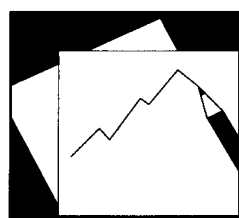


Africa's Rising Exposure to China: How Large are Spillovers Through Trade?



IMF Working Paper

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African Department

Africa's Rising Exposure to China: How Large Are Spillovers Through Trade?**Prepared by Paulo Drummond and Estelle Xue Liu¹**

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Abstract

The rapid growth in China's domestic investment in recent decades has generated a large appetite for global goods, including from sub-Saharan Africa (SSA). This paper estimates the impact of changes in China's investment growth on SSA's exports. Although rising trading links with China have allowed African countries to diversify their export base across countries, away from advanced economies, they have also led SSA countries to become more susceptible to spillovers from China. Based on panel data analysis, a 1 percentage point increase (decline) in China's domestic investment growth is associated with an average 0.6 percentage point increase (decline) in SSA countries' export growth. This impact is larger for resource-rich countries, especially oil exporters. These effects could be mitigated, however, to the extent that countries can reorient their exports.

JEL Classification Numbers: C2, F4, O1

Keywords: China, sub-Saharan Africa, investment, trade, spillover, panel data, econometrics

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I. INTRODUCTION

China has become a major development partner of sub-Saharan Africa (SSA), as its trade, investment, and aid ties with the region have increased remarkably in recent years.² China's real GDP has grown by an average of 10 percent a year in the past decade, and so has its need to import an entire range of products—minerals, farm products, timber, and oil—to satisfy the fast pace of domestic investment, which increased fivefold in the same period. Its investment as a share of GDP increased from 34 percent in 2000 to 46 percent in 2012. China is now the largest single trading partner for SSA. Its stock of foreign direct investment (FDI) reached about US\$16 billion in 2011; and China has stepped up its financial assistance to the region, including by announcing a credit line of US\$20 billion to Africa during the latest conference of the Forum on China-Africa Cooperation (FOCAC) in 2012.³ The increasing role of China in SSA reflects China's increasing share as a major player in world trade and its historic reorientation toward new markets that started in the last decade, including toward SSA countries (IMF, 2011).

Many existing studies focus on whether China's larger involvement in Africa benefits or hurts the region overall. While some scholars and African policymakers have claimed that more trade between China and SSA has benefited the region (Chaponnière, 2009; Ajakaiye and others, 2009; Renard, 2011), others have warned about losses owing to greater exposure to commodity price fluctuations and reduced demand for African production because of competition from China (Ademola, Bankole, and Adewuyi, 2009).

Few studies, however, attempt to quantify the impact of China's domestic economic development on Africa's trade and economic growth. Among the studies that attempt to quantify China's impact on the global economy, Ahuja and Nabar (2012) argue that a 1 percentage point slowdown in investment in China is associated with a reduction of global growth of just under 0.1 of a percentage point. Arora and Vamvakidis (2010) find positive spillover impact of China's growth on the world and this impact has increased in the recent decades: a 1 percentage point increase in China's growth is associated with an average 0.5 percentage point increase in the growth of other countries. In Africa, Ademola, Bankole, and Adewuyi (2009) analyzed trade patterns between China and Africa both at the aggregate Africa and at the national level. They conclude that African countries that gain from trade with China are oil exporters; ore and metal exporters; cotton exporters; and log timber exporters.

The broad aims of this paper are to shed light on this rising exposure of SSA economies to China, and to quantify trade spillovers from China's domestic economic development to SSA economies. We focus on China's domestic investment, a driver of economic growth and a key factor behind its growing demand for imports. We analyze how China's domestic investment affects its demand from its trading partners and the characteristics of the most affected countries in SSA.

² See IMF (2011).

³ FOCAC (2012), "The Fifth Ministerial Conference of the Forum on China-Africa Cooperation Beijing Action Plan (2013–2015)."

The paper finds that China's domestic investment has a positive and significant impact on its imports from SSA, and this impact is larger than on the rest of the world as a whole.

A 1 percentage point increase in China's domestic investment growth is associated with an average 0.6 percentage point increases in SSA's export growth rate. The impact is large for resource-rich countries in SSA, in particular, oil exporters. For the top five resource-rich SSA countries ranked by exports to China as a share of GDP—Angola, South Africa, the Republic of Congo, Equatorial Guinea, the Democratic Republic of the Congo—a 1 percentage point increase in China's domestic investment growth is accompanied by a 0.8 percentage point increase in their export growth rate. These effects could be smaller, to the extent that SSA is able to redirect their trade in the event of a slowdown in China.

The paper is organized as follows. Section II presents stylized facts of China's trade engagement in Africa. Section III analyzes the economic impact of China's trade engagement with SSA economies. Section IV presents a panel data analysis relating China's domestic investment to its demand from the world and SSA countries. Section V discusses results, conducts a robustness check and examines characteristics of SSA countries whose exports are affected the most by China's domestic investment. Section VI concludes.

II. THE RISING EXPOSURE OF AFRICA TO CHINA: STYLIZED FACTS

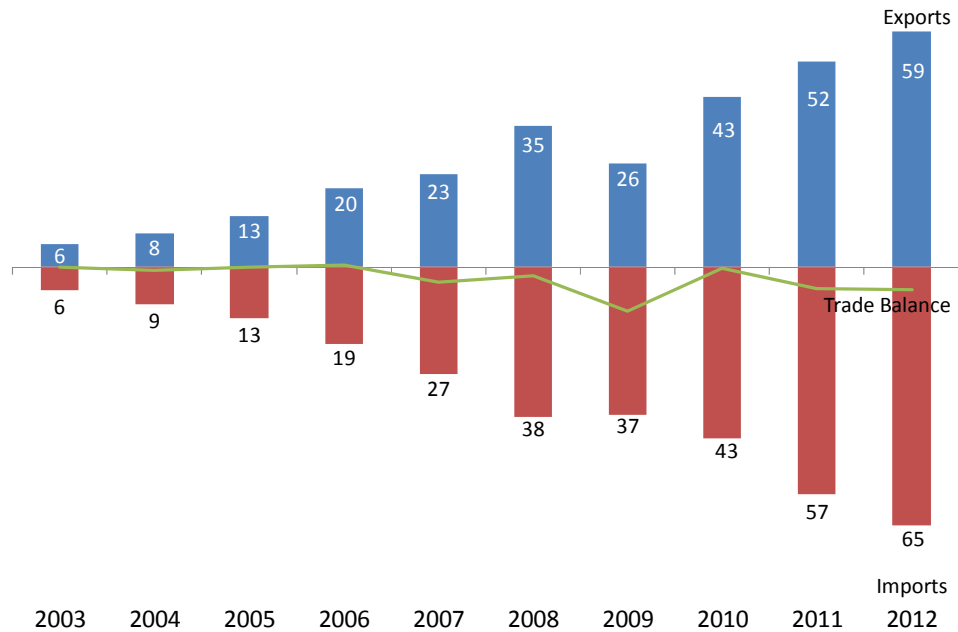
In the past decade, China has become a major economic partner of SSA countries. Chinese presence in SSA, in particular that carried out by the Ministries of Foreign Affairs and Trade and backed by several state-owned banks, has focused on bilateral relationships with African governments.⁴ A broad range of private-sector players from China have also been involved in China-SSA relations, including multinationals, small businesses, traders, migrants, and Chinese local governments through their own firms. The increase in China-SSA relations is not unexpected, because both China and SSA have maintained significantly faster economic growth than advanced economies in the last decade. The increasing relations also reflect the natural resource intensity in China's economic growth and SSA's natural resources abundance. This trend is likely to continue in the coming years.

