

CHAPTER 5

Assessing the Global Value Chain Links between Asia and Sub-Saharan Africa

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Introduction

Since 2000, China and other Asian countries such as Bangladesh, Cambodia, India, and Vietnam have become important trade and investment partners with Sub-Saharan African countries. Some of these Asian trading partners have lost their own growth momentum, and there have also been concerns that their economic engagement may have reduced Sub-Saharan African countries' local industrial capability, causing them to be more dependent on Asian economies. For Sub-Saharan Africa to tap into the trade-and-growth spiral, it needs to diversify—away from some of the traditional high-income economy trading partners, whose growth is slowing, and away from commodity exports, which often exhibit high price volatility.

The growing middle class in and increasing demand from Asia, especially East Asia, along with the shifting structure of global value chains (GVCs), may offer new economic opportunities for Sub-Saharan Africa. This chapter assesses the value chain links between Sub-Saharan Africa and Asia, summarizing the current status and future potential of African products in emerging Asia. The study offers insights on how the region's economies can expand their market potential and advance their industrialization and economic diversification agendas.

Key Findings

One of the lessons from this chapter's detailed sector-level analysis of Sub-Saharan African countries' exports to Asia is that each nation in the region has its own experience of trading with Asia—in terms of structural change, diversification dynamics, and specialization patterns. Although exports from Sub-Saharan Africa to Asia remain highly concentrated in

resource-intensive products such as petroleum, minerals, metals, and primary goods, there are a few exceptions. For instance, Ethiopia and Tanzania did relatively well in diversifying their export portfolios during the boom of exports to Asia. Nigeria, by contrast, has remained highly specialized in natural resources, in particular petroleum and crude oil, before and after the export boom to Asia.

We also find that each country has a distinct key trading partner in Asia. Contrary to the prevailing view, we find that China is not always the dominant trading partner for individual African nations, despite its status as the leading trading partner of the entire African continent. For instance, India is emerging as an increasingly important trading partner of Sub-Saharan Africa. Since 2005, India has become the largest export destination in Asia for Ghana, Nigeria, and Tanzania. Pakistan has been the top destination for Kenya's exports.

Structure of This Chapter

After documenting policy-relevant stylized facts, we examine the determinants of successful participation in GVCs and inclusive growth. The first part of the chapter examines how the sharply increasing engagement of Asian economies in Sub-Saharan Africa has changed the pattern of the region's exports—in the composition of destination countries (for example, between high-income countries and low- and middle-income countries); in factor intensity (for example, capital, skill, and raw material intensity); and in various value chain measures (for example, length of production, upstreamness, and domestic value added). We show that exports to Asia are positively correlated with exports to the rest of the world, using a panel data set of trade and foreign direct investment for 46 countries in Sub-Saharan Africa from 2000 to 2015.

The findings also show that increased exports from a Sub-Saharan African country to Asia, whether proportionally or in absolute value, do not appear to divert exports away from other destination countries. On the contrary, increased exports to Asia tend to raise exports to the rest of the world as well as to other African countries. We discuss the reasons why increased exports to a country (or region) would raise exports to other countries. More exports to a country usually come with more imports from the same country or other countries. The literature has shown that imports of foreign intermediate inputs can increase a firm's productivity, which in turn raises its sales and profits. So the idea of trade diversion based on a zero-sum concept is an exceptional situation. There are many reasons why a country's GVC participation with a fast-growing region can serve as an engine of growth.

The second part of the chapter assesses how Asian economic engagement changes Sub-Saharan Africa's trade patterns. First, we examine the effects of participating in Asian value chains on the factor content of exports. Using a panel data set of trade for 46 Sub-Saharan African countries over 16 years

(2000–15), we show that economic engagement with Asian GVCs raised the capital intensity of Sub-Saharan African exports but had no effect on their skill content. Such an increase in the capital content, or the so-called capital deepening, of exports was mostly driven by increased exports of capital-intensive goods to Asia rather than to the rest of the world.

By contrast, imports from Asia as a whole do not seem to have played a significant role in changing the factor intensity of African exports, although imports from Bangladesh, Cambodia, China, India, and Vietnam (“Asia-5” hereafter) have done so. Moreover, there is no evidence that increased exports to Asia led to more specialization in the resource intensity of exports, debunking the claim that Asian economic engagement in the continent is mainly resource-seeking and can potentially lead to deindustrialization.

Second, we also examine the determinants of the relative successes of some nations in Sub-Saharan Africa in terms of participation in GVCs, through Asia’s economic engagement. Using panel data on trade at the country-industry level, we find that Asian economic engagement in the continent is associated with an increase in “upstreamness,” a measure proposed by Antràs et al. (2012) to capture the shares of exports coming more from upstream than from downstream industries.¹ Such a process was accompanied by a reduction in the length of the production chains, implying that fewer stages and countries are now involved in the production of exported goods from Sub-Saharan Africa. However, there is no evidence that trade with Asia affects the domestic content of Sub-Saharan African nations’ exports.

Third, the study also sheds some light on the policy implications for Sub-Saharan African nations to move up the value chain by participating in Asian GVCs. The results show that proportionally more *exports to* Asia, but not *imports from* Asia, can help Sub-Saharan African nations move up the value chains. The effects are particularly strong among Sub-Saharan African countries that have access to the sea but are relatively poorer than their landlocked peers in the region.

In addition, corruption appears to impede not only trade but also the benefits from GVC participation. These results suggest that export orientation toward Asia as a policy helps reduce poverty, and anticorruption policies can help enhance economic efficiency. Surprisingly, the general measure of a country’s rule of law does not affect the relation between countries’ trade with Asia and their GVC outcomes.

Key Trade Patterns and GVC Links between Sub-Saharan Africa and Asia

This section examines the patterns of exports from Sub-Saharan Africa as well as from five selected countries in the region (the “Africa-5”: Ethiopia, Ghana, Kenya, Nigeria, and Tanzania) for which we have survey data that

allow for granular GVC analyses. To this end, we aggregate the BACI trade data² from the Harmonized System (HS) 6-digit level to the HS 2-digit level (96 categories) in order to analyze the top sectors in Sub-Saharan Africa and the Africa-5 nations that sold to Asia in 2005 and 2015.

Top Products Exported from Sub-Saharan Africa to Asia

Focusing on the top 10 export sectors to Asia from Sub-Saharan Africa and each of the Africa-5 countries, it appears that, in both 2005 and 2015, the top sector by export value was minerals, fuels, and mining. The entire continent exported about \$16.1 billion worth of goods from that sector to Asia in 2005, which increased to \$54.5 billion in 2015.³ The next sectors are natural or cultured pearls (valued at \$4.1 billion and \$16.3 billion in 2005 and 2015, respectively) and ores, slag, and ash (valued at \$2.7 billion and \$9.0 billion in 2005 and 2015, respectively). Both years exhibit a clear pattern: exports from Sub-Saharan Africa to Asia remained heavily concentrated in raw materials and primary goods, with mining and fuels always standing at the top.

Figure 5.1 shows the shares of exports from Sub-Saharan Africa to Asia by HS 2-digit sector, for 2005 and 2015. For clarity, only sectors that contributed at least 1 percent of total Sub-Saharan African exports to Asia in each respective year (or either year) are shown. Sixteen sectors (of 96) satisfied this 1 percent rule; that is, each of the 16 sectors accounted for over 1 percent of Sub-Saharan Africa's exports to Asia in *either* year.

The minerals, fuels, and mining sector (HS 27) stands out, accounting for 41 percent of Sub-Saharan Africa's total exports to Asia in 2005 and increasing to 48 percent by 2015. The second most prominent export sector in both years is natural or cultured pearls (HS 71), whose share of Sub-Saharan Africa's exports to Asia also rose, from 11 percent in 2005 to 14 percent by 2015. Among the 16 sectors shown, six increased in shares of Sub-Saharan African exports to Asia.

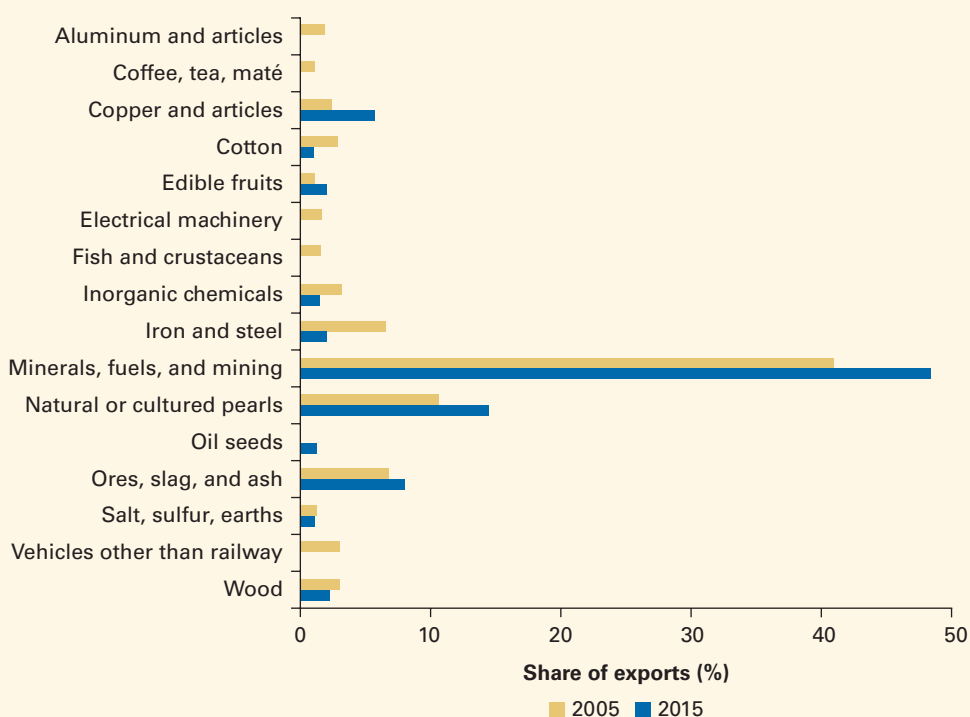
In addition to the top two sectors mentioned, the others include copper and copper articles (HS 74); edible fruits (HS 08); ores, slag, and ash (HS 26); and oil seeds (HS 12). The other 10 sectors declined in their shares in Sub-Saharan Africa–Asia exports. The sector that experienced the largest drop in export share between 2005 and 2015 in percentage terms is iron and steel (HS 72), which dropped from 7 percent to 2 percent. Other sectors that experienced a significant drop in export shares include aluminum and articles (HS 76), electrical machinery (HS 85), and fish and crustaceans (HS 03).

Top Exports from Africa-5 Countries to Asia

Ethiopia

Among Ethiopia's aggregate exports to Asia in 2005 and 2015, only 10 sectors (of 96 HS 2-digit sectors) made up at least 1 percent of exports in either year (figure 5.2). Two sectors stand out from the rest: coffee, tea, and maté (HS 09) and oil seeds (HS 12). The coffee sector accounted for 47 percent

Figure 5.1 Sectoral Composition of Sub-Saharan Africa's Exports to Asia, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

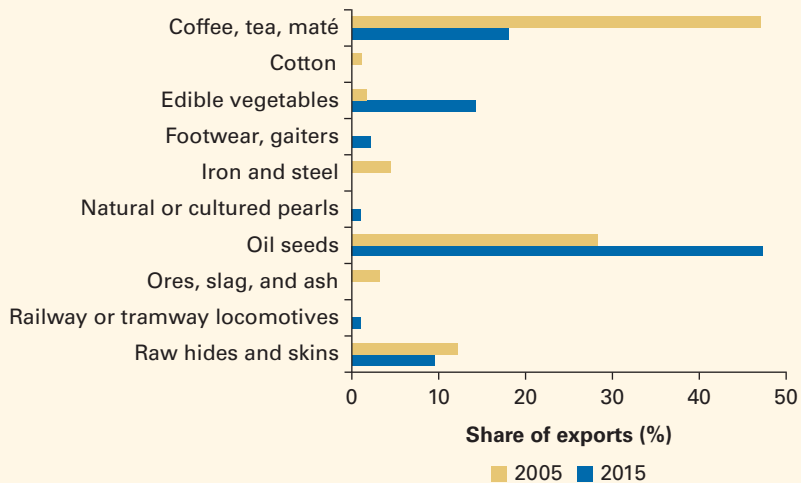
Note: Shares of exports are shown by Harmonized System (HS) 2-digit sector, including only sectors that contributed at least 1 percent of total Sub-Saharan African exports to Asia in each respective year (or either year). Therefore, any sector making up less than 1 percent of exports in either year does not display a bar for that year.

of Ethiopia's total exports to Asia in 2005, but it decreased to only 18 percent in 2015. The oil seed sector instead increased its share in Ethiopia's exports to Asia, from 28 percent to 48 percent. Another notable increase was in the edible vegetables (HS 07) sector, which increased about sixfold over the 10-year period, becoming one of the top three export sectors by 2015.

Three sectors—footwear and gaiters (HS 64), natural or cultured pearls (HS 71), and railway or tramway locomotives (HS 86)—contributed less than 1 percent to Ethiopia's exports to Asia in 2005, but by 2015 they had become significant sectors in the country's exports to Asia. By contrast, another three sectors—cotton (HS 52); ores, slag, and ash (HS 26); and iron and steel (HS 72)—contributed more than 1 percent to Ethiopia's exports to Asia in 2005 but declined to less than 1 percent by 2015.

Overall, the changes in Ethiopia's export patterns are encouraging news. It is also one of the few countries in Sub-Saharan Africa that have shown

Figure 5.2 Sectoral Composition of Ethiopia's Exports to Asia, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) 2-digit sector, including only sectors that contributed at least 1 percent of total Ethiopian exports to Asia in either respective year. Therefore, any sector making up less than 1 percent of exports in either 2005 or 2015 does not display a bar for that year.

