



Drivers of participation

Key findings

- **Global value chain (GVC) participation is determined by fundamentals such as factor endowments, market size, geography, and institutional quality, but these fundamentals need not dictate destiny.** Choosing the right policies can shape each one of these fundamentals and thus GVC participation.
- **Factor endowments matter.** Low-skilled labor and foreign capital are central to backward participation in GVCs at early stages. An abundance of natural resources drives forward GVC integration. Foreign capital, whether efficiency-seeking or resource-seeking, can enhance host country integration in GVCs.
- **Market size matters.** Small countries are more dependent on imported inputs and foreign markets. Trade liberalization can expand effective market size and promote participation in GVCs.
- **Geography matters.** Overcoming remoteness by improving connectivity can promote GVC participation. Trade in parts and components within international production networks is highly sensitive to logistics performance and uncertainty in bilateral international transport times.
- **Institutional quality matters.** Entering deep preferential trade agreements (PTAs) can enhance institutional quality and increase GVC participation. Deep PTAs cover legal and regulatory frameworks, harmonize customs procedures, and set rules on intellectual property rights.

Vietnam's electronics sector expanded dramatically in less than a decade. Today, Vietnam is the second-largest smartphone exporter, producing 40 percent of Samsung's global mobile phone products and employing 35 percent of its global staff.

Vietnam's success can be attributed to a combination of factors. Trade liberalization—driven by World Trade Organization (WTO) accession and an agreement with the United States—a favorable investment climate, and a large pool of low-cost labor determined Vietnam's attractiveness as a global value chain (GVC) location. The result was large foreign direct investment (FDI) inflows, including from Samsung. Vietnam's geographical proximity to regional suppliers of electronics parts and components such as China, Japan, the Republic of Korea, and Thailand helped foreign investors gain access to high-quality inputs from abroad. And improved connectivity enabled Vietnam to import and export in a timely manner.

The story of Vietnam demonstrates that GVC participation is determined first and foremost by fundamentals such as factor endowments, market size, geography, and institutions (box 2.1). But these fundamentals need not dictate destiny. Choosing the right policies can shape each one of these fundamentals and thus GVC participation. Attracting FDI can remedy a scarcity of capital, technology, and management skills. Liberalizing trade at home and negotiating trade liberalization abroad can overcome the constraints of a small domestic market, freeing firms and farms from dependence on limited local inputs and narrow domestic demand. Improving transport and communication infrastructure and introducing competition in these services can address the disadvantage of a remote location. Participating in deep trade integration agreements that encompass policy areas beyond traditional trade policy, such as investment, competition, and intellectual property rights protection, can improve domestic institutions by helping countries commit to domestic reform and receive technical and financial assistance.

Factor endowments matter. Low-skilled labor and foreign capital are central to backward participation in GVCs. The abundant supply of low-cost labor in lower-income countries is often an entry point for participation in the labor-intensive manufacturing segments of GVCs. But upgrading skills becomes necessary for integration in more complex GVCs. An abundance of natural resources drives forward GVC integration. Foreign capital, whether efficiency-seeking or resource-seeking, can enhance host country integration in GVCs. Indeed, it is strongly and

positively correlated with backward GVC participation. It also promotes domestic upstream sectors, as happened in the case of apparel in Bangladesh, electronics in Vietnam, and automotives in Morocco.

Market size matters. Trade liberalization can expand market size and promote participation in GVCs. Lower tariffs on manufacturing goods foster backward GVC participation in manufacturing. Manufacturing tariffs fall sharply in the years before a country's transition from commodity to limited manufacturing GVCs. Sectors facing lower tariffs in destination markets exhibit stronger backward and forward GVC participation. Market access for low-income countries provided by the Everything but Arms initiative of the European Union (EU) or the African Growth and Opportunity Act (AGOA), a U.S. trade pact, can stimulate their exports and GVC integration. In the long run, however, the effects depend on rules of origin and their impacts on developing a local supplier base.

Geography matters. Overcoming remoteness by improving connectivity can promote GVC participation. Longer geographical distances to the major GVC hubs—China, Germany, and the United States—have a strong negative impact on both backward and forward GVC participation in manufacturing. By contrast, longer distances increase a country's likelihood of specializing in commodity GVCs. High transport costs impede entering, establishing, and upgrading in GVCs. Inefficient transport and logistics services and weak competition in these services amplify those costs in many manufacturing GVCs. Trade in parts and components within international production networks is highly sensitive to logistics performance and uncertainty in bilateral international transport times. Connectivity also includes effective communication among the participants in GVCs, which can be improved by access to the Internet. Higher Internet usage is linked to stronger backward GVC integration.

Institutional quality matters. Entering deep preferential trade agreements (PTAs) can enhance institutional quality and increase GVC participation. Deep PTAs cover legal and regulatory frameworks, harmonize customs procedures, and set the rules on intellectual property rights. Weak contract enforcement deters traditional trade flows, and GVCs are particularly sensitive to the quality of contractual institutions. Sectors relying more on contract enforcement see faster growth in GVC participation in countries with better institutional quality. Greater political stability reduces the likelihood of specializing in commodity GVCs.

Box 2.1 Vietnam's integration in the electronics GVC

Today, Vietnam is the second-largest smartphone exporter, producing 40 percent of Samsung's global mobile phone products and employing 35 percent of its global staff. Vietnam's backward participation in electronics GVCs increased from 47 percent in 2000 to 67 percent in 2010, and then declined slightly after 2012 (figure B2.1.1, panel a). Import tariffs in the sector dropped from about 8 percent in 2000 to less than 3 percent by 2015 (figure B2.1.1, panel b).

Vietnam has been a member of the Association of Southeast Asian Nations (ASEAN) since 1995, and after entering the World Trade Organization in 2007 the country's number of preferential trade partners increased from 10 to 16 by 2014. Most free trade agreements were between ASEAN and third countries (Australia, China, India, Japan, the Republic of Korea, and New Zealand), but some were bilateral with Chile, Japan, and the European Union. The coverage in Vietnam's trade agreements expanded substantially from 13 core provisions in 2007 to 86 in 2014.

Vietnam owes its success in the electronics sector to the following factors.