The gradual liberalization of the Chinese economy and unprecedented high growth in China and SSA economies were accompanied by strong growth in trade between China and SSA (Figure 1), by an average of 30 percent a year since 2003. Overall, SSA has maintained a slight trade deficit with China, with fewer than half of the countries, notably Angola, the Republic of Congo, the Democratic Republic of the Congo, Zambia, and Equatorial Guinea, having a trade surplus with China.

⁴ These banks include Exim Bank (China Export-Import Bank), China Development Bank (CDB), and China Export and Credit Insurance Corporation (SINOSURE).

Figure 1. Sub-Saharan Africa's Increasing Trade with China, 2003–2012

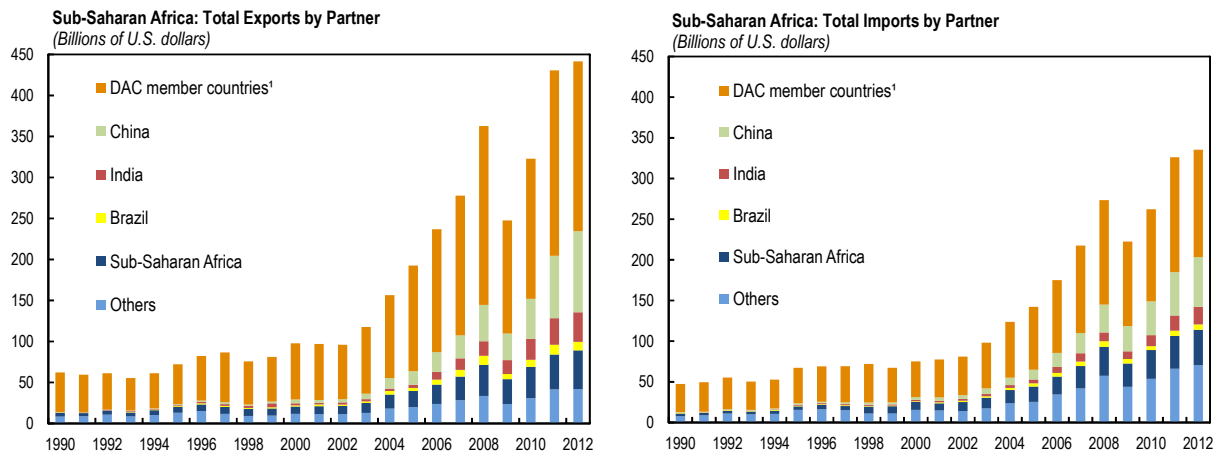
(Billions of U.S. Dollars)



Sources: IMF, Direction of Trade Statistics.

In addition, the increase in trade with China has outpaced SSA's trade with other regions, both in terms of exports and imports. By 2011, China became the largest individual trading partner for the region, with the share of SSA trade with China reaching approximately 16 percent, rising from negligible shares in the 1990s (Figure 2). At the same time, traditional SSA trading partners' shares, as measured by the Organisation for Economic Co-operation and Development's (OECD's) Development Assistance Committee (DAC) member countries, have fallen steadily.

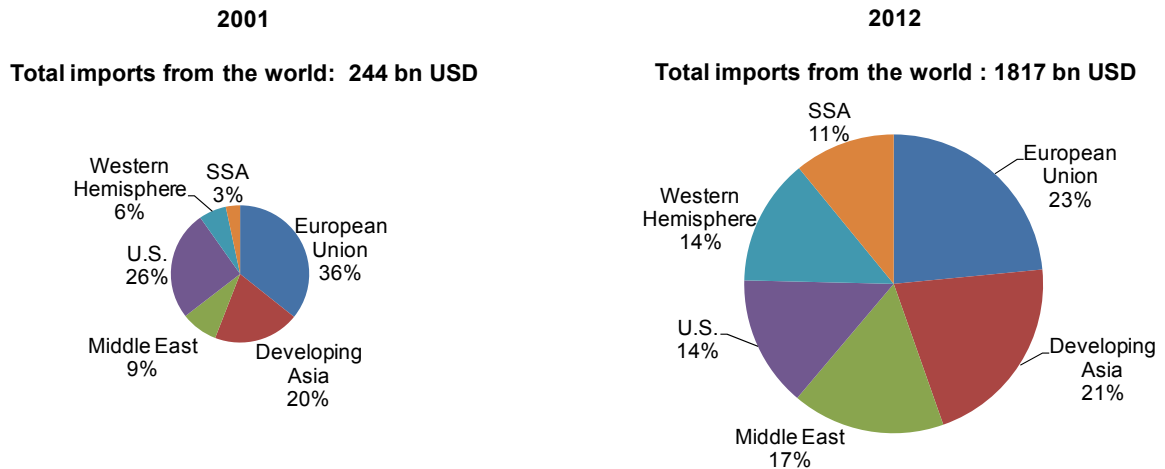
Figure 2. Sub-Saharan Africa: Trade by Partners, 1990–2011



Source: IMF, Direction of Trade Statistics.

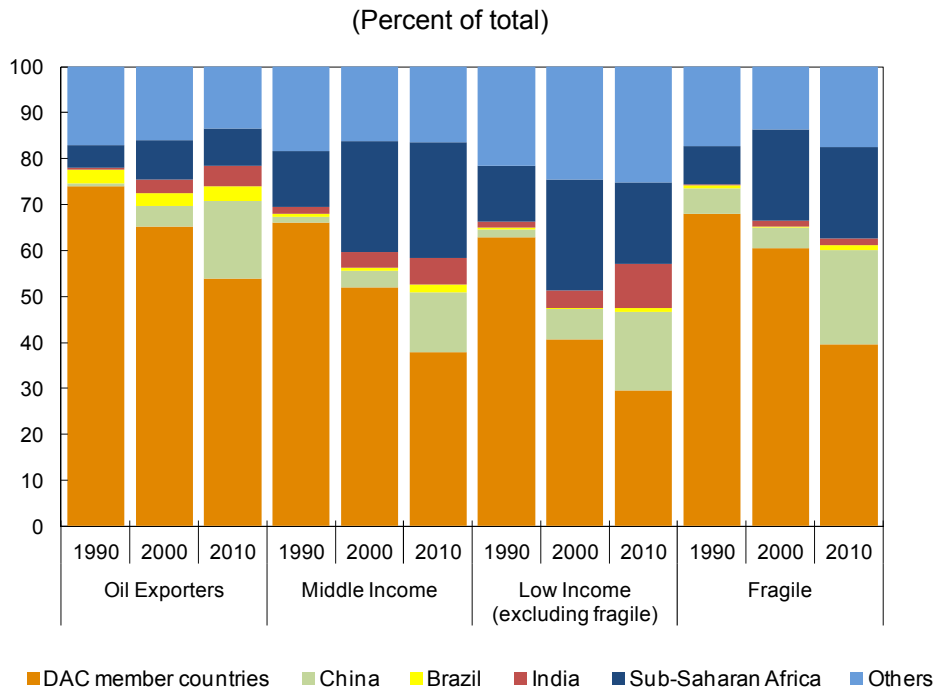
¹DAC member countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States

