCs = lower-middle-income countries; UMCs = upper-middle-income countries.

FIGURE 2.5: Foreign Financing Inflows to Sub-Saharan Africa, by Income Group, Standard Deviation, 2000–17

Gross other investment inflows (international loans) and foreign aid show the highest volatility among low-income Sub-Saharan African countries; gross FDI inflows record the largest volatility among upper-middle-income countries in the region



Source: International Monetary Fund Balance of Payments BPM 6.0.

Note: Aggregate figures represent GDP-weighted averages of the standard deviation of the ratio of international financing flows to GDP in Sub-Saharan Africa and country groups in the region according to income level. GDP = gross domestic product; LICs = low-income countries; LMCs = lower-middle-income countries; UMCs = upper-middle-income countries.

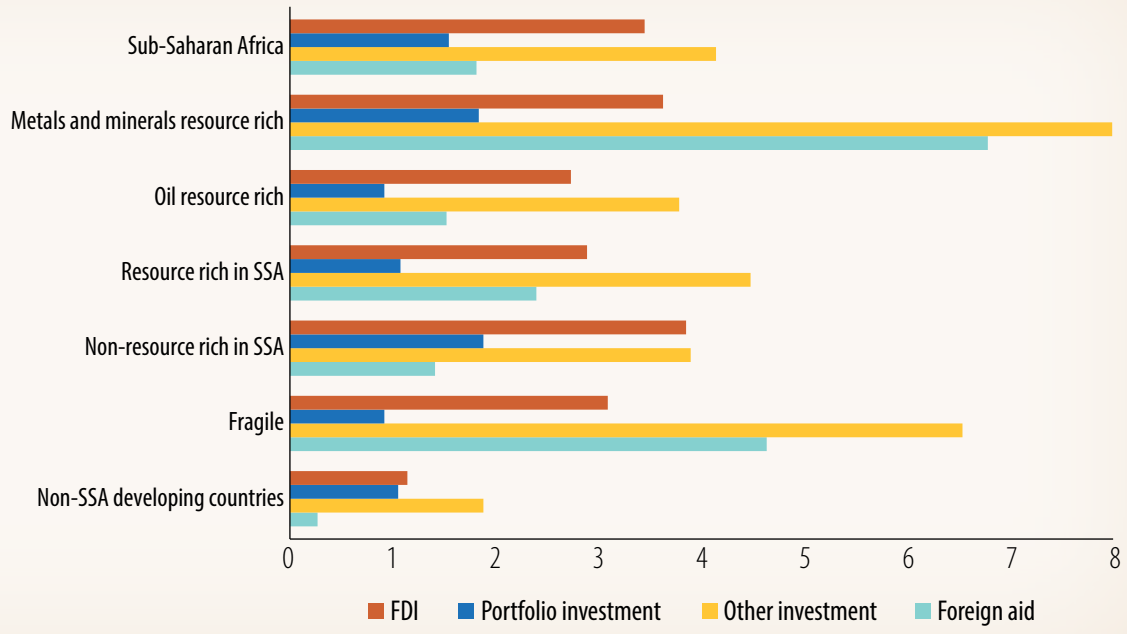
standard deviation of the inflows across countries. Gross OI inflows (international loans) and foreign aid exhibit the highest volatility among low-income Sub-Saharan African countries. Gross OI inflows are also the most volatile among lower-middle-income countries—although their standard deviation is considerably lower than that of low-income countries. Gross FDI inflows record the largest volatility among upper-middle-income countries in the region. This might be attributed to the lumpy FDI inflows in the finance and manufacturing sectors.

Figure 2.6 and Table 2A.1 (in annex 2A) show the average cross-country volatility of gross capital inflows to developing countries—including Sub-Saharan Africa and other country groups—from 2000 to 2017. The first finding emerging from the table is that foreign financing inflows to Sub-Saharan Africa are more volatile compared with those of non–Sub-Saharan African developing countries. For instance, the standard deviation of FDI in Sub-Saharan Africa is 3.42, while that of non–Sub-Saharan African developing countries is less than 1.2. Additionally, the standard deviation of gross OI for Sub-Saharan Africa is 4.12, while that of non–Sub-Saharan African developing countries is less than half (about 1.86). When focusing on the groups of Sub-Saharan African countries by resource abundance, gross inflows from the balance of payments tend to be more volatile in non-resource-rich vis-à-vis resource-rich countries—except for gross OI inflows. For example, the standard deviation of FDI among non-resource-rich countries is 3.83, while that of resource-rich countries is 2.86. Within the latter group, FDI inflows to countries that are abundant in metals and minerals are more volatile than those to oil abundant countries (standard deviations 3.61 and 2.71, respectively).

The volatility of gross OI inflows is higher in resource-rich countries than in non-resource-rich countries (standard deviations 4.46 and 3.87, respectively). Within the group of resource-rich countries, the volatility of gross OI inflows is less in oil abundant countries (3.76) than in countries abundant in metals and minerals (7.96). This finding might be partly associated with the greater volatility of international prices of metals and minerals compared with oil prices. Finally, the volatility of foreign aid and personal remittances is considerably higher in Sub-Saharan Africa than in non–Sub-Saharan African countries. In the case of foreign aid, the standard deviation for low-income countries in Sub-Saharan Africa (3.99) is higher than that of low-income non–Sub-Saharan African developing countries (1.57). The opposite holds for remittances: the standard deviation

Gross capital inflows—especially other investment inflows among countries that are resource rich in metals/minerals—in Sub-Saharan African countries are more volatile than those in other countries

FIGURE 2.6: Volatility of Gross Capital Inflows, 2000–17, by Type of Inflow and Country Group



Source: Staff estimations.

for low-income countries in Sub-Saharan Africa (1.15) is lower than that of low-income non–Sub-Saharan African developing countries (2.16).

How important was the crisis as an event that changed the composition of gross capital inflows? The retrenchment of global gross capital inflows during the 2008–09 global financial crisis warrants testing two hypotheses for the Africa region. The first hypothesis is whether capital flows in the post-crisis period were greater and/or riskier than the levels observed during the global financial crisis. In other words, the analysis assesses whether the averages and standard deviations of the different types of foreign financing flows (FDI, PI, OI, foreign aid, and remittances) were greater in 2010–17 (post-crisis period) relative to the global financial crisis period (2008–09). Tables 2.1 and 2.2 show the results of testing this hypothesis for Sub-Saharan Africa vis-à-vis other developing countries and country groups in the region classified by resource abundance and fragility, respectively.

The second hypothesis is whether capital flows in the post-crisis period were greater and/or riskier than the levels observed in the pre–global financial crisis period. In other words, the analysis examines whether the averages and standard deviations of the different types of foreign financing flows were greater in 2010–17 (post-crisis period) relative to the pre-crisis period

TABLE 2.1: Are Capital Flows in the Post-Crisis Period Greater Than during the Global Financial Crisis? Sub-Saharan Africa and Other Developing Countries, by Income Group (% GDP, weighted average)

Country group	Direct investment		Portfolio investment		Other investment		Foreign aid		Remittances	
	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17
I. Average										
Sub-Saharan Africa										
All SSA countries	3.451	3.945	0.375	1.694	2.152	1.669	3.105	2.591	2.521	2.495
	(0.130)	(0.870)	(0.036)	(0.964)	(0.477)	(0.523)	(0.945)	(0.055)	(0.163)	(0.837)
SSA LICs	4.001	5.160	0.144	0.429	3.397	2.822	2.166	1.859	1.992	3.288
	(0.030)	(0.970)	(0.114)	(0.886)	(0.251)	(0.750)	(0.957)	(0.043)	(0.050)	(0.951)
SSA LMCs	2.581	1.181	0.253	1.174	1.705	1.047	7.478	5.701	4.199	3.308
	(0.675)	(0.325)	(0.273)	(0.727)	(0.616)	(0.385)	(0.605)	(0.395)	(0.686)	(0.315)
SSA UMCs	4.281	7.205	0.737	3.773	1.810	1.538	7.180	5.513	0.282	0.268
	(0.166)	(0.834)	(0.064)	(0.936)	(0.669)	(0.331)	(0.978)	(0.022)	(0.409)	(0.591)
Developing countries (excluding SSA)										
All	3.521	3.174	0.437	1.057	1.174	1.428	0.322	0.219	1.698	1.472
	(0.741)	(0.259)	(0.000)	(1.000)	(0.987)	(0.013)	(0.855)	(0.145)	(0.560)	(0.440)
LICs	4.111	3.406	0.005	0.318	2.293	1.715	4.614	3.506	7.605	7.697
	(0.388)	(0.612)	(0.440)	(0.560)	(0.189)	(0.811)	(0.800)	(0.200)	(0.402)	(0.599)
LMCs	3.056	2.458	0.350	0.673	0.927	1.231	0.284	0.145	1.831	1.545
	(0.893)	(0.107)	(0.001)	(0.999)	(0.331)	(0.669)	(0.946)	(0.055)	(0.531)	(0.469)
UMCs	3.590	3.061	0.494	1.544	2.013	0.707	0.131	0.127	1.123	0.840
	(0.765)	(0.235)	(0.012)	(0.988)	(1.000)	(0.000)	(0.517)	(0.483)	(0.700)	(0.300)

TABLE 2.1: *continued*

Country group	Direct investment		Portfolio investment		Other investment		Foreign aid		Remittances	
	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17
II. Volatility										
Sub-Saharan Africa										
All	0.912	2.811	1.459	1.193	1.964	2.968	0.527	0.716	0.146	0.493
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.996)	(0.004)	(0.757)	(0.244)
LICs	1.379	2.061	0.272	1.266	2.596	3.994	0.365	0.508	0.147	0.846
	(0.000)	(1.000)	(0.000)	(1.000)	(0.745)	(0.255)	(0.996)	(0.004)	(0.057)	(0.943)
LMCs	0.364	1.281	0.146	0.939	1.137	1.631	1.507	1.772	0.216	0.559
	(0.223)	(0.777)	(0.000)	(1.000)	(0.666)	(0.334)	(0.457)	(0.543)	(0.994)	(0.006)
UMCs	1.338	6.009	4.320	1.532	2.662	4.114	0.798	1.170	0.034	0.018
	(0.000)	(1.000)	(0.060)	(0.940)	(0.000)	(1.000)	(0.998)	(0.002)	(0.505)	(0.495)
Developing countries (excluding SSA)										
All	1.207	1.110	1.705	1.099	1.999	2.147	0.089	0.087	0.155	0.217
	(0.000)	(1.000)	(0.258)	(0.742)	(1.000)	(0.000)	(1.000)	(0.000)	(0.859)	(0.142)
LICs	1.124	0.818	0.165	0.327	1.131	1.455	0.802	1.233	0.586	1.555
	(0.180)	(0.820)	(0.385)	(0.615)	(0.316)	(0.684)	(0.983)	(0.017)	(0.714)	(0.286)
LMCs	0.812	0.863	0.858	0.528	1.169	1.838	0.103	0.062	0.182	0.211
	(0.000)	(1.000)	(0.000)	(1.000)	(0.099)	(0.901)	(0.998)	(0.002)	(0.785)	(0.215)
UMCs	1.590	1.323	1.710	1.623	2.399	1.831	0.026	0.051	0.086	0.126
	(0.000)	(1.000)	(0.662)	(0.338)	(1.000)	(0.000)	(0.349)	(0.651)	(0.988)	(0.012)

Note: The numbers in parentheses represent p-values of mean and variance equality tests. The p-value for first period (2008–09) tests against the alternative that the moment in period 0 (2008–09) is less than that in period 1 (2010–17). The p-value for the second period (2010–17) tests against the alternative that the moment in period 0 (2008–09) is greater than that in period 1 (2010–17). LICs = low-income countries; LMCs = lower-middle-income countries; SSA = Sub-Saharan Africa; UMCs = upper-middle-income countries.

(2000–07). This test implies contrasting whether the post-crisis levels of capital flows recovered and surged past the pre-crisis levels. Tables 2.3 and 2.4 present the (mean and volatility) equality tests for Sub-Saharan Africa vis-à-vis other developing countries and for different country groups in the region, respectively.

Table 2.1 reports the (GDP-weighted) averages and standard deviations for Sub-Saharan African countries and other developing countries (as well as their classification by income level) of FDI, PI, OI, foreign aid, and (received) personal remittances during 2008–09 and 2010–17. Panel I in the table shows the averages for the aforementioned periods for the Sub-Saharan Africa region: first, foreign aid for Sub-Saharan Africa decreased significantly, from 3.105 percent of GDP during the crisis period to 2.591 percent after the crisis period. As the ratio of FDI to GDP declined, its volatility increased in the post-crisis period. This is attributed to the reduced budgets of industrial countries that devoted resources instead to conducting countercyclical policies to support aggregate demand in their corresponding countries. Second, the increase in the average ratio of FDI to GDP in Sub-Saharan African countries in the post-crisis period (from 3.45 to 3.945) is (statistically) insignificant. At the same time, the volatility of FDI inflows increased significantly, from 0.912 to 2.811.

Third, similar behavior is exhibited by low-income and upper-middle-income countries in Sub-Saharan Africa; that is, the increase in FDI is not statistically significant, and this ratio was more volatile in the post-crisis period. Fourth, the post-crisis reduction in the average ratio of gross OI inflows to GDP in Sub-Saharan Africa is also insignificant, and the volatility significantly increased, from 1.964 to 2.968 in the aftermath of the crisis. Fifth, there was a significant increase in average PI in the region during the post-crisis period (from 0.38 percent of GDP in 2008–09 to 1.69 percent in 2010–17). The increase in PI more than offset the decline in gross OI inflows—although the decline does not appear to be statistically significant. Finally, remittances remained statistically invariant between the two periods (average 2.52 percent of GDP in 2008–09 and 2.50 percent in 2010–17).

Table 2.2 presents the (GDP-weighted) averages and standard deviations of gross inflows across groups of countries in the region classified by resource abundance and fragility. The ratio of FDI to GDP increased for non-resource-rich African countries relative to the crisis period—although this increase is not statistically significant. Simultaneously, FDI became more volatile in the post-crisis period. For resource-rich countries, the post-crisis FDI/GDP ratio is smaller than in the crisis period, although the mean difference is not statistically significant, while the post-crisis volatility in this ratio is significantly higher. Interestingly, the mean and volatility of FDI inflows to fragile countries remain statistically invariant in the post-crisis vis-à-vis the crisis period.

For other foreign financing inflows, there is an insignificant decline in the post-crisis period for foreign aid among resource-rich countries, and its volatility increased over time. In the case of non-resource-rich countries, there is a significant decline in foreign aid (from 5.6 percent of GDP in 2008–09 to 4.72 percent of GDP in 2010–17); however, the increase in volatility is not statistically significant. Foreign aid declined for fragile and nonfragile countries, although this variation is only significant in the latter group. The increase in the volatility of foreign aid, by contrast, is statistically significant for the group of fragile countries. Finally, the mean and standard deviation of workers' remittances to non-oil-rich African countries increased significantly in the post-crisis period.

Table 2.3 reports the (GDP-weighted) averages and standard deviations for Sub-Saharan Africa and other developing countries by income level and composition of capital inflows excluding the crisis period (2002–07 and 2010–17). The table also examines whether the post-crisis levels of capital flows are higher than the pre-crisis levels. The average ratios to GDP of the different types of gross capital inflows from the balance of payments into Sub-Saharan Africa (gross FDI, PI, and OI inflows) are larger in the post-crisis period than in the period before the crisis.

Looking at 2000–17, first, FDI may have plateaued during the post-crisis period—as investors may have reacted more cautiously to sharp swings in commodity prices. Second, gross PI recovered from the drop during the global financial crisis, and the recovery of these flows surpassed and nearly doubled the pre-crisis ratios. This behavior might be attributed to the greater access of frontier markets in Sub-Saharan Africa to international bond markets. Third, foreign aid in the post-crisis period is lower than it was during the pre-crisis period not only in Sub-Saharan Africa, but also across low- and lower-middle-income countries in the region. This might capture the reduced portfolios of donor countries that devoted resources to finance countercyclical policies in their respective countries and the access of countries in the region

TABLE 2.2: Are Capital Flows in the Post-Crisis Period Greater Than during the Global Financial Crisis? Country Groups in Sub-Saharan Africa Classified by Resource Abundance and Fragility (% GDP, weighted average)

Country group	Direct investment		Portfolio investment		Other investment		Foreign aid		Remittances	
	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17	2008-09	2010-17
I. Average										
Resource abundance										
Non-resource rich	3.167	5.237	0.543	2.267	2.261	2.309	5.608	4.722	1.347	1.846
	(0.159)	(0.841)	(0.047)	(0.953)	(0.584)	(0.416)	(0.912)	(0.088)	(0.256)	(0.744)
Resource rich	3.808	2.434	0.164	1.024	2.016	0.921	1.849	1.488	4.136	3.311
	(0.193)	(0.807)	(0.211)	(0.789)	(0.318)	(0.682)	(0.827)	(0.173)	(0.145)	(0.855)
- Non-oil rich	5.058	7.080	-0.091	-0.208	2.071	-0.300	1.154	0.923	0.522	0.880
	(0.031)	(0.969)	(0.300)	(0.700)	(0.230)	(0.770)	(0.833)	(0.167)	(0.100)	(0.900)
- Oil rich	3.592	1.580	0.208	1.251	2.007	1.145	8.818	5.967	4.789	3.772
	(0.500)	(0.501)	(0.147)	(0.854)	(0.785)	(0.215)	(0.715)	(0.285)	(0.704)	(0.296)
Fragility										
Nonfragile	3.429	3.998	0.422	1.961	2.113	1.906	3.323	2.719	2.574	2.460
	(0.149)	(0.851)	(0.034)	(0.966)	(0.592)	(0.408)	(0.905)	(0.095)	(0.295)	(0.705)
Fragile	3.600	3.584	0.064	-0.111	2.410	0.067	2.793	2.389	2.164	2.743
	(0.266)	(0.734)	(0.473)	(0.527)	(0.338)	(0.662)	(0.872)	(0.128)	(0.191)	(0.809)
II. Standard deviation										
Resource abundance										
Non-resource rich	0.599	3.565	2.507	1.180	1.957	3.456	1.178	1.543	0.099	0.461
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.668)	(0.332)	(0.929)	(0.071)
Resource rich	1.305	1.929	0.147	1.209	1.973	2.397	0.200	0.287	0.211	0.534
	(0.010)	(0.991)	(0.000)	(1.000)	(0.994)	(0.006)	(0.995)	(0.005)	(0.000)	(1.000)
- Non-oil rich	3.700	3.659	0.193	2.417	5.236	6.935	0.097	0.175	0.178	0.300
	(0.045)	(0.955)	(0.000)	(1.000)	(0.957)	(0.043)	(0.984)	(0.016)	(0.000)	(1.000)
- Oil rich	0.892	1.611	0.139	0.987	1.409	1.562	1.242	1.176	0.217	0.579
	(0.074)	(0.926)	(0.000)	(1.000)	(1.000)	(0.000)	(0.532)	(0.469)	(0.872)	(0.128)
Fragility										
Nonfragile	0.815	2.996	1.664	1.185	1.737	2.454	0.616	0.818	0.146	0.473
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.762)	(0.239)	(0.966)	(0.034)
Fragile	1.560	1.558	0.104	1.254	3.465	6.439	0.399	0.555	0.145	0.633
	(0.000)	(1.000)	(0.000)	(1.000)	(0.778)	(0.222)	(0.982)	(0.018)	(0.224)	(0.776)

Note: The numbers in parentheses represent p-values of mean and variance equality tests. The p-value for the first period (2008–09) tests against the alternative that the moment in period 0 (2008–09) is less than that in period 1 (2010–17). The p-value for the second period (2010–17) tests against the alternative that the moment in period 0 (2008–09) is greater than that in period 1 (2010–17).

to other sources of financing. Fourth, received personal remittances as a percentage of GDP increased in the post-crisis period by about 0.6 percent of GDP (and this increase is significant at the 10 percent level). Finally, the ratios of FDI, PI, and OI to GDP are higher and more volatile in the post-crisis period relative to pre-crisis period. In contrast, foreign aid is smaller on average and less volatile in the post-crisis period.

TABLE 2.3: Are Capital Flows in the Post-Crisis Period Greater Than in the Pre-Crisis Period? Sub-Saharan Africa and Other Developing Countries, by Income Group (% GDP, weighted average)

Country group	Direct investment		Portfolio investment		Other investment		Foreign aid		Remittances	
	2000-07	2010-17	2000-07	2010-17	2000-07	2010-17	2000-07	2010-17	2000-07	2010-17
I. Average										
Sub-Saharan Africa										
All SSA countries	2.906	3.945	0.878	1.694	-0.032	1.669	3.569	2.591	1.863	2.495
	(0.002)	(0.998)	(0.012)	(0.988)	(0.141)	(0.859)	(0.998)	(0.002)	(0.092)	(0.908)
SSA LICs	2.694	5.160	0.091	0.429	1.281	2.822	2.862	1.859	1.910	3.288
	(0.000)	(1.000)	(0.001)	(0.999)	(0.205)	(0.795)	(0.998)	(0.002)	(0.000)	(1.000)
SSA LMCs	3.289	1.181	0.308	1.174	-2.499	1.047	6.047	5.701	3.592	3.308
	(0.392)	(0.608)	(0.095)	(0.905)	(0.009)	(0.991)	(0.931)	(0.069)	(0.974)	(0.026)
SSA UMCs	2.652	7.205	1.923	3.773	1.636	1.538	8.409	5.513	0.254	0.268
	(0.021)	(0.979)	(0.072)	(0.928)	(0.746)	(0.254)	(0.757)	(0.243)	(0.286)	(0.714)
Developing countries (excluding SSA)										
All	3.460	3.174	1.136	1.057	1.792	1.428	0.378	0.219	1.700	1.472
	(0.686)	(0.314)	(0.040)	(0.961)	(0.901)	(0.099)	(0.991)	(0.009)	(0.124)	(0.876)
LICs	2.176	3.406	0.436	0.318	0.542	1.715	4.585	3.506	5.725	7.697
	(0.031)	(0.969)	(0.305)	(0.695)	(0.152)	(0.848)	(0.784)	(0.216)	(0.029)	(0.971)
LMCs	2.945	2.458	0.750	0.673	0.921	1.231	0.407	0.145	1.891	1.545
	(0.723)	(0.277)	(0.000)	(1.000)	(0.000)	(1.000)	(1.000)	0.000	(0.568)	(0.432)
UMCss	3.422	3.061	0.630	1.544	1.531	0.707	0.133	0.127	1.267	0.840
	(0.871)	(0.129)	(0.045)	(0.955)	(1.000)	0.000	(0.988)	(0.012)	(0.448)	(0.552)
II. Volatility										
Sub-Saharan Africa										
All	2.236	2.811	1.255	1.193	3.581	2.968	1.705	0.716	1.118	0.493
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(1.000)	(0.000)	(1.000)	(0.000)
LICs	2.046	2.061	0.238	1.266	5.452	3.994	1.650	0.508	0.737	0.846
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.995)	(0.005)	(0.000)	(1.000)
LMCs	2.084	1.281	0.350	0.939	3.907	1.631	2.219	1.772	2.489	0.559
	(0.000)	(1.000)	(0.000)	(1.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)
UMCs	2.502	6.009	2.772	1.532	2.125	4.114	1.506	1.170	0.066	0.018
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.991)	(0.009)	(0.623)	(0.377)
Developing countries (excluding SSA)										
All	1.475	1.110	1.431	1.099	2.989	2.147	0.140	0.087	0.418	0.217
	(0.000)	(1.000)	(0.990)	(0.010)	(1.000)	(0.000)	(1.000)	(0.000)	(0.061)	(0.939)
LICs	1.020	0.818	0.969	0.327	2.806	1.455	0.949	1.233	1.742	1.555
	(0.004)	(0.997)	(0.995)	(0.005)	(1.000)	(0.000)	(0.815)	(0.186)	(0.003)	(0.997)
LMCs	0.921	0.863	0.729	0.528	1.432	1.838	0.173	0.062	0.368	0.211
	(0.998)	(0.002)	0.000	(1.000)	(0.953)	(0.047)	(1.000)	(0.000)	(0.901)	(0.100)
UMCs	1.629	1.323	1.480	1.623	2.558	1.831	0.058	0.051	0.417	0.126
	(0.000)	(1.000)	(0.173)	(0.827)	(0.948)	(0.052)	(1.000)	(0.000)	(1.000)	(0.000)

Note: The numbers in parentheses represent p-values of (mean, variance, and median) equality tests. The p-value for the first period (2000–07) tests against the alternative that the moment in period 0 (2000–07) is less than that in period 1 (2010–17). The p-value for the second period (2010–17) tests against the alternative that the moment in period 0 (2000–07) is greater than that in period 1 (2010–17). LICs = low-income countries; LMCs = lower-middle-income countries; SSA = Sub-Saharan Africa; UMCs = upper-middle-income countries.

Table 2.4 compares the pre-crisis and post-crisis levels of foreign financing flows into different country groups in Sub-Saharan Africa, classified by resource abundance and fragility. First, FDI flows into non-resource-rich Sub-Saharan African countries were significantly higher and more volatile in the pre-crisis period. The opposite holds for resource-rich countries: levels of FDI inflows were smaller and less volatile among resource-rich countries. This behavior was mainly driven by FDI flows into oil-rich countries in the region. Second, post-crisis gross PI inflows are higher than in the pre-crisis period for non-resource-rich and resource-rich countries, and they have become more volatile over time. Third, foreign aid to both non-resource-rich and resource-rich countries is smaller and less volatile in the post-crisis period relative to the pre-crisis period.