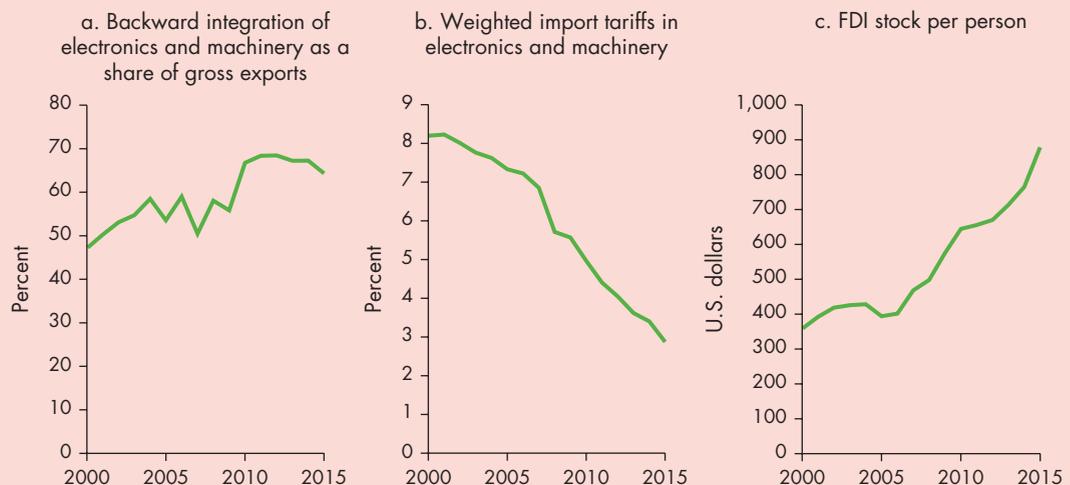
Stable investment climate. Vietnam's foreign direct investment (FDI) stock picked up from around \$400 per person in the early 2000s to \$500 in 2008 and \$880 in 2015 (figure B2.1.1, panel c). FDI inflows to the electronics sector included mostly large investments from Korea's Samsung Group, which launched Samsung Electronics Vietnam in

2008. Samsung's presence in Vietnam now includes the world's largest smartphone production facility, a smartphone and tablet display assembly facility, an electro-mechanical assembly operation for camera modules, and the Samsung Vietnam Mobile Research and Development Center. Samsung has about 160,000 workers in Vietnam, and lead firms LG, Canon, and Panasonic, contract manufacturers Foxconn and Jabil Circuit, and platform leaders Intel and Microsoft also operate there. FDI benefited from generous incentives, including tax concessions provided by the Vietnamese government.

Abundant low-skilled, low-cost labor. Vietnam's large pool of low-skilled, low-cost labor was an important determinant of its attractiveness as a GVC location. Over half of the workforce in Vietnam's population of more than 95 million was estimated to be low-skilled in 2006. But the quality of education in Vietnam is a significant barrier, and extensive training is still necessary. Samsung's software engineers are trained at the Samsung Vietnam Mobile Research and Development Center, with 90 percent of them attaining Samsung's global standards. The improved technological skills of the Vietnamese workforce may have actually contributed to the country's declining share of low-skilled workers—down to less than 40 percent by 2015.

Proximity. Most of the electronic inputs imported by Vietnam are from China; Hong Kong SAR, China; Japan;

Figure B2.1.1 Vietnam's backward GVC integration increased from 2000 to 2015 as tariffs declined and foreign direct investment (FDI) expanded



Sources: WDR 2020 team, using data from Eora and World Bank's WDI and WITS databases. See appendix A for a description of the databases used in this Report.

(Box continues next page)

Box 2.1 Vietnam's integration in the electronics GVC (continued)

Korea; Singapore; Taiwan, China; and Thailand. Although the import content of electronics exports reached two-thirds of gross exports in recent years (figure B2.1.1, panel a), the reliance on imported inputs declined slightly as the role of local suppliers increased. Samsung's local suppliers include not only foreign-owned suppliers that co-located with Samsung in Vietnam, but also 29 domestic suppliers (such as in display making and plastic molding) in 2016, up from just four in 2014, all trained by Samsung to meet quality standards.

Connectivity. Vietnam reduced the average time to import by two days—to roughly three weeks over 2006–15—and yet this is still one week longer than in the Philippines or Thailand, which have been involved in manufacturing GVCs for much longer. Meanwhile, Vietnam's Internet usage shot up from 17 percent of the population in 2006 to 43 percent in 2015—higher than the 27 percent in the Philippines and 25 percent in Thailand—reflecting an effort to dominate the information and communication technology GVC, not only in hardware but also in business services.

Sources: *Nikkei Asian Review* (2018); Sturgeon and Zylberberg (2016); *Viet Nam News* (2015).

Factor endowments matter

GVCs entail a finer international division of labor than standard trade, with countries specializing in segments of GVCs rather than in industries (chapter 1). Traditional trade theory postulates that factor endowments are an important determinant of specialization in GVCs, and they also shape the positioning of countries in GVCs. For example, an abundance of natural resources in a country is naturally linked to high forward GVC integration because agricultural products and commodities are used in a variety of downstream production processes that typically cross several borders. Vietnam's electronics GVC illustrates how abundance in low-skilled labor is often an entry point to backward participation.¹

A large pool of low-skilled workers matters for joining manufacturing GVCs, but higher skills matter for upgrading

When Samsung decided to invest in Vietnam, it was attracted to the young, cheap, and abundant workforce.² On average, Vietnamese workers could be hired at half the cost of their Chinese counterparts and were seven years younger. This cheap labor lowers costs in Samsung's factories, giving the smartphone maker an edge over Apple in the less expensive handsets. Likewise, Bangladesh's success in apparel exports after conclusion of the Multifibre Arrangement's quota regime in 2004 is linked to its large pool of low-skilled, low-cost workers. At less than \$200 a month, the average wage of an apparel sector worker in Bangladesh is lower than that in China (\$270), India (\$255), and Vietnam (\$248).³

The abundance of low-skilled labor in countries is positively linked to the extent of their backward integration in GVCs, based on evidence from a large sample of countries in the Eora database (box 2.2).⁴ This pattern is driven by backward GVC participation in the manufacturing and services sectors. Countries with larger endowments of low-skilled labor in the 2000s were also more likely to be among the group of countries specializing in either limited manufacturing or advanced manufacturing and services in 2011. Among countries engaged in limited manufacturing, Vietnam had by far the highest average percentage of low-skilled workers in its labor force (over 42 percent) during 2006–15, followed by Ethiopia (37 percent) and El Salvador (31 percent). Using labor costs as an alternative measure of low-skilled labor endowments for the same large sample of countries in the Eora database confirms the positive link with backward integration. According to evidence for 87 countries, lower wages facilitate participation in the final assembly stages of GVCs, mostly in the apparel sector.⁵

But labor costs could rise with a country's continued involvement in and upgrading of GVCs, as has happened in China. Improved technological skills contributed to a declining share of low-skilled workers in Vietnam (see box 2.1). Upgrading workforce skills becomes necessary to export more advanced manufacturing goods and services (box 2.2).⁶ A firm-level analysis of Bangladesh confirms that the higher skill intensity of a workforce and higher wages (relative to other firms in the country) are positively associated with the likelihood of being a GVC firm.⁷