SSA has also become a non-negligible source of China's imports, though the share remains small compared with other regions (Figure 3). Africa's and non-U.S. Western Hemisphere's shares of China's imports have grown at the fastest rate, mirroring declining shares of the European Union (EU) and the United States (U.S.). The high level of China's trade with other Asian countries is partially explained by components trade, because the region has formed substantive production value chains in Asia in the past decades, but not yet in Africa (Renard, 2011).

Figure 3. China's Imports by Region

Source: IMF, Direction of Trade Statistics.

The trade expansion toward China is broadly homogeneous across the various SSA groups of countries (oil exporters, low-income countries, middle-income countries). All subgroups are exporting a lower share of their products to traditional DAC partners than they were in 1990, and all are now exporting more to China (Figure 4).

Figure 4. Sub-Saharan Africa: Imports by Partner

Source: IMF, Direction of Trade Statistics.

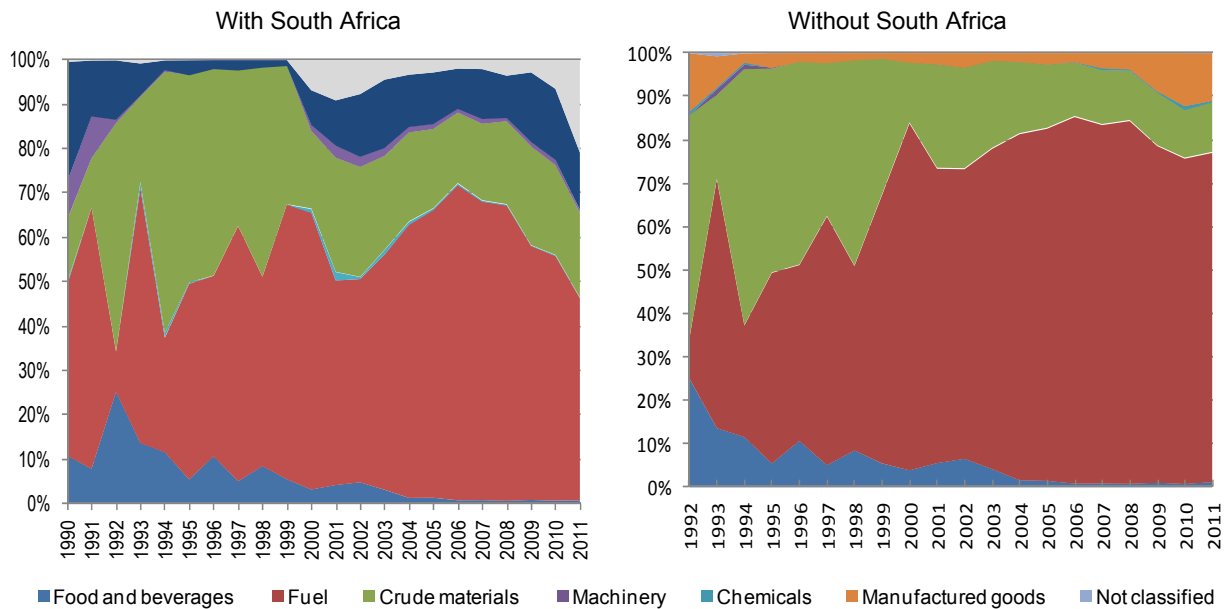
¹DAC member countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States.

China's trade with SSA is highly concentrated in a few countries. Five countries, Angola, South Africa, the Democratic Republic of the Congo, the Republic of Congo, and Equatorial Guinea account for about 75 percent of SSA's exports to China. Six countries, South Africa, Nigeria, Liberia, Ghana, Benin, and Angola account for more than 80 percent of SSA's total imports from China.

In addition, China's trade with SSA is highly concentrated in products. SSA's exports to China are heavily concentrated in primary products, mainly oil. By 2008 (before the short-lived collapse in oil prices in 2009), mineral fuel and related materials accounted for about 45 percent of all SSA exports to China, and for more than 84 percent of exports if we exclude South African exports (Figure 5). SSA's exports to China are more concentrated in oil and gas than exports to DAC countries, because SSA countries tend to export more food, beverages, and manufactured goods to DAC countries than to China, whether excluding South Africa or not. The main drivers of SSA's imports from China are machinery, chemicals, and manufactured goods, although there is some heterogeneity across trading partners (Figure 6). Compared with DAC countries as import origins, SSA imports from China are more concentrated on manufactured products.

Figure 5. Sub-Saharan Africa: Exports to China by Product Composition

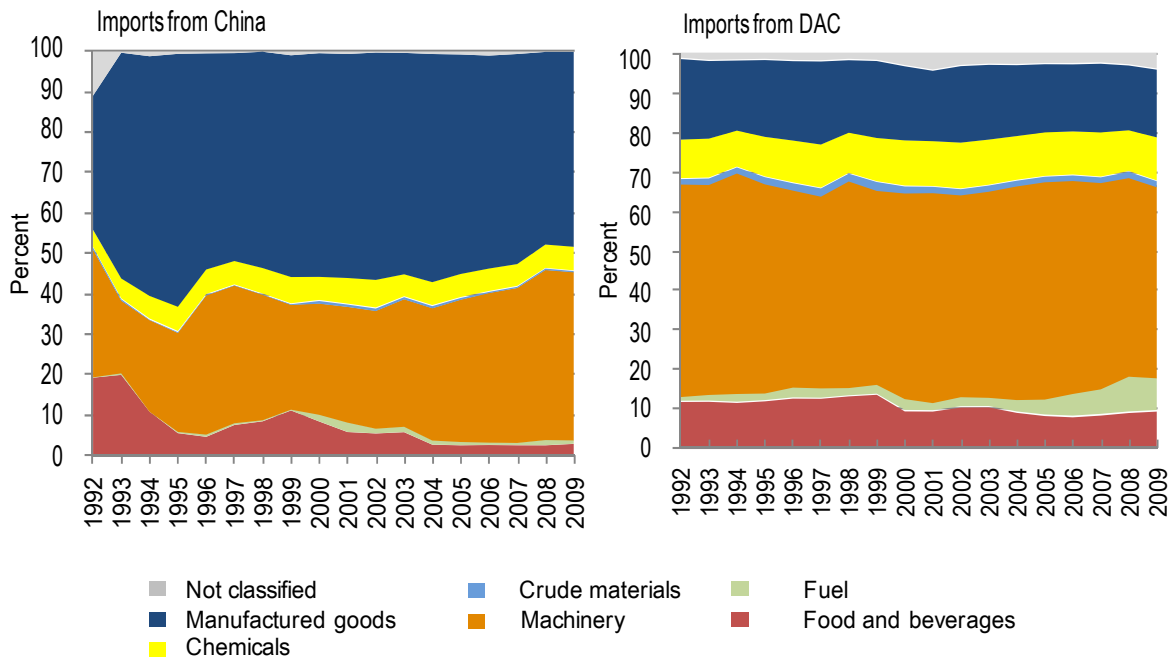
(Percentage of total exports)



Source: United Nations' Comtrade Statistics database.