Fifth, increases in gross OI and remittance inflows for non-resource-rich countries were not significant, and these flows became more volatile in the post-crisis period (relative to pre-crisis). In the case of resource-rich countries, remittances are larger and more volatile in the post-crisis

TABLE 2.4: Are Capital Flows in the Post-Crisis Period Greater Than in the Pre-Crisis Period? Countries in Sub-Saharan Africa Classified by Resource Abundance and Fragility (% GDP, weighted average)

Country group	Direct investment		Portfolio investment		Other investment		Foreign aid		Remittances	
	2000-07	2010-17	2000-07	2010-17	2000-07	2010-17	2000-07	2010-17	2000-07	2010-17
I. Average										
Resource abundance										
Non-resource rich	2.008	5.237	1.283	2.267	1.456	2.309	6.487	4.722	1.268	1.846
	(0.004)	(0.996)	(0.021)	(0.979)	(0.172)	(0.828)	(0.989)	(0.011)	(0.156)	(0.844)
Resource rich	4.366	2.434	0.220	1.024	-2.452	0.921	2.253	1.488	3.089	3.311
	(0.083)	(0.917)	(0.113)	(0.888)	(0.310)	(0.690)	(0.961)	(0.039)	(0.032)	(0.968)
- Non-oil rich	4.078	7.080	0.061	-0.208	-0.439	-0.300	1.425	0.923	0.821	0.880
	(0.000)	(1.000)	(0.241)	(0.759)	(0.389)	(0.611)	(0.937)	(0.063)	(0.025)	(0.975)
- Oil rich	3.437	1.580	0.678	1.251	-0.727	1.145	11.137	5.967	3.547	3.772
	(0.773)	(0.227)	(0.032)	(0.969)	(0.266)	(0.734)	(0.982)	(0.018)	(0.490)	(0.510)
Fragility										
Nonfragile	2.709	3.998	1.007	1.961	-0.209	1.906	4.783	2.719	1.756	2.460
	(0.007)	(0.993)	(0.012)	(0.988)	(0.025)	(0.975)	(1.000)	(0.000)	(0.569)	(0.431)
Fragile	4.102	3.584	0.091	-0.111	1.044	0.067	2.213	2.389	2.621	2.743
	(0.005)	(0.995)	(0.381)	(0.619)	(0.854)	(0.146)	(0.644)	(0.356)	(0.001)	(0.999)
II. Standard deviation										
Resource abundance										
Non-resource rich	1.638	3.565	1.794	1.180	2.960	3.456	3.203	1.543	0.428	0.461
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(1.000)	(0.000)	(1.000)	(0.000)
Resource rich	3.209	1.929	0.377	1.209	4.592	2.397	1.030	0.287	2.538	0.534
	(0.793)	(0.208)	(0.000)	(1.000)	(0.000)	(1.000)	(0.976)	(0.024)	(0.000)	(1.000)
- Non-oil rich	2.897	3.659	0.293	2.417	4.749	6.935	0.936	0.175	0.381	0.300
	(0.093)	(0.907)	(0.000)	(1.000)	(0.000)	(1.000)	(0.918)	(0.083)	(0.000)	(1.000)
- Oil rich	3.291	1.611	0.850	0.987	4.151	1.562	2.032	1.176	2.975	0.579
	(0.640)	(0.360)	(0.000)	(1.000)	(0.000)	(1.000)	(1.000)	(0.000)	(0.802)	(0.198)
Fragility										
Nonfragile	2.135	2.996	1.440	1.185	3.331	2.454	2.598	0.818	1.128	0.473
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(1.000)	(0.000)	(1.000)	(0.000)
Fragile	2.849	1.558	0.130	1.254	5.105	6.439	0.709	0.555	1.049	0.633
	(0.000)	(1.000)	(0.000)	(1.000)	(0.000)	(1.000)	(0.954)	(0.047)	(0.000)	(1.000)

Note: The numbers in parentheses represent p-values of (mean, variance, and median) equality tests. The p-value for the first period (2000–07) tests against the alternative that the moment in period 0 (2000–07) is less than that in period 1 (2010–17). The p-value for the second period (2010–17) tests against the alternative that the moment in period 0 (2000–07) is greater than that in period 1 (2010–17).

period, and this behavior is mainly driven by the behavior of remittances received in non-oil-rich African countries. Finally, FDI inflows are smaller and foreign aid remains fairly constant in the post-crisis period relative to the pre-crisis period among fragile countries in Sub-Saharan Africa. The level of volatility of these two types of flows was significantly smaller. Therefore, FDI inflows in commodity-abundant countries tend to be more volatile and, surprisingly, lower levels of investment have become more stable in fragile countries during the post-crisis period. Gross PI inflows in the post-crisis period surpass the pre-crisis levels for non-resource-rich and oil-rich countries, and these inflows tend to be more volatile.

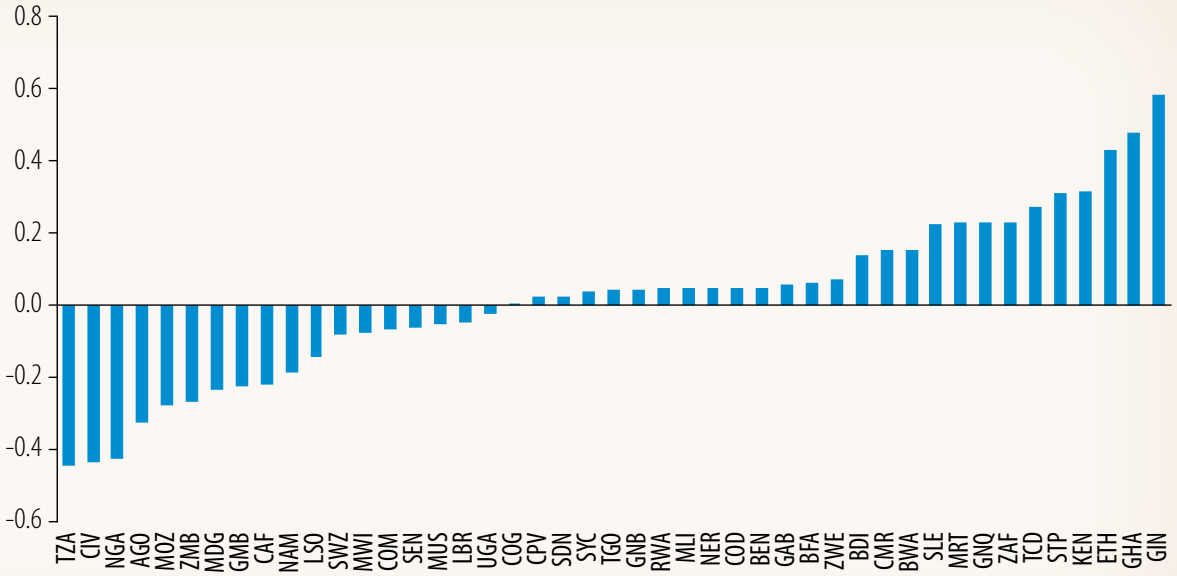
Table 2A.2 reports the panel data estimation results of regression-based measures of cyclicality of the different types of foreign financing flows during 1980–2017, namely, gross total inflows from the balance of payments and their different components (gross FDI, PI, and OI inflows) as well as other foreign financing inflows (foreign aid and personal remittances inflows). This table shows the estimated coefficient of GDP growth and its associated robust standard deviation from regression of the ratio of the foreign financing inflow to GDP on GDP growth, changes in the terms of trade, and the lagged explanatory variable. The regressions also include country and time effects. The table reports not only the least squares estimates, but also instrumental variables (IV), where GDP growth is instrumented by (actual and lagged values of) the growth of main trading partners and terms of trade changes. Panels I and II show the regression-based relationship between foreign financing flows and GDP growth for the samples of Sub-Saharan African countries and other developing countries using least squares and IV, respectively, while accounting for unobserved country and time effects.

The results in table 2A.2, panels I and II, confirm that gross total inflows are procyclical for both samples—when the coefficient is positive and significant. However, the estimated IV coefficient in panel II is larger (in magnitude) for Sub-Saharan Africa compared with other developing countries (0.84 and 0.45, respectively) and the largest impact is on fragile African countries, with a coefficient of 2.068. This implies that the procyclical bias of capital inflows is larger in this group of countries; therefore, gross inflows may increase (decrease) more than proportionally in good (bad) times for fragile countries. In panel II, FDI inflows have a positive and significant impact on economic activities in Sub-Saharan Africa and other developing countries. Foreign aid inflows have a negative and significant impact on economic growth in Sub-Saharan Africa and other developing countries. Consequently, FDI tends to be procyclical, whereas foreign aid tends to be countercyclical. The degree of procyclicality (countercyclicality) of FDI (foreign aid) is larger among Sub-Saharan African countries than other developing countries. Gross OI inflows have a negative and significant relationship with GDP growth for non–Sub-Saharan African developing countries, while that relationship is not significant for Sub-Saharan African countries. Finally, although remittances appear to be acyclical (no significant relationship with GDP growth) for Sub-Saharan Africa and other developing countries, they tend to behave countercyclically for fragile countries in the region. This implies that remittance inflows in this group of countries tend to be higher in downswings.

Table 2A.3 reports estimates of the degree of association between capital flows and economic activity at the country level in Sub-Saharan Africa—thus exploiting the full heterogeneity in the behavior of capital flows along the cycle of economic activity. Figure 2.7 plots the correlation between gross capital inflows and domestic GDP growth for each country in the region from

Total gross inflows are positively correlated with economic activity for about 60 percent of the countries in Sub-Saharan Africa

FIGURE 2.7: Correlation between Gross Capital Inflows and GDP Growth across Sub-Saharan African Countries



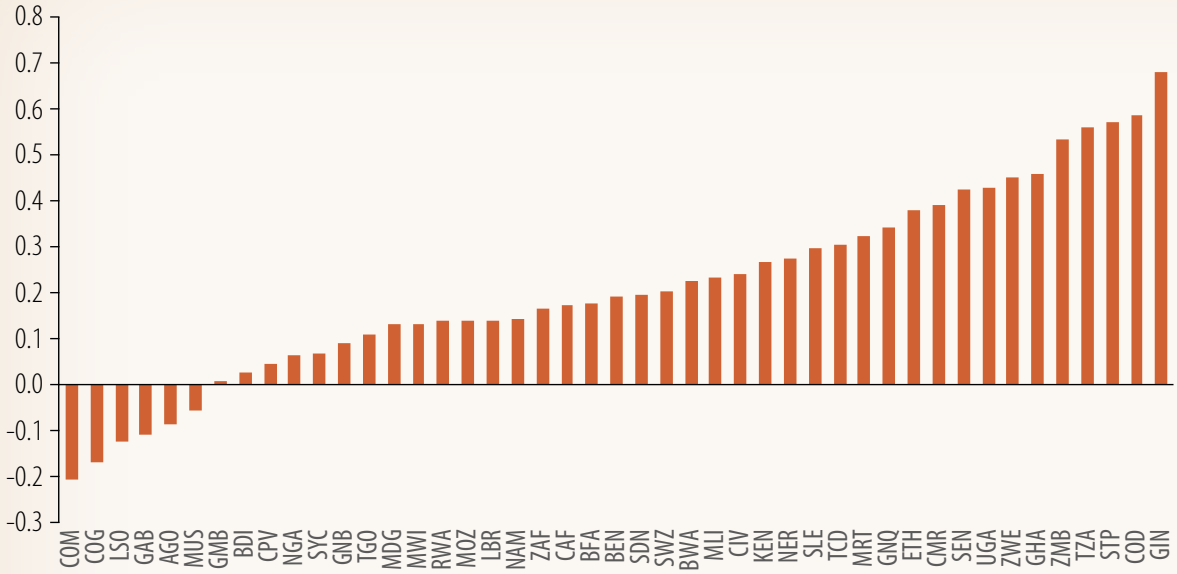
Sources: International Monetary Fund Balance of Payments Statistics BPM 6.0; World Bank World Development Indicators.

Note: This figure reports the correlation between aggregate gross capital inflows and GDP growth for each country in Sub-Saharan Africa from 1980 to 2017. GDP = gross domestic product.

1980 to 2017. It shows that 18 of the 45 countries have a negative correlation, while 27 countries have a positive correlation. Hence, total gross inflows appear to behave procyclically in the majority of countries in the region. Figure 2.8 presents the correlation between FDI inflows and domestic GDP growth by country. FDI inflows have a positive correlation with economic growth for most of the countries in Sub-Saharan Africa (39 of 45). Figure 2.9 shows the correlation between foreign aid inflows and domestic GDP growth for each country in Sub-Saharan Africa. There is a negative correlation between foreign aid and growth for 19 countries, while the correlation is positive for 26 of the 45 countries. Therefore, foreign aid tends to be procyclical for more than half of the countries in the region.

Table 2A.3 reports the IV regression analysis of gross foreign financing flows on economic growth for each country in Sub-Saharan Africa, using annual data from 1980 to 2017. There is a great deal of heterogeneity in the behavior of capital flows along the cycle across Sub-Saharan African countries, and this heterogeneous behavior might depend on the size and structure of the economy, available resources, level of income, level of development, exchange rate regime, political system, and regulations, among other factors. For instance, flows into the economy may behave differently along the cycle in oil abundant countries such as Angola, Chad, and Nigeria. According to table 2A.3, economic growth and PI inflows have a negative and significant relationship in Chad, while remittance inflows have a positive and significant association with growth in Angola. The results for Nigeria are negligible—that is, all financing flows appear not to have a significant relationship with output growth. Consistent with the correlations plotted in figures 2.7 to 2.9, the country regression analysis finds a negative impact of growth on gross

FIGURE 2.8: Correlation between FDI Inflows and GDP Growth across Countries in Sub-Saharan Africa

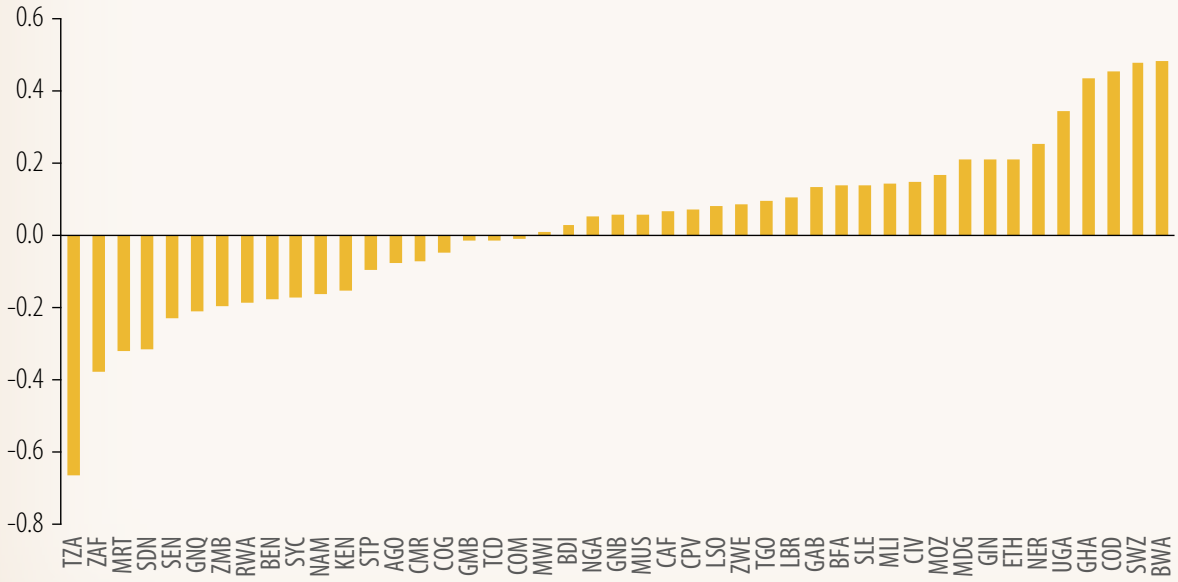


FDI inflows are positively correlated with economic activity for about 87 percent of the countries in Sub-Saharan Africa

Sources: International Monetary Fund Balance of Payments Statistics BPM 6.0; World Bank World Development Indicators.

Note: The figure reports the correlation between aggregate gross FDI inflows and GDP growth for each country in Sub-Saharan Africa from 1980 to 2017. FDI = foreign direct investment; GDP = gross domestic product.

FIGURE 2.9: Correlation between Foreign Aid Inflows and GDP Growth across Countries in Sub-Saharan Africa



Foreign aid inflows are positively correlated with economic activity for about 58 percent of the countries in Sub-Saharan Africa

Sources: International Monetary Fund Balance of Payments Statistics BPM 6.0; World Bank World Development Indicators.

Note: The figure reports the correlation between aggregate gross foreign aid inflows and GDP growth for each country in Sub-Saharan Africa from 1980 to 2017. GDP = gross domestic product.

capital inflows, FDI, and foreign aid in Angola, although this impact is not statistically significant. The correlation between GDP growth and capital inflows is negative in Nigeria (driven by the negative effect on gross OI inflows), while FDI, gross PI, foreign aid, and remittances inflows have a positive comovement with growth—however, all these effects are not statistically significant. In the case of Chad, gross capital inflows and FDI inflows have a positive relationship with growth, whereas that of PI and foreign aid inflows is negative.

Non-oil-rich countries, such as Mozambique and Zambia, also behave differently. For example, the relationship between the economic cycle and PI inflows is negative and significant for Zambia, while the results for Mozambique are negligible. The correlation between FDI inflows and growth is positive in both countries, and Zambia records one of the highest correlations between GDP growth and FDI inflows in the region. Within the group of non-resource-rich countries, economic growth has a positive and significant impact on overall capital, FDI, and remittances inflows in Ethiopia, while the relationship with output growth is only positive and significant for overall capital inflows in Kenya. The patterns of correlation between foreign financing flows and economic growth are negligible in Rwanda. Ethiopia and Kenya record the highest correlation between gross capital inflows and GDP growth.

Pull and Push Drivers of Gross Capital Flows

Table 2A.4 reports estimates of the determinants of gross capital inflows to Sub-Saharan Africa (aggregate and by type) from 1980 to 2017. The dependent variable is gross capital inflows as a percentage of GDP. The different types of capital flows are also included as alternative dependent variables, namely, gross FDI inflows, gross PI inflows, and gross OI inflows. The set of determinants chosen follows recent empirical literature—for example, Forbes and Warnock (2012), Calderón and Kubota (2014), and Ghosh et al. (2014). Pull factors are domestic factors that attract foreign capital flows, such as domestic economic growth, Consumer Price Index inflation, primary balance, and exchange rate flexibility. The push or external factors considered in this analysis are trade and financial openness, VIX index, and economic growth of main trading partners. The regression analysis compares the behavior of pull and push factors across different time periods: 1980–2017, 1980–99, and 2000–17. This implicitly tests whether financial globalization plays a role in driving changes in the sensitivity of capital inflows to pull and push factors.

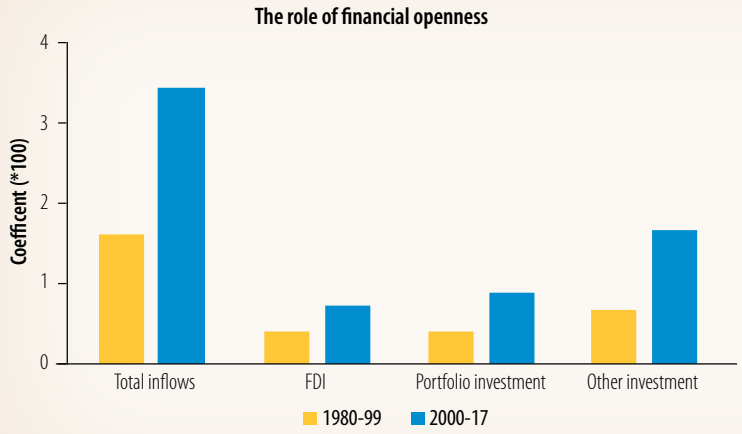
A recent strand of the literature highlights the incidence of extreme movements in capital inflows and the likely nonlinear relationship between pull-push drivers and extremely large waves of (inward and/or outward) capital flows. Initially, capital flow bonanzas were identified in the literature using annual information on net capital inflows (Reinhart and Reinhart 2009; Cardarelli, Elekdag, and Kose 2010). The extreme behavior of capital inflows has implications not only for the variable itself, but also for the shocks associated with these waves of flows—which suggests the existence of nonlinear behavior. Therefore, quantile regressions were conducted to investigate the nonlinear relationship between capital inflows and pull-push drivers.

Domestic economic growth is a robust driving force of total capital inflows in Sub-Saharan Africa regardless of the period of the estimation. When economic growth increases by one point in the full sample period, total inflows increase by 0.24 point, and FDI inflows increase by 0.18 point. The primary balance is a positive driving force for OI inflows regardless of the sample period of

estimation. Consequently, macroeconomic discipline (or the lack of macroeconomic imbalances), as captured by general government primary surpluses, helps attract capital flows. If the primary balance increases by one point in 1980–2017, OI inflows increase by 0.076 point. Financial openness is an important push factor for total capital inflows, and this finding is consistent for all the estimation periods. Therefore, greater participation of the domestic economy in global capital markets would help attract foreign investors. If financial openness increases by one point, then total capital inflows increase by 2.62 points.

FIGURE 2.10: The Role of Financial Openness in Gross Capital Inflows

The role of financial openness in attracting flows increased in the 2000s



Source: Staff estimations.

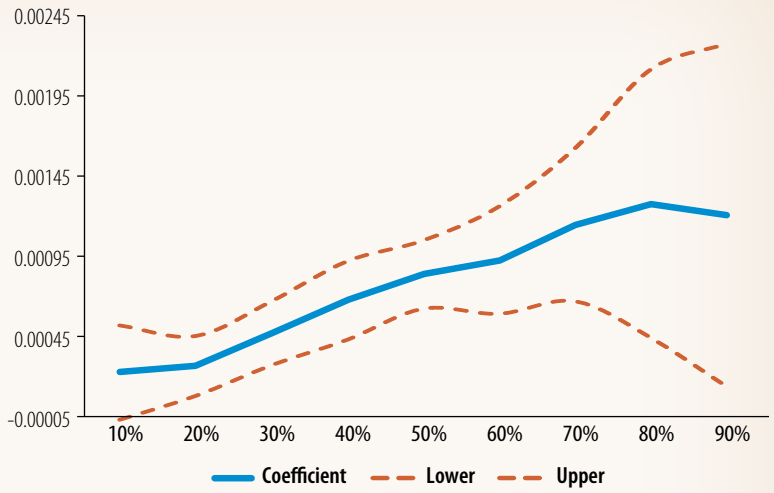
Note: The estimated regression coefficient of financial openness is multiplied by 100 in this figure for presentation purposes. The coefficients are presented in table 2A.3. FDI = foreign direct investment.

Focusing on the determinants of FDI inflows, domestic economic growth plays a significant role as a pull factor throughout 1980–2007 and during the globalization period (2000–17). Fiscal discipline and financial openness also help attract FDI—although the impact is not necessarily robust across the estimation periods. In the case of gross PI inflows, less flexible (more managed) exchange rate regimes may help pull more PI inflows to Sub-Saharan Africa in the full sample period as well as the pre-globalization period (1980–1999). Trade openness plays a role in pushing PI inflows into the domestic economy in the pre-globalization period (1980–99), and the direction of this relationship changes during 2000–17. In the case of gross OI inflows, more flexible exchange rate regimes attract more OI inflows in the full period and after 2000 for gross OI inflows. Financial openness helps attract more PI and OI inflows in the full period and especially after 2000. Accordingly, foreign investors are more likely to shift their portfolio to the domestic economy if it is inserted in global capital markets. Finally, higher foreign growth and lower global market uncertainty (VIX index) attracts more OI inflows in the full period and after 2000.

Tables 2A.5 and 2A.6 report the results of quantile regressions that assess the nonlinear relationship between total gross inflows and pull and push factors, as well as between FDI inflows and pull and push factors, respectively. The findings show that, overall, domestic economic performance, general government primary balance, and trade openness are key drivers of capital inflows and FDI inflows at different deciles of the distribution. For instance, higher domestic economic growth helps attract gross capital inflows from the lower-middle to the upper-middle percentiles of the distribution (30th to 80th), while a sound primary balance of the government helps attract more capital inflows at all deciles of the distribution. Moreover, the impact of fiscal discipline as a pull factor is largest in the middle deciles (40th to 60th). Trade openness pushes foreign investors to bring more capital inflows to all countries except the ones with the poorest penetration of capital inflows (those below the 10th percentile). Financial openness also helps attract more capital inflows, and the impact of this push factor operates in the middle-to-high

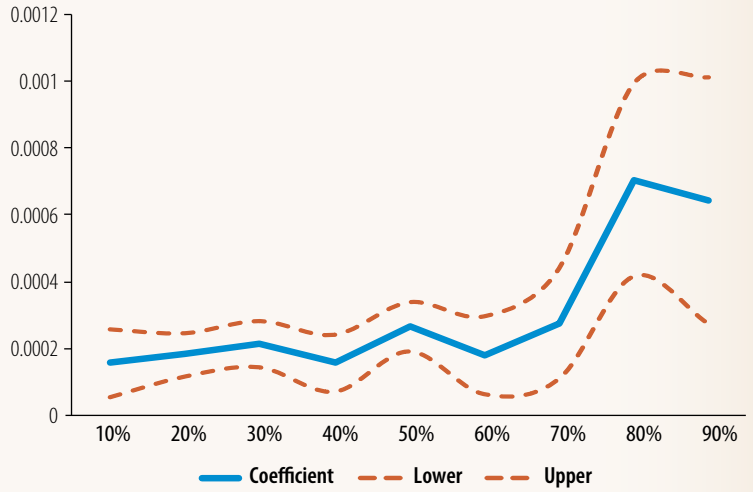
The impact of growth on capital flows is greater in countries with higher foreign capital penetration

FIGURE 2.11: GDP Growth (%)



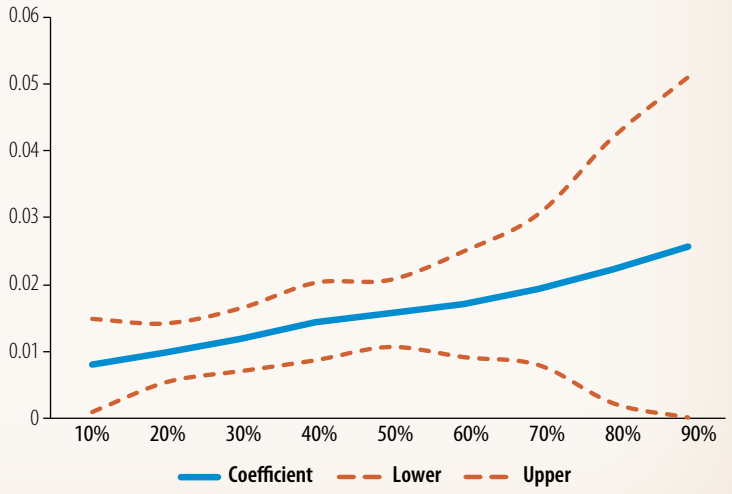
The discipline effect of fiscal balances is similar for countries with low to moderate foreign capital penetration

FIGURE 2.12: Primary Balance (%)



The impact of trade openness increases steadily with the degree of foreign capital penetration

FIGURE 2:13: Trade Openness (%)



Source: Staff estimatations.
Note: The coefficient from the quantile regressions are reported in the y-axis

deciles of the distribution (50th to 80th percentiles). Consequently, financially open countries will receive more inflows if their integration into global capital markets surpasses a certain threshold (such as the median of the distribution).

Table 2A.6 shows the results of the quantile regressions for FDI inflows. Consistent with the findings for gross total inflows, improved domestic economic performance, a healthier primary balance, and more trade openness attract more FDI inflows for all percentiles of the distribution of FDI inflows (figures 2.11 to 2.13). Although the impact of domestic growth is largest in the middle deciles (40th to 60th), the effects on FDI inflows of the primary balance and trade openness occur in the upper deciles. Therefore, the sensitivity of FDI inflows to growth is largest for countries with median levels of FDI inflows, while the sensitivity to the primary balance and trade openness is largest for countries with the greatest penetration of FDI inflows.

BOX 2.1: Capital Flight in Sub-Saharan Africa

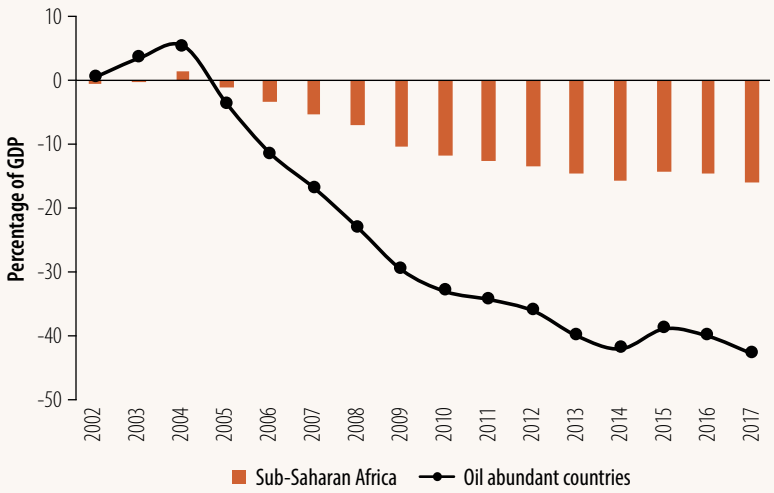
The problem of unrecorded financial outflows is pervasive in capital-starved Sub-Saharan Africa (Ajayi and Ndikumana 2015). Unrecorded flows, which typically take the form of capital flight, impose a severe economic cost in the region. Evidence shows that Africa had incurred a 16 percent loss of output by 1990—an amount that was four times higher than in Latin America and eight times higher than in East and South Asia (Collier, Hoeffler, and Pattillo 2001). Measuring capital flight provides a proxy for the opportunity cost to the source country—that is, the gains foregone associated with the loss of capital that could have financed productive investments in the areas of education, health, and infrastructure, among others.