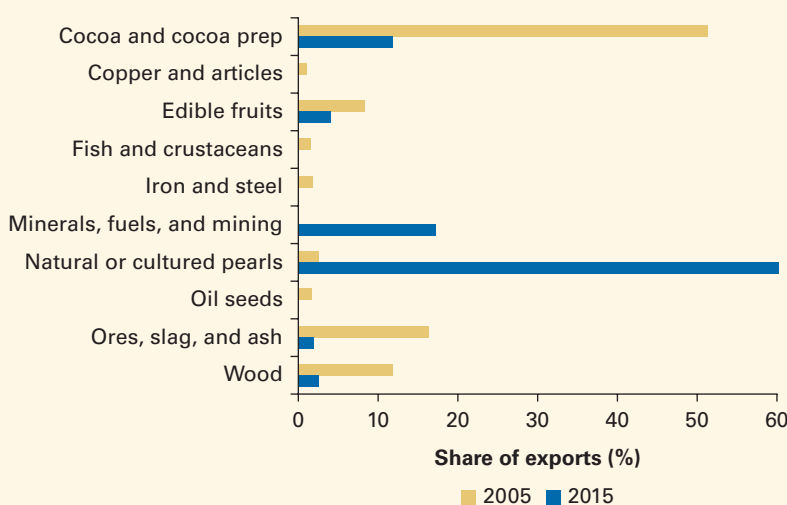
significant improvement in industrialization, at least as revealed in its movement along the GVCs with Asia.

Ghana

Only 10 of Ghana's 96 HS 2-digit sectors made up at least 1 percent of aggregate exports to Asia in either 2005 or 2015. Two sectors that clearly stand out are cocoa and cocoa prep (HS 18) in 2005, and natural or cultured pearls (HS 71) in 2015 (figure 5.3). In 2005, exports from the cocoa sector accounted for over half of Ghana's exports to Asia but declined to only 12 percent by 2015. By contrast, the natural or cultured pearls sector has emerged rapidly. In 2005, it accounted for a mere 3 percent of Ghana's exports to Asia, but it increased tremendously, to 60 percent, in 2015 because of increased demand from India in recent years.

The growth of the natural or cultured pearl sector was so substantial that it crowded out almost all other sectors, causing each of them (except for minerals, fuels, and mining) to decline in their share of Ghana's exports to Asia. Although the dominance of a single sector in a country's export basket appears to be quite common across Sub-Saharan African nations, the substantial switching of the top sector in a matter of 10 years is unique to Ghana.

Figure 5.3 Sectoral Composition of Ghana's Exports to Asia, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) 2-digit sector, including only sectors that contributed at least 1 percent of total Ghanaian exports to Asia in either respective year. Therefore, any sector making up less than 1 percent of exports in either 2005 or 2015 does not display a bar for that year.

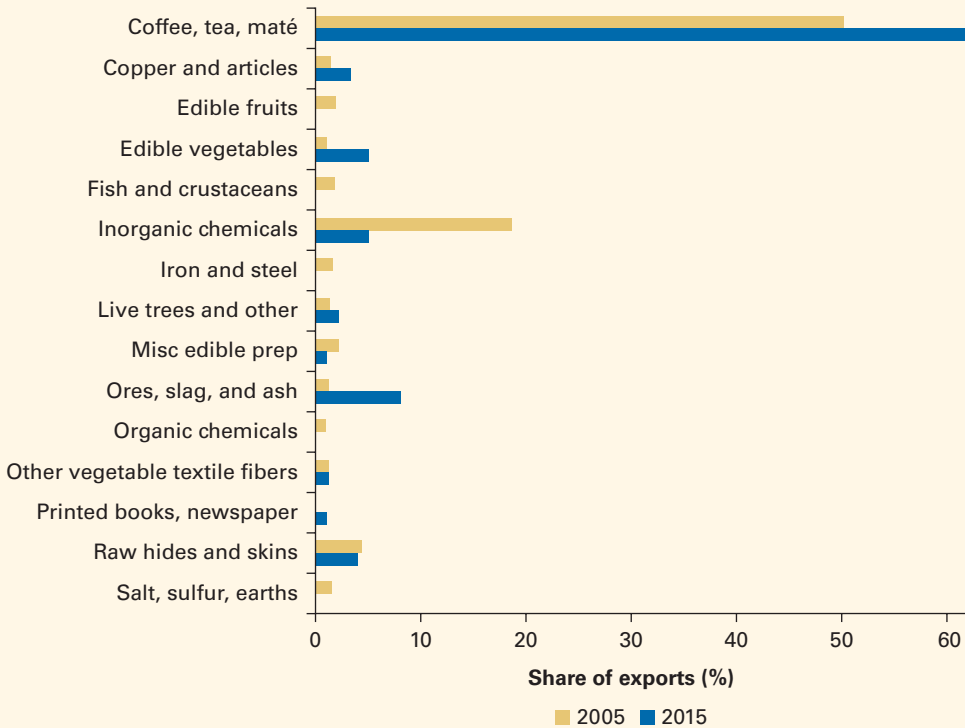
Kenya

Among Kenya's total exports to Asia in 2005 and 2015, 15 of the 96 HS 2-digit sectors made up at least 1 percent in either year, suggesting that Kenya's exports (to Asia) have been more diversified than those of Ethiopia and Ghana. Despite the country's more diversified export basket, the top sector—coffee, tea, and maté (HS09), which already accounted for over half of Kenya's exports to Asia in 2005—continued to grow in absolute value and in share, contributing about 61 percent of the country's exports by 2015 (figure 5.4).

All the other sectors appear to be much less important in Kenya's exports. Inorganic chemicals (HS 28), which was Kenya's second-largest export sector to Asia in 2005, declined from 19 percent to 5 percent of exports in 10 years. The dominance of a single sector in a country's export basket, a common feature in many Sub-Saharan African nations' exports, is particularly strong in Kenya.

Nigeria

Only 6 of Nigeria's 96 HS 2-digit sectors made up at least 1 percent of its total exports to Asia in either 2005 or 2015, suggesting that Nigeria's exports (to Asia) were much more concentrated in a few sectors than those of the four other Africa-5 countries. The top sector—minerals, fuels, and

Figure 5.4 Sectoral Composition of Kenya's Exports to Asia, 2005 and 2015

Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) 2-digit sector, including only sectors that contributed at least 1 percent of total Kenyan exports to Asia in either respective year. Therefore, any sector making up less than 1 percent of exports in either 2005 or 2015 does not display a bar for that year.

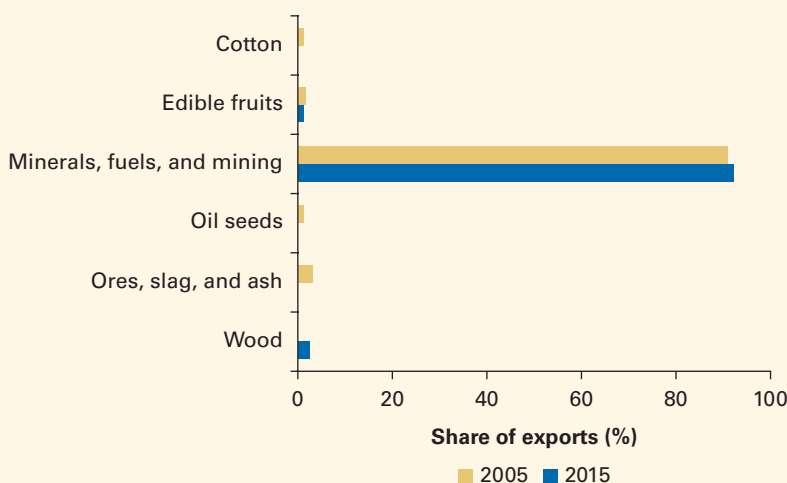
mining (HS 27)—accounted for over 90 percent of Nigeria's exports to Asia in both 2005 and 2015 (figure 5.5). All the other sectors have been much less important to Nigeria's export trade, by definition.

The hyperspecialization of Nigeria's exports in petroleum and oil must be related to its rich endowment of oil. In 2015, only three sectors in Nigeria accounted for more than 1 percent of the country's exports to Asia. Aside from petroleum, they were wood (HS 44) and edible fruits (HS 08). The cotton (HS 52), oil seeds (HS 12), and ores, slag, and ash (HS 26) sectors dropped off the list because they fell below the 1 percent cutoff.

Tanzania

As for Tanzania's changing specialization pattern, 14 of the 96 HS 2-digit sectors made up at least 1 percent of the country's exports in either 2005 or 2015. This suggests that Tanzania's exports (to Asia) have been more diversified than Nigeria's and comparable to those of Ghana and Ethiopia. The more diversified export basket is illustrated not only by the number of

Figure 5.5 Sectoral Composition of Nigeria's Exports to Asia, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

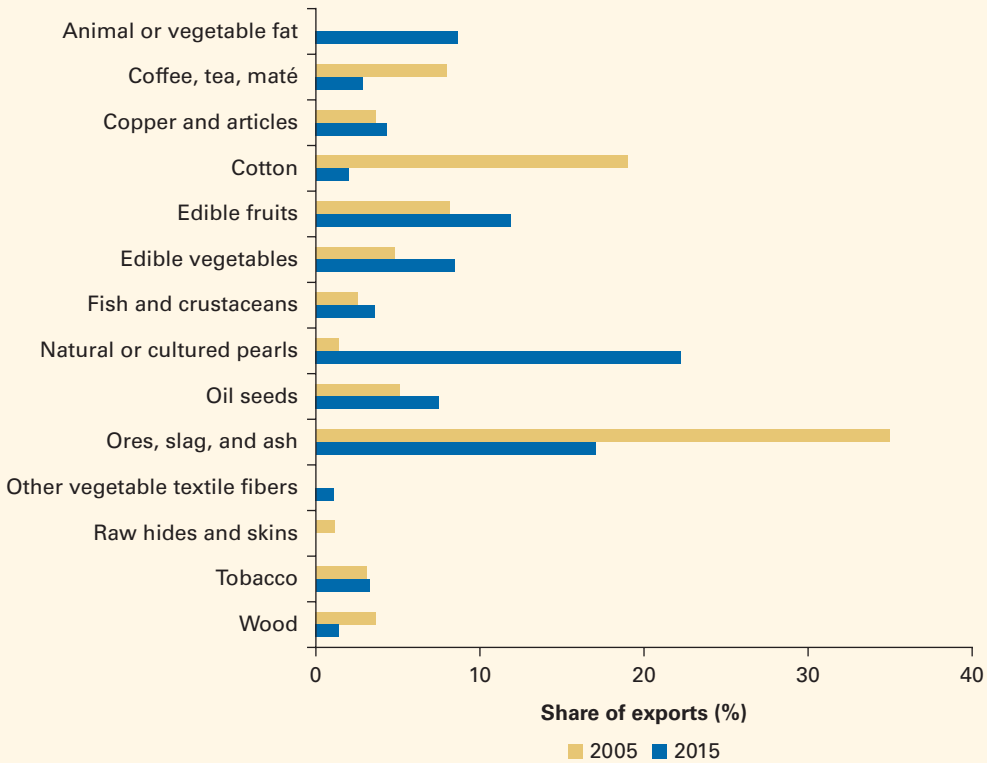
Note: Shares of exports are shown by Harmonized System (HS) 2-digit sector, including only sectors that contributed at least 1 percent of total Nigerian exports to Asia in either respective year. Therefore, any sector making up less than 1 percent of exports in either 2005 or 2015 does not display a bar for that year.

“above 1 percent” sectors but also by the more even distribution of export values across sectors.

The top export sector in 2005—ores, slag, and ash (HS 26)—accounted for 35 percent of Tanzania’s exports to Asia in that year (figure 5.6). But the top sector in 2015—natural or cultured pearls (HS 71)—contributed only about 22 percent to the country’s exports to Asia.

An active process of dynamic reallocation of resources between sectors has contributed to the diversification of Tanzania’s export portfolio between 2005 and 2015. The shares of the raw material sectors (such as ores, slag, and ash) declined substantially, whereas some light manufacturing (such as edible fruits [HS 08] and edible vegetables [HS 07]) became more prevalent sectors in Tanzania’s exports to Asia.

In sum, the Africa-5 countries have been quite heterogeneous in their changing patterns of exports to Asia. Although Sub-Saharan Africa’s exports to Asia, overall, have been concentrated in resource-intensive sectors, there were a few exceptions in the region. Ethiopia and Tanzania did relatively better in diversifying their export portfolios during the export boom (to Asia). Nigeria remained very specialized in natural resource exports, particularly petroleum and crude oil. The econometric assessment section later in this chapter presents regression analyses to identify the relevant policies or economic fundamentals that contributed to the positive changes.

Figure 5.6 Sectoral Composition of Tanzania's Exports to Asia, 2005 and 2015

Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) 2-digit sector, including only sectors that contributed at least 1 percent of total Tanzanian exports to Asia in either respective year. Therefore, any sector making up less than 1 percent of exports in either 2005 or 2015 does not display a bar for that year.

Primary versus Nonprimary Exports from the Africa-5 to Asia

This subsection summarizes the sectoral patterns in terms of the “primary” (extractive) and “nonprimary” (nonextractive) exports to Asia from the entire Sub-Saharan African continent as well as the individual Africa-5 nations. We classify sectors as primary or nonprimary on the basis of the United Nations (UN) *Classification by Broad Economic Categories Rev.5* (UN DESA 2018).

The aggregate value of the region’s primary exports to Asia was \$22 billion in 2005, accounting for 56 percent of Sub-Saharan African exports to Asia that year (table 5.1, panel a). The share was larger than that of primary exports from Sub-Saharan Africa to non-Asian countries, which was 52 percent. Ten years later, in 2015, the share of primary exports from

Sub-Saharan Africa to Asia remained about 55 percent, but the value tripled, to \$63 billion. Among the region's exports to non-Asian countries, primary goods accounted for only 35 percent in 2015, a substantially smaller share than that to Asian destinations.

Ethiopia

The same set of statistics for Ethiopia's exports to Asian and non-Asian countries shows that the share of primary exports in the country's total exports to Asia is significantly smaller than the continent's average.