Box 2.2 Modeling results on the drivers of GVC participation

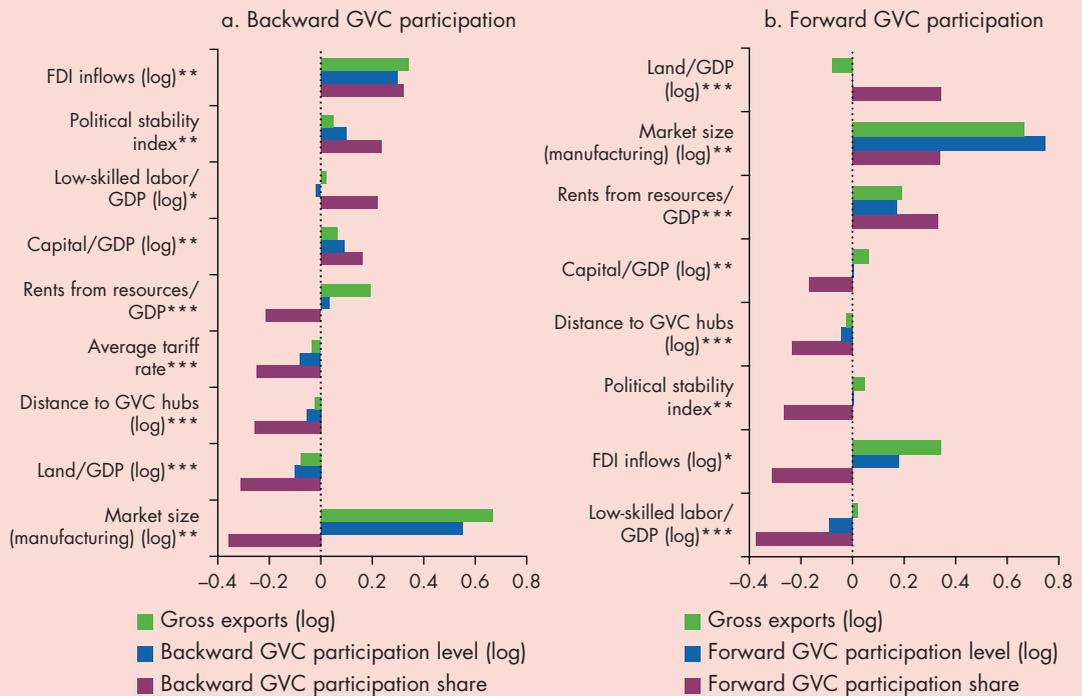
From imports of pistons used as intermediates in car manufacturing in Morocco (foreign content of exports/backward participation) to Chilean exports of copper used in refrigerators produced by firms in China and Mexico (domestic value added in exports used by partner countries for export production/forward participation), GVC participation is multifaceted and diverse across countries.

This assessment of the drivers of GVC participation across countries relies on GVC participation measures from Borin and Mancini (2019) using the Eora database, which covers 190 countries and draws on a combination of international input-output tables, domestic production, and trade data (see appendix A for a description of the databases used in this Report). The econometric model assesses the marginal impacts on

GVC participation of seven broad types of determinants emphasized in the trade literature: (1) factor endowments, (2) geography, (3) market size, (4) trade policy and foreign direct investment (FDI), (5) quality of institutions, (6) connectivity, and (7) financial and business environment factors.

This assessment estimates the impact of country averages of the determinants in the previous decade (e.g., the 1990s) on country average GVC participation in the following decade (e.g., the 2000s). It considers the following dependent variables: (1) the share of backward or forward GVC participation in gross exports, which captures the intensity of GVC trade relative to that of traditional exports; (2) backward or forward GVC participation levels (logs); and (3) gross exports (logs). Comparing the factors that affect

Figure B2.2.1 What explains backward and forward GVC participation?



Sources: WDR 2020 team, using data from CEPII, Eora, ILO, PWT 9.0, UNCTAD, WDI, WGI, and World Bank. See Appendix A for a description of the databases used in this Report. For more detail, see Fernandes, Kee, and Winkler (2019).

Note: The graphs show standardized coefficients for each variable on the y-axis. The coefficients are based on a between-effects regression. The dependent variables are average exports and backward or forward GVC participation levels and shares. The determinants are measured as averages in the previous decade and include manufacturing import tariffs, FDI inward inflows, distance to major GVC hubs (China, Germany, and the United States), manufacturing value added, political stability index, ratio of low-skilled labor to GDP, ratio of resource rents to GDP, ratio of land to GDP, ratio of capital stock to GDP, nominal exchange rate appreciation, and decade fixed effects. Significance is based on the GVC participation share regressions. Only determinants with statistically significant coefficients are shown. Standardized coefficients refer to how many standard deviations the dependent variable will change per standard deviation increase in the explanatory variable. FDI = foreign direct investment.

Significance level: * = 10 percent, ** = 5 percent, *** = 1 percent.

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Box 2.2 Modeling results on the drivers of GVC participation *(continued)*

GVC participation shares with their influence on GVC participation levels and on export levels indicates which determinants matter beyond traditional exports. This assessment also decomposes backward and forward country-level GVC participation measures into the four broad sectors of agriculture, mining, manufacturing, and services to shed light on which sectors are driving the overall cross-country results. The estimated impacts of the drivers in the baseline model are shown in figure B2.2.1 (these drivers explain more than half the variation in GVC participation shares):

- Low-skilled labor fosters backward GVC participation, while endowments of natural resources and land foster forward GVC participation.
- Controlling for factor endowments, liberal trade policy, higher FDI presence, and better institutional quality are important in determining backward GVC participation, while they do not matter (tariffs) or they matter in the opposite direction (FDI, political stability) for forward GVC participation.
- Domestic market size provides a larger pool of local input suppliers, which lowers backward GVC participation but increases forward GVC participation.

Decomposing the country-level backward GVC participation measures by broad sector suggests that the findings in figure B2.2.1 are driven largely by backward GVC participation of the manufacturing sector. The role of other drivers of GVC participation shares is also tested. Membership in preferential trade agreements and the depth of those agreements increase backward GVC participation. The time required to clear imports weakly reduces backward

GVC participation, whereas a better score in the logistics performance index (LPI) is linked to stronger backward GVC participation. Female labor market participation increases backward GVC participation. And the share of population speaking English as a second language weakly increases both forward and backward GVC participation.

To better understand what determines how countries participate in GVCs, measures of backward and forward GVC participation at the country-sector level are used in another econometric model that combines country endowments (capital, skilled labor, and natural resources), institutional quality, and input, output, and market access tariffs.^a The model allows sectors to differ (largely for technological reasons) in their intensity of using endowments and contracts, and it allows results to be given a causal interpretation (figure B2.2.2):

- Sectors using high-skilled labor or capital more intensively exhibit stronger GVC participation and gross exports in countries relatively more endowed with skilled labor or capital.
- Countries with better institutional quality exhibit stronger GVC participation and exports in their more contractually intensive sectors.
- Input tariffs and market access tariffs reduce GVC participation and gross exports.