Figure B2.1.1 shows the cumulative net errors and omissions for 2002–17 in Sub-Saharan Africa. The region experienced cumulative (net) errors and omissions of about 16 percent of gross domestic product (GDP), and the amount of unrecorded financial flows was even greater for oil-abundant countries in the region (43 percent of GDP).[a] Table B2.1.1 lists countries with cumulative net errors and omissions in excess of 10 percent of GDP during 2002–17.

Net errors and omissions are an (imperfect) proxy for unrecorded financial flows. Ndikumana, Boyce, and Ndiaye (2015) argue that capital flight can be estimated as the difference between recorded inflows and recorded uses of foreign exchange. This definition will be equal to net errors and omissions if balance of payments data are the only source of information. However, debt inflows tend to be underreported in balance of payments accounts. Hence, the latter

FIGURE B2.1.1: Cumulative Errors and Omissions in Sub-Saharan Africa, 2002–17

Cumulative net errors and omissions are about 16 percent of GDP during 2002–17



Source: International Monetary Fund Balance of Payments Statistics BPM 6.0.

Note: The group averages represent GDP-weighted averages of the ratio of cumulative (net) errors and omissions. Negative (net) errors and omissions indicate unrecorded capital outflows, which represent a broad measure of capital flight. GDP = gross domestic product.

TABLE B2.1.1: Cumulative Errors and Omissions in Selected Countries in Sub-Saharan Africa, 2002–17 (% of GDP)

Country	Negative NEO	Country	Positive NEO
Botswana	-65.0	Gambia, The	10.6
Liberia	-52.7	Sudan	11.7
Eswatini	-50.5	Chad	12.0
Nigeria	-43.2	Benin	12.2
Mauritania	-37.3	Namibia	16.8
Sierra Leone	-35.1	Congo, Rep.	17.2
Lesotho	-26.2	Mauritius	18.9
Gabon	-24.2	Burkina Faso	21.4
Cabo Verde	-20.5	Seychelles	39.3
Burundi	-16.6	Niger	51.2
Angola	-14.8	Guinea	83.1
Comoros	-13.2		
Tanzania	-11.5		

Source: International Monetary Fund Balance of Payments Statistics BPM 6.0.

Note: The group averages represent GDP-weighted averages of the ratio of cumulative (net) errors and omissions. Negative (net) errors and omissions indicate unrecorded capital outflows, which represent a broad measure of capital flight. GDP = gross domestic product. NEO = net errors omissions.

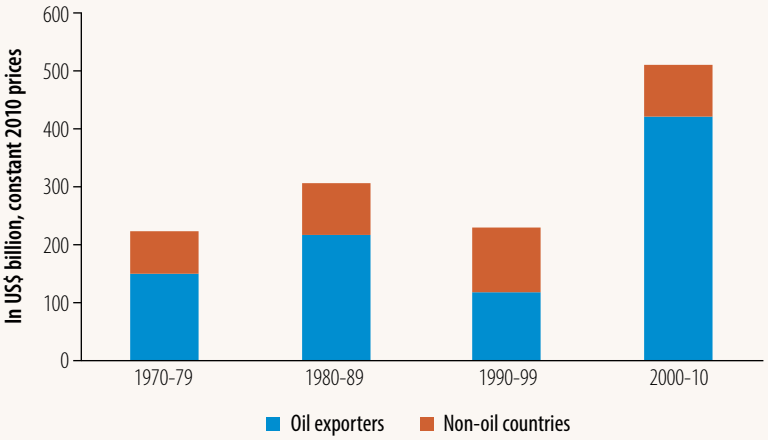
BOX 2.1: *Continued*

flows need to be obtained from other official sources and adjusted for asset price changes—for example, exchange rate fluctuations. An even broader measure of capital flight will additionally include total trade mis-invoicing and unrecorded remittances.

Figure B2.1.2 plots the (adjusted) capital flight measure computed by Ndikumana, Boyce, and Ndiaye (2015) for African countries during 1970–2010. There was an acceleration of capital flight after 2000—which coincided with the super cycle of commodity prices and a period of rapid growth in the region (*Africa Rising*). The bulk of this acceleration is explained by oil exporting countries: the amount of capital flight for this group of countries grew from US$118 billion in 1990–99 to US$423 billion in 2000–10. For Nigeria and Angola, the estimated amounts of capital flight during 2000–10 were about US$311 billion and US$77.5 billion, respectively.

Capital flight for oil exporters in 2000-10 more than doubled that of previous years

FIGURE B2.1.2: Capital Flight across Countries in Sub-Saharan Africa (US$, billions, at constant 2010 prices)



Source: Ndikumana, Boyce, and Ndiaye 2015.

Analysis of the drivers of capital flight suggests that these unrecorded outflows were partly driven by external borrowing: 63 to 73 cents per dollar borrowed by countries in the region left the country as capital flight. Furthermore, the high persistence of capital flight indicates severe habit formation patterns. Ndikumana, Boyce, and Ndiaye (2015) find that the incidence of capital flight is greater in natural resource abundant countries with poor governance. The depth of the financial system has no systematic relationship with capital flight in Africa.

The findings by Ndikumana, Boyce, and Ndiaye (2015) suggest that the solution should focus on improving the efficacy of existing institutions and frameworks to address capital flight. For instance, mechanisms and institutions supporting transparency and accountability should be strengthened. Financial intelligence units should be empowered to gather and process information on financial crimes. Tough legal frameworks for prosecution should also be put in place (Boyce and Ndikumana 2015).

The effectiveness of national strategies in curbing financial crimes is hindered by inadequate coordination, harmonization, and cooperation across countries in Sub-Saharan Africa and across the world. Harmonization of legislation across countries is needed to reduce mechanisms for cross-border criminal arbitrage. Regional and global conventions offer a standard framework to define harmonization and coordinate national strategies. Finally, global initiatives—such as the Stolen Recovery Initiative and the Organisation for Economic Co-operation and Development's Global Forum and Transparency and Exchange of Information for Tax Purposes—should be more than mechanisms to exchange information and platforms for coordination. They should be empowered with enforcement capacity. In this context, industrial countries should champion the causes of international financial transparency and accountability (Boyce and Ndikumana 2015).

a. Negative net errors and omissions correspond to unrecorded financial outflows.

BOX 2.2: Challenges Posed by International Financial Flows: Macro-Financial Risks

The size and composition of international financial flows in Sub-Saharan Africa are likely associated with some critical macro-financial risks. Improper management of these flows may lead to financial imbalances and macroeconomic distortions. This box assesses the relationship between international financial flows and four macro-financial risk factors.

First, international financial flows (IFFs) may have an impact on *domestic credit growth*. Rising IFFs lead to credit buildup and asset price booms and, in some cases, end up in a systemic banking crisis (Mendoza and Terrones 2008, 2012; Barajas, Dell'Ariccia, and Levchenko 2009; Calderón and Kubota 2012; Lane and McQuade 2014).

Second, IFFs may affect the *real exchange rate*. Rising IFFs induce a real appreciation of the currency, with subsequent relative loss of competitiveness among firms in the traded sector and a relative expansion of lower-productivity non-tradable sectors—see Lane (2013) and Benigno and Fornaro (2014) for recent contributions.

Third, *domestic inflation* may increase due to greater IFFs. Massive monetary expansion associated with rising capital inflows may heighten currency pressures. In countries operating under pegged exchange rate regimes, these pressures will be manifested in rising domestic inflation.

Fourth, access to IFFs may pose risks to the *fiscal balance*. Procyclical access to international financial flows may restrict the ability of governments to conduct countercyclical macroeconomic policies. Interest rate cuts and excessive expansion of government spending may take place during periods of capital flow booms, and they may have to adjust drastically when foreign capital comes to a halt (Kaminsky, Reinhart, and Vegh 2005; Reinhart and Reinhart 2009).

Lane (2016) estimates the impact of IFFs on the macro-financial indicators mentioned above (table B2.2.1):[a]

Domestic credit growth. Net international financial inflows have little relation with domestic credit growth for Sub-Saharan African countries—except for the more financially open countries. The relationship between IFFs and credit growth may be driven by the composition of financial flows into and out of the domestic economy—namely, debt inflows, foreign direct investment (FDI) inflows, and reserve outflows. Again, there is little association between the different types of financial flows and domestic credit growth in Sub-Saharan Africa (see table B2.2.1).[b]

The lack of a systematic relationship between international financial flows and credit growth in Sub-Saharan Africa can be interpreted in the context of the very limited role of domestic banks in funding domestic activity, and the financial regulatory frameworks that require banks to hold ample liquid assets and/or government debt, thus leading to the banking system's very limited capacity for rapid credit expansion. However, it may still be argued that the econometric results may reflect the average behavior of the region rather than the behavior of emerging markets and frontier economies.

Real exchange rate. The evidence in table B2.2.1 shows a positive but statistically negligible association between aggregate net financial inflows and the real exchange rate among countries in Sub-Saharan Africa. The different types of financial flows that are more common among low-income and lower-middle-income countries have a significant association with real exchange rates. Greater reserve accumulation is associated with an appreciation of the real exchange rate, and official aid inflows in Africa are associated with a real depreciation of the currency—a finding

BOX 2.2: *Continued*

that is consistent with Mongardini and Rayner (2009). This suggests the deployment of resources to boost productivity in the non-traded sector.

Domestic inflation. Rising IFFs channeled to activity in non-traded sectors may put pressure on wages and prices (if they are not accompanied by productivity gains), thus leading to greater domestic inflation. The regression analysis results in table B2.2.1 fail to provide evidence in support of a significant relationship between international financial flows and inflation. Neither net financial inflows nor the different types of financial flows have a systematic pattern of association with Consumer Price Index inflation.

Fiscal balance. Greater net financial inflows are associated with weaker fiscal balances among countries in Sub-Saharan Africa. Additionally, higher gross debt inflows and higher reserve outflows are associated with widened fiscal deficits. The negative relationship between international financial inflows and fiscal balances might be related to the procyclical access to markets and, hence, procyclical bias of fiscal policies. In the face of ample access to external funding, governments may not restrain spending and may implement fiscal plans that may be not only procyclical, but also nonsustainable (Kaminsky, Reinhart, and Vegh 2005).

TABLE B2.2.1: International Financial Flows and Macro-Financial Risks in Sub-Saharan Africa

	Domestic credit growth		Real exchange rate (% chg)		Domestic inflation		Fiscal balance	
Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Net financial inflows	0.003	..	0.006	..	0.051	..	-0.112***	..
	(0.020)		(0.039)		(0.060)		(0.025)	
Debt inflows	..	0.005	..	0.008	..	-0.025	..	-0.065**
		(0.012)		(0.024)		(0.032)		(0.028)
FDI inflows	..	0.003	..	-0.021	..	0.001	..	-0.021
		(0.007)		(0.048)		(0.007)		(0.017)
Reserve outflows	..	0.024	..	0.089**	..	0.002	..	-0.169***
		(0.046)		(0.035)		(0.090)		(0.034)
ODA	0.031	0.035**	-0.398***	-0.417***	0.074	0.063	-0.106	-0.011
	(0.024)	(0.016)	(0.121)	(0.114)	(0.090)	(0.063)	(0.069)	(0.064)
GDP per capita	-0.014	-0.014	-0.095***	-0.098***	-0.192**	-0.217***	-0.004	0.007
(lagged)	(0.021)	(0.020)	(0.018)	(0.019)	(0.079)	(0.082)	(0.006)	(0.007)
GDP growth	-0.006	0.010	0.022	0.029	-0.470*	-0.605**	0.048	0.052
	(0.033)	(0.044)	(0.064)	(0.064)	(0.247)	(0.277)	(0.055)	(0.059)
Terms of trade growth	-0.041**	-0.040**	-0.023	-0.020	-0.077	-0.090	0.077***	0.074***
	(0.019)	(0.018)	(0.032)	(0.032)	(0.058)	(0.057)	(0.020)	(0.020)
Observations	427	426	1,078	1,067	505	500	1,223	1,209
R-squared	0.189	0.191	0.256	0.260	0.319	0.335	0.375	0.389

Source: Lane 2016.

Note: The regression analysis was conducted for the full sample of Sub-Saharan African countries. Robust standard errors are in parentheses. The regression accounts for time and country fixed effects. The constant is included in the regression but not reported. GDP = gross domestic product; ODA = Official Development Assistance.

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

BOX 2.2: *Continued*

In sum, the econometric evidence does not signal a considerable heightening of macro-financial risks as the outcome of international financial flows to the region:

a. Low responsiveness of credit markets to financial inflows may reflect tight regulation of the banking system or a "bypass" of the financial sector by (domestic and international) investors.

b. Evidence that currencies in Sub-Saharan Africa depreciate when financial aid flows are on the rise may suggest that these flows have been deployed productively.

c. Access to markets (as signaled by greater debt inflows) may relax fiscal discipline and the need to contain expenditure growth (especially in good times), thus weakening the fiscal position.

The absence of immediate risk signals during a specific period does not rule out the emergence of future risk factors, as tranquil periods are typically followed by troubled ones. The further increase in international debt flows—notably, bond flows—to some Sub-Saharan African countries over 2012–18 stresses the need to continue monitoring such risk factors. This requires the collection of better data on the role of international financial flows in the domestic financial systems of countries in the region. To the extent that external debt stocks continue rising (and their associated currency and refinancing risks continue to rise) and/or new domestic risks emerge, policy makers in the region may face greater challenges in the future to maintaining domestic macro-financial stability.

a. The examination of the implications of IFFs to countries in Sub-Saharan Africa involves conducting a regression analysis for a sample of Sub-Saharan African countries with annual data from 2001 to 2012. The dependent variable consists of the following risk factors: (a) change in the ratio of domestic credit to GDP, (b) percentage change in the real exchange rate, (c) domestic rate of inflation, and (d) fiscal balance expressed as a ratio to GDP. The explanatory variables are the scale of official development assistance, log level of GDP per capita (a general development indicator), growth rate of output, and terms of trade. Country and time fixed effects are included in several specifications.

b. FDI inflows are significant for Sub-Saharan Africa when time fixed effects are not taken into account. However, this strand of the literature focuses on the relationship between debt inflows and domestic credit growth, and debt inflows fail to have a significant coefficient in any regression for any Sub-Saharan Africa sample (Lane 2016).

Source: Lane 2016.

Annex 2A. Regression Results

The following tables present the results from the panel estimation of least squares estimates and instrumental variables (IV) estimates to examine the determinants of gross capital inflows. The regression analysis investigates the importance of global vis-à-vis domestic factors in driving gross capital inflows to Sub-Saharan Africa. The IV estimation method instruments gross domestic product (GDP) growth with actual and lagged values of the growth of main trading partners and changes in terms of trade.

The database for the empirical analysis comprises annual information on gross capital inflows for 45 Sub-Saharan African countries from 1980 to 2017. It gathers information for total gross inflows as well as its components, such as foreign direct investment, portfolio investment (PI), and other investment from the International Monetary Fund's (IMF's) Balance of Payments Statistics BPM 6.0. Other foreign financing flows, such as foreign aid and remittance inflows, were collected from the World Bank's World Development Indicators (WDI). The GDP level and growth data were gathered from the WDI. This source was also used to gather information on Consumer Price Index (CPI) inflation (computed as log differences in the CPI). The general government primary balance a percentage of GDP is from the IMF's World Economic Outlook. The exchange rate regime is proxied by the Fine classification of exchange rate regimes developed by Reinhart, and Rogoff (2004) and updated by Ilzetzki, Reinhart and Rogoff (2017). Trade openness is measured as the ratio of exports and imports to GDP from the WDI, and the index of financial openness is taken from Chinn-Ito (2006, 2008). Foreign growth is the trade-weighted GDP growth of main trading partners, and the VIX index measures volatility computed using S&P 500 index options.

TABLE 2A.1: Volatility of Gross Capital Inflows to Developing Countries: By Type of Inflow, 2000–17
(% GDP, weighted average)

Country group	Standard deviation					Number of countries
	Gross capital inflows			Other foreign flows		
	Direct investment	Portfolio investment	Other investment	Foreign aid	Personal remittances	
Sub-Saharan Africa	3.42	1.53	4.12	1.81	1.07	40
By natural resource abundance:						
Non-resource rich	3.83	1.87	3.87	1.39	0.72	29
Resource rich	2.86	1.06	4.46	2.39	1.56	11
- Metals and minerals	3.61	1.82	7.96	6.75	0.44	8
- Oil	2.71	0.91	3.76	1.52	1.79	3
By condition of fragility:						
Fragile	3.07	0.91	6.51	4.62	1.17	14
Nonfragile	3.48	1.63	3.74	1.36	1.06	26
By income level:						
Low income	2.58	1.01	5.80	3.99	1.15	25
Lower-middle income	2.38	0.82	3.77	1.62	1.68	10
Upper-middle income	5.79	3.08	3.14	0.16	0.07	5
Memo:						
Non-SSA developing countries	1.12	1.05	1.86	0.26	0.39	64
- Low income	1.45	0.72	2.69	1.57	2.16	10
- Lower-middle income	1.11	0.65	1.76	0.30	0.36	31
- Upper-middle income	1.14	1.79	1.99	0.11	0.33	23
Selected developing regions						
- Latin America & the Caribbean	1.06	1.71	1.61	0.10	0.34	21
- East Asia & the Pacific	1.03	0.66	1.64	0.12	0.17	11
- South Asia	0.75	0.86	1.59	0.26	0.77	8

Sources: International Monetary Fund Balance of Payments BPM 6.0; World Bank World Development Indicators.

Note: Aggregate figures represent GDP-weighted averages of the standard deviation of the ratio of international financing flows to GDP for the country groups. GDP = gross domestic product; SSA = Sub-Saharan Africa.

TABLE 2A.2: Gross Inflows and Economic Activity: Panel Regression Analysis, 1980–2017 (annual)
Dependent variable: Gross foreign financing inflows (% GDP)

Country group	Gross capital inflows				Other financing flows	
	Aggregate inflows	Direct investment	Portfolio investment	Other investment	Foreign aid	Personal remittances
I. Least squares						
Non-SSA developing	0.4728 **	0.1033 **	0.0136	0.3502 **	-0.0123	0.0309 **
	(0.077)	(0.032)	(0.013)	(0.065)	(0.013)	(0.015)
Sub-Saharan Africa	0.1503 *	0.1645 **	0.0055	-0.0401	0.0033	0.1128 *
	(0.097)	(0.071)	(0.011)	(0.047)	(0.027)	(0.068)
- Non-resource rich	0.0900	0.0125	0.0210	0.0558	0.0947 **	0.1933 *
	(0.204)	(0.145)	(0.023)	(0.089)	(0.043)	(0.103)
- Resource rich	0.1519 **	0.2266 **	0.0013	-0.0826 *	-0.0427	0.0154
	(0.072)	(0.050)	(0.005)	(0.054)	(0.041)	(0.017)
- Nonfragile	0.1397	0.1951 *	0.0067	-0.0624	-0.0461 *	0.1929 **
	(0.130)	(0.102)	(0.016)	(0.053)	(0.029)	(0.101)
- Fragile	0.1937 *	0.0620	0.0026	0.0837	0.1223 **	-0.0329
	(0.109)	(0.045)	(0.007)	(0.099)	(0.062)	(0.025)
II. Instrumental variables						
Non-SSA developing	0.4545 *	0.1972 **	-0.0325	0.3082 *	-0.1004 **	0.0149
	(0.233)	(0.100)	(0.040)	(0.186)	(0.035)	(0.043)
Sub-Saharan Africa	0.8425 **	0.8166 **	0.0059	-0.0221	-0.2110 *	1.0722
	(0.389)	(0.302)	(0.046)	(0.183)	(0.118)	(0.758)
- Non-resource rich	2.5156	0.0052	0.0026	2.0487 *	0.2674	1.7132
	(2.629)	(1.569)	(0.249)	(1.361)	(0.540)	(1.382)
- Resource rich	0.8083 **	0.9823 **	-0.0020	-0.1648	-0.2360 *	0.2278 *
	(0.242)	(0.192)	(0.016)	(0.164)	(0.131)	(0.133)
- Nonfragile	0.8103 *	0.8438 **	0.0114	-0.0434	-0.2918 **	1.1641 *
	(0.427)	(0.341)	(0.052)	(0.171)	(0.098)	(0.637)
- Fragile	2.0680 **	0.5648	0.0552	1.4580 *	0.5143	-0.4599 **
	(1.022)	(0.429)	(0.060)	(0.879)	(0.702)	(0.230)

Note: The table reports the coefficient estimates and standard errors of GDP growth from a regression where the dependent variable is the corresponding gross foreign financing inflow. In addition to GDP growth, the set of explanatory variables includes the terms of trade index (in log differences) and the lagged dependent variable. The regression includes a constant and controls for country and time effects. The instrumental variable estimation accounts for the likely endogeneity of GDP growth. The instruments are (actual and lagged values of) growth of main trading partners and commodity prices. GDP = gross domestic product; SSA = Sub-Saharan Africa.

Significance level: * = 10 percent, ** = 5 percent.

TABLE 2A.3: Gross Inflows and Economic Activity: Country Regressions, 1980–2017 (annual)
Dependent variable: Gross foreign financing inflows (% GDP)
Estimation method: Instrumental variables

Country	Gross capital inflows				Other financing flows	
	Aggregate inflows	Direct investment	Portfolio investment	Other investment	Foreign aid	Personal remittances
Angola	-0.4485	-0.0893	0.0069	-0.3929	-0.1908	0.0063 **
Benin	-1.0382	-0.0393	0.0714	-1.0703	-0.2993	-0.1579
Botswana	-0.0409	0.0375	-0.0042	-0.0743	0.3360 *	0.2120 **
Burkina Faso	3.1989	0.0577	0.0231	3.1181	-0.0009	-0.9321 *
Burundi	0.8797 **	0.0299	0.0004	0.8494 **	-0.4239	-0.1561
Cabo Verde	-0.2282	-0.0703	0.0047	-0.1626	0.8452 *	0.3253 **
Cameroon	0.2069 *	0.1673 **	0.0067	0.0329	-0.1105	0.0248 **
Central African Rep.	0.0732	-0.1141	..	0.0355	0.5659	-0.0003
Chad	0.4422	0.0216	-0.0018 *	0.4224	-0.2592	0.0005
Comoros	-0.9496	0.0241	0.0055	-0.9792	-1.7617	1.8737
Congo, Dem. Rep.	0.1445	0.5488 **	-0.2087	-0.2166	0.5914	0.0355
Congo, Rep.	-0.9751	0.5507	-0.0084	-1.1459	-0.3111	0.0143
Côte d'Ivoire	0.5692	0.1286 *	0.2190 **	0.2216	-0.1148	0.0475 **
Equatorial Guinea	0.8861	0.9442	0.0009 *	-0.0589	-0.1325	0.0004
Ethiopia	0.3995 **	0.2889 *	..	0.1106	0.2982	0.1725 *
Gabon	0.4089	0.7228	0.0107	-0.3247	0.1158	-0.0032
Gambia, The	0.2186	0.2158	0.0728	-0.0700	0.2054	1.2016
Ghana	0.7148 **	0.4747 **	0.1013 *	0.1388	0.3931 **	0.2602 **
Guinea	0.3666	1.2596 **	-0.1578	0.4964	-0.2319	-0.0080
Guinea-Bissau	3.6211	-0.0081	-0.0336	2.1288	0.7835	-0.2814
Kenya	0.7392 *	0.1797	0.1406	0.4189	-0.2068	0.1299
Lesotho	0.1052	-1.4749	-0.0622	1.6424	2.0989	-1.0696
Liberia	-0.8712	2.3890	..	-1.5576	2.4294	-0.8084 *
Madagascar	-1.2514 *	-1.0387 *	0.0001	-0.2128	0.2346	-0.2094
Malawi	-0.9892	-0.2012	0.0066	-0.7946	-0.4950	-0.0169
Mali	0.4226	0.1017	-0.0502	0.3711	0.6213	-0.1041
Mauritania	-2.3704	-1.6413	-0.0016	-0.7275	-0.1865	0.0871
Mauritius	-20.6521	-12.6187	-4.7711	-3.2622	-0.4198	0.0012
Mozambique	-2.4878	0.4584	-0.0295	-0.5736	0.8040	0.0012
Namibia	-0.5453	-0.3282	0.0469	-0.2640	0.0029	-0.0018
Niger	1.3820	0.6493	0.0896	0.3876	-0.1022	0.1000
Nigeria	-0.3950	0.0667	0.0599	-0.5216	0.1244	0.1739
Rwanda	-0.0123	0.0077	-0.0080	-0.0121	0.2697	-0.0157
São Tomé & Príncipe	8.6254	0.5761	0.0090	8.0403	-0.2242	0.6183 *
Senegal	-0.4061	-0.2134	-0.3323	0.1396	1.0883	-1.9342
Seychelles	-0.0679	-0.4472	0.4801	-0.1008	0.0812	-0.0416
Sierra Leone	1.4758 *	0.6120 *	0.0236	0.8402	-0.3528	0.0458
South Africa	0.7632	0.0077	0.4188	0.3367 **	-0.0092	0.0033
Sudan	-1.8449	1.0768	0.0156	-2.9373	-3.3406	0.0283
Eswatini	0.3028	0.3886 **	0.0247	-0.1105	0.1667 **	0.6897 **
Tanzania	-1.4656 **	0.5015 **	0.0040 **	-1.9712 **	-3.7305 **	0.2174 **
Togo	-0.6243	0.0797	0.1799	-0.8839	0.0399	-0.2179
Uganda	1.1358 **	0.4590 **	0.0150	0.6618 **	1.3533 **	0.0403
Zambia	-1.2586	-0.1617	-0.5338 **	-0.5631	-1.6113	-0.0273
Zimbabwe	-0.0721	0.0972 **	0.0707	-0.3279 *	0.1277	0.8968

Note: The table reports the coefficient estimate of GDP growth from a regression where the dependent variable is the corresponding gross foreign financing flows to a specific Sub-Saharan African country. In addition to GDP growth, the set of explanatory variables includes the terms of trade index (in log differences) and the lagged dependent variable. The regression includes a constant and controls for country and time effects. The instrumental variable estimation accounts for the likely endogeneity of GDP growth. The instruments are (actual and lagged values of) growth of main trading partners and commodity prices. GDP = gross domestic product.
Significance level: * = 10 percent, ** = 5 percent level.