Table 5.1 Relative Importance of Primary versus Nonprimary Exports from Sub-Saharan Africa and the Africa-5 Countries to Asian and Non-Asian Destinations, 2005 and 2015

Primary or nonprimary, by origin and destination	2005		2015	
	Export value (US\$, millions)	Export share, by destination (%)	Export value (US\$, millions)	Export share, by destination, (%)
<i>a. Africa</i>				
Primary exports to Asia	22,100.00	56	62,600.00	55
Nonprimary exports to Asia	17,100.00	44	50,200.00	45
Primary exports to Non-Asia	139,000.00	52	105,000.00	35
Nonprimary exports to Non-Asia	128,000.00	48	193,000.00	65
<i>b. Ethiopia</i>				
Primary exports to Asia	44.87	16	36.04	5
Nonprimary exports to Asia	227.44	84	689.02	95
Primary exports to Non-Asia	155.49	15	79.89	2
Nonprimary exports to Non-Asia	866.91	85	4,643.30	98
<i>c. Ghana</i>				
Primary exports to Asia	112.86	32	1,133.80	23
Nonprimary exports to Asia	235.63	68	3,874.70	77
Primary exports to Non-Asia	293.15	8	1,025.84	19
Nonprimary exports to Non-Asia	3,245.80	92	4,500.94	81
<i>d. Kenya</i>				
Primary exports to Asia	50.72	11	127.93	16
Nonprimary exports to Asia	399.06	89	665.36	84
Primary exports to Non-Asia	157.58	5	263.98	6
Nonprimary exports to Non-Asia	3,048.19	95	4,183.62	94

(Table continues on next page)

Table 5.1 Relative Importance of Primary versus Nonprimary Exports from Sub-Saharan Africa and the Africa-5 Countries to Asian and Non-Asian Destinations, 2005 and 2015 (*continued*)

Primary or nonprimary, by origin and destination	2005		2015	
	Export value (US\$, millions)	Export share, by destination (%)	Export value (US\$, millions)	Export share, by destination, (%)
<i>e. Nigeria</i>				
Primary exports to Asia	2,682.23	95	9,357.30	66
Nonprimary exports to Asia	139.30	5	4,918.96	34
Primary exports to Non-Asia	35,200.00	89	28,700.00	85
Nonprimary exports to Non-Asia	4,271.35	11	5,128.23	15
<i>f. Tanzania</i>				
Primary exports to Asia	329.48	60	632.11	25
Nonprimary exports to Asia	216.07	40	1,895.78	75
Primary exports to Non-Asia	249.65	14	689.50	17
Nonprimary exports to Non-Asia	1,494.52	86	3,403.65	83

Source: Database for International Trade Analysis (BACI) and staff calculations.

Note: "Primary" products are extractive, as defined by the United Nations' Broad Economic Categories. "Nonprimary" products are nonextractive. Full Sub-Saharan Africa export values are rounded to the nearest 100 million; country export values are rounded to the nearest 10,000.

Only 16 percent of Ethiopia's exports to Asia in 2005 were primary exports, amounting to \$44.9 million worth of goods (table 5.1, panel b). The share declined to 5 percent in 2015.

As for Ethiopia's exports to non-Asian countries, the share of primary goods in total exports is also much smaller than that of other Sub-Saharan African nations as a whole. The share of primary exports from Ethiopia to the rest of the world was only 15 percent in 2005, and it dropped to a mere 2 percent in 2015. In sum, Ethiopia has not been a resource-dependent exporter.

Ghana

Looking at the same set of statistics for Ghana, we see that the share of primary exports in its total exports to Asia is significantly less than the regionwide average. Primary exports made up only 32 percent of Ghana's exports to Asia in 2005, amounting to \$113 million worth of goods (table 5.1, panel c). The share declined to 23 percent in 2015.

As for Ghana's exports to non-Asian countries, the share of primary goods in total exports was much smaller than that of its exports to Asia as well as the corresponding average in Sub-Saharan Africa as a whole.

The share of primary exports from Ghana to the rest of the world was only 8 percent in 2005, increasing to 19 percent by 2015.

In sum, Ghana's pattern of trade in extractive industries is very different from that of Ethiopia. Although Ghana's share of primary exports to Asian markets was larger than Ethiopia's in 2005, it has since declined. On the contrary, its share of extractive exports was small for exports to the rest of the world in 2005, but it has since increased substantially. In general, Ghana has been much more dependent than Ethiopia on primary exports.

Kenya

Kenya's share of primary exports in its total exports to Asia is significantly smaller than the region's average—only 11 percent in 2005, amounting to \$51 million worth of goods (table 5.1, panel d). The share increased to only 16 percent by the end of 2015.

In Kenya's exports to non-Asian countries, the share of primary goods in total exports was also much smaller than the average share of other Sub-Saharan African nations as well as its own shares of primary exports to Asia. The share of primary exports from Kenya to the rest of the world was only 5 percent in 2005 and hovered around 6 percent in 2015. In sum, Kenya has not been dependent on resource exports, even less so than Ethiopia.

Nigeria

Looking at the same set of statistics for Nigeria's exports to Asian and non-Asian destinations, we see that the share of primary exports in Nigeria's total exports to Asia is much larger than the region's average as well as the three other countries analyzed so far. The share of primary exports in Nigeria's exports to Asia was 95 percent in 2005, amounting to \$2.7 billion worth of goods (table 5.1, panel e). Nigeria has been successful in diversifying away from hyperspecialization in natural resources. As a result, in 2015, the share of primary exports declined to 66 percent.

In Nigeria's exports to non-Asian countries, the share of primary goods in total exports is still much higher than other Sub-Saharan African nations. It was 89 percent in 2005, decreasing slightly, to 85 percent, in 2015.

In sum, Nigeria's pattern of trade in extractive industries is very different from the other Africa-5 countries. Nigeria has also been more dependent on primary exports, although there are signs of diversification in its portfolio of exports to Asia.

Tanzania

Finally, we show the same set of statistics for Tanzania's exports to Asian and non-Asian destinations. The share of primary exports from Tanzania to Asia was 60 percent in 2005, which was very close to the region's average

(table 5.1, panel f) and amounted to a total value of \$329 million. The share declined significantly, to 25 percent in 2015, suggesting successful diversification from primary goods in its exports to Asia.

In Tanzania's exports to non-Asian countries, the share of primary goods in total exports is much smaller than that of its exports to Asia as well as the corresponding average in Sub-Saharan Africa as a whole. The share of primary exports from Tanzania to the rest of the world was only 14 percent in 2005, increasing slightly, to 17 percent, by 2015.

In sum, the Africa-5 nations represent the significant variation in the patterns of extractive exports across Sub-Saharan Africa—showing no systematic direction of the trend in concentration of natural resources in exports. Some countries, like Nigeria and Tanzania, reduced their shares of primary goods in exports to Asia, whereas other countries, like Ghana and Kenya, maintained or even increased those shares.

High-Skill- versus Low-Skill-Intensive Exports from Africa-5 to Asia

This subsection summarizes our sector-level analysis along the lines of skill intensity. We categorize sectors into high-skill and low-skill and show their shares in each Africa-5 country's total exports to Asia. We first measure a product's (HS 6-digit) skill intensity, using the share of workers with high school completion or above, in Chinese 4-digit manufacturing sectors 2002–04. The descriptions of the microdata and the concordances involved in matching the Chinese 4-digit manufacturing sectors to multiple HS 6-digit sectors are discussed in Ma, Tang, and Zhang (2014).

On the basis of this measure of product-level skill intensity, we aggregate exports from the entire Sub-Saharan African region across all HS 6-digit sectors that have a skill intensity measure above the median in the sample of more than 5,000 HS 6-digit categories. Because we have data for only manufacturing firms in China, the analysis of the skill intensity of Sub-Saharan African exports to both Asian and non-Asian countries is restricted to those from the manufacturing sector only.

By this analysis, the aggregate value of high-skill manufacturing exports to Asia was about \$10.7 billion in 2005, accounting for 55 percent of Sub-Saharan Africa's exports to Asia that year (table 5.2, panel a). For the region's manufacturing exports to non-Asian destinations, the share of high-skill exports was lower (46 percent), amounting to \$58.5 billion. Ten years later, in 2015, the share of high-skill exports to Asia from Sub-Saharan Africa had declined to 46 percent, although the export value more than doubled, to \$24.2 billion. At the same time, the high-skill share of exports to non-Asian destinations rose, to 54 percent (\$97.3 billion).

Over the same period, exports of the region's low-skill-intensive manufacturing exports to Asia increased more than threefold, from \$8.7 billion in 2005 to \$28.1 billion in 2015, driving the low-skill share from 45 percent to 54 percent of total manufacturing exports to Asia that year. Meanwhile, although the low-skill manufacturing exports to the non-Asian destinations

increased in value, from \$68.3 billion in 2005 to \$83.1 billion in 2015, the low-skill share declined from 54 percent in 2005 to 46 percent in 2015.

Ethiopia

Turning to the first country in the Africa-5 group, Ethiopia's share of high-skill exports in its manufacturing exports to Asia is about the same as the Sub-Saharan African average. The share of high-skill exports from Ethiopia to Asia was 56 percent in 2005 (\$150 million in goods), increasing to 59 percent by the end of 2015 and its value nearly tripling, to \$424 million (figure 5.2, panel b).

Table 5.2 High-Skill versus Low-Skill Manufacturing Exports from Sub-Saharan Africa and the Africa-5 Countries to Asian and Non-Asian Destinations, 2005 and 2015

Skill intensity of exports, by origin and destination	2005		2015	
	Export value (US\$, millions)	Export share, by destination (%)	Export value (US\$, millions)	Export share, by destination (%)
<i>a. Africa</i>				
Skilled exports to Asia	10,700.00	55	24,200.00	46
Unskilled exports to Asia	8,690.29	45	28,100.00	54
Skilled exports to Non-Asia	58,500.00	46	97,300.00	54
Unskilled exports to Non-Asia	63,300.00	54	83,100.00	46
<i>b. Ethiopia</i>				
Skilled exports to Asia	150.87	56	423.92	59
Unskilled exports to Asia	118.12	44	293.48	41
Skilled exports to Non-Asia	388.01	41	1,512.57	38
Unskilled exports to Non-Asia	569.33	59	2,504.25	62
<i>c. Ghana</i>				
Skilled exports to Asia	78.32	65	145.23	42
Unskilled exports to Asia	41.98	35	204.57	58
Skilled exports to Non-Asia	699.60	38	1,155.22	61
Unskilled exports to Non-Asia	1,142.02	62	727.08	39
<i>d. Kenya</i>				
Skilled exports to Asia	147.72	34	253.16	32
Unskilled exports to Asia	285.73	66	536.85	68
Skilled exports to Non-Asia	1,176.26	38	1,449.79	33
Unskilled exports to Non-Asia	1,932.77	62	2,893.35	67

(Table continues on next page)

Table 5.2 High-Skill versus Low-Skill Manufacturing Exports from Sub-Saharan Africa and the Africa-5 Countries to Asian and Non-Asian Destinations, 2005 and 2015 (continued)

Skill intensity of exports, by origin and destination	2005		2015	
	Export value (US\$, millions)	Export share, by destination (%)	Export value (US\$, millions)	Export share, by destination (%)
<i>e. Nigeria</i>				
Skilled exports to Asia	58.39	40	325.40	23
Unskilled exports to Asia	89.11	60	1,064.82	77
Skilled exports to Non-Asia	1,534.22	58	1,303.40	67
Unskilled exports to Non-Asia	1,095.75	42	641.06	33
<i>f. Tanzania</i>				
Skilled exports to Asia	69.37	14	620.58	37
Unskilled exports to Asia	409.67	86	1,038.86	63
Skilled exports to Non-Asia	326.51	32	1,140.51	36
Unskilled exports to Non-Asia	683.12	68	1,988.95	64

Source: Database for International Trade Analysis (BACI) and staff calculations.

Note: A product's (Harmonized System [HS] 6-digit) skill intensity is measured by using the share of "high-skilled" workers (those with high school completion or above) in that sector. The detailed methodology is discussed in Ma, Tang, and Zhang (2014). On the basis of this product-level skill intensity measure, we aggregate manufacturing exports from the entire Sub-Saharan African continent across all HS 6-digit sectors that have a skill intensity measure above the median (in the sample of more than 5,000 HS 6-digit categories) as the "skilled exports"; and the rest are referred as "unskilled exports." The data are restricted to manufacturing sectors because the Chinese data are available only for manufacturing firms. Full Sub-Saharan Africa export values are rounded to the nearest 100 million; country export values are rounded to the nearest 10,000.

In Ethiopia's exports to non-Asian countries, the share of high-skill goods in total manufacturing exports was smaller than both the Sub-Saharan African average and its own exports to Asia. The share of high-skill products in Ethiopia's exports to the rest of the world was 41 percent in 2005, declining to 38 percent in 2015.

In sum, Ethiopia's manufacturing exports to Asia have become more skill-intensive over time, whereas its manufacturing exports to non-Asian countries have become less skill-intensive. These developments were accompanied by the country's decreasing dependence on primary exports, as documented in table 5.1.

Ghana

Looking at the same set of statistics for Ghana, we see that high-skill exports made up 65 percent of its manufacturing exports to Asia in 2005, which exceeded the Sub-Saharan African average (table 5.2, panel c). Their total value amounted to \$78.3 million. However, the share declined to 42 percent in 2015 (valued at \$145.2 million), suggesting that exports to Asia were not related to skill upgrading in the country's manufacturing sector.

By contrast, Ghana's exports to the rest of the world started with lower skill content in 2005, because only 38 percent of its manufacturing exports were above the median level of skill intensity. But by 2015 that share reached 61 percent.

Kenya

High-skill exports made up about 34 percent of Kenya's total manufacturing exports to Asia in 2005, a significantly smaller share than the Sub-Saharan African average (table 5.2, panel d). Those exports amounted to \$147.7 million in value. The share declined slightly, to 32 percent by the end of 2015 (valued at \$253.2 million), consistent with the increase in the share of primary exports reported in table 5.1.

In Kenya's exports to non-Asian countries, the share of high-skill goods in total exports was also much smaller than the Sub-Saharan African average. The share of high-skill exports from Kenya to the rest of the world was only 38 percent in 2005, and it declined to 33 percent in 2015. In sum, the skill content of Kenya's exports has declined, whether going to Asian or to non-Asian destinations.

Nigeria

Nigeria's high-skill exports made up 40 percent of its total manufacturing exports to Asia in 2005, amounting to \$58.4 million worth of goods (table 5.2, panel e). Despite the country's success in diversifying away from hyperspecialization in natural resources, as shown in table 5.1, the share of high-skill exports in the country's total exports to Asia declined to only 23 percent by 2015.