In a separate additional test, sectors using the Internet more intensively exhibit stronger GVC participation and gross exports in countries with a higher number of Internet users, controlling for all other determinants.

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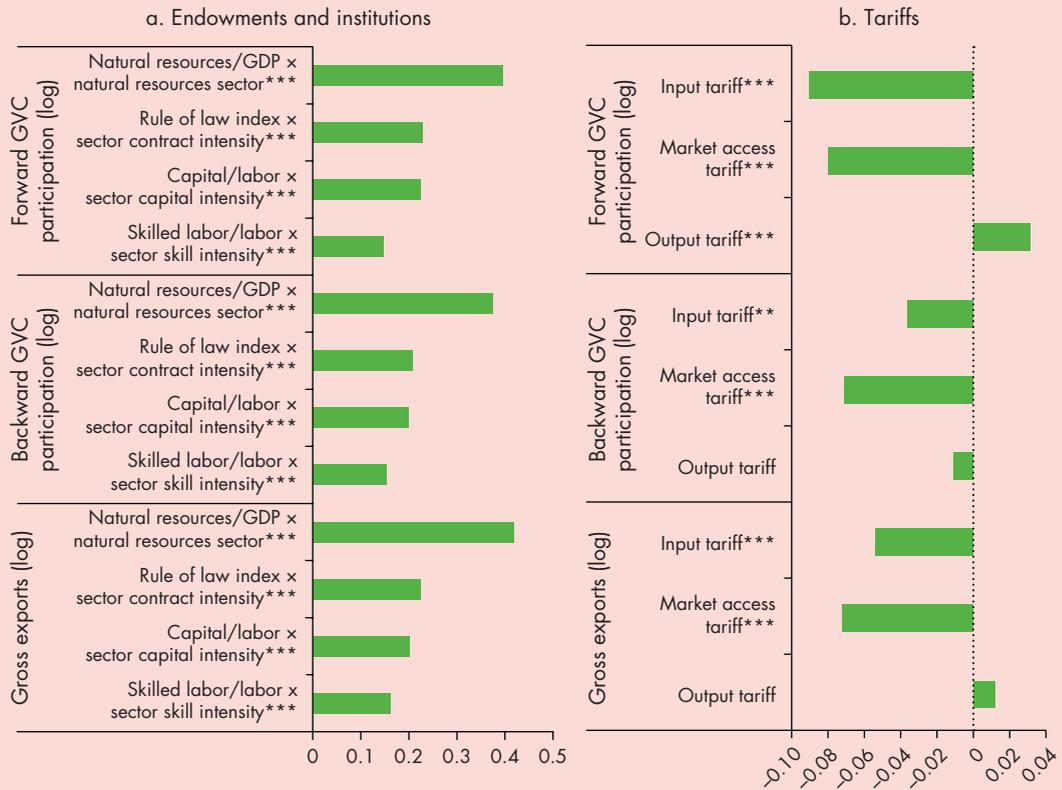
Different types of engagement in GVCs require different types of workers. The average annual labor costs for countries with limited manufacturing GVCs (such as Costa Rica, Morocco, South Africa, and Sri Lanka) were about \$11,000 per worker over 2006–15. Labor costs reached \$16,500 for countries specializing in advanced manufacturing and services GVCs (such as Mexico, Poland, Thailand, and Turkey). In countries focusing on innovative GVC activities—such as Germany, Japan, the United Kingdom, and the United States—the employee cost was about \$55,000 a year on average, reflecting their higher skill intensity and productivity (figure 2.1).

Cross-country evidence supports the positive correlation between skills and integration in innovative GVCs. Countries that entered the group of advanced manufacturing and services GVCs at some point over

1990–2015 (such as China, the Czech Republic, Poland, and Turkey) saw their labor costs increase sharply. Even countries with limited manufacturing GVCs (such as Cambodia, Indonesia, Nicaragua, and South Africa) show strong increases in their labor costs in the five years before transitioning (figure 2.2, panel a). Sectors using skilled labor more intensively see faster growth in GVC participation (and in gross exports) in countries relatively more endowed with skilled labor (see box 2.2). The estimated impacts are large: if Ghana increased its skilled labor share (7.5 percent) to the cross-country median (20 percent), its backward GVC participation and its gross exports would grow by an estimated 42 percent, and its forward GVC participation would grow by 39 percent. Further evidence for Sub-Saharan Africa shows that skilled labor and higher values of the World Bank's Human Capital

Box 2.2 Modeling results on the drivers of GVC participation (continued)

Figure B2.2.2 What explains a country-sector's GVC participation levels and gross exports?



Sources: WDR 2020 team, using data from Eora, ILO, NBER-CES Manufacturing Industry Database, PWT 9.0, TRAINS, UNIDO, WGI, WITS, Braun (2003), Felbermayr, Teti, and Yalcin (2019), and Nunn (2007). See Appendix A for a description of the databases used in this Report. For more detail, see Fernandes, Kee, and Winkler (2019).

Note: The graphs show standardized coefficients for each variable on the y-axis from three separate regressions using forward GVC participation, backward GVC participation, and gross exports as dependent variables. The regressions use a three-year lag of each of the determinants shown in panels a and b and control for country-year fixed effects and sector fixed effects. Standardized coefficients refer to how many standard deviations the dependent variable will change per standard deviation increase in the explanatory variable.

Significance level: * = 10 percent, ** = 5 percent, *** = 1 percent.

a. This analysis focuses only on differences across countries in the seven subsectors within the overall manufacturing sector in the Eora database.

Index⁸ are positively associated with GVC participation in the region.⁹

Female labor market participation is linked to higher backward GVC participation (see box 2.2). Evidence from manufacturing firms across 64 developing countries confirms that the female share of total employment is higher for firms participating in GVCs (defined as those that both import intermediate inputs and export).¹⁰ Verified in all sectors, this pattern is especially strong in the apparel and electronics sectors. A causal link is not warranted, however, because female labor market participation and GVC

integration can mutually reinforce one another. But the link between firm GVC participation and female corporate leadership is negative. Majority female-owned and female-managed firms are less likely to participate in GVCs. Chapter 3 discusses further the relationship between GVC participation and female employment, ownership, and management.