TABLE 2A.4: Determinants of Gross Capital Flows, 1980–2017
Dependent variable: Gross capital inflows (ratio to GDP)

Variable	Total inflows 1980-2017 [1]	Direct investment 1980-2017 [2]	Portfolio investment 1980-2017 [3]	Other investment 1980-2017 [4]	Total inflows 1980-99 [5]	Direct investment 1980-99 [6]	Portfolio investment 1980-99 [7]	Other investment 1980-99 [8]	Total inflows 2000-17 [9]	Direct investment 2000-17 [10]	Portfolio investment 2000-17 [11]	Other investment 2000-17 [12]
Domestic factors												
Growth	0.00240***	0.00180***	0.000248	0.000348	0.00134*	0.000706	-1.20e-05	0.000614	0.00236**	0.00172**	0.000383	0.000428
	(0.000786)	(0.000528)	(0.000223)	(0.000449)	(0.000690)	(0.000530)	(0.000315)	(0.000405)	(0.00112)	(0.000747)	(0.000277)	(0.000642)
CPI inflation	0.000195	0.000141	0.000117*	-5.50e-05	0.000436**	0.000218	9.62e-05	0.000128	-0.000112	0.000107	-1.24e-05	-0.000199
	(0.000234)	(0.000159)	(6.71e-05)	(0.000134)	(0.000218)	(0.000167)	(9.94e-05)	(0.000128)	(0.000333)	(0.000227)	(8.43e-05)	(0.000192)
Primary balance	0.000371	-0.000450**	1.24e-05	0.000761***	0.000145	-5.96e-05	-8.40e-05	0.000282**	0.00373***	-0.000795	0.000837**	0.00252***
	(0.000271)	(0.000184)	(7.78e-05)	(0.000156)	(0.000187)	(0.000144)	(8.55e-05)	(0.000110)	(0.00141)	(0.000914)	(0.000338)	(0.000811)
Exchange rate flexibility	-0.000860	-0.00103	-0.00239***	0.00221*	-0.00626*	-0.000274	-0.00579***	-0.000211	0.00418	-0.000371	-0.000130	0.00445**
	(0.00231)	(0.00156)	(0.000660)	(0.00133)	(0.00327)	(0.00251)	(0.00150)	(0.00192)	(0.00348)	(0.00236)	(0.000876)	(0.00201)
External factors												
Trade openness	0.00472	0.00968	0.00617	-0.00811	0.161***	0.0809***	0.0500***	0.0355	-0.0338	-0.00573	-0.0175**	-0.0141
	(0.0194)	(0.0131)	(0.00553)	(0.0111)	(0.0401)	(0.0307)	(0.0183)	(0.0235)	(0.0290)	(0.0197)	(0.00731)	(0.0167)
Financial openness	0.0262***	0.00776*	0.00658***	0.0103***	0.0161**	0.00415	0.00400	0.00665	0.0344***	0.00737	0.00884***	0.0167***
	(0.00646)	(0.00439)	(0.00186)	(0.00371)	(0.00767)	(0.00587)	(0.00349)	(0.00450)	(0.0102)	(0.00696)	(0.00258)	(0.00588)
Foreign growth	0.00368*	0.000793	-0.000477	0.00346***	0.00419	0.00609	-0.00259	0.00123	0.00229	0.000535	-0.00105*	0.00297**
	(0.00205)	(0.00139)	(0.000589)	(0.00118)	(0.00508)	(0.00387)	(0.00231)	(0.00298)	(0.00237)	(0.00162)	(0.000600)	(0.00137)
VIX index	-0.0121	0.0112	-0.000296	-0.0214**	0.0174	0.00370	0.0125	0.00564	-0.0266	0.00482	-0.00863*	-0.0255**
	(0.0147)	(0.00993)	(0.00420)	(0.00845)	(0.0169)	(0.0129)	(0.00765)	(0.00988)	(0.0188)	(0.0127)	(0.00470)	(0.0108)
Constant	0.0885	-0.0300	0.00658	0.0975*	-0.587***	-0.320***	-0.172**	-0.133	0.272*	0.0555	0.120***	0.121
	(0.0998)	(0.0674)	(0.0285)	(0.0573)	(0.155)	(0.118)	(0.0705)	(0.0907)	(0.152)	(0.103)	(0.0382)	(0.0878)
Observations	2,646	2,699	2,704	2,652	538	547	548	538	2,108	2,152	2,156	2,114
R-squared	0.016	0.010	0.016	0.023	0.129	0.051	0.068	0.063	0.019	0.004	0.014	0.023
No. countries	134	136	136	134	83	84	84	83	134	136	136	134

Note: The regression analysis is conducted with annual data from 1980 to 2017. All explanatory variables are lagged one period to ameliorate issues of reverse causality and endogeneity. Robust standard errors are in parentheses.
CPI = Consumer Price Index; GDP = gross domestic product.

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

TABLE 2A.5: Determinants of Gross Total Capital Flows: Quantile Regression Analysis, 1980–2017
Dependent variable: Gross total capital inflows (ratio to GDP)

	Total gross inflows (% GDP)								
Variable	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Domestic factors									
Growth	0.000324	0.000569	0.00132***	0.00152***	0.00175***	0.00212***	0.00226***	0.00213***	0.000988
	(0.000812)	(0.000356)	(0.000308)	(0.000318)	(0.000359)	(0.000393)	(0.000477)	(0.000647)	(0.00119)
CPI inflation	-7.95e-05	7.44e-06	2.66e-05	7.59e-05	0.000130	0.000176	0.000236*	0.000362*	0.000686*
	(0.000241)	(0.000106)	(9.15e-05)	(9.44e-05)	(0.000107)	(0.000117)	(0.000142)	(0.000192)	(0.000355)
Primary balance	0.000520*	0.000417***	0.000557***	0.000649***	0.000687***	0.000715***	0.000407**	0.000552**	0.00121***
	(0.000280)	(0.000123)	(0.000106)	(0.000109)	(0.000124)	(0.000135)	(0.000164)	(0.000223)	(0.000411)
Exchange rate	0.00268	0.00133	0.00119	0.000472	-0.000275	-0.00123	-0.00176	-0.00267	-0.00285
flexibility	(0.00235)	(0.00103)	(0.000891)	(0.000918)	(0.00104)	(0.00114)	(0.00138)	(0.00187)	(0.00345)
External factors									
Trade openness	0.0161	0.0182**	0.0228***	0.0254***	0.0271***	0.0348***	0.0394***	0.0413***	0.0533*
	(0.0195)	(0.00855)	(0.00741)	(0.00764)	(0.00863)	(0.00944)	(0.0115)	(0.0155)	(0.0287)
Financial openness	-0.000131	0.00236	0.00217	0.00320	0.00578**	0.00693**	0.00732*	0.00964*	0.00759
	(0.00659)	(0.00289)	(0.00250)	(0.00258)	(0.00291)	(0.00319)	(0.00387)	(0.00525)	(0.00969)
Foreign growth	0.00282	0.00184**	0.000887	0.000654	0.000942	0.00142	0.00167	0.00167	0.000585
	(0.00212)	(0.000929)	(0.000804)	(0.000829)	(0.000937)	(0.00103)	(0.00125)	(0.00169)	(0.00312)
VIX index	0.00848	0.00407	0.00679	0.00786	0.00712	0.00772	0.00654	0.00386	-0.00257
	(0.0144)	(0.00632)	(0.00547)	(0.00564)	(0.00638)	(0.00698)	(0.00848)	(0.0115)	(0.0212)
Observations	2,740	2,740	2,740	2,740	2,740	2,740	2,740	2,740	2,740

Notes: The regression analysis is conducted with annual data from 1980 to 2017. All explanatory variables are lagged one period to ameliorate issues of reverse causality and endogeneity. Robust standard errors are in parentheses. CPI = Consumer Price Index; GDP = gross domestic product.
**** p < 0.01, ** p < 0.05, * p < 0.1.*

TABLE 2A.6: Determinants of Gross FDI Flows: Quantile Regression Analysis, 1980–2017
Dependent variable: Gross FDI inflows (ratio to GDP)

	Gross FDI inflows								
Variable	**10th**	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
Domestic factors									
Growth	0.000268*	0.000308***	0.000508***	0.000708***	0.000866***	0.000954***	0.00117***	0.00130***	0.00123**
	(0.000147)	(9.35e-05)	(0.000100)	(0.000123)	(0.000107)	(0.000168)	(0.000239)	(0.000419)	(0.000535)
CPI inflation	-7.50e-06	-9.91e-06	-5.56e-06	-5.98e-06	-1.23e-05	-6.66e-06	1.76e-05	8.29e-05	0.000103
	(4.44e-05)	(2.83e-05)	(3.03e-05)	(3.73e-05)	(3.23e-05)	(5.09e-05)	(7.23e-05)	(0.000127)	(0.000162)
Primary balance	0.000158***	0.000183***	0.000215***	0.000158***	0.000267***	0.000182***	0.000276***	0.000706***	0.000644***
	(5.15e-05)	(3.28e-05)	(3.51e-05)	(4.32e-05)	(3.74e-05)	(5.91e-05)	(8.39e-05)	(0.000147)	(0.000188)
Exchange rate	0.000136	6.15e-05	-0.000169	-0.000148	-0.000170	-0.000223	-1.83e-05	2.36e-05	0.000333
flexibility	(0.000430)	(0.000273)	(0.000293)	(0.000361)	(0.000312)	(0.000493)	(0.000700)	(0.00123)	(0.00157)
External factors									
Trade openness	0.00796**	0.00984***	0.0118***	0.0145***	0.0157***	0.0171***	0.0193***	0.0222**	0.0256**
	(0.00358)	(0.00227)	(0.00244)	(0.00300)	(0.00260)	(0.00410)	(0.00582)	(0.0102)	(0.0130)
Financial openness	0.000832	0.00128*	0.00188**	0.00123	0.00159*	0.00175	0.00235	0.00321	0.00423
	(0.00121)	(0.000772)	(0.000827)	(0.00102)	(0.000882)	(0.00139)	(0.00198)	(0.00346)	(0.00442)
Foreign growth	0.000435	0.000289	0.000145	6.54e-05	5.10e-05	4.01e-05	-2.87e-05	-5.63e-05	0.000130
	(0.000389)	(0.000248)	(0.000265)	(0.000327)	(0.000283)	(0.000446)	(0.000634)	(0.00111)	(0.00142)
VIX index	0.00327	0.00347**	0.00449**	0.00530**	0.00525***	0.00472	0.00523	0.00680	0.00537
	(0.00263)	(0.00167)	(0.00179)	(0.00221)	(0.00191)	(0.00302)	(0.00429)	(0.00751)	(0.00959)
Observations	2,796	2,796	2,796	2,796	2,796	2,796	2,796	2,796	2,796

Note: The regression analysis is conducted with annual data from 1980 to 2017. All explanatory variables are lagged one period to ameliorate issues of reverse causality and endogeneity. Robust standard errors are in parentheses. CPI = Consumer Price Index; FDI = foreign direct investment; GDP = gross domestic product.
**** p < 0.01, ** p < 0.05, * p < 0.1.*

Section 3: Boosting Productivity in Sub-Saharan Africa: The Role of Human Capital

3.1 INTRODUCTION

Despite the rapid growth achieved by Sub-Saharan African countries since 1996, the region has made little progress in converging to the standard of living or productivity level of the labor force of industrial economies, notably, the United States. Growth per worker in the region over the past half-century has been driven primarily by factor accumulation—with physical capital growing at a faster pace than human capital—while the contribution of total factor productivity (TFP) growth has been modest.

The large and persistent disparity in labor productivity between Sub-Saharan Africa and the United States was initially attributed to lower relative accumulation of (physical and human) capital, especially from the 1960s to the 1980s. Although gaps in factor accumulation relative to the United States are still important, the gap in the efficiency with which the region combines its factors of production has become increasingly relevant to explain the productivity gap over 2000–14. Inefficiencies in the allocation of resources have become relatively more important than *undercapitalization* in explaining the gaps in labor productivity to the world frontier. This finding points to resource misallocation across producers as a cause of lower labor productivity.

The less than stellar aggregate performance of the region over the past half-century is related to the substantial lag in the structural transformation process. The shift of labor from agriculture into modern activity—say, manufacturing and information technology (IT) and knowledge-based modern services—has been slower than in other developing areas. Several countries in the region still have very large shares of employment in agriculture, while those shares are the smallest among industrial countries. The average agricultural employment share in Sub-Saharan Africa was 31 percent by 2016, with some countries above the 60 percent mark. Countries in the region allocate most of their labor toward agriculture, and the sector's productivity tends to be lower than that of non-agricultural activities.

The low labor productivity of Sub-Saharan Africa is determined by the inefficient allocation of production factors across agricultural farms and manufacturing firms. An efficient allocation of resources is characterized by: (a) greater demand for inputs (capital, labor, and land) by the more productive firms, and (b) an equal amount of output generated by an additional unit of input across production units. Any deviation from this efficient allocation generates lower aggregate output and total factor productivity (TFP). The *misallocation of resources* reflects inefficiencies in land markets, lack of access to finance, insecure property rights, and discretionary government interventions, among others.

The misallocation of resources results from firm-specific distortions affecting the decision-making process of producers with different productivity levels. Inefficiencies in the allocation of resources reflect differences in the marginal products of the different factors of production across producers. For instance, lower manufacturing productivity in the region might be attributed

to firm dynamics that enable the coexistence of many less productive firms with few very productive firms. In Côte d'Ivoire, 90 percent of the manufacturing labor force is employed by small and medium-size manufacturing enterprises. Productivity differences across manufacturing firms are very large, with the most productive firms being 7 times as productive as the least productive ones. Policies that eliminate misallocation (for example, improving access to finance and market contestability) can potentially increase total factor productivity by 31 percent (Cirera, Fattal-Jaef and Maemir 2018). At the same time, the low productivity of agriculture is driven by inefficiencies in the use of inputs across Sub-Saharan African farms rather than by agronomic conditions (such as low soil quality or unfavorable climate). Improving land property rights can help reduce the misallocation of resources (Aragon and Rud 2018).

Inefficiencies in the allocation of resources across agricultural farms and manufacturing firms in Sub-Saharan Africa are linked to policies and institutions that lead to inefficiencies in the allocation of human capital across production units have static and dynamic effects on aggregate output and productivity. From a static perspective, the misallocation of human capital is attributed to policies and institutions that lead to inefficient occupational choices at a point in time, among other mechanisms. Policies and institutions may drive the most talented individuals away from their most productive use. For instance, talented individuals may become rent seekers rather than entrepreneurs; high-productivity entrepreneurs may be unable to join the formal sector; and less productive farmers may not be able to opt out of agriculture and work in non-agricultural activities. Labor market regulations, barriers to human capital investment (such as financial market imperfections), and social norms and their interplay may lead to misallocation of human capital and, hence, lower aggregate output and productivity (Nguimkeu 2015; Castro and Ševčík 2016).

From a dynamic perspective, policies and institutions have larger effects on aggregate output and productivity by changing the productivity distribution through mechanisms that affect further accumulation of human capital, such as technological adoption, learning by doing, and knowledge spillovers, as well as those affecting the entry/exit of firms. Misallocation will likely introduce distortions in producers' decisions to invest in new technologies or methods of production (the technology mechanism) as well as entry and exit decisions (the selection mechanism). The responses through investment and the productivity level of entrant firms, in turn, have an impact on future productivity.

An illustration of the static and dynamic effects of misallocation on productivity is the impact of restrictions on land allocation. From a static point of view, the misallocation of human capital reflects by the inability of less productive farmers to opt for work in higher productivity non-agricultural activities, such as manufacturing and knowledge-based services. From a dynamic perspective, resource misallocation affects agricultural productivity by introducing distortions in decisions that influence the formation of human capital, such as the adoption of new technologies (Chen, Restuccia, and Santaeulalia-Llopis 2017), learning by doing, and knowledge spillovers (Chen and Restuccia 2018). Overall, this section argues that the low levels of human capital compounded by misallocation of resources translate into lower labor productivity.

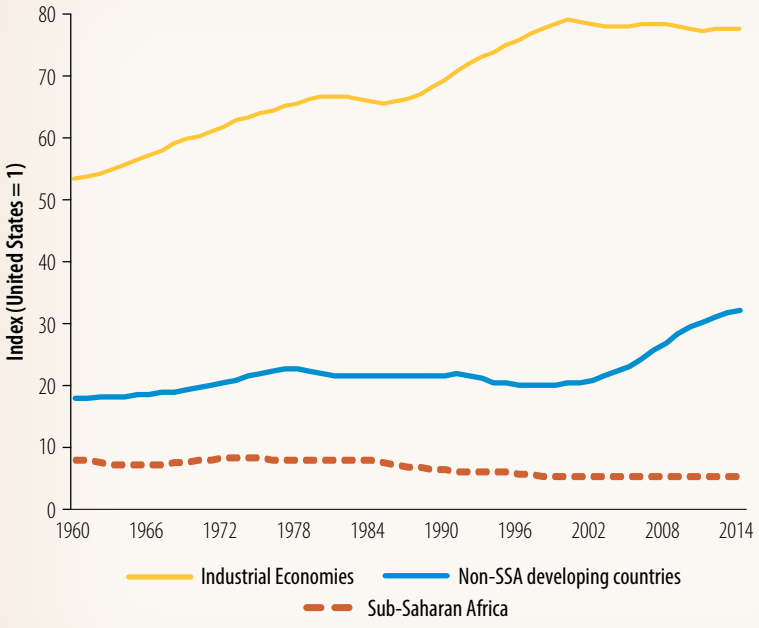
3.2 PRODUCTIVITY TRENDS IN SUB-SAHARAN AFRICA

Over the past two decades, many countries in Sub-Saharan Africa have experienced unprecedented growth at a rate exceeding 5 percent per year. This period, labeled *Africa Rising*, saw broad-based growth that benefitted resource-rich countries, non-resource-rich low-income countries, and some fragile and conflict-affected states. The Africa Rising narrative attributed the region's swift growth to external tailwinds, progress in macroeconomic management, and robust public investment. The favorable external environment was characterized by high commodity prices, the emergence of China as an important trade and investment partner, and massive inflows of foreign capital. On the domestic front, improved macroeconomic frameworks delivered lower inflation and improved countries' resilience to shocks (thanks partly to healthy fiscal and external positions). Furthermore, growth was supported by buoyant domestic demand as (private and public) investment increased in resource-intensive sectors (for example, extractive industries) and non-resource sectors (for example, telecommunications, finance, transportation, real estate, and retail, among others).

Despite the rapid growth exhibited by Sub-Saharan African countries during 1996–2016, they have made meager progress on convergence in standards of living relative to industrial economies, notably, the United States. There is still a considerable gap to catch up: the income per capita of the region as a whole relative to that of the United States was about 6.4 percent in 1960, and it stood at 3.2 percent in 2016. The poor performance in income convergence might be related to the stagnant labor productivity of Sub-Saharan Africa relative to the world technology frontier. Aggregate labor productivity in the region has remained below 10 percent relative to that of the United States over the past half-century (figure 3.1). In contrast, industrial countries and non–Sub-Saharan African developing countries reduced their distance in aggregate labor productivity relative to that of the United States: the relative labor productivity of non–Sub-Saharan African developing countries rose from 17.6 percent in 1960 to 31.7 percent in 2014. The relative labor productivity of industrial economies grew from 53.7 percent in 1960 to 77.8 percent in 2014. The disparity in output per worker of Sub-Saharan Africa with either industrial countries or other

FIGURE 3.1: Aggregate Labor Productivity Relative to the United States, 1960–2014

There are large and persistent disparities in output per worker between Sub-Saharan Africa and the United States



Source: Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015).

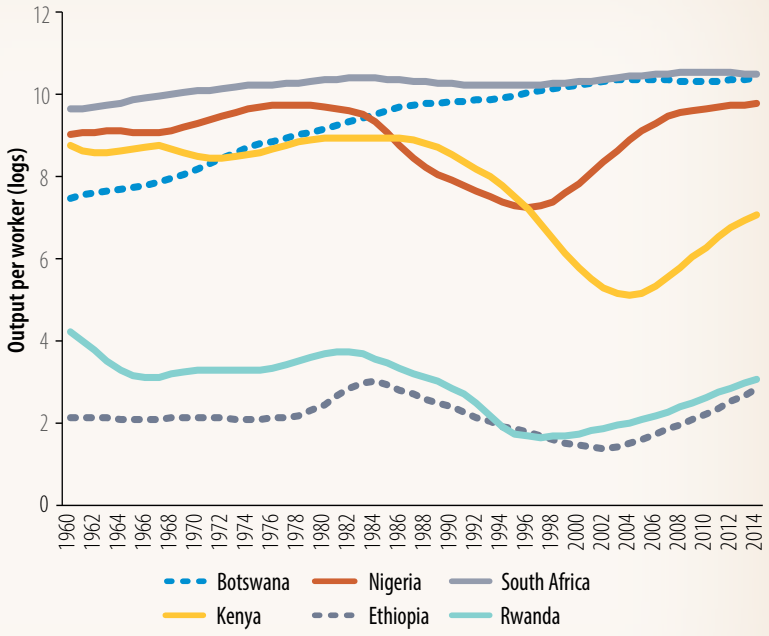
Note: The regional values represent medians of the (country-level data on the) ratio of output per worker relative to the United States. The figure depicts the Hodrick-Prescott trend component of the regional relative labor productivity. SSA = Sub-Saharan Africa.

developing countries is not only persistent, but it also has widened. The inability of Sub-Saharan Africa to gain ground on U.S. labor productivity over the past half-century is the outcome of different productivity growth experiences in the region—in some cases, output per worker not only declined relative to that of the United States, but also in absolute terms.

Most of the countries in the region (29 of 45) experienced a decline in labor productivity relative to that of the United States over the past half-century. Within this group of countries, seven experienced a relative labor productivity drop that exceeded 2.5 percent per year, namely, the Central African Republic, the Democratic Republic of Congo, the Comoros, Guinea, Liberia, Niger, and Zimbabwe. In contrast, about one-third of the countries in the region (16 of 45) experienced an improvement in relative labor productivity during 1970–2015. Two countries in the latter group (Botswana and Equatorial Guinea) registered an average annual rate of growth in relative productivity of more than 3.5 percent.

Growth experiences across countries in the region are heterogeneous

FIGURE 3.2: Productivity Growth Experiences across Selected African Countries



Source: The data on output per worker are from the Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015).

Note: The figure depicts the Hodrick-Prescott trend component of the log of output per worker for selected countries.

Figure 3.2 plots the Hodrick-Prescott trend component of the (absolute level of aggregate) output per worker for selected countries in the region. It illustrates protracted swings of aggregate labor productivity over time, with the magnitude of the downswings and upswings differing across countries. For instance, Kenya's output per worker has resumed growth after a prolonged downswing. Over the past half century, stagnation has prevailed in South Africa, while Botswana made inroads in terms of growth convergence. Finally, fast-growing countries over the past two decades (Ethiopia and Rwanda) are coming from very low levels of aggregate labor productivity.

Development Accounting

The large gap in aggregate labor productivity between Sub-Saharan African countries and the United States—as depicted in figure 3.1—can be attributed to the following: (a) the United States has more factors of production (other than raw labor), or (b) the United States combines these factors of production in a more efficient manner. The importance of each component in explaining the disparities in output per worker of each Sub-Saharan African country (as well as the region) relative to the United States is computed using the development accounting

framework (Klenow and Rodriguez-Clare 1997; Hsieh and Klenow 2010). This framework uses the production function in its intensive form to decompose the distance of the aggregate labor productivity of each African country to the United States (the typical benchmark used in the literature to approximate the production possibility frontier) into two distinct components: the distance to the frontier in terms of the stock of physical and human capital (factor accumulation) and the distance to the frontier in terms of TFP.[1]

The evolution of the gap in factor accumulation in Africa vis-à-vis the United States reveals two trends. First, the region's capital intensity gap relative to that of the United States has been narrowing over time—with the median ratio growing from around 40 percent in the 1960s to about 70-75 percent since 2000. The narrowing gap in capital intensity over time has been experienced by non-resource-rich and resource-rich countries as well as fragile and conflict-affected states, although at a slower pace for non-resource-rich countries. Second, the gap in human capital (an index that captures years of schooling attained) relative to the United States has widened rather than narrowed over the past half-century. Human capital accumulation in Africa was outpaced by that in the United States during the 1960s and 1970s. From the 1980s, relative human capital started growing in the region, as enrollment and years of schooling started to increase gradually. The recovery has not been uniform across countries or country groups in the region—for instance, it has been slow among resource-rich countries.[2]

The development accounting for Sub-Saharan Africa across decades from 1960 to 2014 is presented in figure 3.3.[3] The analysis by decade was conducted to purge cyclical influences on the distance to the frontier of the region relative to the United States. Panel A shows that output per worker in Sub-Saharan Africa was about 12 percent that of the United States in 1960–69 (0.115). This is the product of three components. First, the capital-output of the region is around 42 percent of that in the United States and, due to diminishing returns, the differences in capital intensity that matter for labor productivity are about 0.64. This implies that differences in physical capital lead to a gap of nearly 57 percent in real output per worker between the United States and the region. Second, given the differences in the years of schooling for people over age 15 years and the returns to education, the relative index of human capital is 0.34—that is, human capital in Sub-Saharan Africa was about one-third that in the United States in 1960–69. Third, the implied difference in TFP is then 0.525—that is, processes in the region are approximately half as productive as those in the United States.

In other words, labor productivity in the United States was more than eight times higher than that of Sub-Saharan Africa (8.66). A factor of (1/0.63) x (1/0.35) ≈ 4.55 of this difference is due to differences in the accumulation of inputs of production, and (8.66/4.55) ≈ 1.9 is due to differences in TFP. Hence, the share due to TFP that explains labor productivity disparities is about 30 percent.

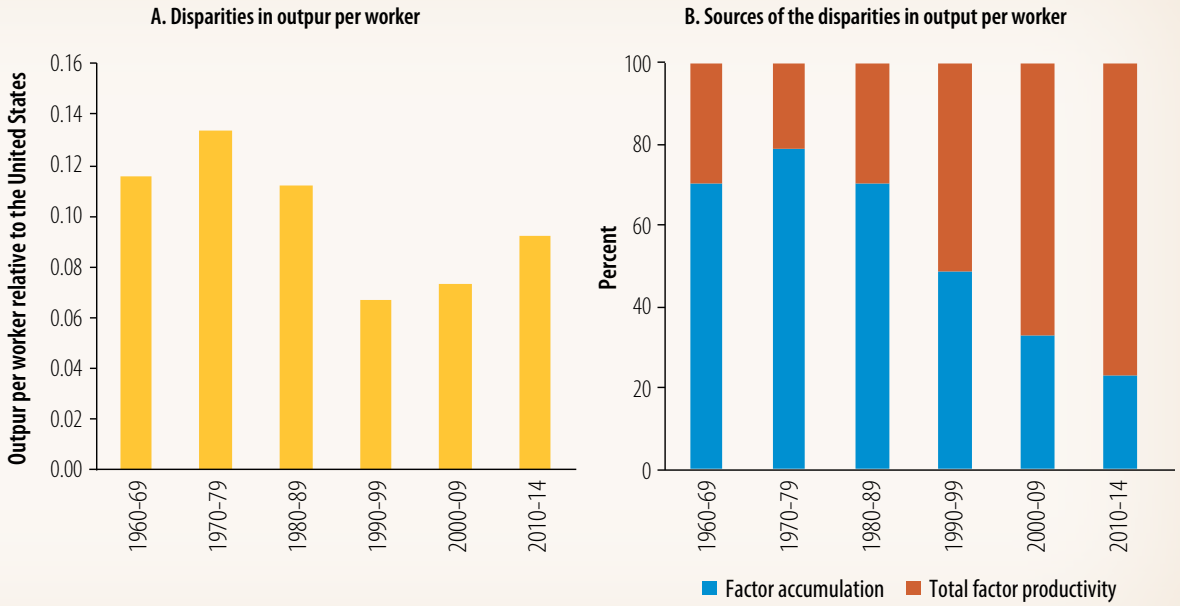
1 The development accounting exercise conducted in this report uses information from the Penn World Tables (PWT) 9.0 on output, employment, physical capital stock, and labor share in income. Instead of using the Human Capital Index reported by the PWT 9.0, the report builds an index based on the relationship between human capital (h) and years of schooling attained (s) for each country i in period t—where the returns to education are heterogeneous across countries. The country estimates for the returns to education are taken from Montenegro and Patrinos (2014). For a country with data on years of schooling but no data on returns, we input the average returns on education of its corresponding region.

2 The recovery and more rapid accumulation of human capital since the 1980s was insufficient to surpass the level of relative human capital exhibited in the 1960s.

3 Development accounting exercises were undertaken for each country and year. Regional development accounting was computed using population-weighted country averages for each year. Annual comparisons across countries/regions may be affected by cyclical factors (such as capacity utilization or labor shirking); hence, averages across decades are calculated to purge these cyclical influences. A cleaner comparison would account for these cyclical factors; however, the data availability of the corresponding proxies is reduced not only at the cross-sectional dimension, but also at the time-series one.

The persistent disparities in output per worker between Sub-Saharan Africa and the United States are increasingly explained by production inefficiencies

FIGURE 3.3: Development Accounting in Sub-Saharan Africa, 1960–2014



Source: The information was collected from Penn World Tables 9.0 (Feenstra, Inklaar and Timmer 2015).