Nigeria's improvement in skill upgrading becomes more evident when looking at its manufacturing exports to non-Asian countries. The share of high-skill manufacturing exports from Nigeria to the rest of the world was 58 percent in 2005, increasing to 67 percent by 2015.

In sum, Nigeria's skill content in manufacturing exports to Asia declined, whereas it increased in the country's manufacturing exports to non-Asian countries—showing that growing economic engagement with Asia may not necessarily result in growth-inducing outcomes.

Tanzania

Finally, we examine the same set of statistics for Tanzania's exports to Asian and non-Asian destinations. The share of high-skill manufacturing exports from Tanzania to Asia was merely 14 percent in 2005 (valued at \$69.4 million), which was much lower than the region's average (table 5.2, panel f). The share increased significantly, to 37 percent, by 2015 (valued at \$620.6 million)—suggesting successful skill upgrading along with the stellar diversification from primary exports to Asia, as documented in table 5.1.

In Tanzania's exports to non-Asian countries, the share of high-skill manufactured goods in 2005, at 32 percent, was higher than its high-skill share of exports to Asia. The share to non-Asia destinations increased slightly, to 36 percent, by 2015.

In sum, similar to the pattern of extractive exports, there is significant heterogeneity in the shares of high-skill exports, and growth of the shares, across countries in Sub-Saharan Africa. There is no systematic direction of the trend in skill upgrading in exports or how it is related to economic engagement with Asia. After discussing the top Asian destinations for Sub-Saharan Africa's exports, we will turn to regression analysis to offer a more systematic investigation of the relationships.

Top Asian Destinations for the Africa-5 Nations' Exports

This subsection examines the potentially changing composition of Asian trading partners of Sub-Saharan African exporting countries. To this end, we aggregate the BACI trade data across all HS 6-digit categories to the country-pair level. For Sub-Saharan Africa as a whole and each of the Africa-5 countries, we examine the major Asian trading partners for imports and exports. Similar to our analysis of the sectoral distribution of exports from each nation, we exclude destination countries in Asia that accounted for less than 1 percent of a Sub-Saharan African nation's total exports in the respective year (2005 and 2015).

Among the Asian nations that accounted for at least 1 percent of Sub-Saharan Africa's exports in 2005 or 2015, China stands as the top destination. In 2005, China accounted for 41 percent of Sub-Saharan Africa's total exports to Asia—a share that increased modestly, to 43 percent, by 2015 (figure 5.7). Although China remains Sub-Saharan Africa's main trading partner, the small increase contrasts sharply with the media's description of China as dominating Sub-Saharan Africa's trade.

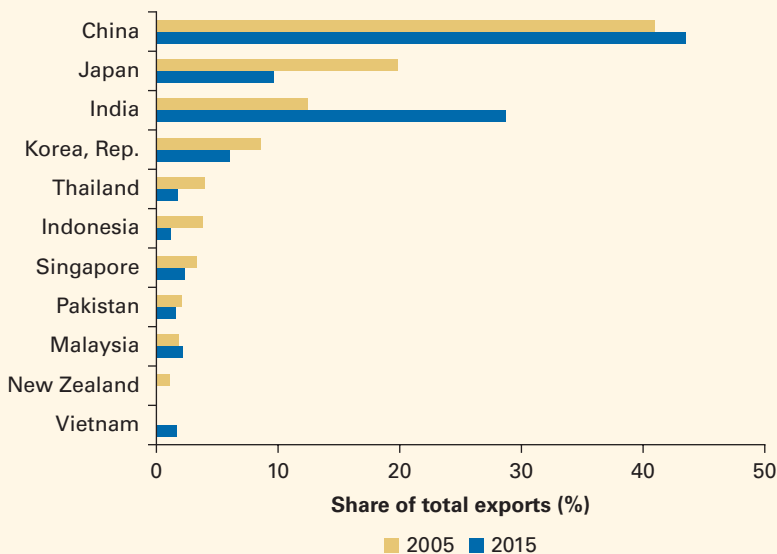
India is now the second-largest destination for the region's exports. In 2005, India ranked third in the share of exports from Sub-Saharan Africa to Asia, contributing 12 percent of Sub-Saharan Africa–Asia trade, following Japan, which accounted for 20 percent. The conventional thinking is that China has been increasing its dominance in Sub-Saharan Africa's trade. But, although China has risen rapidly as a source of investment in Sub-Saharan Africa, India is the Asian country that experienced the largest increase in export share from Sub-Saharan Africa, from 12 percent in 2005 to 29 percent in 2010.

Japan used to be a much more important trading partner for Sub-Saharan Africa, but, as China's and India's shares were growing at a much faster pace, Japan's share declined, from 20 percent to about 10 percent. Other important Asian destinations for Sub-Saharan Africa's exports in both years include the Republic of Korea, Malaysia, Singapore, and most recently Vietnam. Vietnam's share of trade with Africa was quite small (about \$745 million) in 2005, but, by 2015, it had become the region's eighth-largest export destination.

Ethiopia

Similar to the region's overall pattern, China ranked as the top destination for Ethiopia's exports in 2015 (figure 5.8). However, its export pattern differed from the overall region's in 2005, when Japan rather than China was

Figure 5.7 Top Asian Destinations for Sub-Saharan Africa's Exports, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) HS 6-digit categories at the country-pair level, including only destination countries in Asia that accounted for at least 1 percent of Sub-Saharan Africa's exports in either of the respective years (2005 and 2015).

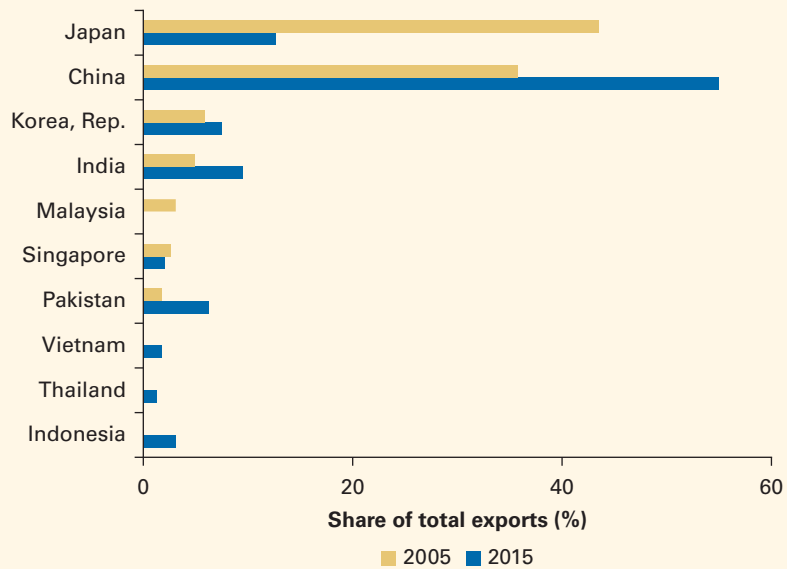
the country's top Asian destination. In 2015, Japan remained the second-largest destination for Ethiopian exports, instead of India.

Ethiopia has become increasingly dependent on China as an export market. In 2005, 36 percent of Ethiopia's total exports to Asia went to China, a share that increased to 55 percent in 2015. The share of its total exports going to India rose rapidly as well; however, because its base was much lower (only 5 percent in 2005), it accounted for only 9 percent of Ethiopia's exports to Asia in 2015. The first lesson from the comparison of Sub-Saharan Africa and Ethiopia is that what is true for the entire region may not be true for an individual country in the region.

Ghana

Among Ghana's export partners in Asia, what stands out is that India has emerged rapidly as the country's most important export destination. The country's top export destination in 2005 was China, which accounted for 26 percent of Ghana's exports to Asia. Since then, India's share has been increasing consistently, and India has become the top destination by a large margin (figure 5.9). In 2005, India was only the second-largest Asian market for Ghana's goods, accounting for 24 percent of Ghana's exports to Asia. By 2015, its share reached 64 percent, replacing China as the top destination, whose share declined to only 21 percent. The natural

Figure 5.8 Top Asian Destinations for Ethiopia's Exports, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) HS 6-digit categories at the country-pair level, including only destination countries in Asia that accounted for at least 1 percent of Ethiopia's exports in either of the respective years (2005 and 2015).

or cultured pearls sector expanded rapidly, becoming Ghana's main export sector (as shown in table 5.1). Indeed, this is a main reason why India has become Ghana's largest export destination in Asia.

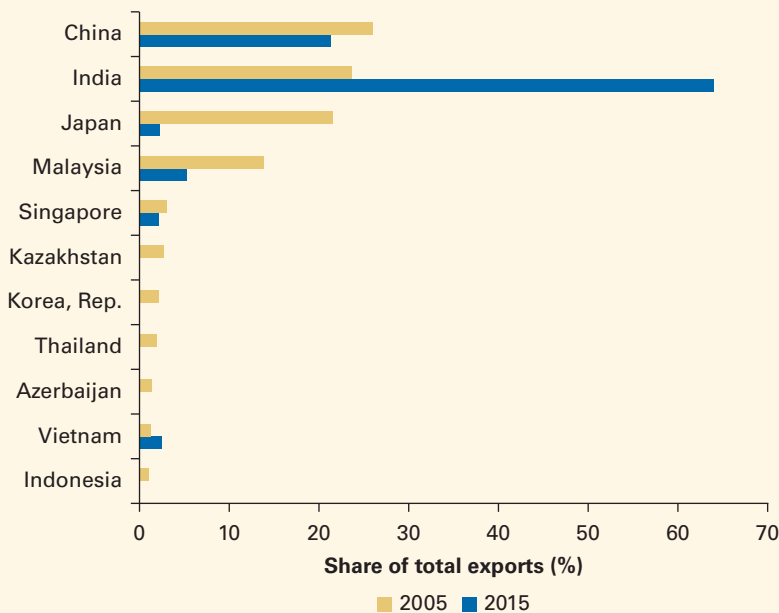
Unlike Ethiopia, Ghana has not become more dependent on China but instead less dependent. This finding confirms that Asia affects the trade of each African nation in a unique way. The region's overall average trade patterns should not be relied upon to understand the experience of each individual country.

Kenya

Kenya's top Asian trading partners (for exports) are very different from those of Ethiopia and Ghana. Its top export destination in Asia is Pakistan, which in 2005 accounted for 42 percent of Kenya's exports to Asia, a share that increased to 43 percent by 2015 (figure 5.10).

Despite the significant increase in China's share of Kenya's exports, from 4.9 percent to 11.7 percent between 2005 and 2015, China remained a much less significant destination than Pakistan for Kenya's exports. India, which remains Kenya second-largest export destination, has been increasing rapidly as an export destination for other African nations.

Figure 5.9 Top Asian Destinations for Ghana's Exports, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) HS 6-digit categories at the country-pair level, including only destination countries in Asia that accounted for at least 1 percent of Ghana's exports in either of the respective years (2005 and 2015).

Nigeria

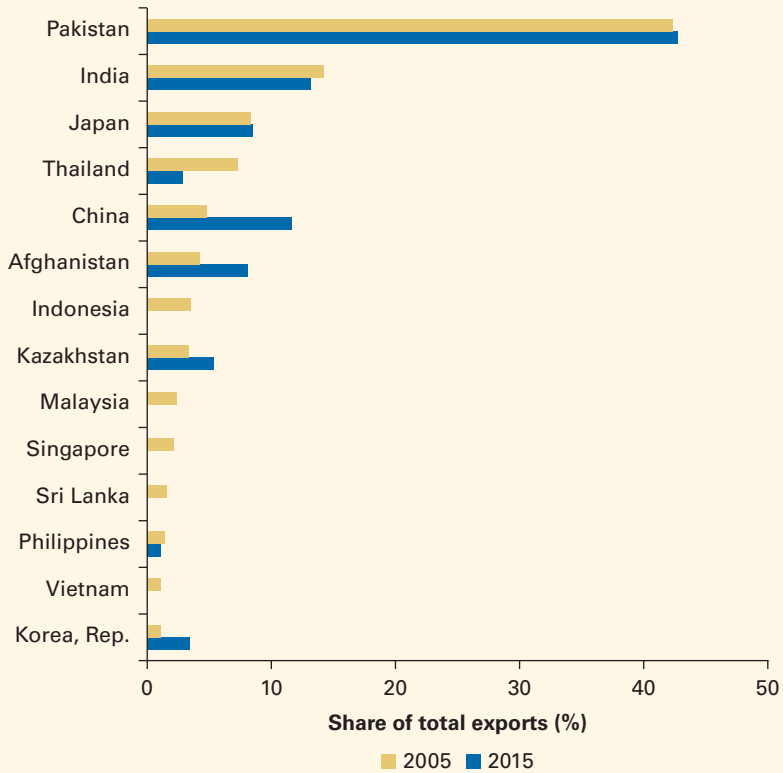
For Nigeria—unlike Ethiopia, Ghana, and Kenya—China has never been a top export destination. In 2005, Nigeria's biggest Asian trading partner (in terms of exports) was Japan, accounting for 31 percent of total Nigerian exports to Asia (figure 5.11). Japan's contribution as a destination market dropped to 18 percent in 2015. India replaced Japan as the top destination in 2015. India's share of Nigerian exports to Asia was a mere 4 percent in 2005, accelerating to 64 percent in 2015.

As noted earlier (figure 5.5), the single most important sector for Nigerian exports to Asia has consistently been minerals, fuels, and mining. The sharp shift in Nigeria's main trading partners between 2005 and 2015 implies that raw materials are fairly homogeneous, making switching destination countries relatively easier for Nigeria than for other African nations that have different specialization patterns.