Automation, robotics, and 3D printing could pose a challenge to the GVC participation of countries whose comparative advantage lies predominantly in abundant low-cost workers. These enterprises require higher skills, and they enable customized production

close to the end markets, such as the 3D printing of shoes. Producers in lower-income countries typically rely more on low-skilled manual labor than do producers in higher-income countries. But this could become more difficult in the context of new technologies in GVCs because new technologies are associated with higher-quality standards and high-skilled labor, raising the hurdle for lower-income countries wishing to participate in GVCs.¹¹ (Chapter 6 discusses the potential impacts of new technologies on countries' prospects for GVC participation.)

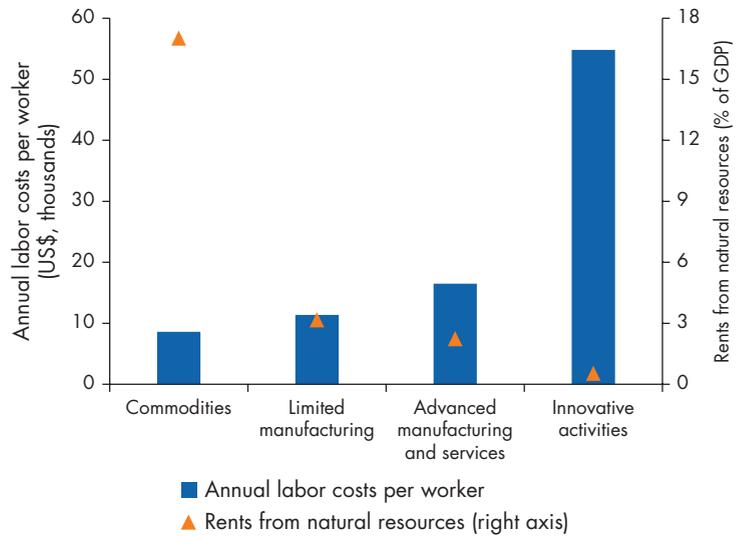
Natural resources are a driving force for forward GVC participation

Higher relative endowments of land or natural resources are both strongly positively correlated with forward GVC participation (see box 2.2). In other words, countries with abundant extractive resources, such as copper, iron ore, and other minerals, exhibit higher shares of domestic value added embodied in their partner countries' exports downstream. Sub-Saharan countries rich in non-oil natural resources exhibit greater forward linkages to manufacturing GVCs than other countries exhibit.¹² Almost a fifth of GDP originates from natural resources in countries specializing in commodities, compared with 3 percent or less for countries operating in limited manufacturing GVCs (see figure 2.1).

FDI acts as a catalyst for GVC integration, providing foreign capital and technical know-how

Higher capital endowments stimulate GVC integration and upgrading, but for those countries with scarce

Figure 2.1 Countries specializing in limited manufacturing rely on low labor costs, and countries specializing in commodities derive almost a fifth of GDP from natural resources

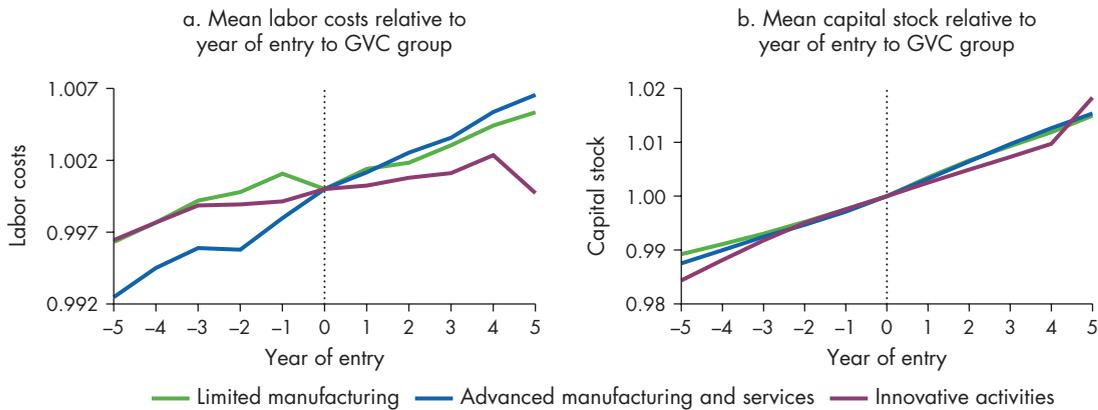


Sources: WDR 2020 team, based on Penn World Table; World Bank's WDI database; GVC taxonomy for the year 2011.

Note: The left axis shows average annual labor costs and the right axis the average rents from natural resources as a share of GDP by GVC taxonomy group, with averages over 2006–15. Labor costs were obtained by multiplying a country's (deflated) GDP by its labor share and dividing by the number of employees. The average of labor costs for countries specializing in commodities includes several high-income countries (such as Australia, Norway, and Saudi Arabia). See box 1.3 in chapter 1 for a description of the GVC taxonomy used in this Report.

capital FDI offers a solution. Cross-country cross-sector evidence from the Eora database shows that a relative scarcity of capital deters stronger GVC participation in capital-intensive sectors (see box 2.2). Countries moving from commodities to limited

Figure 2.2 Increases in labor costs and capital stock accompany upgrading in GVCs



Sources: WDR 2020 team, based on Eora; World Bank's WDI database; GVC taxonomy.

Note: The year of entry is normalized to 0 for all countries in a particular GVC group, and the sample used to compute the means shown is based on countries with at least five years of observations before and after entry to the GVC group. Labor costs and capital stock are measured relative to the year of entry. Additional analysis confirms that labor costs and capital stock increase significantly in the five years before and after a switch.

manufacturing GVCs exhibit a strong increase in capital stock in the five years before the transition (figure 2.2, panel b). Because countries can attract FDI to overcome relative capital scarcity and thus integrate into GVCs, GVC activity and FDI inflows go hand in hand. When tight control over foreign production processes is necessary (perhaps because of weak contractual enforcement or weak protection of intellectual property), lead firms might prefer vertical integration of suppliers over an arm's-length relationship, resulting in intrafirm trade and FDI flows (see chapter 1).

It is hard to imagine a GVC in which a multinational firm is not involved at some stage of the production chain. Vietnam's success in smartphones stemmed from investments by Samsung in Vietnam to set up Samsung Electronics Vietnam (SEV) in 2008 and Samsung Electronics Vietnam-Thai Nguyen (SEVT) in 2013 (see box 2.1). Likewise, the Moroccan automotive industry has relied on investments by the French Renault-Nissan Alliance and PSA Group car companies. Singapore's Olam, one of the world's largest suppliers of cocoa beans, contributed to Ghana's cocoa exports reaching over 23,000 customers worldwide.¹³ And then there were the earlier success stories such as Intel in Costa Rica (until 2014) and Volkswagen in South Africa.¹⁴ In addition, investors from Taiwan, China, in the 1990s and South African investors in the 2000s were instrumental in developing and expanding the apparel value chain in Lesotho, whereas Mauritian investors played a similar role for apparel in Madagascar.¹⁵ In all these cases, foreign-owned firms were instrumental in jumpstarting the domestic economy and integrating production into GVCs. And yet the reliance on FDI inflows also poses risks: Costa Rica lost many manufacturing jobs to Vietnam in 2014 after Intel abruptly relocated its operations.