For 2010–14, real output per worker in Sub-Saharan Africa was about 9 percent of that in the United States. The relative gap in the capital-output ratio for Sub-Saharan Africa has narrowed (the relative capital-output ratio increased to 0.77 in 2010–14), while it remains almost invariant in human capital (about 0.32). The implied TFP difference is even larger than in the 1960s: production processes are not even a fifth as efficient in the region as in the United States (0.16). In other words, real output per worker in the United States was about 11 times more productive than that in Sub-Saharan Africa—of which 1.8 parts are due to inputs and 6.1 parts are due to TFP. The (larger) distance to the frontier (United States) is now overwhelmingly explained by differences in TFP, that is, about 77 percent.

There are two emerging findings from the analysis of the drivers of the (widening) gap in aggregate labor productivity between the United States and Sub-Saharan Africa:

(1) Differences in output per worker were mainly driven by a story of undercapitalization in Sub-Saharan Africa from the 1960s to the 1980s—as the lower relative accumulation of (physical and human) capital in the region became the main culprit of the labor productivity gap between Sub-Saharan Africa and the United States.

(2) Gaps in factor accumulation between Sub-Saharan Africa and the United States still play a role in explaining differences in relative output per worker; however, the gap in the efficiency with which the region combines its factors of production—as captured by the share due to TFP—has become increasingly relevant for explaining productivity gaps over 2000–14.

The evolution of relative labor productivity across developing countries is rather different than that of Sub-Saharan Africa. In developing countries outside Sub-Saharan Africa, relative output per worker increased from 0.10 in 1960–69 to 0.21 in 2010–14. The relative capital-

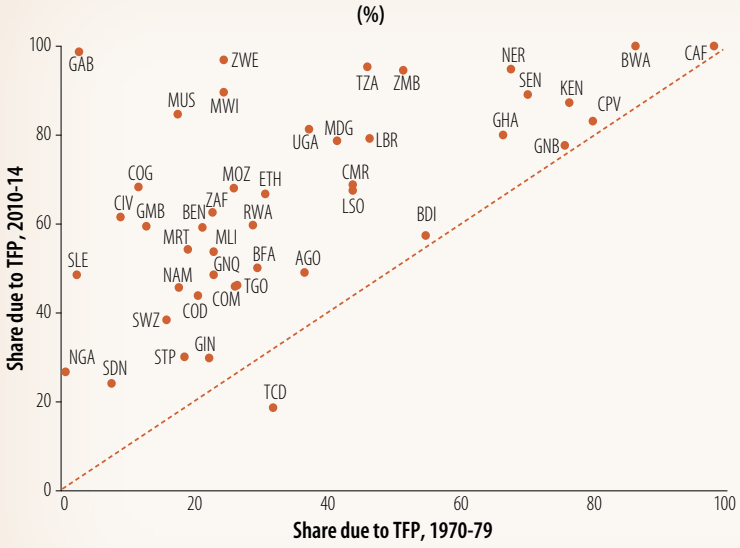
output ratio increased at a faster pace than relative human capital, while the implied difference in TFP was larger in 2010–14 relative to 1960–69. More than half of the labor productivity difference between developing countries and the United States was due to the difference in the accumulation of factors in 1960–69. That story is different for 2010–14: although the output per worker gap narrowed, TFP differences became the main driver of the distance to the frontier.

Looking at the regional aggregate does not account for the heterogeneity of the extent and persistence of the disparities in labor productivity relative to the United States or the performance of the growth of labor productivity across countries in the region. Figure 3.1 shows that most African countries lost ground relative to the United States over 1970–2014. Additionally, the larger and more persistent differences in labor productivity between countries in Sub-Saharan Africa and the United States are increasingly explained by differences in the efficiency of the combination of factors of production given a certain technology.

Figure 3.4 shows that the share of those labor productivity differences explained by production efficiency gaps has increased over time for 43 of 44 countries in the region. The (median of the) share due to TFP for all countries in Sub-Saharan Africa increased from 26 percent in 1970–79 to 65 percent in 2010–14. A closer look at figure 3.4 shows that the *undercapitalization narrative* (that is, lower factor accumulation explaining more than half of the labor productivity disparities) holds for 14 of 44 countries in the region in 2010–14. In contrast, the *inefficiency narrative* (that is, lower relative productivity explains more than half of the labor productivity disparities) holds for the remaining 30 countries in the analysis. For this restricted group of 30 countries, inefficiencies in the combination of factors of production explain about 80 percent of the gap in labor productivity relative to the world technological frontier. These findings imply that the story of inefficiency in the use of the current technology—which could be attributed to, among other things, resource misallocation—is getting more mileage in explaining differences in output per worker in Sub-Saharan Africa.[4]

FIGURE 3.4: Share of Labor Productivity Disparities Due to Lower Relative TFP

For most countries in the region, the share of labor productivity disparities due to lower relative TFP has increased over time



Source: World Bank staff calculations based on data from the Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015).

Note: The figure depicts the contribution of lower relative TFP to the increasing gap in labor productivity between Sub-Saharan African countries and the United States. TFP = total factor productivity.

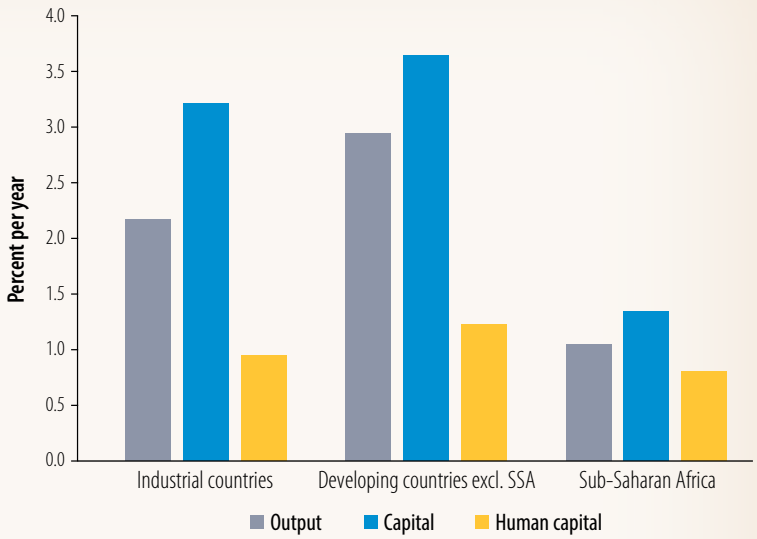
4 Figure 3.4 implicitly shows that labor productivity differences between Sub-Saharan African countries and the United States in 1970–79 were primarily driven by differences in the rate of factor accumulation. Low ratios of capital-output and human capital relative to the United States explain more than half of the differences in output per worker in 34 of 44 Sub-Saharan African countries. The median share of labor productivity differences attributed to factor accumulation is about 75 percent.

Growth Accounting

The sources of growth in Sub-Saharan Africa are calculated by conducting a growth accounting analysis. Figure 3.5 plots the average annual rate of growth per worker of output, physical capital, and human capital for Sub-Saharan Africa, non–Sub-Saharan African developing countries, and industrial economies from 1961 to 2014. On average, the labor productivity of developing countries grew at the fastest pace (2.95 percent per year), while growth per worker in the region was about 1.07 percent per year. Physical capital per worker grew at an annual average growth rate that exceeded 3 percent in industrial and non–Sub-Saharan African developing economies. It grew below 1.5 percent per year in Sub-Saharan Africa. Finally, human capital accumulation among other developing countries outpaced that of Sub-Saharan Africa (1.24 and 0.8 percent per year, respectively).

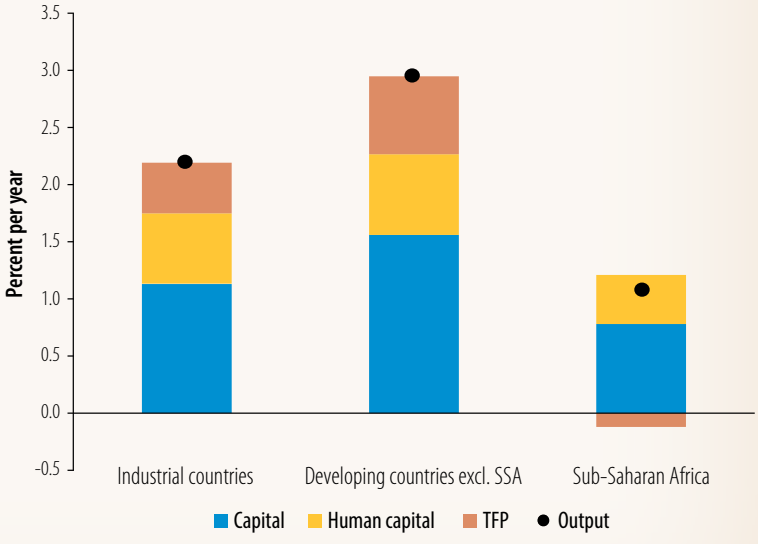
Growth in per capita output and physical and human capital in Sub-Saharan Africa has underperformed relative to the rest of the world

FIGURE 3.5: Growth Rate of Output per Worker and Sources of Growth, 1961–2014



Growth in per capita output in Sub-Saharan Africa is overwhelmingly explained by factor accumulation; the contribution of TFP growth is modest

FIGURE 3.6: Traditional Solow Decomposition, 1961–2014 (% per year)



Source: The data on output, employment, physical capital, and labor share in income are from the Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015).

Note: Regional averages are weighted by population. SSA = Sub-Saharan Africa; TFP = total factor productivity.

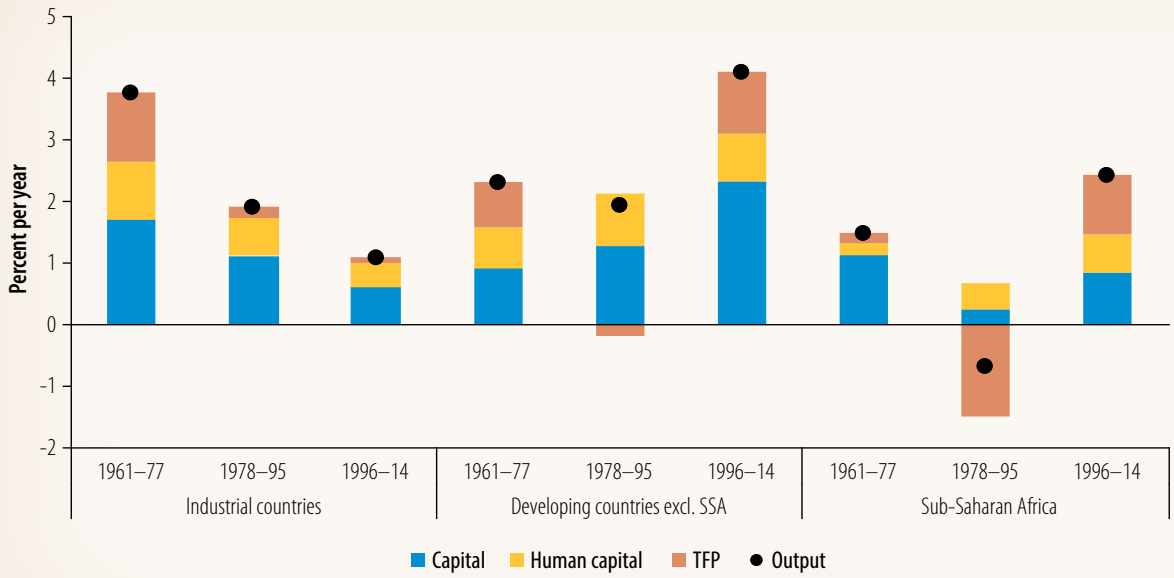
Figure 3.6 depicts the sources of growth for Sub-Saharan Africa and the groups of non–Sub-Saharan African developing countries and industrial economies during 1961–2014. On the one hand, about half of the growth among industrial and non–Sub-Saharan African developing countries has been driven by the accumulation of physical capital. On the other hand, the contributions of human capital and TFP were about 25 and 20 percent, respectively, for both groups

of countries. In contrast, the growth narrative of Sub-Saharan Africa from 1961 to 2014 is overwhelmingly driven by physical capital accumulation (about three-fourths of growth), while the contribution of TFP is negligible.

A closer look at the evolution of labor productivity growth in Sub-Saharan Africa over the past 50 years shows that there were three distinct periods (Hostland and Giugale 2013): (a) a period of positive growth per capita from 1961 to 1977, bolstered by favorable oil prices despite the post-1973 global volatility; (b) a contractionary labor productivity period characterized by macroeconomic instability and negative external shocks; and (c) a growth expansion from 1996 to 2014 amid a favorable external environment (commodity price boom and ample capital inflows) and improved macroeconomic frameworks and adequate (policy and liquidity) buffers built during the years of expansion, which allowed some countries to formulate policies to withstand the unprecedented 2008–09 external shock.

Figure 3.7 reports the decomposition of growth for industrial countries, non–Sub-Saharan African developing countries, and Sub-Saharan African countries across the subperiods 1961–77, 1978–95, and 1996–2014. Labor productivity growth among industrial economies has declined monotonically over time along with the contribution of TFP—which explains no more than 10 percent of growth in 1996–2014. Growth per worker among developing countries decelerated in 1978–95 to 1.9 percent per year (down from 2.4 percent in 1961–77) and rebounded in 1996–2014 (4.1 percent per year). The contribution to this growth acceleration was mainly attributed to physical capital accumulation (which accounted for 2.4 percent per year) and, to a lesser extent,

FIGURE 3.7: Growth Decomposition, 1961–2014: By Subperiod



Growth in per capita output in Sub-Saharan Africa accelerated over 1996–2014, and TFP made a significant contribution

Source: The data on output, employment, physical capital, and labor share in income are from the Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015).
Note: Regional averages are weighted by population. SSA = Sub-Saharan Africa; TFP = total factor productivity.

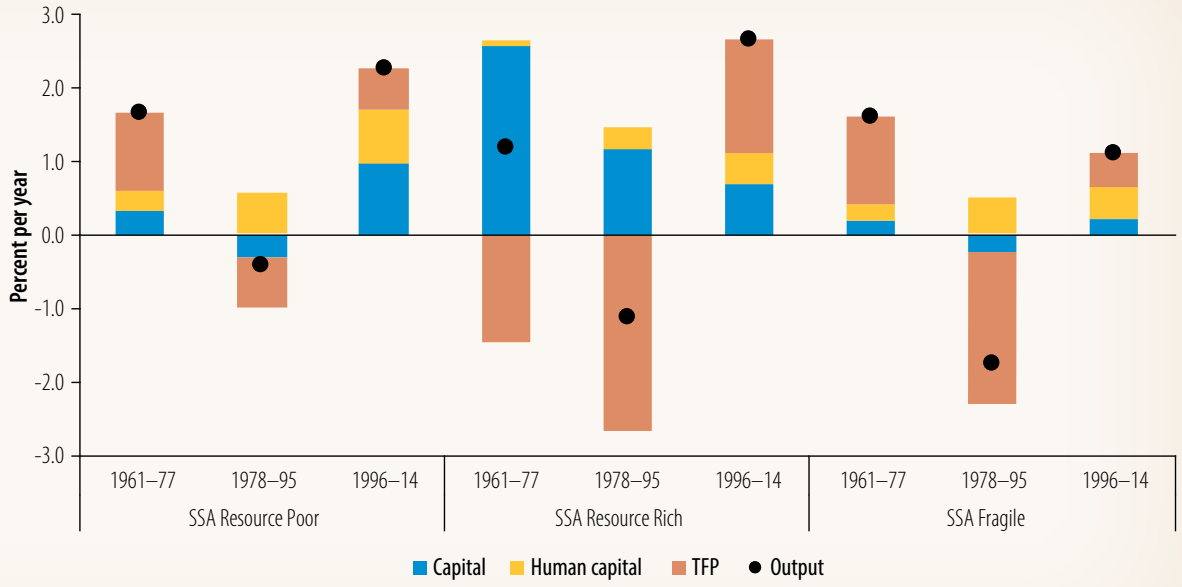
TFP growth (explaining about 1 percent per year). Factor accumulation plays a large role in explaining economic growth in Sub-Saharan Africa across the subperiods. In 1996–2014, growth per worker in the region recovered to 2.4 percent per year (up from -0.7 percent per year in 1978–95). About 40 percent of Sub-Saharan African growth in 1996–2014 was attributed to TFP growth—as opposed to 60 percent attributed to factor accumulation. The contribution of TFP growth in Sub-Saharan Africa over the past two decades was comparable to that of non–Sub-Saharan African developing countries and greater than that of industrial economies.

Figure 3.8 plots the growth decomposition across subperiods for country groups in Sub-Saharan Africa classified by their extent of natural resource abundance and condition of fragility.[5] The rebound in the growth of labor productivity in Sub-Saharan Africa over the past two decades is observed among non-resource-rich and resource-rich as well as fragile countries. The pick-up in growth per worker came along with an acceleration in TFP growth for all country groups. For instance, the average annual growth per worker of non-resource-rich countries jumped from -0.4 percent in 1978–95 to 2.3 percent in 1996–2014 (with annual TFP growth accelerating from -0.7 to 0.6 percent in the aforementioned periods). TFP contributed positively to growth per worker in all country groups: its relative contribution is 25 percent for non-resource-rich countries, 58 percent for resource-rich countries, and 40 percent for fragile countries.[6]

Accounting for natural resource wealth in economic performance has been generally ignored in the empirical literature. The inclusion of natural capital as an input of production changes the

Growth in per capita output picked up in 1996–2014 across different country groups in the region, especially among resource-rich and non-resource-rich countries

FIGURE 3.8: Growth Decomposition for Country Groups in Sub-Saharan Africa, 1961–2014: By Subperiod



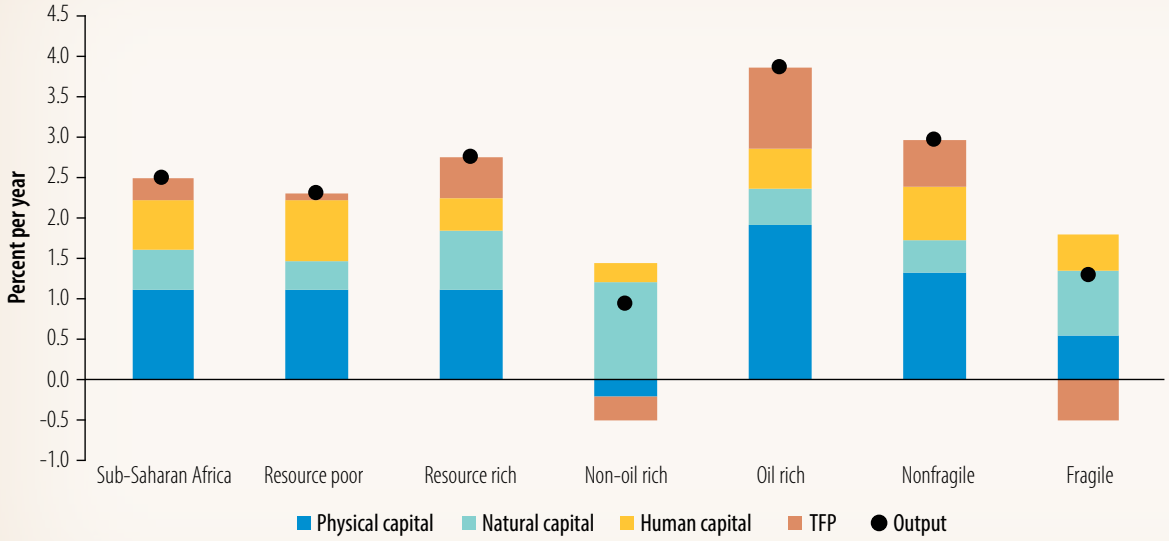
Source: The data on output, employment, physical capital, and labor share in income are from the Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015).
Note: Regional averages are weighted by population. SSA = Sub-Saharan Africa; TFP = total factor productivity.

5 In this report, resource-rich countries are those with rents from natural resources (excluding forests) that exceed 10 percent of GDP—that is, the sum of oil rents, natural gas rents, coal rents (hard and soft), and mineral rents should exceed 10 percent of GDP over the past decade. Estimates of natural resource rents are based on Lange, Wodon, and Carey (2018). Fragile and conflict-affected states are defined as countries having a harmonized Country Policy and Institutional Assessment rating of 3.2 or less, or the presence of a United Nations and/or regional peace-keeping or peace-building mission during the past three years.

6 The contribution of TFP might be overstated in the case of resource-rich countries, as we do not control for the accumulation of natural wealth. This issue will be addressed later.

measurement of TFP growth and its relative importance among the different sources of growth.[7] Figure 3.9 presents a Solow decomposition accounting for the role of natural capital across different country groups in the region. In turn, natural capital is approximated by estimates of the stock of extractive industries (energy, metals, and minerals) in Lange, Wodon, and Carey (2018). As expected, the contribution of natural capital is greater among resource-rich countries than among non-resource-rich countries.

FIGURE 3.9: Growth Decomposition across Country Groups in Sub-Saharan Africa, 1996–2014: Accounting for Natural Capital



Natural capital contributed significantly to growth in 1996–2014, especially among countries abundant in minerals and metals

Sources: The data on output, employment, physical capital, and labor share in income are from the Penn World Tables 9.0 (Feenstra, Inklaar, and Timmer 2015). The data on natural capital are from Lange, Wodon, and Carey 2018.

Note: Regional averages are weighted by population. TFP = total factor productivity.

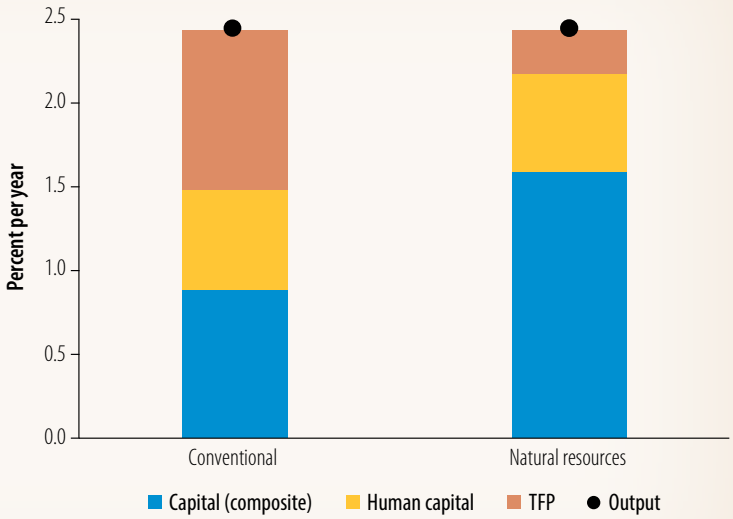
During 1996–2014, resource-rich countries grew at an annual average rate of 2.75 percent, and natural capital explains about one-third of their growth per worker. For oil-rich countries in the region, the joint contribution of physical and natural capital to growth per worker was 61 percent (1.92 and 0.44 percent per year, respectively). Interestingly, natural capital was the main driver of growth per worker in non-oil-rich countries, and its contribution was about 1.21 percent per year; however, the contribution of TFP was detrimental, indicating inefficiencies in the combination of inputs by this group of countries. Natural capital explains more than 60 percent of the growth per worker among fragile countries in the region (approximately 0.8 percent per year).

The measurement of TFP could be biased if we do not account for the role of natural resources in the economy. Figure 3.10 compares the growth decomposition accounting for natural resources with the traditional Solow decomposition. To make the comparison, the sample of countries is constant (37) across the different methodologies. The figure depicts the contribution of a *composite* capital good that includes physical and natural capital. Growth per worker across 37 countries in

7 The depletion of natural capital leads to higher economic growth in the short term, and it will be sustainable over a longer horizon to the extent that the revenues from natural capital depletion are used, at least partly, to build reproducible capital.

The contribution of TFP growth is overestimated if the analysis does not account for natural capital in resource-rich countries

FIGURE 3.10: Growth Decomposition in Sub-Saharan Africa, 1996–2014: Comparing Methodologies



Sources: The data on output, employment, physical capital, and labor share in income are from the Penn World Tables 9.0 (Feenstra, Inklaar and Timmer 2015). The data on natural capital are from Lange, Wodon and Carey 2018.

Note: Regional averages are weighted by population. TFP = total factor productivity.

the region with natural capital information was 2.43 percent per year during 1996–2014. The first column in the figure shows that growth of physical capital (0.88 percent per year) accounted for 36 percent of growth in output per worker, whereas TFP (0.95 percent per year) accounted for 39 percent. The second column depicts the growth decomposition that accounts for natural capital. The composite capital good (physical and natural capital) contributes 1.58 percent per year (65 percent of growth per worker), while TFP grows at an annual rate of 0.25 percent (thus explaining only 10 percent of growth per worker). In sum, when accounting for natural capital, the contribution of TFP to growth is reduced by approximately 70 basis points per year.

3.3 SECTORAL STRUCTURE AND LONG-TERM PRODUCTIVITY GROWTH

Sustained long-term productivity growth has been attained by countries that experienced a structural transformation process characterized by declining labor (or hours worked) in agriculture over time, a rising share of labor (or hours worked) in services, and a hump-shaped share of labor (or hours worked) in manufacturing—that is, increasing (declining) for countries at early (later) stages of development (Duarte and Restuccia 2010; Herrendorf, Rogerson, and Valentinyi 2014).

Along their corresponding development paths, countries that managed to lift themselves from poverty and reach upper-middle-income and high-income status were able to diversify away from agriculture and other traditional sectors. The shift of labor from agriculture into modern economic activity—say, manufacturing and IT and knowledge-based modern services—was accompanied by sustained productivity growth and an expansion of incomes.

The process of structural transformation has taken place at different moments and different speeds across countries in the world. In some countries—notably, those in Sub-Saharan Africa—there has been a substantial lag in the structural transformation process. Specifically, an important number of countries in the region still have very large shares of employment in agriculture, while those shares are the smallest among industrial countries.

Sectoral Employment and Structural Transformation

Figure 3.11 documents the evolution of the employment share for four regions in the world (Sub-Saharan Africa, less developed countries, emerging market economies, and industrial countries) across five sectors of economic activity (agriculture, manufacturing, non-manufacturing, market services, and non-market services).[8] The figure corroborates the finding that agriculture is still important across countries in Sub-Saharan Africa.

The (weighted) average employment share in agriculture for Sub-Saharan Africa was about 40 percent in 1990—higher than the shares in less developed countries (30 percent), emerging market economies (34 percent), and industrial economies (5 percent). The agricultural employment share for the region declined to 31 percent by 2016; however, it is still substantially higher than the other comparator groups (for instance, 19 percent for emerging markets and 2 percent for industrial economies). Despite this reduction, the regional average masks the wide heterogeneity in agricultural employment shares across countries in Sub-Saharan Africa in 2016. The percentage of workers devoted to agricultural activities remains above 60 percent for 12 (of 28) countries in the region, namely, Cameroon, Mali, Rwanda, Eswatini, Uganda, Madagascar, Mozambique, Niger, Nigeria, Malawi, the Central African Republic, and Burundi. The employment share in agriculture is considerably higher in countries with low levels of development and, hence, lower relative labor productivity.[9]

The manufacturing employment share remains low in Sub-Saharan Africa and declined slightly from 10.3 percent in 1990 to 8.4 percent in 2016. In 10 (of 28) countries in the region, the manufacturing employment share was below 5 percent by 2016 (Mozambique, Botswana, Angola, Burundi, Rwanda, Sierra Leone, Gabon, Mali, Uganda, and Zambia).[10] The manufacturing employment share has declined at the fastest pace among industrial economies (from 21 percent in 1990 to 12 percent in 2016).