Tanzania

Finally, among Tanzania's Asian export destinations, China, which accounted for 42 percent of Tanzania's total exports to Asia in 2005, was replaced by India as the top destination in 2015 (figure 5.12). India

Figure 5.10 Top Asian Destinations for Kenya's Exports, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

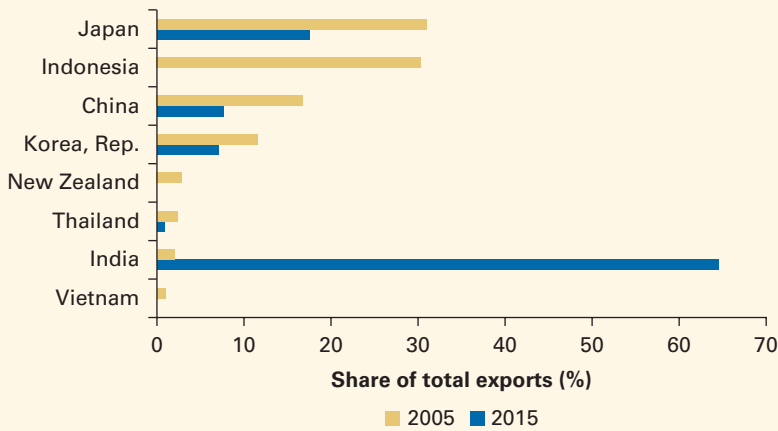
Note: Shares of exports are shown by Harmonized System (HS) HS 6-digit categories at the country-pair level, including only destination countries in Asia that accounted for at least 1 percent of Kenya's exports in either of the respective years (2005 and 2015).

accounted for over 44 percent of Tanzania's exports to Asia in 2015, rising from only 20 percent in 2005.

Japan remained a stable number three market for Tanzania. Vietnam rose from an insignificant market to the fourth-largest market for Tanzania, accounting for about 5 percent of Tanzania's exports to Asia in 2015.

In sum, each of the Africa-5 countries has its own main trading partner in Asia. Contrary to the conventional wisdom, China is not always the dominant trading partner for individual African nations, although it is the case for the entire Sub-Saharan African region. India has emerged as an increasingly important trading partner of Africa. Since 2005, India has become the largest export destination in Asia for countries like Ghana, Nigeria, and Tanzania. What these three countries have in common is their high specialization in one particular raw material product—natural or cultured pearls for Ghana; minerals, fuels, and mining for Nigeria; and, to a lesser extent, ores, slag, and ash for Tanzania.

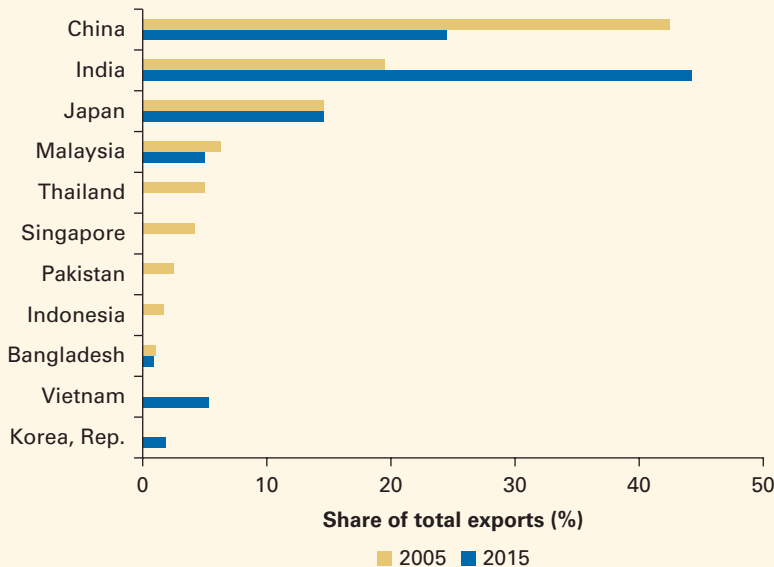
Figure 5.11 Top Asian Destinations for Nigeria's Exports, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) HS 6-digit categories at the country-pair level, including only destination countries in Asia that accounted for at least 1 percent of Nigeria's exports in either of the respective years (2005 and 2015).

Figure 5.12 Top Asian Destinations for Tanzania's Exports, 2005 and 2015



Source: Staff calculations from the Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: Shares of exports are shown by Harmonized System (HS) HS 6-digit categories at the country-pair level, including only destination countries in Asia that accounted for at least 1 percent of Tanzania's exports in either of the respective years (2005 and 2015).

Econometric Assessment of Sub-Saharan African Participation in Asian GVCs

On the basis of the stylized facts described in the previous section, this section conducts an empirical analysis to understand whether economic engagement with Asia has shaped the particular trade and GVC patterns observed in individual Sub-Saharan African nations.

Our main sample covers 46 countries in Sub-Saharan Africa over a 16-year period from 2000 to 2015 (listed in annex 5A, table 5A.1). Several facts stand out from the analysis. First, Asia's economic engagement in trade with Sub-Saharan Africa increased significantly over the sample period. The share of imports from Asia in the total imports of a median Sub-Saharan African country in 2005 was 18 percent, which increased to 28 percent by 2015. The share of exports to Asia was only 12 percent in 2005, which rose to 20 percent by 2015. Of a Sub-Saharan African country's total imports, the median share *imported from* China in 2005 was 5 percent, which increased to 14 percent by 2015. The share of *exports to* China was only 2 percent in 2005, and tripled to 6 percent by 2015.

Second, we use three GVC measures as the dependent variables of interest: the ratio of domestic value added (DVA) to gross domestic product (GDP), the average length of production, and the upstreamness of exports, finding the following:

- Among the countries in our Sub-Saharan Africa sample, the median DVA declined slightly (from 0.37 to 0.35 between 2005 and 2015), consistent with the global trend of declining DVA (Johnson and Noguera 2012).
- Over the same period, the production chain of Sub-Saharan African exports became more complex, as revealed by the increasing average length of manufacturing production chains. For the median country (in terms of export volume), the export-weighted average of the number of stages (sectors) involved before final export rose from 2.31 to 2.36 between 2005 and 2015.
- Among the GVC measures, the upstreamness index—which captures the distance between the sector and final-goods consumers (at home or abroad)—increased the most. Among the countries in the sample, the median upstreamness index increased from 2.45 to 2.62.

A country's exports become "more upstream" for many reasons. One tempting explanation is that Sub-Saharan Africa's exports, partly because of China's economic engagement, have become more resource-intensive. Given that natural resource-intensive sectors tend to be more upstream, the observed increase in export upstreamness may be related to the increasing resource intensity of Sub-Saharan Africa's exports. This section empirically examines this hypothesis.

Complementarity of Exports to Asian and Non-Asian Markets

One hypothesis is that increasing demand from Asia could crowd out Sub-Saharan African countries' exports to other countries. To empirically examine this "trade diversion" hypothesis, we use as the dependent variable the log of exports from each Sub-Saharan African country to the rest of the world excluding Asia in each year (table 5.3). We subtract exports to Asia from exports to the rest of the world to remove any mechanical correlation between the dependent and independent variables of interest. Controlling for (exporting) country and year fixed effects, we find a positive and statistically significant correlation between a country's (log) exports to the rest of the world and its (lagged log) exports to Asia, as reported in column (1). This result suggests that, instead of trade diversion, exports to Asia complement exports to non-Asian countries.

In column (2), we add a country's log imports from Asia to consider the potential complementarity of imported inputs and technology from Asia on the country's exports. Controlling for country and year fixed effects, as well as (log) exports to Asia, we find that a country's imports from Asia are positively and significantly correlated with its exports to the rest of the world, suggesting that Asia may have provided intermediate inputs that facilitate individual countries' exports and participation in GVCs.

Exports to a country (or region) would complement exports to other countries for several reasons:

- In the presence of internal economies of scale, increased sales at the firm level, by tapping into more export markets, imply spreading the fixed costs of production by exporting over a larger volume of production, driving down the firm's average cost.
- In the presence of external economies of scale, increased exports may generate positive externalities between firms. Such positive externalities can take the form of labor pooling and technology spillover in exporting or special economic zones, or of information spillover between firms through learning about foreign markets.
- Participation in GVCs is a two-way game, as confirmed indirectly by the positive correlation between imports from Asia and exports to the rest of the world. More exports to a country usually come with more imports from the same country or other countries.

In general, imports of foreign intermediate inputs can increase a firm's productivity, which in turn raises its sales and profits. So the idea of trade diversion based on a zero-sum concept is a rare situation. There are many reasons why a country's GVC participation with a fast-growing region can serve as an engine of growth of the same country.

Table 5.3, columns (3) and (4), repeats the same analysis as in columns (1) and (2) but restricts it to (log) exports to and imports from, respectively, the Asia-5 countries as the regressors of interest. We adjust the dependent

Table 5.3 Correlation of Sub-Saharan Africa's Exports to Asia versus Exports to Other Countries

Dependent variable	ln(Exports to ROW except Asia)		ln(Exports to ROW except Asia-5)		ln(Exports to ROW except China)	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Exp to Asia)	0.184*** (2.749)	0.151** (2.454)				
ln(Imp from Asia)		0.204*** (4.073)				
ln(Exp to Asia-5)			0.114** (2.626)	0.106** (2.446)		
ln(Imp from Asia-5)				0.139* (1.909)		
ln(Exp to China)					0.0947*** (2.818)	0.0891*** (3.128)
ln(Imp from China)						0.185** (2.594)
Year FE	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y
N	710	710	698	698	681	681
R ²	0.957	0.958	0.956	0.957	0.957	0.959

Source: World Bank calculations.

Note: All independent variables are lagged one year. t-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam. FE = fixed effects; ln = natural logarithm; ROW = rest of the world.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

variable accordingly, by subtracting the exports to the Asia-5 nations from Sub-Saharan Africa's exports to the rest of the world in a year, so that the positive correlation between (log) exports to Asia and those to the rest of the world is not spurious. Within an (exporting) country and year, a country's (log) exports to the rest of the world are positively correlated with its (log) exports to and (log) imports from the Asia-5 countries, respectively.

These statistically significant results suggest that, instead of trade diversion, trade to Asia complements exports to other non-Asian countries. The elasticity of exports to the rest of the world in relation to exports to Asia-5 is smaller than that regarding exports to all of Asia. This is expected in light of the postulated spillover hypothesis. If internal and external economies of scale are the drivers, the positive effect of exporting to the entire Asian continent should be larger than exporting to only the Asia-5 countries.

Columns (5) and (6) in table 5.3 consider the potential crowding-out effect of exporting to China specifically. China has emerged as Sub-Saharan

Africa's largest trading partner. Analysts have expressed concern that Chinese economic engagement has displaced Sub-Saharan Africa's local industrial capability and made the region more dependent on economic support from China. After all, although China's increasing economic engagement in Sub-Saharan Africa has boosted the region's economic growth, it has also generated considerable controversy. We find that, contrary to the concern raised in the press and some research, more exports to and imports from China are positively related to trade with the rest of the world (with China excluded). In other words, trade with China does not divert resources away from exporting to other nations.

In table 5.4, we empirically explore the "crowding out" hypothesis, on the basis of aggregate export data from a hypothetical Sub-Saharan African country, by using the country's exports to the rest of the world at the (HS 2-digit) *sector level*. Specifically, we regress (log) Sub-Saharan African country *C*'s exports to the rest of the world on (log) exports to Asia from the same country and sector (*i*). Controlling for year, country, and industry fixed effects, we find a positive and statistically significant correlation between (log) exports to Asia and (log) exports to the rest of the world in the same industry.

There may be a concern that a country's exports to Asia or any other country could be driven by a common supply shock (for example, technological shocks or government export-promotion policies). To address this concern, we control for country-year fixed effects in column (2). Or there may be a concern that a common global demand shock could lead to the observed positive correlation between a country's exports to Asia and the rest of the world. To tackle this concern, we control for industry-year fixed effects in column (3). The results reported in both columns (2) and (3) remain robust and are quantitatively similar to those reported in column (1).

In columns (4) to (6), using the same regression specifications, we find complementary effects of exports to Asia on exports to the rest of the world (excluding Asia) at the industry level. For instance, the coefficient on (log) exports to Asia in column (3) suggests that a 1 percent increase in exports to Asia is associated with a 0.413 percent increase in exports to non-Asian countries.

Following parallel specifications as in table 5.4 columns (1) to (3), we repeat the regressions with (log) exports to Asia-5 as the regressor of interest in columns (4) to (6) and (log) exports to China as the regressor of interest in columns (7) to (9), respectively. The dependent variable in each specification is adjusted accordingly by subtracting from exports to the rest of the world the exports to Asia-5 or China. Interestingly, controlling for various combinations of fixed effects, we find a negative and marginally significant correlation between exports to Asia-5 and exports to the rest of the world within the same HS 2-digit industry (columns [4] to [6]). When we restrict the analysis to exports to China only, however, we find complementarity between exports to China and exports to the rest of the world.

Table 5.4 Impact of Sub-Saharan African Countries' Exports to Asia versus Exports to Other Countries

Dependent variable	ln(Exp _{cit}) to ROW			ln(Exp _{cit}) to ROW except Asia-5			ln(Exp _{cit}) to ROW except China		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(Exp to Asia)	0.403*** (20.034)	0.406*** (19.769)	0.413*** (18.800)						
ln(Exp to Asia-5)				-0.0849** (-2.349)	-0.0733* (-1.903)	-0.0674* (-1.752)			
ln(Exp to China) (lagged)							0.327*** (17.587)	0.329*** (16.408)	0.343*** (13.870)
Year FE	Y			Y			Y		
Country FE	Y			Y			Y		
Industry (HS2) FE	Y	Y		Y	Y		Y	Y	
Country x Year FE		Y	Y		Y	Y		Y	Y
Industry x Year FE			Y			Y		Y	Y
N	22,860	22,860	22,860	9,581	9,581	9,581	9,556	9,556	9,556
R ²	0.661	0.678	0.696	0.593	0.621	0.658	0.675	0.702	0.738

Source: World Bank data.

Note: t-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). The “Asia-5” countries are Bangladesh, Cambodia, China, India, and Vietnam. Exp_{cit} = exports from country *c* in sector *i* and year *t*; FE = fixed effects; HS2 = Harmonized System 2-digit level; ln = natural logarithm; ROW = rest of the world.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

In sum, together with the results in table 5.3, we find no empirical evidence of trade diversion due to economic exchanges with Asia as a whole or with China. However, exports to the Asia-5 countries are found to be related to trade diversion at the sector level, suggesting that exporting to one of the other four Asia-5 countries (Bangladesh, Cambodia, India, or Vietnam) could be related to trade diversion.