Figure 6. Sub-Saharan Africa: Imports by Product Composition

(Percentage of total)



Source: United Nations' Comtrade Statistics database.

III. ECONOMIC IMPACT THROUGH TRADE: AN OVERVIEW

SSA economies are increasingly exposed to China's domestic development through direct trade expansion. In the last decade, SSA's exports to China have risen as a share of GDP for many countries (Figure 7). The higher export exposure to China is a result of two developments. First, the region experienced an expansion in international trade, including its trade with China. Between 2001 and 2012, as the value of SSA's exports expanded by an annual average of about 15 percent, exports to China accounted for about 2.5 percentage points of that growth.⁵ Second, SSA's exports to China outpaced its export growth across many countries in SSA (Figure 8). The contribution of China to SSA's export growth has become even more important in recent years, explaining about 30 percent of total export growth in 2005–12.

⁵ Equatorial Guinea's exports to China have decreased in the last decade, likely as the result of the export ban on logs since 2008 and the rapid increase of hydrocarbon exports to the United States and Europe. China is the largest importer of timber from Equatorial Guinea.

Figure 7. SSA Exports to China as percent of GDP, 2001 and 2011

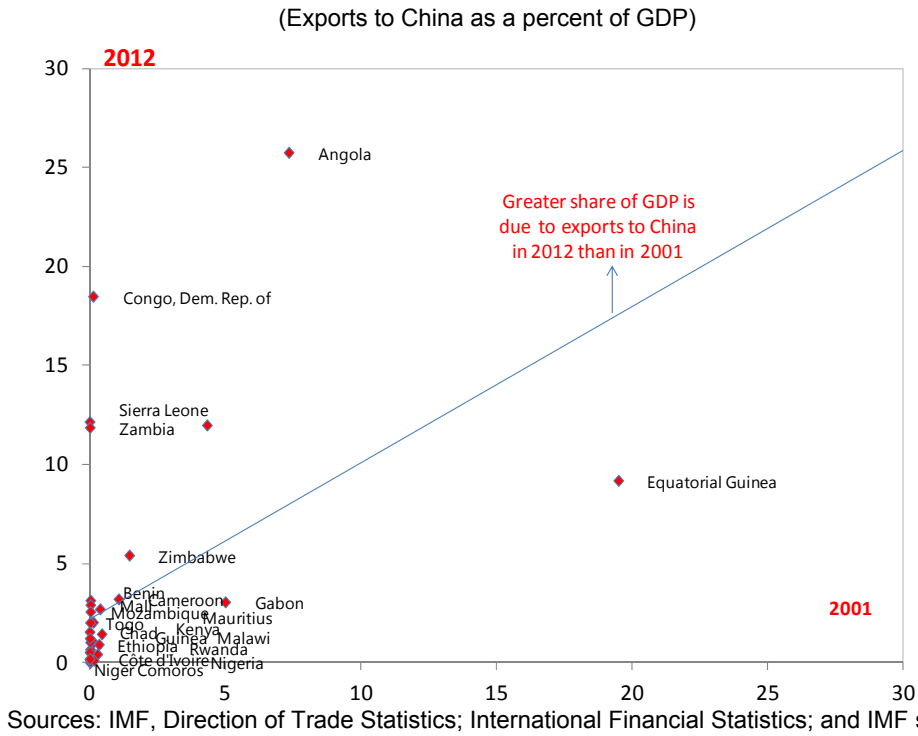
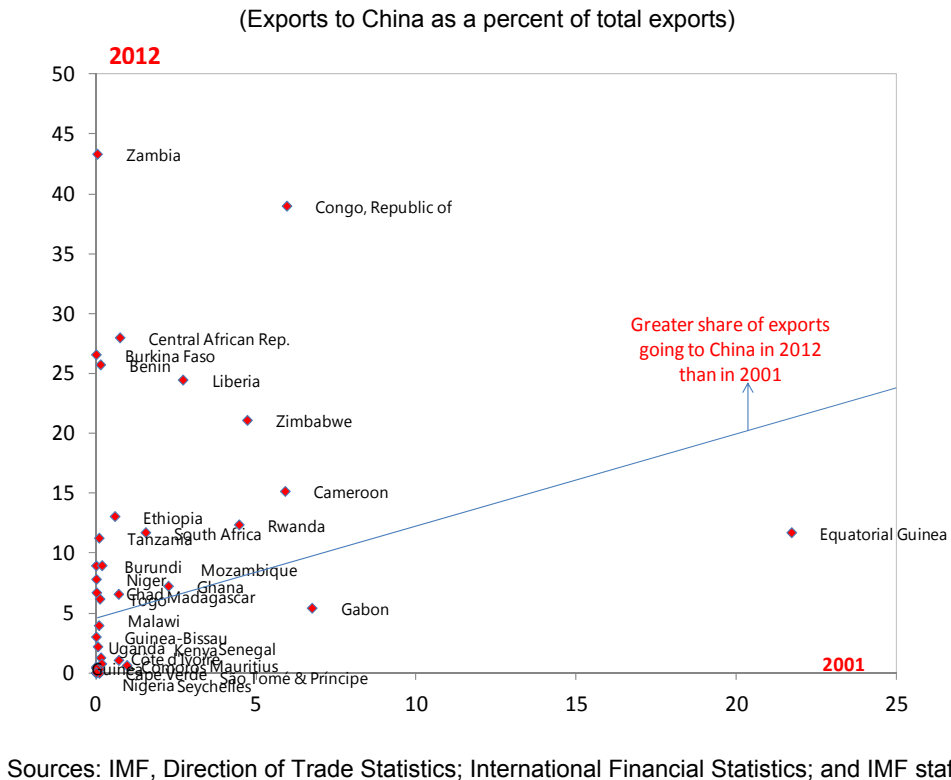


Figure 8. SSA Exports to China as percent of Total Exports, 2001 and 2011



SSA's larger exposure to China helped shield the region from the global financial crisis. Trading with China helped to reduce the region's historically high export volatility. Although in 2000–04 advanced economies contributed an annual average of 6.6 percentage points to SSA's export growth, they contributed less than 1 percentage point in 2005–09 because of their economic deceleration. Yet, China increased its contribution to the growth of SSA exports from 3 percentage points in 2000–04 to 5 percentage points in 2005–09, thus providing a cushion for SSA exports and SSA economies in general during the crisis. Indeed, SSA growth suffered only a mild and short-lived deceleration despite the recession in advanced economies.