Although many of these success stories (particularly in East Asia) are linked to FDI in manufacturing GVCs, much of the growth in FDI over the past two decades has come through natural resource-based sectors. Such investment differs considerably from traditional manufacturing FDI. Investors tend to be resource-seeking rather than efficiency-seeking or market-seeking. Investment is also likely to be dispersed across a wider set of countries and to emerge from a widening set of investors (including large investors from the global South).¹⁶

FDI inflows play a strong role in the extent of backward GVC participation shares and levels (see box 2.2), driven by GVC integration of the manufacturing sector.¹⁷ The lack of foreign-owned firms in manufacturing is an important reason for low backward GVC participation in Sub-Saharan Africa.¹⁸ Meanwhile, FDI

is linked to lower forward GVC participation shares driven by GVC integration of agriculture and services. Countries attracting FDI in manufacturing may reduce their exports of raw agricultural goods and intermediate services (such as transportation) embodied in exports of resource-intensive goods, thereby lowering their forward GVC participation.¹⁹

Foreign-owned firms may also promote domestic upstream sectors. They increase the demand for local intermediate inputs and cultivate local suppliers that may subsequently supply other downstream domestic firms and even export. FDI can ease the entry of domestic firms into GVCs by, for example, conferring technical know-how and transmitting managerial practices. According to the Moroccan minister of industry, trade, and new technologies, Moulay Hafid El Alami, when Renault-Nissan set up plants in the north of Morocco's small city of Melloussa, it aimed to build an "industry ecosystem." Later, in fact, it attracted many other companies specializing in auto parts production and seeking to supply Renault-Nissan. Meanwhile, the government of Morocco is looking at ways to deepen the country's backward linkages. FDI in the apparel sector in Bangladesh led to new local input suppliers producing zippers, buttons, and fabrics, which also benefited domestic apparel firms and ensured the country's competitiveness in global apparel exports (box 2.3).²⁰ Such linkages of sectors and firms through FDI can further deepen countries' participation in GVCs.²¹ Indeed, China has defied the global decline in the share of domestic value added in exports because its large domestic manufacturing capacity is supplying the downstream GVC parties through favorable FDI and trade policies (box 2.4).²²

The link between FDI and GVC participation makes it difficult to disentangle their determinants. In their responses to the World Bank's Global Investment Competitiveness survey, executives at multinational corporations involved in efficiency-seeking FDI viewed country endowments as crucial for their investment decisions. Endowments included the available talent and skill of labor, the low cost of labor and inputs (including ease of access to imported inputs), and the capacity and skills of local suppliers.²³ Favorable exchange rates, good physical infrastructure, and low tax rates are also important, as are PTAs, bilateral investment treaties, and investment incentives. (Some of these policy-amenable factors are discussed throughout the chapter as important drivers of GVC participation. Other factors are covered in chapter 7.)

FDI is critical, particularly for countries upgrading their type of participation in GVCs. From 1990 to 2015,

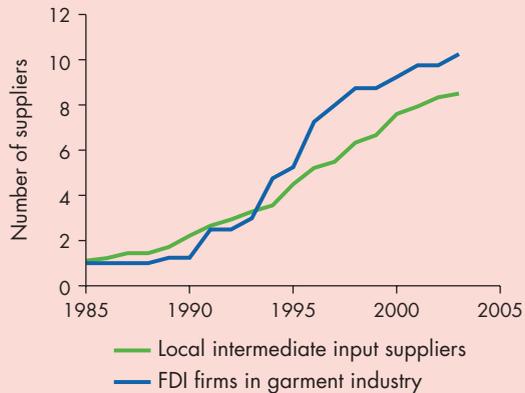
Box 2.3 Sharing suppliers: How foreign firms benefit domestic firms

In the development of Bangladesh’s apparel sector, foreign firms created incentives for local suppliers to improve their quality and productivity. Domestic firms that shared local suppliers with foreign firms gained access to newer and better local inputs. The spillover effects of shared suppliers helped explain a quarter of the expanded product scope and a third of the productivity gains of Bangladesh’s domestic firms in the apparel sector from 1999 to 2003. In Bangladesh, foreign apparel firms also fostered the local market supplying intermediate inputs (figure B2.3.1).

But the reverse is true when foreign firms leave. In Malaysia, a local supplier sold a special plastic resin to Panasonic for its fax machines and to local manufacturers of box cutters. When Panasonic closed the plant, manufacturers of box cutters suffered as well.

Source: Kee 2015.

Figure B2.3.1 In Bangladesh, local suppliers grew as FDI grew from 1985 to 2003



Source: Kee 2015.

Note: FDI = foreign direct investment.

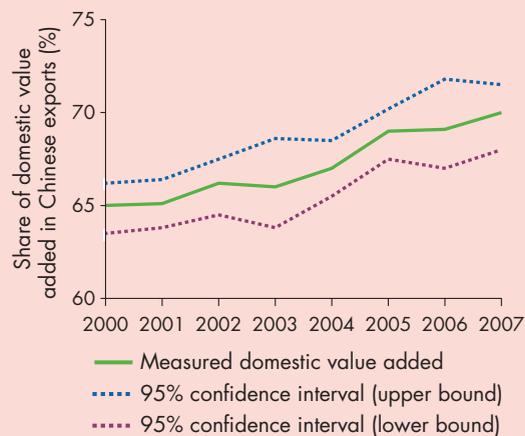
Box 2.4 How liberalizing trade and FDI helped China move up in GVCs

Global production fragmentation has allowed firms to rely less on domestic inputs for production, as is evident in the growing backward GVC participation and the declining ratios of value added to gross exports across the world. China is an intriguing exception. How did it defy the global decline in domestic content in exports, despite its deep engagement in GVCs?