Factor Content in Exports

The next analysis takes a deeper look into the effects of Asian economic engagement on the pattern of Sub-Saharan Africa's exports. There have been concerns that the rapid economic growth of Asian emerging markets, by increasing the demand for natural resources, could act as a source of the "resource curse"—the paradox by which resource-rich countries fail to benefit fully from their natural resource wealth, instead facing challenges such as less economic growth and stability, poorer governance, more conflict, and worse development outcomes. If this speculation is correct, we would expect to see that more exports to Asia or selected Asian countries, such as China, are associated with deeper specialization in material-intensive exports such as ores or oils.

Material Intensity

To this end, table 5.5 regresses the weighted average of a Sub-Saharan African country's material intensity on the country's exports to Asia, Asia-5, and China (lagged by a year). We measure a sector's material intensity by the average firm's material cost per worker in the US manufacturing sector. We then compute the export-weighted average material intensity of a country in year t , using sector exports as weights. As reported in table 5.5, we find no statistically significant correlation between exports to Asia, Asia-5, or China and the weighted average material intensity of overall exports (to the rest of the world) from an individual Sub-Saharan African nation, controlling for country and year fixed effects.

Capital Intensity

Table 5.6 repeats the same set of regressions to examine whether engaging in a GVC with Asia is associated with more specialization in capital-intensive products such as ores and oils. To the extent that it is, we can argue that trade with Asia raises the demand for capital, which may lead to more investment and thus long-run growth.

As shown in columns (1) to (3), we find that proportionally more *exports to*, but not *imports from*, Asia are positively correlated with higher average capital intensity in exports to the rest of the world (including Asia), controlling for year and fixed effects. When we restrict the set of destinations to the Asia-5 countries (columns [4] to [6]) and China (columns [7] to [9]), we continue to find a positive correlation between the two variables.

In addition, we find that the shares of imports from Asia-5 and China are also positively correlated with capital deepening in countries' exports. The correlation with the share of imports from China is quantitatively larger,

Table 5.5 Correlation between Asian Economic Engagement and Material Intensity of Exports from Sub-Saharan Africa

Dependent variable	Export-weighted material intensity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Imp from Asia/Tot Imp	0.336 (1.070)		0.350 (1.084)						
Exp to Asia/Tot Exp		0.239 (1.659)	0.247 (1.651)						
Imp from Asia-5/Tot Imp				0.611 (1.435)		0.680 (1.546)			
Exp to Asia-5/Tot Exp					0.0100 (0.064)	0.0352 (0.227)			
Imp from China/Tot Imp							1.059 (1.504)		0.953 (1.434)
Exp to China/Tot Exp								0.0965 (0.545)	0.106 (0.588)
Year FE	Y	Y	Y	V	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	710	710	710	710	698	698	710	687	687
<i>R</i> ²	0.849	0.849	0.850	0.850	0.863	0.865	0.851	0.868	0.871

Source: World Bank data.

Note: All regressors are lagged one year. *t*-statistics, based on standard errors clustered at the country level, are in parentheses. We measure a sector's material intensity by the average firm's material cost per worker in the US manufacturing sector. We then compute the export-weighted average material intensity of a country in year *t*, using sector exports as weights. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam. FE = fixed effects.

suggesting that Sub-Saharan African countries' engagement in the same value chains, with GVCs in particular, encourages investment and long-run economic growth.

Skill Intensity

Next, table 5.7 repeats the same set of regressions as in tables 5.5 and 5.6 to examine whether engaging in a GVC with Asia is positively associated with specialization in skill-intensive exports such as machinery. To the extent that it is, we can argue that trade with Asia can potentially increase the demand for skills and thus education, which may enhance a country's long-run growth.

In contrast to our encouraging findings in table 5.6, however, we find no significant correlation between (lagged) exports to Asia, Asia-5, or China and the weighted average of the skill intensity of overall exports from individual Sub-Saharan African nations.

Table 5.6 Correlation between Asian Economic Engagement and Capital Intensity of Exports from Sub-Saharan Africa

Dependent variable	Export-weighted capital intensity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Imp from Asia/ Tot Imp	0.399 (1.473)		0.422 (1.471)						
Exp to Asia/ Tot Exp		0.386** (2.640)	0.395** (2.556)						
Imp from Asia-5/Tot Imp				0.685* (1.864)		0.724* (1.889)			
Exp to Asia-5/ Tot Exp					0.317* (1.720)	0.344* (1.839)			
Imp from China/Tot Imp							1.144** (2.056)		1.051* (1.879)
Exp to China/ Tot Exp								0.506** (2.610)	0.516** (2.607)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	710	710	710	710	698	698	710	687	687
<i>R</i> ²	0.855	0.857	0.858	0.856	0.866	0.869	0.858	0.873	0.878

Source: World Bank data.

Note: All regressors are lagged one year. t-statistics, based on standard errors clustered at the country level, are in parentheses. A sector's factor (capital, skilled) intensity measures are constructed on the basis of the Manufacturing Industry Database for US firms of the National Bureau of Economic Research (NBER) and US Census Bureau's Center for Economic Studies (CES). Out of 96 possible HS 2-digit sectors, 94 sectors have the sector factor intensity measures. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam. FE = fixed effects.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Patterns of GVC Participation

This subsection examines whether China's economic engagement has changed the way Sub-Saharan African nations participate in GVCs. To this end, we consider three value chain measures that are commonly used in the literature: upstreamness, the DVA ratio, and the average length of production. Although each measure captures a distinct concept of the extent of a country's GVC participation, each measure is also an indicator for whether a country has been participating in GVCs in a way to benefit the most from globalization.

As noted earlier, upstreamness captures how far a sector is from final-goods consumers. The DVA ratio captures how much of a country's GDP is generated by domestic content. The higher the DVA ratio, the more export revenue, proportionally, will be paid to domestic owners of factors or

Table 5.7 Correlation between Asian Economic Engagement and Skill Intensity of Exports from Sub-Saharan Africa

Dependent variable	Export-weighted skill intensity								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Imp from Asia/Tot Imp	-0.00354 (-0.047)		-0.00809 (-0.106)						
Exp to Asia/Tot Exp		-0.0777 (-1.417)	-0.0779 (-1.406)						
Imp from Asia-5/Tot Imp				0.0625 (0.524)		0.0158 (0.142)			
Exp to Asia-5/Tot Exp					-0.0846 (-1.086)	-0.0840 (-1.085)			
Imp from China/Tot Imp							0.142 (0.729)		0.0809 (0.456)
Exp to China/Tot Exp								-0.0785 (-0.894)	-0.0778 (-0.879)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	710	710	710	710	698	698	710	687	687
<i>R</i> ²	0.725	0.727	0.727	0.725	0.750	0.750	0.726	0.754	0.754

Source: World Bank data.

Note: All regressors are lagged one year. t-statistics, based on standard errors clustered at the country level, are in parentheses. A sector's factor (capital, skilled) intensity measures are constructed based on the Manufacturing Industry Database for US firms of the National Bureau of Economic Research (NBER) and US Census Bureau's Center for Economic Studies (CES). Out of 96 possible HS 2-digit sectors, 94 sectors have the sector factor intensity measures. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam. FE = fixed effects.

suppliers of intermediates and materials. As such, any policies or shocks that enhance exports will have a larger impact on the exporting country's GDP.

The length of production of exports measures how many sector-country pairs are involved in a sector's production of exports. The longer the production process behind an exported product, the more complex it is, which implies more potential channels through which exports can benefit the rest of a country's economy.

Asian Economic Engagement and Upstreamness

We first examine whether China's economic engagement is related to the upstreamness of a country's exports. There are no direct implications

about whether exports being more upstream is good for economic development, but the level of upstreamness portrays the structure of the domestic supply chain that generates the country's exports. Some of the most upstream sectors, constructed using information from the 2005 US input-output tables, include vegetable plaiting material; ores, slag, and ash; and fertilizers. These sectors have a large share of costs paid for raw materials and capital and thus have higher material and capital intensity. (For the top export sectors and trade partners of each of the Africa-5 countries—Ethiopia, Ghana, Kenya, Nigeria, and Tanzania—see annex 5A, tables 5A.2 to 5A.6.)

Using the same regression specifications and panel structure of the data as in table 5.7, table 5.8 regresses the export-weighted average of a country's upstreamness (with weights equal to the sectoral export shares in the total gross exports of a country) on a Sub-Saharan African country's (lagged) shares of imports from and exports to Asia.

In column (1), we find a positive and marginally significant (at the 10 percent level) correlation between a country's export upstreamness and the share of *imports from* Asia, after controlling for country and year fixed effects. Column (2) shows a positive and statistically more significant correlation between a country's export upstreamness and the share of *exports to* Asia. These results imply that, when a country is more engaged in GVCs with Asia, its exports on average will move upstream (away from consumers, at home and abroad). In column (3), when the shares of exports to and imports from Asia are included as regressors, in addition to the fixed effects, only the share of exports to Asia seems to matter.

In table 5.8, columns (4) to (6) repeat the same set of analyses but now consider trade with the Asia-5 countries only. Column (6) shows that imports from and exports to Asia-5 are correlated with a country's exports "moving up the value chain." According to the coefficients, the economic effects appear to be larger than those from trading with Asia only. When the share of *imports from* Asia-5 countries increases by 10 percentage points, a country's overall exports will move away from final-goods consumers by about 0.04 sector. The same magnitude increase in export share (to Asia-5 countries) implies a movement of exports toward the most upstream sector of supply chains by 0.06 sector. The effect of *exports to* Asia-5 is found to be economically significant.

The last three columns in table 5.8 consider trade shares with China. Column (9), which includes variables of imports from and exports to China, shows that the economic effects of trading with China on a country's export upstreamness seem to be even stronger. When the share of *imports from* China increases by 10 percentage points, a country's overall exports will move away from final-goods consumers by about 0.09 sector. The same magnitude increase in the share of *exports to* China implies a movement of exports toward the most upstream sector of supply chains by 0.1 sector.

Table 5.8 Correlation between Asian Economic Engagement and Upstreamness of Exports from Sub-Saharan Africa

Dependent variable	Export-weighted upstreamness								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Imp from Asia/Tot Imp	0.333* (1.712)		0.367 (1.678)						
Exp to Asia/Tot Exp		0.584** (2.229)	0.592** (2.205)						
Imp from Asia-5/Tot Imp				0.464 (1.498)		0.586* (1.719)			
Exp to Asia-5/Tot Exp					0.631** (2.151)	0.652** (2.190)			
Imp from China/Tot Imp							0.866* (1.742)		0.895* (1.713)
Exp to China/Tot Exp								0.991*** (3.411)	0.999*** (3.418)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	710	710	710	710	698	698	710	687	687
<i>R</i> ²	0.875	0.884	0.885	0.875	0.885	0.887	0.877	0.897	0.901

Source: World Bank data.

Note: All regressors are lagged one year. t-statistics, based on standard errors clustered at the country level, are in parentheses. "Upstreamness" refers to an input's average distance from final use (Antràs et al. 2012), used as a measure of a sector's distance from final-use consumers. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam. FE = fixed effects.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Asian Economic Engagement and DVA Ratio

We next examine whether trade with Asia affects Sub-Saharan African nations' movement along a GVC, as measured by the ratio of DVA to gross exports. The Global Trade Analysis Project's input-output tables are available only for 2004, 2007, and 2011. Thus, instead of using the fixed-effect models that we used to examine the other dependent variables of interest, we adopt a long-difference approach.

Table 5.9 regresses the change in the DVA ratio of a country's exports on all regressors of interest from 2004 and 2011. We find that (the change in) the share of *imports from* Asia is not related to the average DVA ratio of Sub-Saharan African countries' exports (column [1]). However, changes in

the share of *exports to Asia* seem to be negatively correlated with the DVA ratio of a country's exports (column [2]). However, when we include changes in shares of imports from and exports to Asia, in column (3), the statistical significance disappears.

The rest of table 5.9 shows that there is no significant relationship between a country's DVA ratio and engagement in a GVC with Asia. A possible reason behind the lack of significant results is that the sample size covers only 23 countries, which is half the original sample of 46 Sub-Saharan African nations, because of missing data from many of the countries for the designated years.

Table 5.9 Correlation between Asian Economic Engagement and DVA Participation of Sub-Saharan Africa

Dependent variable	Weighted average ratio of DVA to gross exports								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Change in share of imp from Asia	0.0652 (0.276)		-0.0329 (-0.129)						
Change in share of exp to Asia		-0.263* (-1.708)	-0.266 (-1.674)						
Change in share of imp from Asia-5				0.0397 (0.158)		0.0678 (0.252)			
Change in share of exp to Asia-5					0.107 (0.481)	0.111 (0.484)			
Change in share of imp from China							0.751 (1.341)		0.717 (1.246)
Change in share of exp to China								0.716 (1.192)	0.697 (1.240)
<i>N</i>	46	46	46	46	46	46	46	46	46
<i>R</i> ²	0.00098	0.0967	0.097	0.000296	0.00821	0.00906	0.0569	0.093	0.145

Source: World Bank data.

Note: *t*-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers the 23 Sub-Saharan African countries for which full data were available over 2000–15. The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam. DVA = domestic value added.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Asian Economic Engagement and Length of Production

In table 5.10, we use the same long-difference specification to examine the relationship between Asian economic engagement and the average length of production involved in a country's exports. An increase in the length of production implies more complex production, suggesting that there are large potential gains from trade for a country.

Similar to the findings on the relation between exports to Asia and a country's DVA ratio, we find no significant relationship between changes in the share of *imports from* Asia and the length of production for Sub-Saharan Africa's exports. However, we find a negative but marginally significant relation between the share of *exports to* Asia and the length of production. Such negative correlation is quantitatively larger when a country imports

Table 5.10 Correlation between Asian Economic Engagement and Sub-Saharan African Participation in a Complex GVC

Dependent variable	Export-weighted production length								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Change in share of imp from Asia	-0.420 (-0.421)		-0.783 (-0.908)						
Change in share of exp to Asia		-0.933 (-1.619)	-0.981* (-1.746)						
Change in share of imp from Asia-5				-1.496** (-2.181)		-1.585* (-1.891)			
Change in share of exp to Asia-5					-0.247 (-0.229)	-0.352 (-0.321)			
Change in share of imp from China							-2.243 (-1.443)		-2.337 (-1.518)
Change in share of exp to China								1.817 (0.746)	1.881 (0.736)
<i>N</i>	46	46	46	46	46	46	46	46	46
<i>R</i> ²	0.00317	0.0944	0.105	0.0328	0.00343	0.0396	0.0395	0.0466	0.0893

Source: World Bank data.