China's economic growth has an indirect impact on SSA's trade through commodity price effects. As net exporters of commodities, some SSA countries are affected by fluctuations in economic activity in China through its effect on world commodity prices, because China is the dominant importer for various commodities. Roache (2012) suggests that aggregate activity in China has a significant and persistent impact on the price of oil and some base metals, and this impact is rising, while shocks to consumption have no effect on commodity prices. Yu (2011) pointed out that China's high investment rates, supporting industrialization and urbanization, have contributed to a large and growing demand for commodities. Rapid growth in China was a major contributor to the boom in commodity prices in the 2000s. For instance, China accounted for about 20 percent of world consumption of non-renewable energy resources (oil, gas, coal), 23 percent of major agricultural crops (corn, cotton, rice, soybeans, wheat), and 40 percent of base metals (copper, aluminum) in 2010. Overall, China's demand for base metals dominates its total demand for world commodities (Table 1).

China also affects SSA economies through its exports. More than half of SSA economies maintain a trade deficit with China, with large imports in manufacturing goods. Import-related gains reflect lower import prices and access to a wider variety of final and intermediate goods. At the same time, imports from China can lead to adjustment pressures on African manufacturing sectors as a result of Chinese competition.

IMF (2012a) suggests that several economies in the world are exposed to China's investment led-growth and face growing risks from a deceleration in investment in China. Specifically, a 1 percentage point slowdown in investment in China is associated with a reduction of global growth of just under one-tenth of a percentage point. The impact is about five times larger than in 2002. The economies most vulnerable to an investment slowdown in China are regional supply chain economies and commodity exporters with relatively less diversified economies. SSA's terms of trade could also be affected by the impact of China on international prices of manufacturing products. Thus, growth in manufacturing-producing trading partners such as China may benefit the region by weakening price inflation in the basket of SSA's imports.

Table 1. China's Commodity Imports as a Share of Total Imports by Major Economies, 2011

Commodity Categories	% of major economies*	Major SSA Exporters
Chromium ores and concentrates	91.3	Ghana; Rwanda; South Africa
Manganese ores and concentrates (including manganiferous iron ores)	77.5	Gabon; South Africa
Copper	54.9	Congo, Republic of; Gabon; Congo, Dem. Rep. of Côte
Nickel	39.0	Zimbabwe
Titanium ores and concentrates	33.3	Mozambique; South Africa
Natural uranium and its compounds; alloys, dispersions (including cermet)	30.4	Angola; Equatorial Guinea
Zinc	26.0	Congo, Republic of; Congo, Dem. Rep.
Tin	19.6	
Platinum	19.6	Côte d'Ivoire; South Africa; Ghana; Zimbabwe
Petroleum oils, crude	17.3	Angola; Cameroon; Chad; Côte d'Ivoire; Equatorial Guinea; Gabon; Ghana; Nigeria; South Africa
Diamonds excl. industrial	9.5	Angola; Botswana; Congo, Rep. of; Congo, Dem. Rep. of; Ghana; Mauritius; South Africa; Tanzania
Aluminium	9.2	Cameroon; Côte d'Ivoire; Mozambique; South Africa
Tobacco, tobacco manufacturer	8.3	Angola; Malawi; Mozambique; Senegal
Natural gas	5.3	Mozambique

Source: UN Comtrade, IMF country teams.

*For the purpose of this table, major economies include Euro area, UK, US, Japan and China.

IV. SPILLOVERS FROM CHINA TO AFRICA: PANEL REGRESSIONS

In this section, we take a closer look at the potential spillovers of China to Africa to shed light on the impact of China's demand from SSA. We use fixed-effect dynamic panel regressions to assess the impact of China's fixed assets investment (FAI) on sample countries' exports to China as a share of each country's GDP. We include 174 countries from all regions in 1995–2012, subject to data availability.⁶

We focus on China's investment growth instead of GDP because China's import demand has been driven by investment. And an investment slowdown is a risk worth looking at in the process of China's rebalancing toward a consumption-driven economy. In addition, investment growth displays greater variation than GDP growth and partly as a result, produces a better fit for the regressions.

Our benchmark model is as follows:

$$\% \Delta Export_{it} = \alpha + \beta_1 \% \Delta C_{rFAI_t} + \beta_2 \% \Delta Export_deflator_{it} + BX_{it} + \beta_i + \beta_t + \varepsilon_{it}, \quad (1)$$

⁶ See Appendixes I and II for country lists.

$\% \Delta Export_{it}$ is the annual percentage change of each country's exports, in U.S. dollars. We focus on the nominal value of total exports to capture both the volume and price impacts on each country's exports from China's domestic development. In addition, we use exports of goods and services instead of exports of goods, because trade in goods generates trade in services, especially in the sectors of telecommunication and transportation.

$\% \Delta Export_deflator_{it}$ is the annual percentage change of each country's export prices, in US dollars.

$\% \Delta C_{rFAI_t}$ is the annual percentage change of China's domestic fixed asset investment (FAI), deflated by China's annual consumer price inflation.

X_{it} is a range of time- and country-varying controls, including population growth and annual growth of real GDP in the United States. U.S. real GDP growth is used as a proxy for growth in the advanced economies.⁷ β_i and β_t capture country fixed effects and individual year effects, and $\varepsilon_{i,t}$ is the error term.

Data on China's fixed asset investments are from the CEIC China database, which is in domestic currency terms.⁸ The reason to use domestic currency for China's domestic investment is to exclude the impact of variation in the Chinese yuan on sample countries' exports to China. Data on China's inflation come from Haver, and the rest of the data are from the International Monetary Fund's World Economic Outlook database. All the country-specific data are in U.S. dollar terms. Table 2 presents statistics for these variables.⁹

⁷ We also used the GDP growth rate in the euro area as an alternative control variable; the results are similar.

⁸ We used equivalent terms in U.S. dollar value as robustness check. The results are similar.

⁹ Note that each variable is tested for unit root using the Fisher's test, with the null hypothesis against the alternative that at least one series (country) in the panel is stationary. The null hypothesis is rejected for all variables.