An additional feature of the structural transformation process in Sub-Saharan Africa is the rapid increase in the share of employment in market services: it grew from 23 percent in 1990 to 33 percent in 2016.[11] The market services employment share also increased over the past 25 years in other benchmark groups: it grew at a similar pace among emerging markets and less developed countries and a slower pace among industrial economies. In 2016, one-third of the labor force worked in market services across emerging market and less developed countries, while that proportion was about 42 percent among industrial countries.[12]

8 The sectoral analysis is conducted over a sample of 28 Sub-Saharan African countries from 1990 to 2016: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, the Central African Republic, the Democratic Republic of Congo, Gabon, The Gambia, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sierra Leone, South Africa, Eswatini, Togo, Uganda, and Zambia. Furthermore, economic activity is classified into five sectors from a larger nomenclature of sectors. For instance, the non-manufacturing sector includes mining, utilities, and construction, while market services comprise wholesale, retail trade, restaurants and hotels, transport, storage, and communications.

9 Restuccia, Yang, and Zhu (2008) find that not only do poorer countries tend to have most of their workers in agriculture, but also agriculture is the least productive sector.

10 The declining share of manufacturing employment is not an exclusive feature of Sub-Saharan Africa. It is also taking place among emerging market economies and industrial countries. However, those countries' share of employment in manufacturing in 2016 was still higher than that of Sub-Saharan Africa; that is, 15 percent for emerging economies and 12 percent for industrial countries.

11 There is a great deal of country heterogeneity in the share of employment in market services: three countries have a share below 10 percent (Burundi, the Central African Republic, and Malawi), while three countries have a share that exceeds 40 percent (Mauritius, South Africa, and The Gambia).

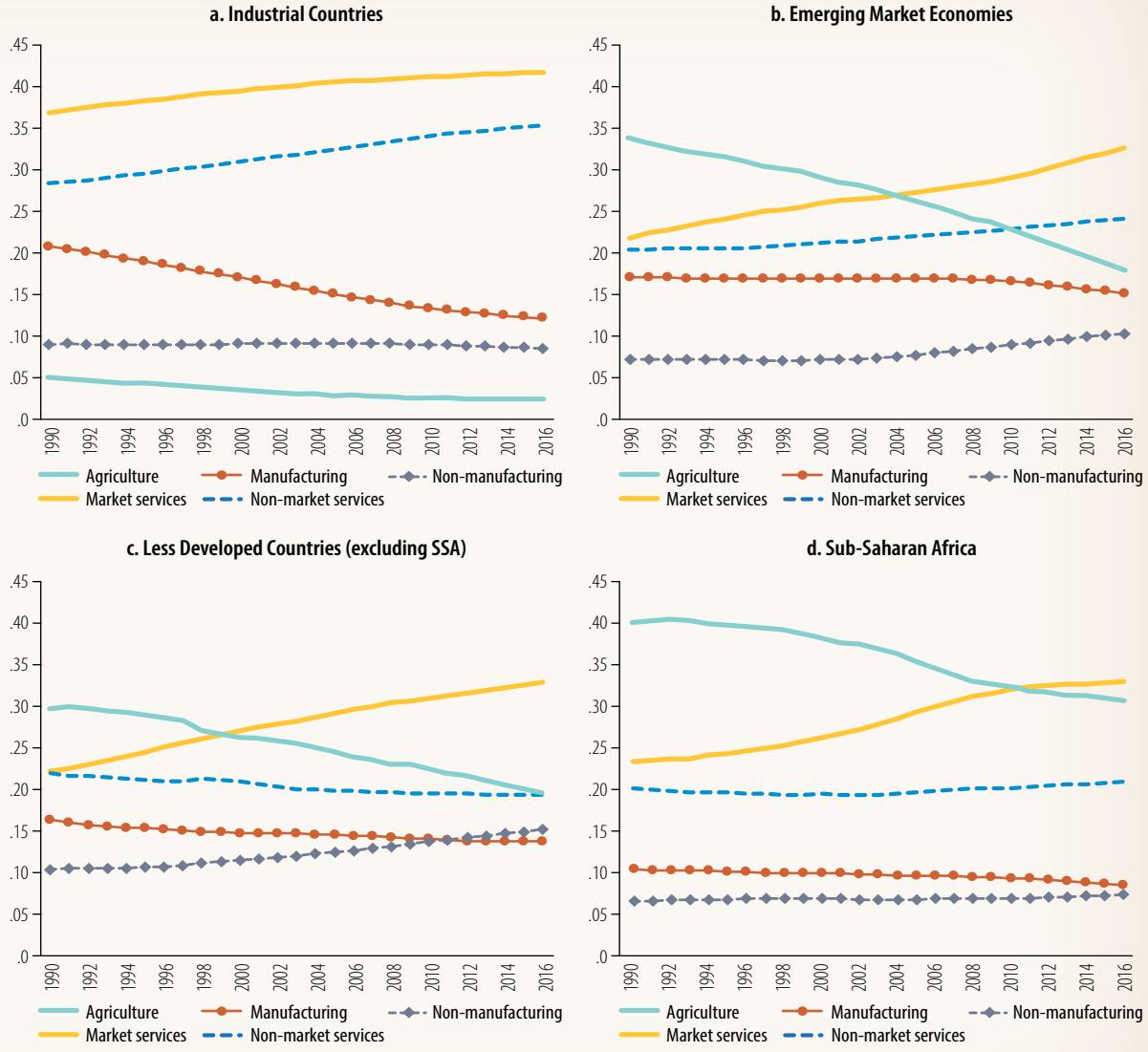
12 The shares of employment in non-manufacturing activities as well as non-market services in Sub-Saharan Africa have remained almost invariant over the past quarter-century. By 2016, the shares of employment in non-manufacturing and non-market services in the region were 7 and 21 percent, respectively.

Sub-Saharan Africa lags in the structural transformation process

The share of agricultural employment in the region is relatively high compared with other world regions

Labor has shifted from agricluture to market services and, to a lesser extent, non-market services

FIGURE 3.11: Sectoral Employment Shares, 1990–2016: Sub-Saharan Africa vis-à-vis the World



Source: Barrot-Araya, Calderon, and Serven 2018.
Note: Regional sectoral labor shares are gross domestic product–weighted averages of country sectoral labor shares. SSA = Sub-Saharan Africa.

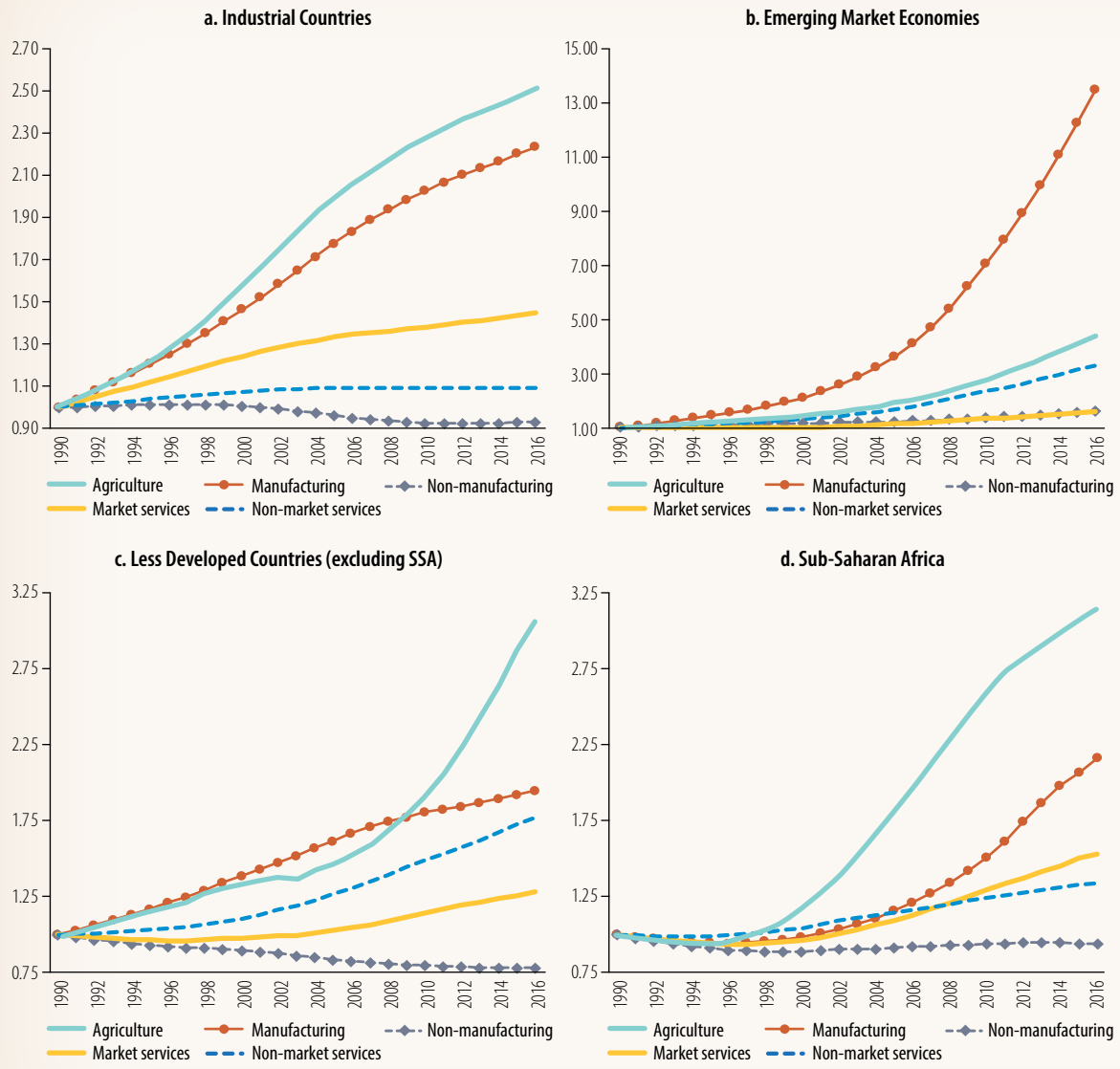
Labor Productivity Growth across Sectors of Economic Activity

This section has documented so far that aggregate (absolute and relative) labor productivity across Sub-Saharan African countries exhibits long and protracted swings at frequencies beyond the business cycle, as shown in figure 3.3. This finding is the outcome of large swings in sectoral labor productivity over time for most Sub-Saharan African countries (Duarte and Restuccia 2018). Figure 3.12 plots the cumulative labor productivity growth in agriculture, manufacturing, non-manufacturing, market services, and non-market services for Sub-Saharan Africa vis-à-vis other regions of the world (less developed countries, emerging market economies, and industrial countries).[13]

13 Duarte and Restuccia (2018) plot labor productivity in agriculture, industry, and services (normalized to one in 1970) for the 11 Sub-Saharan African countries in their sample and the United States. While sectoral productivity growth has been fairly stable over time in the United States, in most African countries there have been large swings in productivity over time (for instance, Botswana or Malawi). These low-frequency swings in sectoral labor productivity are not reflected in the same variability of employment shares across sectors, which suggests a role for frictions in sectoral employment or measurement issues in the data.

FIGURE 3.12: Sectoral Labor Productivity: Sub-Saharan Africa and the Rest of the World

(index, 1990 = 1.0)



Agricultural labor productivity in Sub-Saharan Africa has increased at a faster pace since the mid-1990s

Source: Barrot-Araya, Calderon, and Serven 2018.

Note: The figure plots the cumulative labor productivity growth index across agriculture, manufacturing, non-manufacturing, market services, and non-market services (normalized to one in 1990). Regional sectoral cumulative labor productivity growth is computed as the gross domestic product–weighted average of the country indexes of sectoral cumulative labor productivity growth. SSA = Sub-Saharan Africa.

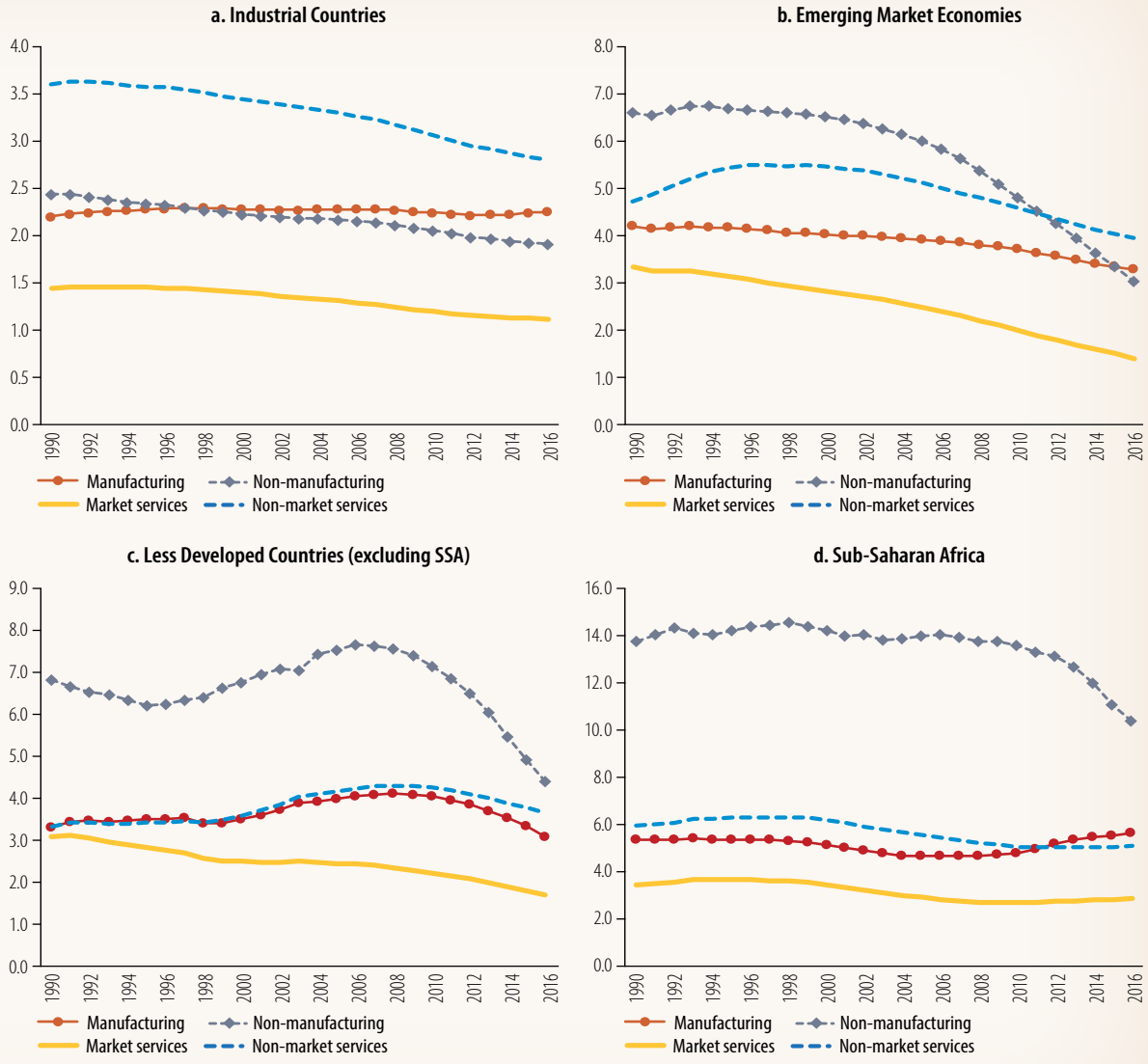
Labor productivity experienced a sharp upswing in agriculture and manufacturing (4.5 and 3 percent per year, respectively) in Sub-Saharan Africa during 1990–2016. This implies that labor productivity in agriculture tripled over the past 25 years, while that of manufacturing doubled. Labor productivity growth in market and non-market services was not as dynamic, registering annual average growth rates of 1.6 and 1.1 percent, respectively. Non-manufacturing labor productivity growth contracted during 1990–2016. The findings for the region are consistent with those of Duarte and Restuccia (2018); that is, the productivity performance of most countries in Sub-Saharan Africa has improved since the second half of the 1990s. The best performance over the past quarter-century in agricultural and manufacturing productivity was

exhibited by emerging market economies, at average annual rates of 5.8 and 10.5 percent, respectively. During this period, labor productivity in agriculture and manufacturing for emerging market economies increased five- and 10-fold, respectively.

Multisector growth models with free labor mobility across sectors and perfectly competitive markets predicted the equalization of (the nominal) value added per worker across sectors—when there are no differences in sectoral factor intensities (Duarte and Restuccia 2018). Figure 3.13 reports the (nominal) value added per worker in manufacturing, non-manufacturing, market services, and non-market services relative to the (nominal) value added per worker in agriculture.[14] The labor productivity ratio of the different non-agricultural activities to that of agriculture was greater than one among advanced economies in 1990 and has been declining

Despite faster growth, the relative productivity of agriculture in Sub-Saharan Africa remains below that of non-agriculture sectors

FIGURE 3.13: Sectoral Labor Productivity Relative to Agriculture: Sub-Saharan Africa and the Rest of the World



Source: Barrot-Araya, Calderon, and Serven 2018.
Note: Regional sectoral labor productivity figures are gross domestic product–weighted averages of country sectoral labor productivity relative to agriculture.

14 Nominal figures are expressed in US$ at current prices.

gradually over time across all sectors except manufacturing. In the case of market services, labor productivity was comparable to that of agriculture by 2016 (with a ratio of 1.1).

The ratio of sectoral labor productivity of non-agricultural activities to that of agriculture in Sub-Saharan Africa is quite different from unity and tends to vary substantially over time. For the region, the (nominal) value added per worker of all non-agricultural activities is greater than that of agriculture. By 2016, labor productivity (in nominal terms) relative to that of agriculture in Sub-Saharan Africa fluctuated from 2.9 in market services to 10.4 in non-manufacturing. Additionally, labor productivity in manufacturing was more than five times as large as that in agriculture.

3.4 RESOURCE MISALLOCATION IN SUB-SAHARAN AFRICA: MICROECONOMIC EVIDENCE

The evidence so far shows that there are large and persistent differences in output per worker across countries, and that an important source of these differences can be attributed to differences in TFP. What accounts for the cross-country differences in TFP? Why would the TFP of individual firms in a country be lower than the TFP of their counterparts in another country?

This section argues that the low labor productivity of developing countries—and, notably, Sub-Saharan African countries—is attributed to the fact that factors of production are not allocated to their most efficient use across individual production units (agricultural farms or manufacturing firms). This so-called *misallocation of resources* might reflect market frictions (say, inefficient credit and land markets), lack of enforcement of property rights, discretionary government interventions, or statutory provisions, among others (Restuccia and Rogerson 2017).[15]

In the efficient allocation, the amount of output produced by an additional unit of the factor of production (say, capital, labor or land) is equal across all operating producers (say, agricultural farmers or manufacturing firms). More productive operating producers demand more inputs (say, capital, labor, or land) and they are larger in size. There are no output gains from factor reallocation in this output-maximizing equilibrium. Any deviation from this efficient allocation will generate lower aggregate output. Given a constant aggregate endowment of factors of production, the output loss associated with an inefficient allocation leads to an aggregate TFP loss. Therefore, policies and institutions that introduce distortions in the decision-making process of operating producers in the economy will lower output and, hence, lower aggregate TFP.

Resource Misallocation in Agriculture

The aggregate and sectoral analysis presented so far shows that: (a) there are large and persistent differences in real output per worker across countries (Hsieh and Klenow 2010; Restuccia 2011; Jones 2016); (b) agricultural productivity in poorer countries tends to be lower than that of non-agricultural activities compared with richer countries (Gollin, Parente, and Rogerson 2002; Restuccia, Yang, and Zhu 2008; Adamopoulos and Restuccia 2014); and (c) poorer countries tend to allocate most of their labor to agriculture (Duarte and Restuccia 2010, 2018; Herrendorf, Rogerson, and Valentinyi 2014). These three findings highlight the important role played by

15 Another strand of the literature argues that the low productivity of developing countries could be attributed to differences in the ability to adopt more efficient technologies (Aghion and Howitt 1992; Parente and Prescott 1994). In other words, the diffusion of frontier technologies and best practices in developing countries—and, notably, Sub-Saharan Africa—can be quite slow.

agriculture in understanding the large disparities in labor productivity across countries. A question that emerges is: why is labor productivity in agriculture so low in poorer countries—and, notably, in Sub-Saharan Africa?

The lower productivity of agriculture among low-income and lower-middle-income countries can be accounted by two different factors (Adamopoulos and Restuccia 2018): (a) an inadequate endowment of resources—as captured by low soil quality and an unfavorable climate (excessively volatile temperatures and amount of rainfall)—and (b) greater inefficiency in the use of these resources. There is evidence that *actual* aggregate yields vary systematically with the level of development. For example, the average yield among the richest countries is 3.1 times higher than that of the poorest countries. However, differences in *potential yield* are not systematically associated with the level of development (Adamopoulos and Restuccia 2018).

There would be larger productivity gains in agriculture for Sub-Saharan African countries if farmers narrowed their actual-potential yield gaps.[16] How much would aggregate agricultural output change if the actual yields were changed to the potential yields under various scenarios (holding constant their crop choices)? Sinha and Xi (2018) conduct a counterfactual exercise on the productivity gains of closing the actual versus potential yield gap under three scenarios: (a) low input use and rainfed cultivation, (b) high input use under rainfed cultivation, and (c) high input usage under irrigated cultivation. Table 3.1 presents the results from this counterfactual analysis.

Under the low input use and rainfed cultivation scenario (the least productive scenario), actual output is higher than potential output for the Democratic Republic of Congo and Nigeria. This finding suggests that, on aggregate, these countries have moved beyond the least productive scenario. The three remaining countries under analysis (Ethiopia, Kenya, and Tanzania) can gain by closing the actual-potential yield gap even at the least sophisticated level of cultivation. These gains are not negligible for any of these countries—with output increasing by nearly half for Tanzania. Agricultural output gains are higher as the cultivation scenarios become more advanced; however, there is a great deal of variation in gains across countries. Agricultural output nearly doubles under the high input use scenario for the Democratic Republic of Congo. These gains are much smaller compared with those in other countries in Sub-Saharan Africa: output increases in Ethiopia, Kenya, and Tanzania exceed 300 percent under the high-input scenario.

The counterfactual analysis presented in table 3.1 also sheds some light on the relative importance of irrigation vis-à-vis input use in explaining improvement in agricultural output. The finding that emerges from this table is that irrigation plays a limited role after farmers have shifted to high input usage. For instance, moving from low to high input usage—and holding constant the rainfed cultivation method—is associated with output gains of seven to 11 times for Ethiopia, Kenya, and Tanzania. Moving further up by using irrigation methods delivers much lower gains. The marginal benefits in aggregate output range from a meager 14 percent of actual output (Democratic Republic of Congo) to 95 percent (Tanzania). In sum, the lower agricultural

16 Sinha and Xi (2018) use plot-level data on actual and potential yields and actual crop choices to measure aggregate gains in agricultural productivity for five large Sub-Saharan African countries. These data were collected from the Global Agronomic Ecological Zones (GAEZ) database, which contains geographically-gridded data on actual crop yields for more than 15 different crops, including cereal crops (wheat, rice), sugar crops (sugarcane, sorghum), and oil crops (soybean, groundnut), among others. The GAEZ data also provide information on potential crop yields at the grid level under different scenarios. These scenarios, in turn, map to the agricultural practice being adopted at the farm level, the use of intermediates in production, and the nature of the water supply. The five Sub-Saharan African countries under consideration (Democratic Republic of Congo, Ethiopia, Kenya, Nigeria, and Tanzania) account together for just under half of the total population of the region. Additionally, agriculture is an important activity for employment and value added in all these countries. Another source of productivity gains involves changing the crop choice—an exercise that is undertaken by Sinha and Xi (2018).

productivity of African countries appears not to be driven by agronomic endowments (that is, lower potential yields) but by inefficiencies in the use of these resources (as captured by actual yields being considerably lower than potential ones).

TABLE 3.1: Closing the Actual-Potential Yield Gap across Countries in Sub-Saharan Africa

	Input use water supply (change in yield, %)		
Country	**Low rainfed**	**High rainfed**	**High irrigated**
Congo, Dem. Rep.	-36	88	102
Ethiopia	32	367	450
Kenya	40	314	380
Nigeria	-16	174	230
Tanzania	47	347	442

Source: Sinha and Xi 2018.

Note: The accounting exercise undertaken considers scenarios that map to the agricultural practice being adopted at the farm level, the use of intermediates in production, and the nature of the water supply. The use of intermediate inputs in production can be classified into three levels (low, intermediate, and high), while the nature of the water supply depends on whether the agricultural production depends on rainfall entirely or employs some additional irrigation techniques. The low use of intermediate inputs considers yields associated with agricultural practices that are largely subsistence-based and labor intensive. Additionally, production does not use any meaningful amount of nutrients and chemicals, and it occurs in absence of any conservation practices. At the intermediate input level, production consists not only of meeting subsistence needs, but also market participation. The production can utilize better seed varieties and hand tools, livestock, and preliminary levels of mechanization. Labor intensity is lower compared with the low-input level. There is also some use of fertilizers and chemicals for pest and disease control together with fallowing and conservation. The high-input level basically refers to modern agricultural practice that happens in most of the developed world. The production is done entirely for market purposes with complete mechanization of the agricultural process. There are no shortfalls in the use of fertilizers, chemicals, or other factors of production.

The efficient allocation of resources in agriculture requires that the amount of output produced by an additional unit of either land or labor is equal across farmers. The existence of resource misallocation in agriculture implies that the microeconomic data at the farm level fail to support the following testable implications: first, more productive farmers should demand more land and labor and have larger farms, and, second, agricultural yields should be uncorrelated with farmer productivity. Figure 3.14 illustrates the extent of resource misallocation in Malawi's agriculture sector (Restuccia and Santaeulalia-Llopis 2017). In the efficient allocation, more productive farms demand more land and capital—shown by the red line in figure 3.14, panels a and c—so that the corresponding factor productivity across farms remains constant—shown by the red line in figure 3.14, panels b and d. However, the actual allocation of capital and land in Malawi (shown by the blue dots in figure 3.14) is quite different from the efficient one.

According to the first testable implication, there is no systematic correlation between the actual allocation of land across farms and the farm TFP, as shown by the blue dot cloud in figure 3.14, panel a. This suggest that there is no equalization of the marginal product of land across farms. The same can be said about the actual allocation of capital across farms, as shown by the blue dot cloud in figure 3.14, panel c. On the second testable implication, the marginal product of capital (or land) across farms is strongly positively related to farm TFP, as shown by the blue dot clouds in figure 3.14, panels b and d.