Note: *t*-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers the 23 Sub-Saharan African countries for which full data were available over 2000–15. The "Asia-5" countries are Bangladesh, Cambodia, China, India, and Vietnam.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

proportionally more from the Asia-5 countries, as shown in columns (4) and (6).

These results suggest that, if anything, imports may have shortened the supply chain in Sub-Saharan Africa by replacing some of the complex intermediate inputs that used to be sourced locally. However, we find no significant correlation between trade with China and the average length of production behind Sub-Saharan Africa's exports (columns [7] and [9]).

Exports to Asia and Extent of Trade Diversion

Finally, we use export data at the country-sector level to study whether exports to Asia change the pattern of exports to other countries. In other words, we are interested in examining whether trade diversion happens in certain types of industries (or exporting countries) but not others. To this end, we regress (log) exports at the sector (HS 2-digit) level to the rest of the world or Asia (both excluding China as a destination) on (log) exports to Asia as well as their interaction with various sector factor intensities (table 5.11). Country-year fixed effects are included to capture exporting country-specific supply shocks. Industry-year fixed effects are included to control for global demand shocks for a particular product, such as a commodity.

As shown in column (1), we continue to find complementary effects of exports to Asia on exports to the rest of the world. However, we do not find stronger complementary effects in the more upstream sectors, suggesting that the increase in upstreamness of exports observed in a country's overall exports should be related to more upstream products exported to Asia rather than to the rest of the world. In column (2), we find that the complementary effects on exports to the rest of the world are weaker for skill-intensive products.

The regression results from analyzing the complementary effects of participation in Asia-5's GVCs are more intriguing. First, as reported in table 5.11, column (3), the overall complementary effects on exports are concentrated in the more-upstream sectors. Column (4) shows, in addition, that the effects are stronger in the material-intensive sectors and weaker in the skill-intensive sectors. These results appear to contrast with the findings in tables 5.6 and 5.7, which show capital deepening instead of resource intensification in overall exports in response to increased engagement in GVCs with Asia. Using the same reasoning we employed to explain the seemingly conflicting results between table 5.11 column (2) and table 5.8, we postulate the following possibility: although more exports to Asia-5 are not associated with more material-intensive exports to Asia-5, they do induce more exports of those goods to non-Asia-5 countries.

In table 5.11, the final two columns show that more exports to China are associated with more exports to the rest of the world, particularly for the more upstream sectors. However, we find no systematic change in the specialization patterns measured in terms of the three factor intensities.

Table 5.11 Effects of Increased Sub-Saharan African Exports to Asia on the Pattern of Trade to Other Countries

Dependent variable	ln(Exp _{cit}) to ROW except Asia		ln(Exp _{cit}) to ROW except Asia-5		ln(Exp _{cit}) to ROW except China	
	Asia		Asia-5		China	
Destination country group	(1)	(2)	(3)	(4)	(5)	(6)
ln(Exp to group) (lagged)	0.379*** (8.838)	0.237 (1.595)	-0.415*** (-6.108)	-1.265*** (-6.475)	0.270* ** (6.845)	0.170 (1.136)
ln(Exp to group) (lagged) x w/upstreamness	0.0161 (1.020)		0.111*** (4.247)		0.0351** (1.992)	
Capital intensity _{US}		0.0117 (0.490)		-0.0105 (-0.251)		0.0160 (0.587)
Material intensity _{US}		-0.0174 (-0.635)		0.171*** (3.980)		-0.00230 (-0.079)
Skill intensity _{US}		-0.157*** (-2.770)		-0.221*** (-4.529)		-0.0869 (-1.527)
Country x Year FE	Y	Y	Y	Y	Y	Y
Industry x Year FE	Y	Y	Y	Y	Y	Y
N	30,373	29,698	13,700	13,477	13,611	13,389
R ²	0.697	0.704	0.656	0.665	0.727	0.734

Source: World Bank data.

Note: *t*-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). Asia includes all member countries of the Asian Development Bank except Australia, China, and New Zealand. The “Asia-5” countries are Bangladesh, Cambodia, China, India, and Vietnam. Exp_{cit} = exports of a country *c* in sector *i* and year *t*; FE = fixed effects; ln = natural logarithm; ROW = rest of the world (excluding Asia, Asia-5, or China); US = the measures of intensity employ the United States’ manufacturing sector as the basis.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Country Characteristics and Policy Implications of the Trade Links between Sub-Saharan Africa and Asia

This subsection presents an empirical analysis to examine which country characteristics affect the way trade with Asia shapes Sub-Saharan African nations’ participation in GVCs. We identify several key policy interventions for countries to consider for maximizing the benefits of trade with Asia. To this end, we add interaction terms between key country characteristics of economic fundamentals and institutions and the measures of trade with Asia. The country characteristics we consider include three individual country measures of institutions (rule of law, corruption, and political stability) and three measures of economic fundamentals (the natural logarithm [ln] GDP per capita, [ln] natural resources, and whether the country is landlocked).

Given that we have found that trade with Asia can increase Sub-Saharan African countries’ average upstreamness and capital intensity of exports,

we use these two averages as our dependent variables of interest for the policy analysis.

Implications for Upstreamness

When a country's export-weighted average of upstreamness is used as the dependent variable (table 5.12), we find that, although a larger proportion of a country's *exports to Asia* is associated with the country's overall export upstreamness, the relation is weaker for Sub-Saharan African countries that have a higher corruption index on average (column [2]). There is no significant relation between export upstreamness and individual countries' share of *imports from Asia*. However, we find that a country's measure of rule of law (column [1]) or political stability (column [3]) does not seem to be related to its export upstreamness.

As for the measures of economic fundamentals, in columns (4) through (6), we find that the positive relation between export upstreamness and the share of *exports to Asia* is weaker for countries that have a larger GDP per capita and access to the sea (that is, not landlocked), as suggested by the negative and significant coefficients on the corresponding interaction terms.

Table 5.12 Correlations between Country Institutions, Asian Economic Engagement, and Upstreamness of Sub-Saharan African Exports

Dependent variable	Export-weighted upstreamness					
	Rule of law	Corruption	Political stability	(ln) GDP per capita	(ln) Resources	Landlocked
Country characteristic	(1)	(2)	(3)	(4)	(5)	(6)
Imp from Asia/Tot Imp	0.231 (0.622)	0.150 (0.229)	0.396 (1.588)	1.383 (1.114)	0.339 (1.205)	0.373 (1.256)
Exp to Asia/Tot Exp	0.215 (0.506)	2.092** (2.603)	0.443 (1.289)	2.853** (2.654)	0.440 (0.991)	0.815*** (3.097)
Country Characteristic x Imp from Asia/Tot Imp	-0.119 (-0.284)	0.118 (0.378)	0.0433 (0.178)	-0.145 (-0.973)	-0.00742 (-1.006)	0.0197 (0.054)
Exp to Asia/Tot Exp	-0.270 (-0.563)	-0.896** (-2.090)	-0.0269 (-0.100)	-0.310** (-2.521)	0.00465 (0.419)	-0.797** (-2.622)
Year FE	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y
<i>N</i>	691	691	691	602	592	608
<i>R</i> ²	0.887	0.890	0.887	0.908	0.902	0.893

Source: World Bank data.

Note: All regressors are lagged one year. *t*-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). Bolded values indicate high significance. FE = fixed effects; ln = natural logarithm.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Implications for Capital Intensity

We next consider how the same sets of countries' characteristics affect the relation between the extent of trade with Asia and the capital intensity of the countries' overall exports (to the rest of the world). As reported in table 5.13, although we find that proportionally more exports to Asia are associated with capital deepening of Sub-Saharan African countries' exports, the additional effects related to the six country characteristics are not as strong as those in table 5.12. The only country characteristic that appears to matter is GDP per capita. Sub-Saharan African countries that are relatively poorer appear to benefit more from exporting to Asia, in terms of capital deepening in their export baskets.

From the results in tables 5.12 and 5.13, we learn that countries that are relatively poorer or have access to the sea benefit more from GVC engagement with Asia. Governments of Sub-Saharan African countries, especially those along the coast of the continent, can consider policies to promote exports to Asia as a tool for poverty reduction. And policies that reduce

Table 5.13 Correlations between Country Institutions, Asian Economic Engagement, and Capital Intensity of Sub-Saharan African Exports

Dependent variable	Export-weighted capital intensity					
	Rule of law	Corruption	Political stability	(ln) GDP per capita	(ln) Resources	Landlocked
Country characteristic	(1)	(2)	(3)	(4)	(5)	(6)
Imp from Asia/Tot Imp	-0.188 (-0.350)	1.069 (1.101)	0.0194 (0.065)	1.843 (1.209)	0.236 (0.598)	0.255 (0.766)
Exp to Asia/Tot Exp	0.0532 (0.175)	1.026** (2.102)	0.264 (1.320)	2.717*** (3.819)	0.220 (0.815)	0.489*** (3.141)
Country Characteristic x Imp from Asia/Tot Imp	-0.528 (-0.886)	-0.417 (-0.785)	-0.391 (-1.172)	-0.187 (-0.983)	0.00182 (0.183)	0.820* (1.934)
Country Characteristic x Exp to Asia/Tot Exp	-0.317 (-0.927)	-0.377 (-1.285)	-0.162 (-0.672)	-0.316*** (-3.509)	0.00485 (0.646)	-0.127 (-0.455)
Year FE	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y
N	691	691	691	602	592	608
R ²	0.862	0.856	0.861	0.870	0.863	0.863

Source: World Bank data.

Note: All regressors are lagged one year. *t*-statistics, based on standard errors clustered at the country level, are in parentheses. The sample covers 46 Sub-Saharan African countries over 2000–15 (listed in annex 5A, table 5A.1). FE = fixed effects; ln = natural logarithm.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

corruption can enhance a country's economic efficiency in general and increase the benefits of trade with Asia in particular.

Conclusion and Policy Implications

This chapter studied the effects of Asia's economic engagement on individual Sub-Saharan African nations' participation in GVCs. It first used detailed trade statistics to describe the overall GVC trends between Asia and Sub-Saharan Africa in recent years. The chapter then measured and identified the key exporting sectors driving participation in GVCs by Sub-Saharan Africa as a whole and by selected Sub-Saharan African nations (the Africa-5). The findings show that, although overall exports from Sub-Saharan Africa to Asia are still highly concentrated in resource-intensive sectors, a few countries have leveraged the export booms to Asia to diversify their export portfolios. Furthermore, each Sub-Saharan African nation has a distinct main trading partner in Asia, in contrast to the traditional thinking that China has become Sub-Saharan Africa's dominant trading partner. For example, India has emerged as a leading trading partner of many Sub-Saharan African nations.

Using a panel data set of trade for 46 Sub-Saharan African countries over 16 years (2000–15), the regression analyses show that Asian countries' economic engagement complements rather than crowds out Sub-Saharan African countries' exports to the rest of the world. In other words, the analysis does not find evidence of trade diversion due to participation in Asian GVCs.

Using panel data on trade at the country-industry level, the analysis also finds that Asian economic engagement in the continent is associated with an increase in upstreamness. In addition, proportionally more imports from Asia are associated with shortening of the production chains of a Sub-Saharan African nation's exports. However, trade with Asia has no effect on the domestic content in Sub-Saharan Africa's exports. Engagement with Asian GVCs resulted in capital deepening of Sub-Saharan African exports but not in enhancement of the exports' skill intensity. Such capital deepening of exports is mostly driven by more exports of capital-intensive goods to Asia rather than by exports of such goods to the rest of the world. The analysis also finds that the complementarity effects of trade with Asia on a country's exports to the rest of the world are concentrated in material-intensive sectors, suggesting that engagement in Asian GVCs does not necessarily enhance the economic growth of Sub-Saharan Africa.

The regression results show that proportionally more *exports to* but not *imports from* Asia can help Sub-Saharan African nations move up the value chains. The effects are particularly strong among Sub-Saharan African countries that have access to the sea but are relatively poorer than their Sub-Saharan African peers. Corruption appears to impede not only trade but also the benefits from GVC participation. This result helps

explain why anticorruption policies can enhance economic efficiency. Surprisingly, the general measure of a country's rule of law does not affect the relation between countries' trade with Asia and their GVC outcomes.

As for identifying which value chains in Asia, if any, promise the largest potential for Sub-Saharan African nations to diversify their exports or move up the value chains, based on the assessment in this chapter, it is not easy to come up with a definite list of products or countries. The chapter reveals that countries that are more dependent on natural resources, like Nigeria, seem to have diversified successfully away from primary goods, thanks to trade with Asia.

The chapter also finds that the region's countries that are relatively poorer or have access to the sea benefit more from GVC engagement with Asia. Governments of Sub-Saharan African countries, especially those that are along the coast of the continent, could consider policies to promote more participation in Asian value chains as a vehicle for poverty reduction.

Annex 5A Supplementary Tables

Table 5A.1 List of Sub-Saharan African Countries in the Study Sample

ISO code	Country
DZA	Algeria
AGO	Angola
BEN	Benin
BDI	Burundi
CPV	Cabo Verde
CMR	Cameroon
CAF	Central African Rep.
TCD	Chad
COG	Congo, Rep.
CIV	Côte d'Ivoire
COD	Congo, Dem. Rep.
DJI	Djibouti
EGY	Egypt, Arab Rep.
GNQ	Equatorial Guinea
ERI	Eritrea
ETH	Ethiopia

(Table continues on next page)

Table 5A.1 List of Sub-Saharan African Countries in the Study Sample *(continued)*

ISO code	Country
GAB	Gabon
GMB	Gambia, The
GHA	Ghana
GIN	Guinea
KEN	Kenya
LBR	Liberia
LBY	Libya
MDG	Madagascar
MWI	Malawi
MLI	Mali
MRT	Mauritania
MUS	Mauritius
MAR	Morocco
MOZ	Mozambique
NER	Niger
NGA	Nigeria
RWA	Rwanda
STP	São Tomé and Príncipe
SEN	Senegal
SYC	Seychelles
SLE	Sierra Leone
ZAF	South Africa
SSD	South Sudan
SDN	Sudan
TGO	Togo
TUN	Tunisia
UGA	Uganda
TZA	Tanzania
ZMB	Zambia
ZWE	Zimbabwe

Source: International Organization for Standardization (ISO).