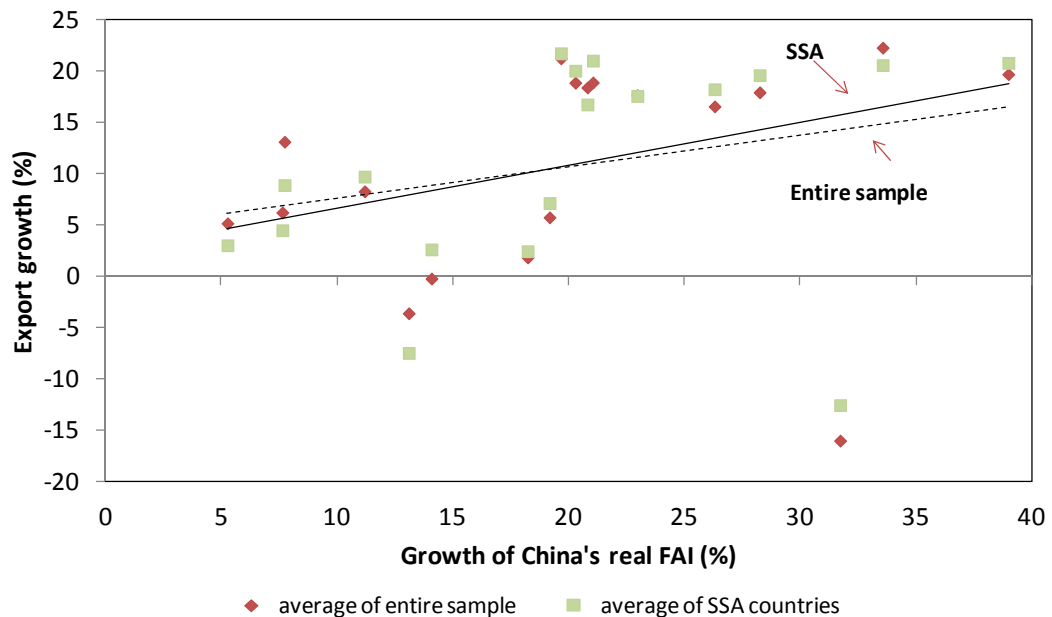
Table 2. Data Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
%ΔExport	3062	11.8	21.9	-60.8	440.4
%ΔC_rFAI	3132	20.0	9.1	5.3	39.0
%ΔExport_deflator	2891	5.1	14.7	-58.3	169.5
%Δpop	3037	1.5	1.9	-18.6	33.3
%ΔRGDP_US	3132	2.4	1.8	-3.1	4.8

β_1 is expected to be positive, because higher domestic investment growth in China tends to lead to higher demand from China to the world, with an impact through both the price and volume of exports. A causal interpretation seems warranted because China's domestic investment is mainly driven by domestic factors rather than other countries' exports. β_2 is expected to be positive, because higher export prices tend to increase a country's exports value, assuming the price elasticity of each country's export demand is lower than one.

Figure 9 shows that there is a positive correlation between the growth of China's FAI and the growth rate of total exports for the countries in the sample (worldwide, red diamonds; SSA, green squares)

Figure 9: China's Real Fixed Asset Investments Growth vs. World Export Growth, 1995–2012



Sources: Haver Analytics, International Financial Statistics, and IMF staff.

Note: Each dot represents a combination of average growth of exports across SSA countries (green square) or the entire sample for 174 countries (red diamonds) against growth of China's real FAI, for each year. Thus, there are 17 observations for SSA and 17 for the entire sample.

V. RESULTS

A. Benchmark Results

Table 3 summarizes the main model specifications estimated during 1995–2012 for the entire sample. In this section, we make the simplified assumption, to be relaxed later, that the impact of China’s FAI growth is the same for all countries in the sample. We use the export value instead of the volume as the dependent variable to capture also the indirect impact of China on world commodity prices, and thus the current dollar value of the exports. The results suggest that there is a statistically significant impact of China’s real FAI growth on individual countries’ export growth. On average, a 1 percentage point increase in China’s real FAI growth is associated with a 0.58 percentage point increase in countries’ export growth. As predicted, a positive shock to the export deflator change leads to higher export growth. Also, when the export deflator enters into the regression, the impact of China’s real FAI growth remains statistically significant but becomes smaller, at 0.27 points. This suggests that a large share of impact from China is channeled through prices. U.S. real GDP growth is also positively correlated with the export growth rate (Table 3).

Table 3. Benchmark Results: All

Variables	%ΔExport	
	(1)	(2)
%Δ China's real FAI	0.583***	0.268***
	(0.04)	(0.03)
%ΔExport_deflator		0.74***
		(0.02)
%ΔPOP	0.172	0.318*
	(0.20)	(0.16)
%ΔRGDP_US	4.411***	2.5892***
	(0.20)	(0.16)
Constant	-23.730***	-9.304***
	(1.62)	(1.30)
Observations	3,027	2,828
R-squared	0.17	0.52
Number of countries	174	162

Standard errors in parentheses

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

Note: all the regressions include time dummies, which are not shown in the table.

Countries, 1995–2012

Table 4 presents the regression results obtained by restricting the sample to the SSA countries alone. The results suggest that China's real FAI has a positive, and somewhat higher, impact on SSA countries export growth than was the case for the worldwide sample. A 1 percentage point increase in China's FAI growth is associated with an average 0.64 percentage point increase in SSA countries' export growth. Conversely, a 1 percentage point slowdown in China's FAI growth would reduce SSA countries export growth accordingly. However, for countries able to reorient their exports to other destinations, the impact of China's slowdown could be lower.

Table 4. Regression Results: SSA Countries, 1995–2012

Variables	%ΔExport	
	(1)	(2)
%Δ China's real FAI	0.635***	0.360***
	(0.08)	(0.07)
%ΔExport_deflator		0.557***
		(0.03)
%ΔPOP	1.188**	1.284**
	(0.60)	(0.50)
%ΔRGDP_US	3.653***	2.047***
	(0.48)	(0.41)
Constant	-25.04***	-10.746**
	(4.12)	(3.51)
Observations	679	646
R-squared	0.13	0.42
Number of countries	39	37

Standard errors in parentheses

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

B. How Have Spillovers Varied in Recent Years?

To analyze the extent to which the impact of China's real FAI growth may have changed over time, we add an interaction term between a time dummy and China's real FAI growth. The results presented in Table 5 suggest that the impact of a given shock to China's real FAI growth on world exports may have decreased slightly overtime. This time-varying impact is also statistically significant for SSA countries, but the magnitude of the decline is small.

Table 5. Panel Regressions: Interaction with Time Dummy

Variables	%ΔExport			
	Entire sample		SSA	
%Δ China's real FAI	1.347*** (0.09)	0.641*** (0.07)	1.410*** (0.20)	0.94*** (0.17)
Time*%Δ China's real FAI	-0.075*** (0.01)	-0.036*** (0.01)	-0.077*** (0.02)	-0.057*** (0.02)
%ΔExport_deflator		0.726*** (0.02)		0.550*** (0.03)
%ΔPOP	0.215 (0.20)	0.336* (0.15)	1.140* (0.59)	1.257** (0.50)
%ΔRGDP_US	3.935*** (0.20)	2.401*** (0.17)	3.156*** (0.49)	1.707*** (0.41)
Constant	-37.529*** (2.14)	-16.223*** (1.76)	-34.046*** (5.27)	-21.399*** (4.51)
Observations	2,991	2828	679	646
R-squared	0.20	0.52	0.15	0.43
Number of countries	173	162	39	37

Standard errors in parentheses

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

C. How Do Spillovers Vary Among SSA Countries?

Because SSA countries differ greatly in terms of export pattern and domestic economic development, it is helpful to study the varying impacts of China's FAI growth on export growth of different SSA countries. Table 6 explores this issue by dividing countries according to their composition of exports. The results confirm that China's investments and its associated higher demand for natural resources, including oil, translate into higher export growth for SSA countries. The overall impact of China's real FAI growth on resource-rich countries' export growth is not statistically different from the impact on oil exporters' export growth. However, when the export deflator enters the regression, the coefficient for China's real FAI growth is larger for oil exporters, suggesting China has a larger impact on oil-exporting countries' export volume.