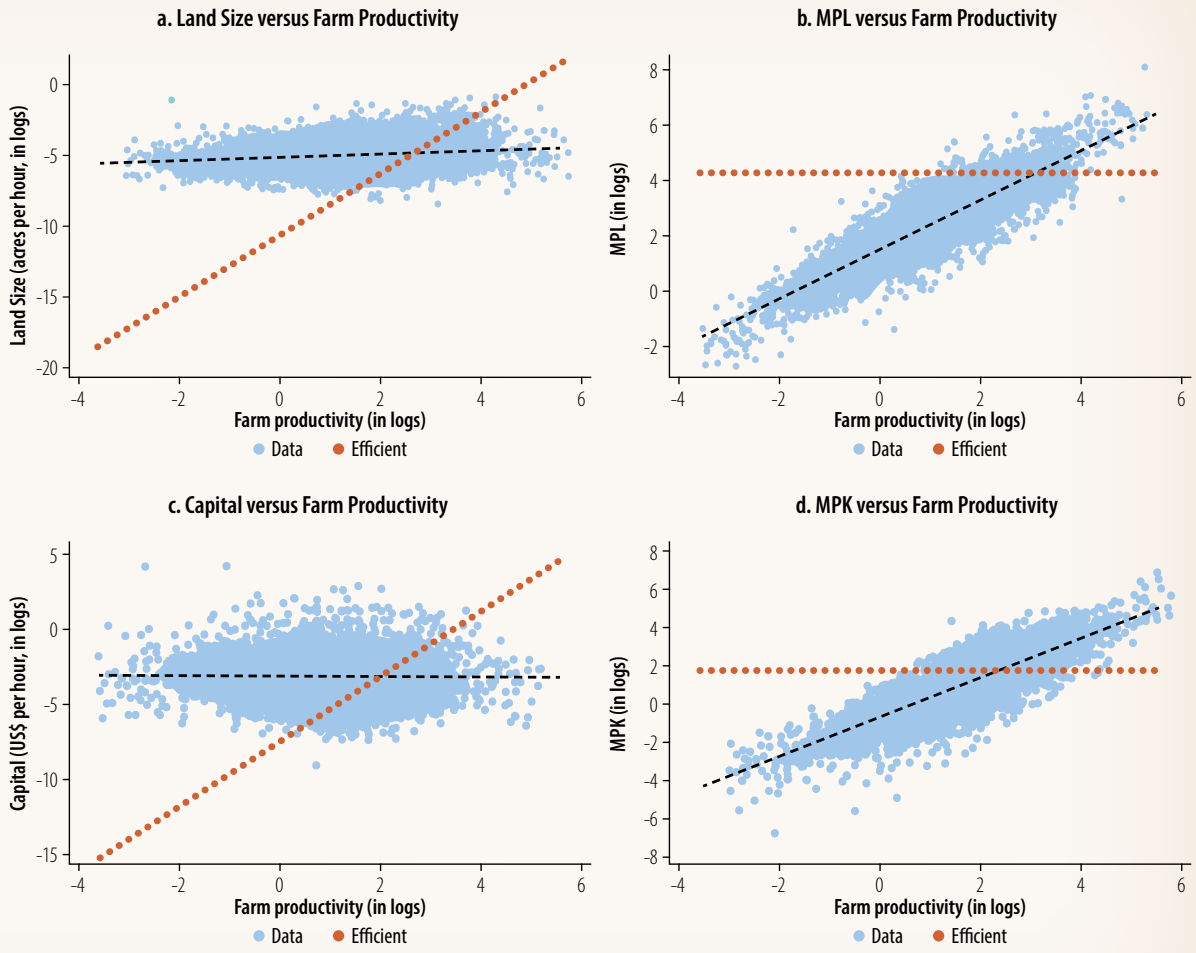
The findings inferred from figure 3.14 suggest that larger farms tend to use more capital; however, their capital-to-land ratio remains roughly constant to farm TFP—given that, on average, larger farms are not more productive. Farm-level data for Ethiopia and Uganda provide additional evidence of resource misallocation in agriculture: more productive farmers do not command more factors of production, and the marginal products of the corresponding factors are not uncorrelated with the farm's productivity (Chen, Restuccia, and Santaeulalia-Llopis 2017; Aragon and Rud 2018).

There is evidence of severe resource misallocation in Malawi's agriculture sector

More productive firms cannot command a larger amount of land and capital

The marginal productivity of capital and land is not equalized across Malawian farms

FIGURE 3.14: Land Size, Capital, MPL, and MPK: Actual and Efficient Allocation in Malawi



Source: Restuccia and Santaeulalia-Llopis 2017.

Note: Panel a reports actual and efficient land size in farms relative to farm productivity. Panel b reports actual and efficient marginal product of land with respect to farm productivity. Panel c reports actual and efficient allocation of capital in farms with respect to farm productivity. Panel d reports actual and efficient marginal product of capital vis-à-vis farm productivity. All variables are expressed in logs. MPK = marginal product of capital; MPL = marginal product of labor.

Resource Misallocation in Manufacturing

Resource misallocation across manufacturing firms plays an important role in understanding lower labor productivity and, more broadly, underdevelopment. For instance, in an environment with well-functioning domestic capital markets, an efficient allocation of capital implies that the amount of output produced by an additional unit of physical capital (or marginal product of capital) for each operating producer is equal to the market interest rate. In other words, there is no dispersion in the marginal product of capital across manufacturing firms. A deviation from the efficient allocation implies that firms borrow at different rates due to either differential access to finance or political connections. This leads to capital misallocation and significant differences in the marginal product of capital across firms.

Assessing the degree of resource misallocation in an environment with multiple factors of production involves calculating the variation in the marginal products of the different factors of production across production units. Revenue total factor productivity (TFPR) or the monetary

value of physical total factor productivity (TFPQ) is the geometric average of the marginal product of the different factors of production—say, capital and labor (Hsieh and Klenow 2009). Hence, the obtained dispersion in TFPR can be interpreted as an indication of resource misallocation.

Cirera, Fattal-Jaef, and Maemir (forthcoming) exploit the firm-level manufacturing census data of selected Sub-Saharan African countries to compute measures of the marginal products of capital and labor, TFPQ, and TPFR. The group of countries in the region under analysis includes Côte d'Ivoire (2003–12), Ethiopia (2011), Ghana (2003), and Kenya (2010).[17] Table 3.2 computes different measures of dispersion in firm-level TFPR and TFPQ across these countries. The evidence shows that there is substantial dispersion in firm-level productivity across manufacturing sectors in Africa.

The extent of resource misallocation across African manufacturing production units is severe regardless of the measure of dispersion—the standard deviation, ratio of the 75th to the 25th percentile (75-25), or ratio of the 90th to the 10th percentile (90–10). However, the magnitude of the dispersion of TFPR is particularly striking in Kenya, where less productive firms coexist with very few productive ones. An economic interpretation of these results suggests that the productivity gap across establishments is quite high. In Kenya, firms in the 90th percentile of productivity are 290 percent more productive than firms in the 10th percentile of productivity. This gap is about 87 percent in Ghana, 39 percent in Ethiopia, and 26 percent in Côte d'Ivoire.

Furthermore, the dispersion of TFPR across manufacturing establishments in Sub-Saharan African countries is considerably larger than in India, China, and the United States (Hsieh and Klenow 2009). For instance, the ratios of the 90th to 10th percentiles of the distribution of TFPR in Kenya (51), Ghana (17), Ethiopia (13), and Côte d'Ivoire (7) are much larger than the corresponding values in India (5.0), China (4.9), and the United States (3.3). The results offer prima facie evidence

TABLE 3.2: Dispersion of Revenue and Physical TFP, TFPR, and TFPQ in Selected Countries

	Côte d'Ivoire		Kenya		Ghana		Ethiopia	
	TFPR 2003–12	TFPQ 2003–12	TFPR 2010	TFPQ 2010	TFPR 2003	TFPQ 2003	TFPR 2011	TFPQ 2011
Sandard deviation	0.65	1.24	1.52	2.41	0.95	1.75	0.78	1.3
Ratio of percentiles								
75-25	0.88	1.74	1.99	3.34	1.42	2.61	1.26	1.94
90-10	1.99	3.25	3.94	5.67	2.89	4.47	2.56	3.67
Cov(TFPQ, TFPR)	0.7		0.85		0.69		0.74	
Reg. coeff.	0.42		0.52		0.44		0.53	
Obs.	4,146	4,146	757	757	1,151	1,151	4,012	4,012

Source: Cirera, Fattal-Jaef, and Maemir forthcoming.

Note: The log(TFPR) and log(TFPQ) are de-meaned by industry-specific averages. Industries are weighted by their value-added shares. The statistics for Côte d'Ivoire are calculated by taking the average for 2003–12. TFP = total factor productivity; TFPQ = monetary value of physical total factor productivity; TFPR = revenue total factor productivity.

17 The censuses are nationally representative, and small and large firms in the formal sector are adequately included.

that resources are severely misallocated in the selected countries in Sub-Saharan Africa. A plausible explanation for the findings is that policies and institutions in Sub-Saharan African countries prevent the more productive firms from eliminating the less productive ones.

An important counterfactual is the calculation of the potential productivity gains from eliminating resource misallocation across firms. This implies calculating the gains from reallocating the different factors of production to replicate the efficient allocation where TFPR is equal across the operating producers in each 4-digit activity of the manufacturing sector for each country. Table 3.3 shows that the equalization of TFPR across firms in each industry entails considerable productivity gains. The first column in the table indicates that the potential TFP gains from improved allocation of resources are much higher in the Kenyan manufacturing sector compared with the other countries under analysis. Furthermore, manufacturing TFP could potentially increase in this counterfactual exercise by 31.4 percent in Côte d'Ivoire, 66.6 percent in Ethiopia, 75.5 percent in Ghana, and 162.6 percent in Kenya.

TABLE 3.3: Potential TFP Gains from Equalizing TFPR (%)

	TFP gains	Relative to U.S.
Côte d'Ivoire	31.4	-8.3
Ethiopia	66.6	16.4
Ghana	75.7	22.7
Kenya	162.6	83.4

Source: Cirera, Fattal-Jaef, and Maemir forthcoming.

Note: The relative TFPR gain is calculated by taking the ratio of efficient to actual total productivity to the U.S. ratio in 1997. TFP = total factor productivity; TFPR = revenue total factor productivity.

A more conservative measure of the potential gains from eliminating misallocation in Sub-Saharan Africa is to subtract the gains that accrue to the United States from the reversal of its own profile of idiosyncratic distortions.[18] The productivity gains for countries in Sub-Saharan Africa are still economically significant in this scenario; however, they become substantially more modest. For Ethiopia, Ghana, and Kenya, the gains become 16.7, 22.7, and 83.4 percent, respectively. The case of Côte d'Ivoire becomes more puzzling, as it is found that this country gains less from an efficient reallocation than the United States does.

Two important messages emerge from this analysis. First, the productivity gains from reversing misallocation are not negligible across Sub-Saharan African countries; however, they are small relative to the development gaps in the region. The analysis presented here does not account for additional potential gains that result from addressing the propagation of idiosyncratic distortions via intersectoral linkages (that is, not accounting for misallocation across 4-digit industries) and dynamic reallocation gains (that is, leaving out any endogenous response of the TFPQ distribution to the elimination of distortions). Second, these findings reveal a gap in understanding how the properties of a given distribution of TFPR maps into the counterfactual TFP gains.

3.5 MISALLOCATION, HUMAN CAPITAL, AND PRODUCTIVITY

Human capital plays an important role as an engine of economic growth. Theoretical models of endogenous growth have postulated that the accumulation of knowledge and skills by

18 The underlying assumption when calibrating sectoral factor shares to U.S. levels is that the United States is an undistorted economy. However, the United States is also subject to misallocation but at a much weaker degree (Hsieh and Klenow 2009). Therefore, many papers in the literature adopt the conservative approach of netting the U.S. gains from a given country's TFP improvement (Cirera, Fattal-Jaef, and Maemir forthcoming).

the labor force can boost productivity. Human capital can also facilitate the adoption of superior technologies from "idea-producing" countries or enhance the ability to develop new technologies.[19]

Endogenous growth theories have explicitly modeled individual educational investment choices and typically allow human capital to have external effects. That is, some of the benefits from higher human capital in the labor force will lead to output gains that cannot be appropriated as higher income for those who undertook the corresponding investment. These externalities lead to a divergence between private and social returns to education. In this context, Lucas (1988) argues that, holding constant the firm's human capital stock, firm-level productivity can be influenced by the (average) economywide stock of human capital. Furthermore, there is a large externality component on the TFP growth effects of human capital, as the economic value of new ideas cannot be fully appropriated by the private sector (Jones 1995, 2003). Other models stress the role of intergenerational human capital externalities (that is, younger cohorts learn from the skills and knowledge accumulated by the older cohorts) as a key component of the process of human capital accumulation (Stokey 1991). In turn, the accumulation of human capital facilitates the introduction of higher quality goods, which are intensive in human capital.

This section has so far documented the large and persistent differences in labor productivity between Sub-Saharan Africa and the United States. These gaps are largely driven by differences in TFP. What accounts for differences in TFP across countries? Recent research has argued that decisions at the firm level can help in understanding labor productivity differences across countries through two broad mechanisms (Restuccia and Rogerson 2017). First, firms have differences in the ability to adopt more efficient technologies (Aghion and Howitt 1992; Parente and Prescott 1994). In other words, the diffusion of frontier technologies and best practices to low-income countries is quite slow. Second, firms in low-income countries are not as effective in efficiently using their different factors of production (say, capital, land, and/or labor) given the current state of technology.[20]

Resource misallocation refers to inefficiencies in the allocation of inputs across producers with different productivity levels, and this typically occurs when producers are affected by firm-specific distortions—for example, they are taxed at different rates. The aggregate output and productivity impacts of these firm-specific distortions can be transmitted through three mechanisms (Restuccia and Rogerson 2017): (a) *technology* (aggregate output will be greater if productivity is higher for all firms), (b) *selection* (through the choice of operating producers), and (c) *misallocation* (through allocation of capital and labor among operating producers). The effects of distortions on aggregate productivity may result from the interplay of these three channels. For instance, policies that may induce distortions in the allocation of resources across producers may potentially generate additional effects through the selection and technology channels.

The inefficient allocation of resources (capital, land, labor) across operating agricultural farms and manufacturing firms in Sub-Saharan Africa is tightly linked to the misallocation of human capital

19 The empirical cross-country growth literature finds mixed results on the growth effects of human capital and more specifically, education. Box 3.1 enumerates some of the empirical problems on the aggregate measurement of human capital.

20 Misallocation of resources at the firm level is not the only channel that explains lower aggregate productivity. It is also the case of within-firm productivity improvement through better management practices or the ability to adopt new technologies. In the case of the latter, adoption of new technologies (for example, digital innovations) can help increase firm-level and aggregate productivity.

through policies and institutions that lead to inefficiencies in the allocation of human capital across production units have static and dynamic effects on aggregate output and productivity.

From a static perspective, the inefficient allocation of human capital is explained by policies and institutions that yield inefficient occupational choices at a point in time, among other channels. These policies and institutions may drive the most talented individuals away from their most productive use. For instance, talented individuals may become rent seekers instead of entrepreneurs; high-productivity entrepreneurs may be unable to join the formal sector; and less productivity farmers may not opt for work in non-agricultural activities. Inefficient occupational choices, in turn, can be attributed to labor market frictions (say, firing costs and discrimination), barriers to human capital investment (for instance, financial market imperfections, entry costs, and tax structures), and social norms (say, community-based, non-market mechanisms for land allocation).

From a dynamic perspective, policies and institutions that lead to resource misallocation have larger effects on aggregate output and productivity by changing the productivity distribution. In turn, the changes in the productivity distribution operate through mechanisms that affect further accumulation of human capital, such as technology adoption, learning by doing, and knowledge spillovers, as well as those affecting the entry/exit of firms. Misallocation will likely influence producers' decisions to invest in new technologies or methods of production (the technology mechanism) and their decisions to enter or exit the industry (the selection mechanism). The responses through investment and the entry productivity of establishments, in turn, have an impact on future productivity. For instance, policies that distort the allocation of credit or land may discourage firms or farmers from undertaking productivity-enhancing investments (for instance, R&D investments or adopting best technologies, among others). The incorporation of dynamic decisions by production units (farms or firms) will amplify the effects of distortions through changes in the distribution of productivity across establishments. In sum, low labor productivity can be attributed to low levels of human capital, and the effect is compounded by the misallocation of human capital across occupations and production units.

Static Implications of Misallocation for Human Capital Accumulation

Policies and institutions that distort the efficient allocation of factors across firms tend to lower aggregate productivity through inefficiencies in occupational choices. This section considers three choices that lead to the misallocation of human capital: (a) talented individuals who become rent seekers instead of entrepreneurs, (b) high-productivity entrepreneurs who are unable to join the formal sector, and (c) less productivity farmers may not be able to opt out of agriculture and work in non-agricultural activities.[21] This strand of the literature argues that several frictions (such as financial, institutional, and land frictions, among others) and their interplay may lead to the misallocation of human capital and, hence, lower aggregate output and productivity.

21 The adoption of digital technologies may facilitate occupational choices. For instance, mobile money has enabled Kenyans living in areas with larger network increases to work in business or sales rather than farming or having a secondary occupation. Expansion of M-PESA has also allowed women to graduate from subsistence agriculture, reduced their reliance on multiple part-time jobs, and led to a reduction in the average household size (Jack and Suri 2016).

Distorted Occupational Choices I: Greater Proneness to Rent-Seeking Activities

The allocation of talent in productive or rent-seeking activities has implications for the country's output and productivity growth. Talented people in productive activities (entrepreneurs) tend to improve current production techniques. Production has increasing returns to ability if the rates of technological progress and income growth are determined by the most talented entrepreneur. The most talented people become entrepreneurs to the extent that they can earn more than proportionally higher profits (given their operating scale) or they can expand the firm to use their ability advantage on a larger scale.

Talented people who choose rent-seeking activities, by contrast, obtain returns from wealth redistribution rather than creation—thus, the economy stagnates. Allocation of talent to rent-seeking activities can harm growth through several channels: rent-seeking sectors demand labor and other sources; the tax imposed by rent-seeking sectors on the productive sectors reduces incentives to produce; and a greater number of rent seekers reduces the pool of entrepreneurs, their ability, and the rate of technological progress. In sum, income and growth are reduced if the returns from rent-seeking sectors are higher than those from the productive ones.

Murphy, Shleifer, and Vishny (1991) assume that rent seekers tax entrepreneurs' profits and distort the allocation of individuals between entrepreneurship and work. Rent-seeking technology exhibits increasing returns to ability and diminishing returns to scale. Each individual has three choices, namely, entrepreneurship, work, and rent-seeking. If the technology of productive activities is more elastic with respect to human capital than that of rent-seeking activities, the most talented people become entrepreneurs and operate the largest firms. The next group goes into rent-seeking, and the least talented are workers. Productivity, technology, wages, profits, and aggregate returns to rent seekers grow at the rate of the ability of the most talented person in the economy. In contrast, when technology for rent-seeking is more elastic on human capital, the most talented people become rent seekers. The next group becomes entrepreneurs, and the least talented become workers. Output grows at a lower rate, since the most talented entrepreneur is no longer the most talented person in the economy.

Rent-seeking introduces three distortions: it demands labor (and other resources) away from productive sectors; it distorts the choice of the least talented entrepreneur who becomes now a worker; and the most talented people join rent-seeking rather than productive activities. Rent-seeking sectors reduce the ability of the most talented person who becomes an entrepreneur and, hence, hinders the growth rate of the economy. A reduction of the tax rate on profits will shrink the size of the rent-seeking sector. Workers will relocate into production activities. If the most talented people are entrepreneurs, the most talented rent seekers become entrepreneurs thanks to better incentives. However, if the most talented people were rent seekers, the least talented rent seekers would become entrepreneurs and the ability of the best entrepreneur rises. In both cases, the growth rate is enhanced as the talent of the person determining technological progress is higher.

Talent allocation between entrepreneurship and rent-seeking can also be influenced by firm size in the two types of activities. Physical diminishing returns to scale are only one limitation on firm size. The state and capital markets can introduce distortions to firm size. For instance, governments have imposed limitations on firm size, such as entry costs and industrial capacity licensing, among

others. Financial frictions can reduce firm size and, hence, the attractiveness of entrepreneurship. In sum, policies that distort firm size may reduce the pool of talent becoming entrepreneurs, their ability, and the rate of technological progress and, hence, growth.

Finally, the allocation of talent over time across gender and race can be affected by changes in occupational preferences, labor market frictions, and barriers to human capital investment. Improved occupational choices of women and blacks in the United States help explain the growth of gross domestic product (GDP) per person over the past half-century. The bulk of the improved living standards for these groups is attributed to declining obstacles to human capital accumulation. However, labor market wedges overwhelmingly account for distortions in labor force participation (Hsieh et al. 2018).[22]

Distorted Occupational Choices II: Entrepreneurship and Informality

Entrepreneurial human capital is an important determinant of firm-level productivity. More educated entrepreneurs make better managers and can operate high-productivity firms. Castro and Ševčík (2016) argue that the interaction between entrepreneurial schooling decisions and financial frictions may lead to misallocation of resources (especially human capital) and lower aggregate output and productivity. Credit constraints restrict production and household-level schooling decisions. Firm-level productivity, in turn, can be enhanced by entrepreneurial schooling decisions. In the presence of frictions, entrepreneurs underinvest in schooling, talent is misallocated across occupations, capital is inefficiently allocated across firms, and labor productivity declines.

Castro and Ševčík's (2016) model suggests that, in the presence of financial frictions, future entrepreneurs will underinvest in schooling. The returns from investment in schooling are not high enough if the entrepreneur operates a small firm. Additionally, the opportunity cost of investing in schooling is high when the resources can be channeled to build up collateral. In this context, there is a misallocation of schooling investments: the largest reduction of schooling investment is undertaken by entrepreneurs with the highest productivity potential.

Financial frictions lead to misallocation of talent across occupations: people with low income and entrepreneurial skills may become workers if the operational scale of their firm is inefficiently small. Other people with lower managerial skills and operating a production technology may find it advantageous to undertake production if they are sufficiently wealthy. Hence, there is misallocation of capital across individuals who choose to become entrepreneurs. In the presence of credit constraints, firm size depends on entrepreneurial wealth and not only firm-level productivity. Additionally, Castro and Ševčík (2016) suggest that entrepreneurial-level schooling decisions have an impact on the distribution of firm-level productivity.

A calibrated solution of the Castro-Ševčík model shows that schooling underinvestment and schooling misallocation play an important quantitative role in accounting for TFP differences between the United States and low-income countries. The interplay of financial frictions and distorted schooling decisions explains between 22 and 44 percent of the labor productivity gap between the United States and low-income countries. Hence, schooling distortions represent

22 Gender- and race-specific obstacles to human capital formation include parental/teacher discrimination in favor of boys about certain skill development processes, historical constraints on women's admission to colleges/training programs, and differences in the quality of schools between black and white neighborhoods, among others (Hsieh et al. 2018).

a major source of productivity differences across countries. Alleviating schooling distortions may involve implementing education policies, such as public provision of schooling or tuition subsidies.

Entrepreneurship plays a crucial role in fostering growth, thanks to its potential to create jobs, improve the operating technology, and boost productivity. However, the coexistence of a sizable informal sector with a formal one poses challenges on the formulation of policies to foster entrepreneurship. For instance, the informal economy accounted for 60 percent of output in Tanzania over 1990–2004 (La Porta and Shleifer 2008).

Informal, noncompliant firms are significantly less productive than formal, tax compliant firms. Noncompliant manufacturing firms in developing countries have lower productivity than their compliant counterparts (IMF 2017). The value added per worker of informal firms in the median country sample in the World Bank Enterprise Surveys is 80 percent lower than in formal firms (La Porta and Shleifer 2014). Informal firms typically circumvent taxation—they may fully avoid paying taxes or partially pay in the event of underreported revenues (Kanbur and Keen 2014). The (full or partial) nonpayment of taxes amounts to an implicit subsidy to informal firms. The value of avoided tax payments and other non-remitted contributions constitutes the main benefit from informality (Fajnzylber 2007).[23] Informal firms are important for job generation, incubators for business potential, and transition to accessibility and graduation to the formal economy (Cano-Urbina 2015).

Nguimkeu (2015) builds an occupational choice model where individuals decide between formal entrepreneurship, informal entrepreneurship, and nonentrepreneurial work. The heterogeneous agent model assumes that the different occupational choices are based on the agents' personal characteristics (say, skills and initial wealth endowment) and institutional factors (for instance, entry costs, taxation enforcement, and financial frictions). The institutional environment of the developing economy assumes onerous registration costs, imperfect credit markets, and low-enforcement tax collection. Formal entrepreneurs pay a registration cost. Once they become formal, entrepreneurs pay taxes and have better access to credit. Informal entrepreneurs evade tax payments (forfeit their profits if they get caught) and are more likely to face borrowing constraints.

According to the model, low-productivity entrepreneurs choose informality, while the most productive ones join the formal sector. Taxation and registration costs are a barrier to entering the formal sector, which is limited to firms with sufficiently high future returns and favorable growth prospects. These costs induce lower entry of entrepreneurs with low productivity into the formal sector and a greater number of unproductive firms in the informal sector. The implications of the model are tested using data from Cameroon—an economy where the informal sector accounts for about 33 percent of gross national product and 90 percent of the labor force is informal.[24] Counterfactual policy simulations are computed to examine the impact on the Cameroonian economy of policies that improve firm registration, taxation compliance, and business training programs.

23 More generally, it is inherently difficult to tax the informal sector, as incomes from informal businesses are difficult to measure and transactions are not recorded (Besley and Persson 2014).

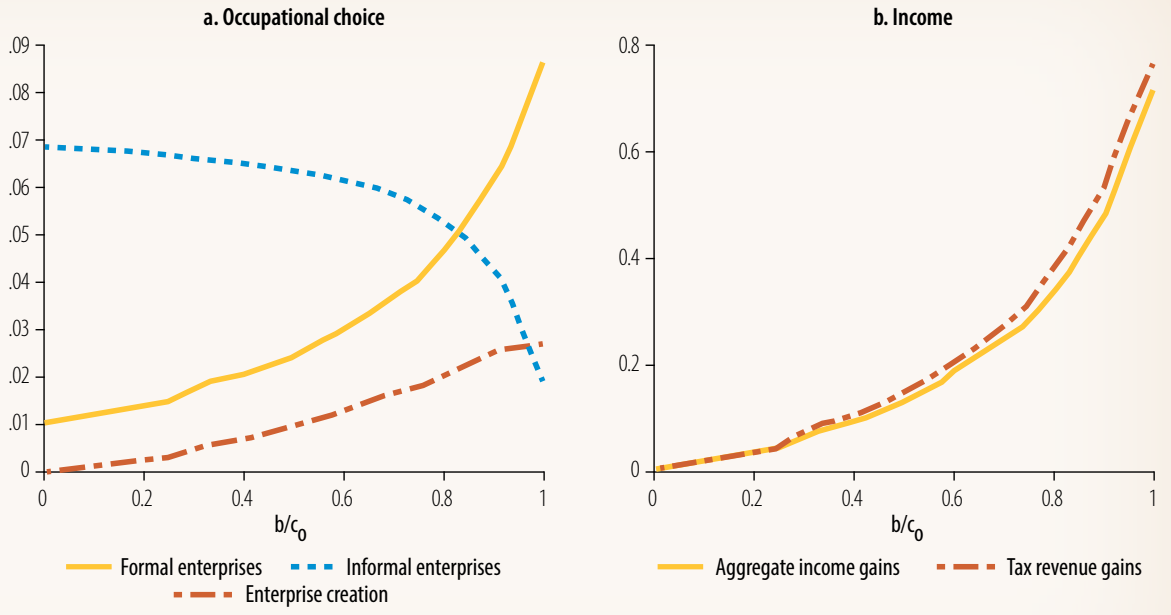
24 Nguimkeu (2015) uses a cross-sectional sample from the 2005 Cameroon National Survey on Employment and the Informal Sector, which collects information on households and their economic activities.

The evidence shows that education plays an important role in the choice to become an entrepreneur. However, this relationship is nonmonotonic (that is, U-shaped): it is more profitable for less educated entrepreneurs to remain in the informal sector as their level of education increases. Beyond a certain threshold of education, informal entrepreneurs with a rising level of education find it attractive to join the formal sector. Parents' occupation influences entrepreneurial choices: more than 40 percent of formal entrepreneurs are offspring of entrepreneurs. In this context, informal business training received at home may lead to entrepreneurial success.

The data also show that failing to incorporate the critical role of entry registration costs substantially undermines the level of selection into the formal sector. Lower registration cost (a 50 percent drop) doubles the share of formal enterprises through formalization of informal firms and new entrants to the industry (figure 3.15, panel a). Additionally, an analogous decline in registration cost leads to an increase in aggregate income by 15 percent, and total net tax revenues more than double the current amount collected by the government (figure 3.15, panel b). In sum, the counterfactual exercises for Cameroon conducted by Nguinkeu (2015) show that an efficient allocation of skill and significant income gains can be obtained from reducing registration costs and selecting the optimal tax rate while fostering entrepreneurial skills and enterprise creation through business training and improved access to credit.

Lower registration costs reduce (raise) the share of informal (formal) entrepreneurs and increase aggregate income

FIGURE 3.15: Impact of Registration Reform on Occupational Choice and Income in Cameroon



Source: Nguimkeu 2015.