Table 5A.2 Ethiopia's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
<i>a. 2005</i>				
Japan	1	09	Coffee, tea, maté	114.298
	2	41	Raw hides and skins	1.994
	3	12	Oil seeds	1.419
	4	15	Animal or vegetable fat	0.401
	5	05	Dairy produce	0.090
China	1	12	Oil seeds	66.360
	2	41	Raw hides and skins	14.994
	3	26	Ores, slag, and ash	8.739
	4	09	Coffee, tea, maté	5.619
	5	13	Lac, gums, resins	0.666
Korea, Rep.	1	72	Iron and steel	10.862
	2	12	Oil seeds	2.600
	3	09	Coffee, tea, maté	1.591
	4	05	Dairy produce	0.774
	5	41	Raw hides and skins	0.019
India	1	41	Raw hides and skins	4.882
	2	69	Ceramic products	1.639
	3	07	Edible vegetables	1.633
	4	12	Oil seeds	1.271
	5	09	Coffee, tea, maté	1.089
Malaysia	1	41	Raw hides and skins	6.587
	2	12	Oil seeds	1.261
	3	52	Cotton	0.252
	4	07	Edible vegetables	0.179
	5	09	Coffee, tea, maté	0.156
<i>b. 2015</i>				
China	1	12	Oil seeds	294.143
	2	41	Raw hides and skins	47.495
	3	64	Footwear, gaiters	15.065
	4	86	Railway/ tramway locomotives	7.555
	5	26	Ores, slag, and ash	6.911
Japan	1	09	Coffee, tea, maté	76.238
	2	12	Oil seeds	6.340
	3	06	Live trees and other	4.251

(Table continues on next page)

Table 5A.2 Ethiopia's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
India	4	15	Animal or vegetable fat	0.932
	5	72	Iron and steel	0.792
	1	07	Edible vegetables	39.119
	2	12	Oil seeds	8.549
	3	41	Raw hides and skins	8.243
Korea, Rep.	4	71	Natural or cultured pearls	6.422
	5	09	Coffee, tea, maté	2.869
	1	09	Coffee, tea, maté	34.924
	2	12	Oil seeds	17.733
	3	62	Apparel access, non-knitted	0.784
Pakistan	4	05	Dairy produce	0.511
	5	41	Raw hides and skins	0.256
	1	07	Edible vegetables	41.180
	2	09	Coffee, tea, maté	3.192
	3	12	Oil seeds	0.343
	4	23	Food residues and waste	0.120
	5	41	Raw hides and skins	0.030

Source: Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: HS = Harmonized System.

Table 5A.3 Ghana's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
<i>a. 2005</i>				
China	1	26	Ores, slag, and ash	51.580
	2	18	Cocoa and cocoa prep	25.729
	3	44	Wood	3.390
	4	74	Copper and articles	2.998
	5	12	Oil seeds	1.601
India	1	44	Wood	33.820
	2	08	Edible fruits	27.367
	3	18	Cocoa and cocoa prep	8.285
	4	72	Iron and steel	5.407
	5	12	Oil seeds	4.300

(Table continues on next page)

Table 5A.3 Ghana's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
Japan	1	18	Cocoa and cocoa prep	65.695
	2	26	Ores, slag, and ash	4.479
	3	03	Fish and crustaceans	3.249
	4	22	Beverages, spirits, and vinegar	0.804
	5	44	Wood	0.465
Malaysia	1	18	Cocoa and cocoa prep	47.192
	2	44	Wood	0.623
	3	14	Vegetable plaiting material	0.412
	4	22	Beverages, spirits, and vinegar	0.130
	5	40	Rubber and articles	0.0474
Singapore	1	18	Cocoa and cocoa prep	8.330
	2	22	Beverages, spirits, and vinegar	1.080
	3	44	Wood	0.741
	4	14	Vegetable plaiting material	0.225
	5	82	Tools, implements, cutlery	0.199
<i>b. 2015</i>				
India	1	71	Natural or cultured pearls	3,010.022
	2	08	Edible fruits	86.391
	3	44	Wood	59.569
	4	76	Aluminum and articles	16.537
	5	12	Oil seeds	14.174
China	1	27	Minerals, fuels, and mining	863.683
	2	26	Ores, slag, and ash	94.994
	3	18	Cocoa and cocoa prep	50.652
	4	44	Wood	49.942
	5	12	Oil seeds	5.373
Malaysia	1	18	Cocoa and cocoa prep	244.273
	2	15	Animal or vegetable fat	14.0392
	3	40	Rubber and articles	10.391
	4	74	Copper and articles	1.086
	5	76	Aluminum and articles	0.276

(Table continues on next page)

Table 5A.3 Ghana's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
Vietnam	1	08	Edible fruits	112.542
	2	44	Wood	17.761
	3	12	Oil seeds	0.275
	4	03	Fish and crustaceans	0.235
	5	52	Cotton	0.185
Japan	1	18	Cocoa and cocoa prep	109.229
	2	03	Fish and crustaceans	2.854
	3	78	Lead and articles	1.612
	4	71	Natural or cultured pearls	0.934
	5	46	Straw	0.615

Source: Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: HS = Harmonized System.

Table 5A.4 Kenya's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
<i>a.2005</i>				
Pakistan	1	09	Coffee, tea, maté	167.767
	2	28	Inorganic chemicals	6.594
	3	41	Raw hides and skins	6.405
	4	72	Iron and steel	3.341
	5	74	Copper and articles	2.172
India	1	28	Inorganic chemicals	27.732
	2	09	Coffee, tea, maté	7.491
	3	41	Raw hides and skins	6.019
	4	25	Salt, sulfur, earths	5.593
	5	08	Edible fruits	4.979
Japan	1	21	Misc. edible prep	8.789
	2	09	Coffee, tea, maté	8.204
	3	06	Live trees and other	5.611
	4	07	Edible vegetables	3.347
	5	08	Edible fruits	2.688

(Table continues on next page)

Table 5A.4 Kenya's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
Thailand	1	28	Inorganic chemicals	25.710
	2	29	Organic chemicals	4.366
	3	84	Nuclear reactors	0.834
	4	71	Natural or cultured pearls	0.647
	5	85	Electrical machinery	0.158
China	1	41	Raw hides and skins	4.515
	2	26	Ores, slag, and ash	3.828
	3	74	Copper and articles	2.995
	4	53	Other vegetable textile fibers	2.932
	5	05	Dairy produce	1.469
<i>b.2015</i>				
Pakistan	1	09	Coffee, tea, maté	328.432
	2	07	Edible vegetables	4.363
	3	28	Inorganic chemicals	3.732
	4	41	Raw hides and skins	1.743
	5	49	Printed books, newspapers	0.544
India	1	07	Edible vegetables	35.017
	2	28	Inorganic chemicals	18.237
	3	09	Coffee, tea, maté	16.160
	4	41	Raw hides and skins	10.494
	5	25	Salt, sulfur, earths	6.871
China	1	26	Ores, slag, and ash	52.402
	2	41	Raw hides and skins	16.785
	3	53	Other vegetable textile fibers	6.499
	4	03	Fish and crustaceans	3.947
	5	09	Coffee, tea, maté	3.622
Japan	1	09	Coffee, tea, maté	16.680
	2	06	Live trees and other	13.160
	3	26	Ores, slag, and ash	11.737
	4	74	Copper and articles	7.983

(Table continues on next page)

Table 5A.4 Kenya's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
	5	21	Misc. edible prep	6.389
Afghanistan	1	09	Coffee, tea, maté	64.474
	2	48	Paper and paperboard	0.100
	3	27	Minerals, fuels, and mining	0.051
	4	62	Apparel access, non-knitted	0.003
	5	84	Nuclear reactors	0.002

Source: Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: HS = Harmonized System.

Table 5A.5 Nigeria's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
<i>a. 2005</i>				
Japan	1	27	Minerals, fuels, and mining	846.493
	2	12	Oil seeds	27.650
	3	18	Cocoa and cocoa prep	0.251
	4	96	Misc manufacturing	0.162
	5	13	Lac, gums, resins	0.104
Indonesia	1	27	Minerals, fuels, and mining	849.505
	2	18	Cocoa and cocoa prep	3.396
	3	52	Cotton	2.667
	4	44	Wood	0.752
	5	78	Lead and articles	0.431
China	1	27	Minerals, fuels, and mining	452.912
	2	41	Raw hides and skins	7.634
	3	26	Ores, slag, and ash	7.120
	4	74	Copper and articles	1.821
	5	18	Cocoa and cocoa prep	1.551

(Table continues on next page)

Table 5A.5 Nigeria's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
Korea, Rep,	1	27	Minerals, fuels, and mining	327.906
	2	74	Copper and articles	0.123
	3	29	Organic chemicals	0.057
	4	78	Lead and articles	0.039
	5	03	Fish and crustaceans	0.030
New Zealand	1	27	Minerals, fuels, and mining	85.255
	2	84	Nuclear reactors	0.011
	3	73	Articles of iron or steel	0.008
	4	85	Electrical machinery	0.007
	5	71	Natural or cultured pearls	0.005
<i>b. 2015</i>				
India	1	27	Minerals, fuels, and mining	9,033.217
	2	08	Edible fruits	52.670
	3	76	Aluminum and articles	45.105
	4	41	Raw hides and skins	19.719
	5	09	Coffee, tea, maté	9.448
Japan	1	27	Minerals, fuels, and mining	2,379.100
	2	12	Oil seeds	91.010
	3	76	Aluminum and articles	60.513
	4	71	Natural or cultured pearls	0.397
	5	03	Fish and crustaceans	0.233
China	1	27	Minerals, fuels, and mining	686.931
	2	44	Wood	308.676
	3	26	Ores, slag, and ash	66.274
	4	74	Copper & articles	11.291
	5	41	Raw hides and skins	9.216
Korea, Rep.	1	27	Minerals, fuels, and mining	835.175
	2	74	Copper and articles	82.531
	3	73	Articles of iron or steel	38.676
	4	78	Lead and articles	30.073
	5	76	Aluminum and articles	19.642

(Table continues on next page)

Table 5A.5 Nigeria's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
Thailand	1	27	Minerals, fuels, and mining	131.715
	2	76	Aluminum and articles	3.594
	3	78	Lead and articles	2.900
	4	26	Ores, slag and ash	1.635
	5	03	Fish and crustaceans	1.087

Source: Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: HS = Harmonized System.

Table 5A.6 Tanzania's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
<i>a. 2005</i>				
China	1	26	Ores, slag, and ash	165.113
	2	52	Cotton	36.614
	3	12	Oil seeds	11.214
	4	44	Wood	9.287
	5	05	Dairy produce	1.923
India	1	08	Edible fruits	42.952
	2	07	Edible vegetables	24.072
	3	44	Wood	8.845
	4	71	Natural or cultured pearls	6.944
	5	52	Cotton	5.331
Japan	1	09	Coffee, tea, maté	24.486
	2	26	Ores, slag, and ash	23.455
	3	12	Oil seeds	14.023
	4	03	Fish and crustaceans	11.260
	5	24	Tobacco	1.564
Malaysia	1	74	Copper and articles	16.478
	2	24	Tobacco	13.563
	3	52	Cotton	4.287
	4	51	Wool, fine or animal hair	0.110
	5	03	Fish and crustaceans	0.073

(Table continues on next page)

Table 5A.6 Tanzania's Top Five Sectors by Its Top Five Trade Partners, 2005 and 2015 (continued)

Top destinations	Sector rank	HS code	Sector	Exports (US\$, million)
Thailand	1	52	Cotton	23.579
	2	26	Ores, slag, and ash	1.600
	3	44	Wood	1.049
	4	71	Natural or cultured pearls	0.664
	5	12	Oil seeds	0.176
<i>b. 2015</i>				
India	1	71	Natural or cultured pearls	550.228
	2	08	Edible fruits	198.194
	3	07	Edible vegetables	197.877
	4	03	Fish and crustaceans	65.527
	5	44	Wood	21.440
China	1	15	Animal or vegetable fat	218.457
	2	26	Ores, slag, and ash	124.055
	3	12	Oil seeds	118.440
	4	74	Copper and articles	55.195
	5	53	Other vegetable textile fibers	22.357
Japan	1	26	Ores, slag, and ash	222.449
	2	12	Oil seeds	53.242
	3	09	Coffee, tea, maté	42.038
	4	24	Tobacco	36.443
	5	03	Fish and crustaceans	10.323
Vietnam	1	08	Edible fruits	95.094
	2	52	Cotton	14.873
	3	12	Oil seeds	12.095
	4	23	Food residues and waste	10.539
	5	03	Fish and crustaceans	2.323
Malaysia	1.5	26	Ores, slag, and ash	75.137
	1.5	74	Copper and articles	31.759
	3	18	Cocoa and cocoa prep	17.543
	4	52	Cotton	1.057
	5	20	Prepared vegetables, fruits, nuts	0.599

Source: Database for International Trade Analysis (BACI) of the Centre for Prospective Studies and International Information (CEPII).

Note: HS = Harmonized System.

Notes

1. “Upstreamness” is an input’s average distance from final use (Antràs et al. 2012). A relatively upstream sector is one that supplies a disproportionately large share of its output to other sectors that sell very little if any directly to final consumers.
2. BACI, the French acronym for “Base pour l’Analyse du Commerce International,” is the Database for International Trade Analysis of the Centre for Prospective Studies and International Information (CEPII), available at http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=37. It provides disaggregated data on bilateral trade flows for more than 5,000 products and 200 countries. The database is built from data directly reported by each country to the United Nations Statistical Division (Comtrade).
3. Data on the value of exports from Sub-Saharan Africa to Asia are from the CEPII’s BACI database.

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