Table 6. Panel Regression: SSA Countries by Exporter Type

Variables	%ΔExport					
	All		Resource rich		Oil Exporters	
%Δ China's real FAI	0.635***	0.360***	0.786***	0.413***	0.79***	0.455***
	(0.09)	(0.07)	(0.14)	(0.10)	(0.26)	(0.16)
%ΔExport_deflator		0.557***		0.712***		0.831***
		(0.03)		(0.04)		(0.06)
%ΔPOP	1.188**	1.284**	2.374	5.888***	3.883	8.424***
	(0.60)	(0.50)	(1.96)	(1.51)	(4.68)	(2.84)
%ΔRGDP_US	3.652***	2.047***	5.621***	2.153***	7.779***	1.436
	(0.48)	(0.41)	(0.79)	(0.58)	(1.46)	(0.99)
Constant	-25.035**	-10.746**	-38.808***	-24.488***	-47.188**	-25.24**
	(4.12)	(3.51)	(8.04)	(5.69)	(17.12)	(10.45)
Observations	679	646	291	275	120	120
R-squared	0.13	0.42	0.19	0.63	0.22	0.72
Number of countries	39	37	11	16	7	7

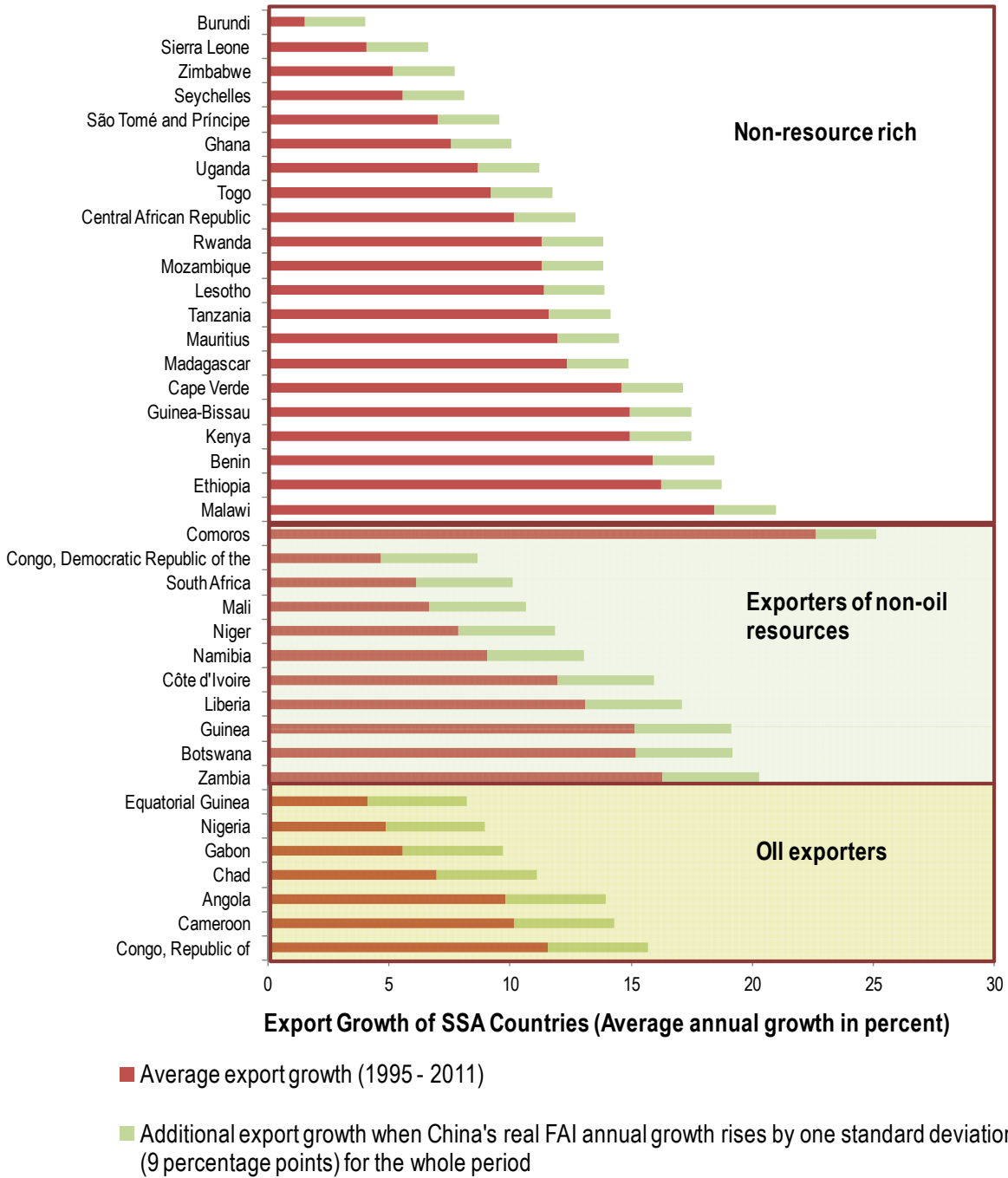
Standard errors in parentheses

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

Figure 10 illustrates the potential impact on each SSA country's export growth in the event of a one standard deviation increase in China's FAI growth rate (or about 9 percentage points).¹⁰ We look into three relevant country groupings: non-resource rich, exports of non-oil resources, and oil exporters. According to the chart, a one standard deviation increase in China's real FAI growth rate could almost double the oil exporters' export growth rate. This also suggests that, if China's real FAI growth slows by one standard deviation, the export growth of oil exporters' and exporters of non-oil resources could be more than halved. However, this impact could be mitigated by countries' ability to reorient their exports to other destinations.

¹⁰ China's FAI annual growth rate varied between 6 percent and 56 percent in 1995–2011; the standard deviation was about 9 percentage points (Table 2)

Figure 10. Impact of China’s Investment on SSA Countries’ Export Growth



VI. CONCLUDING REMARKS

China's rapid investment-driven economic growth has affected SSA economies via trade, investment, aid, and loans. China-SSA trade, in particular, has increased significantly in the last decade and across the region. Although larger exports to China have helped drive economic growth in the region, they have also led to greater exposure to China. Increasing trade links with China have allowed SSA countries to diversify their export destinations, away from advanced economies; but by the same token, these links have led these countries to become more susceptible to spillovers from China.