Firm-level customs transaction data and manufacturing firm survey data are used to measure China’s domestic content in exports (its ratio of domestic value added in exports to gross exports). From 2000 to 2007, the share of domestic content in Chinese exports rose from 65 percent to 70 percent (figure B2.4.1). This upward trend was driven mainly by China’s processing exporters, who substituted domestic for imported intermediate inputs in both volume and variety. After 2000, China’s structural transformation was fueled by trade and foreign direct investment liberalization that encouraged intermediate input producers in China to expand their product varieties. Exporters in China began to buy more domestic intermediate inputs and to rely less on imported inputs. Other factors—such as rising wages, firm entry and exit, and the changing composition of

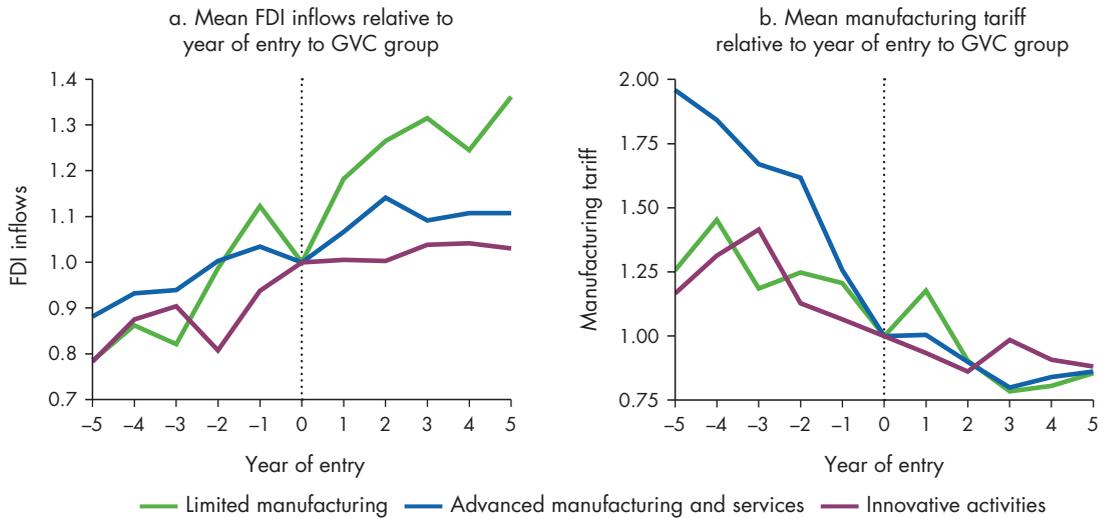
Chinese exports toward industries with high domestic value added or in nonprocessing sectors—cannot explain the upward trend.

Figure B2.4.1 Domestic value added in exports from China increased from 2000 to 2007



Source: Kee and Tang 2016.

Figure 2.3 FDI increases and tariff declines accompany GVC upgrading



Source: WDR 2020 team, based on World Bank’s WDI database and GVC taxonomy.

Note: The year of entry is normalized at 0 for all countries in a particular GVC group, and the sample to compute the means is based on countries with at least five years of observations before and after entry to the GVC group. FDI inflows and manufacturing tariffs are measured relative to the year of entry. Additional analysis confirms that FDI inflows increase significantly in the five years before and after a switch, whereas manufacturing tariffs decline significantly over that same period. FDI = foreign direct investment.

net FDI inflows picked up substantially for all countries in the years before transitioning into a new GVC group (figure 2.3, panel a). The growth of FDI inflows continues after countries transition into limited manufacturing GVCs (such as in Argentina, Cambodia, Indonesia, and South Africa) and to a lesser degree for countries transitioning into advanced manufacturing and services GVCs (such as in China, the Czech Republic, Romania, and Turkey) or into innovative GVC activities (such as in Austria, Italy, Korea, and Singapore).

To attract FDI, lower-income countries that face substantial infrastructure and regulatory gaps can establish special economic zones (SEZs) or export processing zones with less burdensome rules for business and better access to inputs than in the rest of the country. This approach was central to Bangladesh, Cambodia, Lesotho, and recently Ethiopia successfully entering the apparel GVC. Such sites account for a large share of exports and employment in GVCs, but linkages to the local economy tend to be small.²⁴ However, many other countries have struggled to establish successful zones. Chapter 7 dives deeper into SEZs and their role for GVCs.

Market size matters

Backward GVC participation in manufacturing as a percentage of total exports is lower in large economies, including China, Japan, and the United States.

To minimize cross-hauling of semiprocessed goods in GVCs, countries often specialize in contiguous stages of production. Because larger countries have a larger industrial capacity, they tend to attract a larger set of contiguous stages and reduce the use of imported inputs relative to domestically sourced inputs in their exports (lower backward GVC integration).

By their sheer size, large countries are likely to be geographically close to the consumers of final goods, so their more “central” location should make them more prone to specialize in downstream stages of production embodying more foreign value added.²⁵ Moreover, a large domestic supplier base reduces search frictions and facilitates the replacement of domestic suppliers if there are production disruptions.

Market size and the role of domestic suppliers

A story from Poland highlights the relationship between market size and GVCs and how industry linkages through the role of domestic suppliers can affect outcomes. In 1992 General Motors, one of the world’s largest automakers, set up General Motors Poland to import Opel cars for the large Polish domestic market. Two years later, GM Poland commenced production activities, and today Poland has become one of the world’s major auto exporting countries. Through intensive cooperation with Polish auto part suppliers, GM Poland has contributed to the significant growth

in their number and also plays a role in expanding their sales to other GM units around the world.

The effect of market size on GVC participation is crucially mediated by links to domestic industries. Markets with larger manufacturing sectors are characterized by larger forward GVC participation and smaller backward GVC participation, highlighting the importance of domestic suppliers for GVC participation (see box 2.2). A larger manufacturing sector in the 2000s also increased the likelihood of countries participating in advanced manufacturing and services GVCs or in innovative GVC activities in 2011.

Enhancing market size by liberalizing trade policies

The constraints of a small market and limited local inputs can be overcome by liberalizing trade at home and negotiating liberalization abroad in order to liberate firms and farms from dependence on local inputs and narrow domestic demand. Regulatory barriers on both imports and exports, such as tariffs or quotas, increase trade costs, with consequences for countries' GVC participation and positioning. Trade barriers increase the cost of imported intermediate inputs and thus can reduce backward GVC participation. They also translate into higher costs for a country's exports, lowering forward GVC participation. Because tariffs imposed by partner countries increase the costs of exports, reducing tariff barriers can amplify the benefits for internationally fragmented production.