Note: On the x-axes, b represents the reduction of the entry cost implied by the reform, and c0 is the fixed entry cost for the entrepreneur to join the formal sector. Panel a denotes the fraction of formal enterprises, informal enterprises, and new enterprise creation. Panel b indicates the variation in aggregate income gains, computed as the total income gain from all sectors, and the tax revenue gains, computed as the total tax revenues net of forgone registration fees due to reform.

Distorted Occupational Choices III: Excessive Agricultural Employment Share

The low productivity of agriculture in Sub-Saharan African countries has been increasingly attributed to non-market-based mechanisms for allocating land across farmers. Inefficiencies in the allocation of land may respond to social norms. For instance, most of the land tenure in Malawi is customary, and village chiefs assign user rights locally. About 10 percent of the household farms are operating land fully obtained in the market (Restuccia and Santaeulalia-Llopis 2017).[25] Figure 3.14 shows that factor allocation across farmers in Malawi deviates significantly from efficient allocation: larger farms fail to command greater amounts of land and capital, and the marginal productivity of inputs is not unrelated to farms' productivity.

The findings in figure 3.14 are consistent with land allocation that obeys inheritance norms, while land rental and sale markets are severely restricted. Farm size growth for the most productive farmers is affected by the land misallocation. Furthermore, land market restrictions influence the allocation of capital. An efficient reallocation of land and capital would lead to 3.6-fold output gains.

The ability of farmers to raise capital is affected by land market restrictions and insecure property rights. Table 3.4 reports aggregate output gains for farms operating without market land, with some marketed land, and with only marketed land. The largest output gains (4.2-fold) are obtained by farms without marketed land (about 83.4 percent of household farms). These gains are reduced by more than half (nearly 2-fold) for farms with some marketed land (16.6 percent of household farms), and they are even smaller (1.6-fold) for farms with land that is entirely rented-in or purchased (10.4 percent of household farms). In turn, the output gains among farmers can be decomposed by the type of marketed land, namely, rented-in informally, rented-in formally, purchased as untitled, and purchased as titled. The majority of farmers with some marketed land are formally renting-in (9.5 of the 16.6 percent of household farms), and their output gains are similar to those operating land rented-in formally or informally (1.72- to 1.73-fold). Farms with operated land purchased with a title register the lowest output gains (1.39-fold), while those with purchased land without a title record fairly large output gains (5.13-fold).

TABLE 3.4: Land Markets in Malawi: Output Gains for Farms with Marketed and Non-Marketed Land

	Marketed land share			Marketed land type			
	No	Yes	All	Rented		Purshased	
	0%	(>0%)	-100%	Informal	Formal	Untitled	Titled
Output gain	4.15	1.79	1.57	1.72	1.73	5.13	1.39
Observations	5,962	1,189	746	215	682	126	97
Sample (%)	83.4	16.6	10.4	3	9.5	1.8	1.3

Source: Restuccia and Santaeulalia-Llopis 2017.

Note: The output gain is calculated as the ratio of efficient to actual output separately for subsamples of farm households defined by the share of different types of marketed land used. The share of marketed land is defined from the household-farm-level information on how land was obtained. Each column refers to a particular subsample. The first column reports the output gain for the subsample of household farms that do not operate any marketed land. The second column refers to the subsample of household farms operating a strictly positive amount of marketed land, purchased or rented-in. The third column refers to the subsample of household farms for which all their operated land is marketed land. The last four columns disaggregate the results by the main types of marketed land: rented informally, that is, land borrowed for free or moved in without permission; rented formally, that is, leaseholds, short-term rentals, or farming as a tenant; purchased without a title; and purchased with a title. In the Malawi Integrated Surveys on Agriculture, data on type of marketed land are missing for only 1 percent of households with marketed land.

25 The Customary Land Act in Malawi grants the head of the village the power to allow or ban land transactions (say, arising from inheritance) and resolve land limit disputes across villagers (Kishindo 2011; Morris 2016). The Malawi Land Bill, which was passed in 2016, aims at reducing this power; however, the bill is still not in place (Restuccia and Santaeulalia-Llopis 2017).

Institutional restrictions on land allocation also play a role in explaining the low productivity of agriculture in Ethiopia.[26] As was the case for agriculture in Malawi, Chen, Restuccia, and Santaeulalia-Llopis (2017) find pervasive resource misallocation in agriculture in Ethiopia: (a) more productive farmers are unable to demand a larger amount of land and capital; (b) farm output is not proportional to its corresponding productivity level; (c) the marginal products of land and capital across farms are not independent of their individual productivity levels; and (d) TFPR is not similar across farms (that is, its standard deviation is different from zero).

Chen, Restuccia, and Santaeulalia-Llopis (2017) argue that the severe misallocation of resources in agriculture is tightly linked to the uniform allocation of land use rights and the obstacles to reallocating these rights. Despite the comprehensive land certification reform, land markets in Ethiopia remain underdeveloped: about 67 percent of the household farms in the sample do not rent-in or rent-out any land; 25 percent formally or informally rent-in some land for production; 10 percent of households rent-out land; and about 2.5 percent of households rent-in or rent-out land.[27] Table 3.5 reports the aggregate efficiency gains from land reallocation. The efficiency gain for farmers without rentals is 3.18, which is higher than for farmers who rent land (2.61). Relatedly, TFPR across farmers without rentals exhibits a greater degree of dispersion than for farmers with rentals (1.1 and 0.96, respectively), thus implying that the former group displays a greater extent of resource misallocation. Additionally, the marginal product of land across farmers who do not rent is considerably higher than for those who rent-in or rent-out (1.05 and 0.86, respectively).

TABLE 3.5: Misallocation for Farmers with/without Land Rentals in Ethiopia

	Full sample	No rentals (0%)	Rentals (>0%)
Efficiency gain (countrywide)	3.07	3.18	2.61
Std. dev. (log TFPR)	1.06	1.1	0.96
Std. dev. (log MP Land)	0.99	1.05	0.86
Observations	2,887	1,951	936
Sample (%)	100	67.6	32.4

Sources: Chen, Restuccia, and Santaeulalia-Llopis 2017. The data are from the Ethiopia Integrated Surveys on Agriculture 2013/14.

Note: A baseline nationwide reallocation is conducted to compute efficiency gains separately for each group of farmers: those with no rental land and those with rented-in or rented-out land. MP = marginal product; TFPR = revenue total factor productivity.

Institutional features in Uganda that are associated with the presence of secure property rights and well-functioning land markets also play a role in the efficient allocation of resources and labor productivity in agriculture (Aragon and Rud 2018). Land tenure systems can be customary (less secure due to the lack of formal land registries) or noncustomary (with some degree of formal and secure property rights). These tenure systems are spatially concentrated in Uganda: more than 90 percent of holdings are under customary land tenure in the Northern and Eastern regions, and noncustomary tenure systems are mostly located in the Western and Central regions of the country.

26 The communist government that ruled Ethiopia from 1974 until the early 1990s expropriated and redistributed uniformly rural land in the country and legally banned land transactions. The state still owns the land and several of the restrictions on land transactions remain in place. In the 2000s, reforms were aimed at granting land certificates to farmers and allowing partial land reallocation across farmers through (limited) rentals of the use rights. These rentals became the only channel to enable the market reallocation of farms' operational scale. Additionally, local governments were in charge of implementing these reforms; hence, land rental practices differed considerably across subregions and over time (Deininger et al. 2008). For instance, the percentage of rented land across the 65 subregions in Ethiopia varies from 0 to more than 70 percent, and its rate of increase over a two-year period fluctuated between 0 and more than 15 percentage points. Chen, Restuccia, and Santaeulalia-Llopis (2017) exploit the policy-driven variations in land rentals across subregions and over time to examine the effects of land markets on resource allocation and agricultural productivity.

27 Chen, Restuccia, and Santaeulalia-Llopis (2017) classify these household farms in two groups: farmers who do not rent-in or rent-out any land, and farmers who rent-in or rent-out some land.

The relationship between factor misallocation, land market allocation, and property rights is presented in table 3.6, which shows the following: (a) more productive farmers tend to command more land and labor, and they tend to exhibit greater yields; (b) the relationship between land demand and productivity tends to be stronger in the Western and Central regions of Uganda, while that of yields is weaker in these regions; and (c) there are no regional differences in the relationship between demand for labor and farmers' productivity. These findings suggest that improved property rights may reduce agricultural allocative inefficiencies; however, the use of noncustomary land rights does not eliminate land misallocation. The resulting correlation is still significantly below the efficient benchmark.

In sum, resource misallocation in agriculture has led to a very high amount of labor producing a minimum amount across Sub-Saharan African countries. On average, land frictions limit the scale of operations of farms (compared with industrial countries). Improving the quality of institutions supporting the functioning of land markets can help reduce misallocation (Restuccia 2016; Chen, Restuccia, and Santaeulalia-Llopis 2017; Aragon and Rud 2018). Despite reforms that foster market-based allocation mechanisms, farms with marketed land still operate considerably below their efficient scale. This suggests that land markets are still restricted and subject to various frictions, such as weak legal institutions. Insecure property rights on land and limited market allocation may lead to severe resource misallocation. They also lead to distorting individuals' occupational choices between farming and nonfarming activities, as individuals may stay in the agriculture sector (rather than opting to work in the non-agriculture sector) because they do not have a title on their land (Chen 2017).

TABLE 3.6: Factor Misallocation and Property Rights in Uganda

	Land ln(T) [1]	Labor ln(L) [2]	Yields ln(Y/T) [3]	Land ln(T) [4]	Labor ln(L) [5]	Yields ln(Y/T) [6]
Farmer productivity	0.222***	0.166**	0.904***	0.223***	0.167***	0.912***
	(0.022)	(0.017)	(0.014)	(0.024)	(0.016)	(0.016)
Farmer productivity x	0.119***	0.018	-0.080***	..	..	..
Western/Central regions	(0.039)	(0.028)	(0.024)			
Farmer productivity x	..	..	..	0.102**	0.037	-0.084***
share of noncustomary land				(0.039)	(0.026)	(0.025)
Obs.	13,113	13,113	13,113	13,088	13,088	13,088
R**2	0.087	0.056	0.336	0.084	0.059	0.335
Fixed effects						
Growing season (year)	Yes	Yes	Yes	Yes	Yes	Yes
Cropping season (semester)	Yes	Yes	Yes	Yes	Yes	Yes

Source: Aragón and Rud 2018.

Note: The dummy variable for location of land in the Western or Central region denotes the prevalence of noncustomary tenure systems. Standard errors are clustered at the household level (in parentheses). *** (**) {*} implies statistical significance at the 10 (5) {1} percent level. All regressions include fixed effects by growing season (year) and by cropping season (first and second semesters), degree days (DD), harmful degree days (HDD), and ln(precipitation).

Dynamic Implications of Misallocation for Human Capital Accumulation

The policies and institutions that distort farm- and firm-level allocation of factors of production (capital, land, and labor) are also likely to influence the decisions of farms and firms to invest in new technologies or methods of production (*technology*) and enter and exit decisions (*selection*). The endogenous responses through investment and entry productivity of establishments, in turn, affect future productivity.[28] This section looks at the dynamic impact of misallocation on agricultural productivity through changes in decisions that affect the formation of human capital, such as learning by doing and spillovers (Chen and Restuccia 2018) and the adoption of new technologies (Chen, Restuccia, and Santaeulalia-Llopis 2017).[29]

Learning by Doing among Farmers

The dismal *growth* performance of agricultural productivity in the region can be attributed to distortions that reduce farmers' incentives to learn new techniques. In an environment where farmers can potentially choose to learn new techniques that improve the existing technology, the productivity elasticity from learning will be larger if the percentage of farmers deciding to learn in the village is greater. Hence, the probability of learning by farmers depends positively on their own ability and the village state of learning. At the end of the production cycle, the neighborhood's improved production process becomes common knowledge and every farmer can implement it. Hence, there are learning-by-doing and spillover effects among farmers.

Distortions may negatively affect the learning process and reduce its associated marginal profits. Using farm-level data from Ethiopia, Chen and Restuccia (2018) test the hypothesis of learning among farmers.[30] Misallocation arising from imperfections in the allocation of land disproportionally affect the most productive farmers, distort the size distribution of farms, and reduce the returns to learning for more talented farmers. Few farmers then engage in learning and, hence, labor productivity growth slows down.

In a dynamic setting, agricultural TFP will respond endogenously to eliminating the distortions associated with land misallocation through the selection, misallocation, and learning mechanisms. Eliminating misallocation elevates the proportion of Ethiopian farmers learning new techniques from 18.7 to 35.1 percent, and it shifts the technology frontier at a faster pace (1.8 percent per year in the economy without distortions compared with 1 percent per year in the economy with distortions).

28 Vollrath (2013) shows that human capital misallocation can play an important role in understanding underdevelopment. Its adverse impact on aggregate output and productivity is more likely to be significant due to within-sector inefficiencies or strong dynamic spillovers rather than due to static wedges between sectors.

29 Research on resource misallocation in manufacturing looks at the dynamic implications of distortions on future human capital formation and productivity through barriers to technology adoption and diffusion lags (Ayerst 2016) and reduced incentives to lower life-cycle and entry-level investments in productivity (Bento and Restuccia 2017; Cirera, Fattal-Jaef, and Maemir forthcoming).

30 The authors use the 2013/14 and 2015/16 waves of the Living Standards Measurement Study–Integrated Survey on Agriculture for Ethiopia to estimate the learning equation. Learning by a farmer was achieved if the fertilizer-to-land ratio was below (above) the median of the zone or county in the 2013/14 wave and increased (decreased) in the 2015/16 wave. Hence, a farmer can learn from peers in the same zone by adjusting fertilizer usage, which results in productivity gains.

Labor productivity growth in agriculture depends not only on the growth rate of the frontier, but also on the general equilibrium effects arising from the selection mechanism and the associated structural transformation process. The first column in table 3.7 shows meager labor productivity growth in agriculture in the benchmark calibration of a distorted economy—since the growth of the frontier is offset by population growth. Eliminating distortions raises agricultural productivity growth to 1.2 percent, that is, an acceleration of about 0.9 percentage points. Over the next two decades, this higher growth would lead to an increase in the level of agricultural productivity of about 19 percent. The impact on growth of GDP per capita of eliminating misallocation is reported in the second column in table 3.7.[31] The computations from Chen and Restuccia (2018) suggest that eliminating misallocation leads to a substantial drop in the agricultural employment share (from 60 to about 20 percent) that comes along with faster productivity growth in the non-agriculture sector. In turn, faster growth in agriculture and overall productivity growth will accelerate the structural transformation process.

TABLE 3.7: Dynamic Effects of Misallocation in Ethiopian Agriculture

	Growth rate of		Change in
	Agricultural labor productivity	GDP per capita	Agricultural employment share
Benchmark (distorted)	0.33	1.38	-0.16
No distortions (ND)	1.2	1.57	-0.16
ND & low population growth	2.75	1.81	-0.35

Source: Chen and Restuccia 2018.

Note: The table reports statistics for the distorted benchmark economy, the economy with no distortions, and the economy with no distortions and lower population growth rates, respectively. The first two columns show the growth rate (in percent) of agricultural labor productivity and real GDP per capita. The third column shows the change in agricultural employment share in percentage points. GDP = gross domestic product; ND = no distortions.

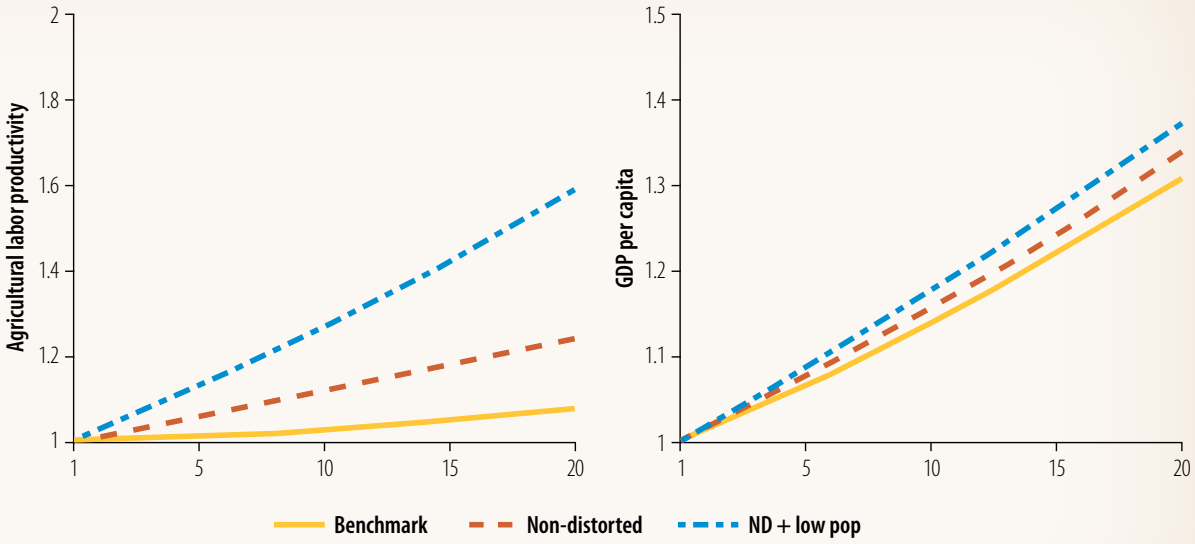
The population in Sub-Saharan Africa grows at a faster pace than in other geographical regions in the world. The region's high population growth rate leads to lags in the structural transformation of the region vis-à-vis other developing areas. This effect is even larger in general equilibrium: a larger population needs to meet greater subsistence requirements and, hence, increases the demand for agricultural goods. To meet this higher demand, selection effects would lead to more people working in agriculture and reduced TFP in the sector (Lagakos and Waugh 2013).

Population growth can have an impact on structural transformation. Chen and Restuccia (2018) compute a counterfactual where wedges driving misallocation are eliminated and population growth is reduced to the rate of the United States (1 percent). The findings are reported in the final row in table 3.7. The shift from a high to a low population growth scenario leads to a sharp acceleration of agricultural productivity (from 1.2 to 2.75 percent per year) and a faster decline in the agricultural employment share. The cumulative impact over 20 years of the lower population growth is plotted in figure 3.16: an accelerated growth rate leads to a level of agricultural productivity that is higher by 40 percent over the two decades when compared with the non-distorted economy with fast-growing population. The shift from high to low population growth

31 Economywide growth consequences from eliminating misallocation are transmitted through two channels: an increase in agricultural productivity growth, and the composition effect through structural transformation (Chen and Restuccia 2018).

Population growth has an impact on structural transformation: lowering the rate of population growth raises agricultural productivity

FIGURE 3.16: Dynamic Effects of Misallocation in Ethiopian Agriculture



Source: Chen and Restuccia 2018.

Note: The figure reports agricultural productivity and GDP per capita for 20 years (both normalized to one in the first period). Real GDP is calculated in the model using the price in the first period. The red solid line represents the benchmark economy with distortions; the blue dashed line represents the economy without distortions; and the black dashed line is the economy without distortions and with lower population growth. GDP = gross domestic product; ND = no distortions.

leads to a decline in the prices of agricultural goods and reduces the incentives and profits associated with learning. Despite the countervailing effect of fewer farmers learning, agricultural productivity grows at a substantially faster pace in the equilibrium economy without distortions and lower population growth.

Adoption of New Technologies and Practices

The dynamic impact of alleviating land frictions on agricultural productivity through policies that foster land rentals is likely to be transmitted through the adoption of new technologies and investments in fertilizers, tractors, and animals.[32] Chen, Restuccia, and Santaeulalia-Llopis (2017) examine the impact of land market rentals on the extensive and intensive margins of technology adoption.

Table 3.8, panel a, reports the effect of land rental on the likelihood of Ethiopian farmers adopting a given technology—say, fertilizers, livestock, and tractors—while controlling for farm productivity relative to the economywide average (that is, the extensive margin). Farmers who rent land are more likely to use fertilizers and livestock than those without rental land. That is not the case for farms with non-market rentals. The probability of using tractors in agricultural production is not higher among farms with (market or non-market) land rentals.

Table 3.8, panel b, exploits the time dimension of the survey of farmers to estimate the impact of land rentals on the intensive margin of technology adoption. Conditional on having adopted the technology in period 1 (2013/14 wave), the analysis assesses the impact of land rentals on the

32 The 2013/14 survey of farmers in Ethiopia reveals that 51.1 percent of farmers use fertilizers, 62 percent use livestock in agricultural production, and 4.9 percent use (owned or rented) tractors (Chen, Restuccia, and Santaeulalia-Llopis 2017).

intensity of technology use in period 2 (2015/16 wave). An increase in land rentals generates greater intensity of fertilizer use, while the effects of land rentals on the intensity of use of livestock or tractors are not significant along the intensive margin. These findings are explained partly by the small plot size and restrictive rental markets for capital assets in Ethiopia. The positive relationship between fertilizers and agricultural productivity is likely to be independent of the size of the cultivated plot. However, that is not the case for tractors, livestock, and other sizable capital goods, which are more likely to render a positive payoff at larger operational scales (Chen 2018).

TABLE 3.8: Effects of Land Rental Markets on Technology Adoption in Ethiopia

a. Extensive margin: Probit specification

	Fertilizers	Livestock	Tractors
Land rentals (d_i)	0.469	0.595	-0.136
	(0.060)	(0.068)	(0.104)
Non-market rentals (d_{ni})	-0.460	-0.536	-0.013
	(0.087)	(0.094)	(0.156)
Observations	2,887	2,887	2,887
Pseudo R**2	0.03	0.11	0.01
Added inference $(d_i) + (d_{ni})$	0.008	0.059	-0.150
Prob. > F	0.912	0.443	0.264
Change in prob. (%)	18.3	20.6	-1.3

b. Intensive margin: Difference-in-difference specification

	Fertilizers	Livestock	Capital
Land rentals (d_z)	0.234	-0.131	-0.006
	(0.099)	(0.086)	(0.089)
Non-market rentals (d_{nz})	0.012	-0.011	0.005
	(0.121)	(0.108)	(0.114)
Observations	2,421	2,214	4,628
R**2	0.31	0.28	0.43
Added inference $(d_z) + (d_{nz})$	0.246	-0.142	-0.001
Prob. > F	0.025	0.148	0.992

Source: Chen, Restuccia, and Santaeulalia-Llopis 2017.

Note: Panel a reports the results of a probit specification; panel b reports the results of a difference-in-difference specification. Each specification is estimated for different measures of technology adoption: fertilizer use, livestock use in agricultural production per unit of labor, and tractors per unit of labor. For the difference-in-difference specification, we use capital per unit of labor. The regressions are accuracy weighted by the number of households in each zone. Standard deviations are in parentheses. Panel a uses the Ethiopia Integrated Surveys on Agriculture (ISA) 2013/14 data, and panel b uses the Ethiopia ISA panel 2013/14 and 2015/16 waves.

BOX 3.1: Measurement Issues in Human Capital

Human capital plays a pivotal role in the progress and development of nations. The neoclassical model specifies technology as a production function augmented by human capital. It is typically estimated using country-level data (Mankiw, Romer, and Weil 1992). Endogenous growth models argue that there is an additional effect of human capital that goes beyond the static effect on output levels. Increasing human capital will raise the rate of innovation and, hence, enhance the growth rate of productivity. The benefits of human capital accumulation are not necessarily restricted to the recipients but may spillover to other individuals. The positive externalities from education can be transmitted through different channels: educated workers may increase the productivity of less educated workers, spillover effects from the accumulation of knowledge or technical progress, and a higher incidence of learning in an environment with higher human capital. Finally, human capital investment tends to have external social effects. Greater educational attainment is associated with better public health, lower crime, and greater social cohesion, among others (Sianesi and van Reenen 2003).

Historically, educational attainment has been an important driver of long-term income growth. During 1270–2010, education accounted for 59 percent of the annual average per capita rate of

BOX 3.1: *Continued*

growth of 0.5 percent (Madsen and Murtin 2017). However, the empirical literature has failed to produce robust evidence on the impact of human capital for a large cross-section of countries at the aggregate level—and, notably, for Sub-Saharan Africa. As a result, general conclusions have led to growing skepticism on its stellar role in boosting growth and productivity (Pritchett 2001). One of the reasons behind this lack of success is the methodological issues in the definition, measurement, and comparison of skills and competencies over time and across countries (De La Fuente 2011).

Measures of education used to examine the relationship between human capital and growth at the aggregate level are affected by several problems (Sianesi and van Reenen 2003): (a) they solely focus on formal educational attainment and do not account for other aspects of human capital, such as on-the-job training, experience, and learning by doing; (b) the quality of education is rarely accounted for; (c) different types of education have differential economic impacts; and (d) school enrollment rates might not appropriately capture the flow of investment in human capital or its stock. In the case of the empirical literature for Sub-Saharan African countries, there has been little focus on tertiary education (Bloom et al. 2014). The growth effects of education in Sub-Saharan Africa are smaller than those in other developing countries, likely due to lower quality of schooling (Glewwe et al. 2014). For these reasons, human capital is a multidimensional concept and its measurement is not a trivial task.

Human capital can be proxied by physical or monetary indicators. Physical indicators of human capital consist of variables that capture the quantity and quality of education and indicators that capture health (Campbell and Ungor 2018). Commonly used proxies for quantity are years of schooling (attained or completed) and school enrollment rates at different levels of formal education. Measurement of the quality of education has been more latent; however, proxies that are commonly used are Mincerian education returns, scores on achievements tests such as the Programme for International Student Assessment, or other cognitive skill measures. Hanushek and Woessmann (2012) find that a one standard deviation increase in the value of cognitive skills in a country's workforce is associated with an annual growth per capita that is higher by approximately 2 percentage points. Health has also been used as a proxy of human capital, due to its correlation with education and productivity. It is typically proxied by survival rates or life expectancy. Healthier people tend to be better workers, since they can work longer and stay focused (Weil 2007).

Appendix

I. Country Classification by Resource Abundance in Sub-Saharan Africa

Resource-rich countries		Non-resource-rich countries		
Oil	Metals & minerals			
Angola	Botswana	Benin	Ghana	Senegal
Chad	Congo, Dem. Rep.	Burkina Faso	Guinea-Bissau	Seychelles
Congo, Rep.	Guinea	Burundi	Kenya	Somalia
Equatorial Guinea	Liberia	Cabo Verde	Lesotho	South Africa
Gabon	Mauritania	Cameroon	Madagascar	Sudan
Nigeria	Namibia	Central African Republic	Malawi	Eswatini
South Sudan	Niger	Comoros	Mali	Tanzania
	Sierra Leone	Côte d'Ivoire	Mauritius	Togo
	Zambia	Eritrea	Mozambique	Uganda
		Ethiopia	Rwanda	Zimbabwe
		Gambia, The	São Tomé and Príncipe	

Note: Resource-rich countries are those with rents from natural resources (excluding forests) that exceed 10 percent of gross domestic product.

II. Country Classification by Income in Sub-Saharan Africa

Low-income countries		Lower-middle-income countries	Upper-middle-income countries	Higher-income countries
Benin	Malawi	Angola	Botswana	Seychelles
Burkina Faso	Mali	Cabo Verde	Equatorial Guinea	
Burundi	Mozambique	Cameroon	Gabon	
Central African Republic	Niger	Congo, Rep.	Mauritius	
Chad	Rwanda	Côte d'Ivoire	Namibia	
Comoros	Senegal	Ghana	South Africa	
Congo, Dem. Rep.	Sierra Leone	Kenya		
Eritrea	Somalia	Lesotho		
Ethiopia	South Sudan	Mauritania		
Gambia, The	Tanzania	Nigeria		
Guinea	Togo	São Tomé and Príncipe		
Guinea-Bissau	Uganda	Sudan		
Liberia	Zimbabwe	Eswatini		
Madagascar		Zambia		

Note: The list is from the World Bank list of economies, June 2018 (FY19).

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