The paper finds that China's domestic investment growth has a positive and significant impact on SSA countries' exports. A 1 percentage point increase in China's domestic investment growth is associated with an average 0.6 percentage point increase in SSA countries' export growth. This impact includes the impact of China's domestic investment on the value of exports of SSA countries. When controlling for sample countries' export price growth, the impact of China's domestic investment halved. The overall impact is somewhat larger for resource-rich countries in SSA, especially oil exporters, which are more susceptible to China's growth slowdown. For these countries, a 1 percentage point increase (decline) in China's domestic investment growth tends to translate into a 0.8 percentage point increase (decline) in their export growth rate. These effects could be mitigated by countries' ability to reorient their exports to other destinations.

REFERENCES

- Ademola, O., Abiodun Bankole, and Adeolu Adewuyi, 2009, “China-Africa Trade Relations: Insight from AERC Scoping Studies,” *European Journal of Development Research*, A.O., Vol. 21, No. 4, pp. 485–505.
- Ahuja, Ashvin, and Malhar Nabar, 2012, “Investment-Led Growth in China: Global Spillovers,” IMF Working Paper WP/12/267 (Washington: International Monetary Fund).
- Ajakaiye, O., R. Kaplinsky, M. Morris, and F. N’Zue, 2009, “Seizing Opportunities and Confronting the Challenges of China–Africa Investment Relations: Insights from AERC Scoping Studies,” Policy Issues Paper, No. 2 (Nairobi: African Economic Research Consortium).
- Arora, V., and A. Vamvakidis, 2011, “China’s Economic Growth: International Spillovers,” *China & World Economy*, Vol. 19, Issue 5, pp. 31–46.
- J. Chaponnière, 2009, “La dérive des continents: l’Asie et l’Afrique” (“The Drift of Continents: Asia and Africa”), *Futuribles*, No. 350, March, pp. 5–26.
- International Monetary Fund, 2011, “Sub-Saharan Africa’s Engagement with Emerging Partners: Opportunities and Challenges,” Chapter 3, *Regional Economic Outlook: Sub-Saharan Africa*, October (Washington: International Monetary Fund).
- International Monetary Fund, 2012a, “China,” Chapter IV, Spillover Report, July.
- International Monetary Fund, 2012b, “Macroeconomic Policy Frameworks for Resource-Rich Developing Countries” *Background Paper* (Washington: International Monetary Fund).
- Renard, Mary-Françoise, 2011, “China’s Trade and FDI in Africa,” African Development Bank Group Working Paper No. 126 (Tunis).
- Roache, S.K., 2012, “China’s Impact on World Commodity Markets” IMF Working Paper No. 12/115 (Washington: International Monetary Fund).
- Wang, J., 2007, “What Drives China’s Growing Role in Africa?” IMF Working Paper No. 07/211 (Washington: International Monetary Fund).
- Yu, Y., 2011, “Identifying the Linkages Between Major Mining Commodity Prices and China’s Economic Growth: Implications for Latin America,” IMF Working Paper No. 11/86 (Washington: International Monetary Fund).

APPENDIX I. SUB-SAHARAN AFRICA IN THE SAMPLE¹

SSA Countries	Resource Rich	Oil Exporters	Fragile	Low Income	Middle Income
Angola	Yes	Yes	Yes		Yes
Benin				Yes	
Botswana	Yes				Yes
Burundi			Yes	Yes	
Cameroon	Yes	Yes			Yes
Cape Verde					Yes
Central African Republic			Yes	Yes	
Chad	Yes	Yes		Yes	
Comoros			Yes	Yes	
Congo, Democratic Republic of the	Yes		Yes	Yes	
Congo, Republic of	Yes	Yes	Yes		Yes
Côte d'Ivoire	Yes		Yes		Yes
Equatorial Guinea	Yes	Yes			
Ethiopia				Yes	
Gabon	Yes	Yes			Yes
Ghana					Yes
Guinea	Yes		Yes	Yes	
Guinea-Bissau			Yes	Yes	
Kenya				Yes	
Lesotho					Yes
Liberia	Yes		Yes	Yes	
Madagascar				Yes	
Malawi				Yes	
Mali	Yes			Yes	
Mauritius					Yes
Mozambique				Yes	
Namibia	Yes				Yes
Niger	Yes			Yes	
Nigeria	Yes	Yes			Yes
Rwanda				Yes	
São Tomé and Príncipe					
Seychelles					Yes
Sierra Leone			Yes	Yes	
South Africa	Yes				Yes
Tanzania				Yes	
Togo			Yes	Yes	
Uganda				Yes	
Zambia	Yes				Yes
Zimbabwe			Yes	Yes	

¹ See IMF (2012b), Appendix I, for the list of resource-rich countries, and IMF (2011) for the sample of SSA oil exporters.

APPENDIX II. NON-SUB-SAHARAN COUNTRIES

Afghanistan	Guyana	Papua New Guinea
Albania	Haiti	Paraguay
Algeria	Honduras	Peru
Antigua and Barbuda	Hungary	Philippines
Argentina	Iceland	Poland
Armenia	India	Portugal
Australia	Indonesia	Qatar
Austria	Iran	Romania
Azerbaijan	Iraq	Russia
Bahamas, The	Ireland	Samoa
Bahrain	Israel	Saudi Arabia
Bangladesh	Italy	Senegal
Barbados	Jamaica	Singapore
Belarus	Japan	Slovak Republic
Belgium	Jordan	Slovenia
Belize	Kazakhstan	Solomon Islands
Bhutan	Kiribati	Spain
Bolivia	Korea	Sri Lanka
Bosnia and Herzegovina	Kosovo	Sudan
Brazil	Kuwait	Suriname
Brunei Darussalam	Kyrgyz Republic	Swaziland
Bulgaria	Lao P.D.R.	Sweden
Cambodia	Latvia	Switzerland
Canada	Lebanon	Syria
Chile	Libya	Tajikistan
Colombia	Lithuania	Thailand
Costa Rica	Luxembourg	Timor-Leste
Croatia	Macedonia, FYR	Tonga
Cyprus	Malaysia	Trinidad and Tobago
Czech Republic	Maldives	Tunisia
Denmark	Malta	Turkey
Djibouti	Mauritania	Turkmenistan
Dominica	Mexico	Tuvalu
Dominican Republic	Moldova	Ukraine
Ecuador	Mongolia	United Arab Emirates
Egypt	Montenegro, Rep. of	United Kingdom
El Salvador	Morocco	United States
Estonia	Myanmar	Uruguay
Fiji	Nepal	Uzbekistan
Finland	Netherlands	Vanuatu
France	New Zealand	Venezuela
Georgia	Nicaragua	Vietnam
Germany	Norway	Yemen
Greece	Oman	
Grenada	Pakistan	
Guatemala	Panama	