Costly imported intermediates are a barrier to GVC integration

Successive rounds of trade negotiations and unilateral trade liberalization efforts have been a driving force for GVC integration over the last three decades. China's accession to the WTO in 2001 and the accompanying requirement to reduce more than 7,000 tariffs ushered in a new era of globalization that stimulated GVC participation not only for its home firms but also for those in partner countries in East Asia and beyond. Meanwhile, accession to the world's largest customs union—the EU—was critical in bringing the Czech Republic, Hungary, Poland, and the Slovak Republic, and later Bulgaria and Romania, into GVCs.²⁶

Lower tariffs on manufacturing goods encourage countries' backward GVC participation (see box 2.2). A 1 percentage point decrease in a country's average manufacturing tariff is associated with an increase of 0.4 percentage points in that country's backward GVC participation share in gross exports. In Sub-Saharan Africa, the negative impact of tariffs on GVC

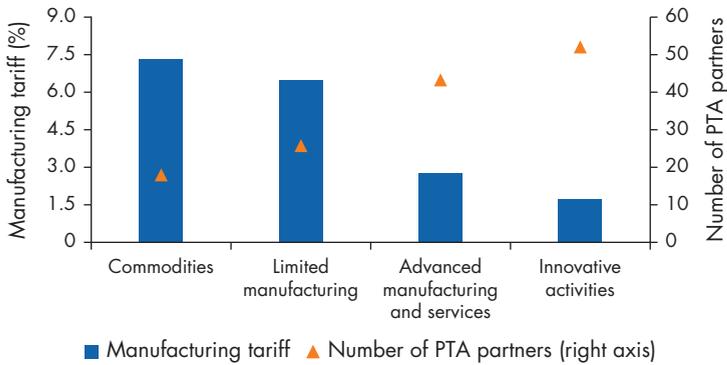
participation is especially acute.²⁷ Higher import tariffs on manufacturing in the 2000s reduced the propensity of being in the group of countries specializing in advanced manufacturing and services GVCs in 2011. Tariffs on intermediate inputs have a strong negative impact on both GVC participation and gross exports (see box 2.2).

Tariffs on imported intermediates shape countries' export bundles, often preventing them from upgrading to more sophisticated or more profitable products. For example, Nepal exports tea almost entirely in bulk to India at about one-tenth of the price for tea sold packaged to Germany or the United Kingdom. To scale up the exports of branded, packaged tea, Nepalese entrepreneurs need intermediate inputs such as filter bags. But those are subject to a tariff of 30 percent, plus a 5 percent excise duty, increasing the world price of filter bags for Nepalese exporters by 36.5 percent and hampering their competitiveness.²⁸

Exporters can often circumvent high tariffs on imported intermediates by using duty suspension mechanisms, but these often do not function efficiently. Two examples from South Asia illustrate this point. Pakistan's tariffs on intermediates average 8 percent—four times the average in East Asia—and its regulatory and additional duties (para-tariffs) are high. Thus, Pakistani exporters of textiles and apparel—the country's major export sector—rely mostly on domestic cotton rather than on imported artificial fibers such as polyester (the leading input to the fast-growing global imports of apparel).²⁹ In principle, Pakistani exporters have access to duty suspension schemes for their imported intermediates, such as the Duty and Tax Remission on Exports. In practice, approvals for remission takes on average 60 days—twice the time specified by law—and clearing customs after approval takes an extra 5–10 days. For that reason, a mere 3 percent of textile and apparel exporters use the scheme. In Bangladesh, by contrast, obtaining approval for duty suspension on intermediates takes on average 24 hours, and about 90 percent of textile and apparel firms use the scheme.³⁰

Despite the gradual decline in tariffs over the last decades, especially for manufactured goods, there are still important differences in the restrictiveness of trade policies across countries. Countries specializing in commodities imposed manufacturing tariffs averaging 7.5 percent from 2006 to 2015, and those with limited manufacturing GVCs imposed tariffs averaging 6.5 percent. Tariffs drop sharply to less than 3 percent for countries with advanced manufacturing and services GVCs and to less than 2 percent for those with innovative GVC activities (figure 2.4).

Figure 2.4 Manufacturing tariffs are high and preferential trading partners few in countries connected to commodity GVCs



Sources: WDR 2020 team, based on World Bank's WDI and Deep Trade Agreements databases and GVC taxonomy for the year 2011.

Note: The left axis shows average manufacturing import tariffs and the right axis the average number of preferential trading partners by GVC taxonomy group, with averages over 2006–15. PTA = preferential trade agreement.

For countries upgrading their participation in GVCs, manufacturing tariffs fall substantially in the years prior to such transitions (see figure 2.3, panel b). For countries establishing limited manufacturing GVCs at some point during 1990–2015—such as Argentina, Cambodia, Indonesia, and South Africa—the average manufacturing tariff rates were on average 25 percent higher five years before the transition compared with the year of the transition. Countries joining the group of advanced manufacturing and services GVCs—such as China, the Czech Republic, Romania, and Turkey—saw their tariffs drop by half from five years before the transition to the time of upgrading and saw a continued decline in the five years after upgrading.

Low tariffs are necessary but insufficient for high backward GVC participation because nontariff measures and other barriers at the border also matter. In South Asia, nontariff barriers—including para-tariffs and other regulatory constraints—increase firms' production costs and alter their input mix, thereby affecting their long-term export competitiveness. This outcome hurts the already low trade and GVC participation in South Asia.³¹ The overall trade restrictiveness index for South Asia countries—capturing the trade policy distortions that each country imposes on its import bundle—shows greater protection for imports from South Asia than from the rest of the world (table 2.1).³²

Brazil's large automotive sector, which employed more than 500,000 workers in 2016, developed under the shelter of high tariffs and high nontariff measures. But these policies have also been behind the sector's poor integration into GVCs, reflected in the lack of

Table 2.1 South Asian countries impose higher barriers to trade on each other (overall trade restrictiveness index, 2011)

Importing country	Origin of imports	
	South Asia	Rest of world
Afghanistan	3.84	4.65
India	4.59	0.50
Nepal	10.59	6.87
Pakistan	3.00	0.51
Sri Lanka	1.01	0.33

Source: Updated estimates by UNCTAD and World Bank (2018), based on their methodology.

Note: The overall trade restrictiveness indexes are computed using applied tariffs that take into account bilateral preferences.

export orientation of its major auto producers and its domestic suppliers.³³ High local content requirements in the country's industrial policy toward the auto sector—the Inovar-Auto policy (2011–17)—prevented the sector from participating in GVCs.

Market access can jumpstart GVC participation

Market access, captured by the tariffs in destination markets, also plays a role in GVC participation. Sectors facing on average lower tariffs in destination markets exhibit stronger backward and forward GVC participation (see box 2.2). A 1 percentage point decline in the average tariff facing a sector in destination markets is associated with an increase in the country-sector's backward (forward) GVC participation by 6 percent (7 percent).

Preferential access is one aspect of special and differential treatment and its objective has been to encourage export-led growth in developing countries. But whether preferential access can help developing countries' exports has sparked disagreement, with skeptics arguing that trade preferences dilute the case for policy reform at home and lure beneficiaries into sectors in which they lack a comparative advantage.³⁴ Preferential access to foreign markets such as that provided by the Everything but Arms initiative of the European Union and the AGOA of the United States can help developing countries' exports in the short run.³⁵ In the long run, however, the effects are more nuanced, depending on the prevalent rules of origin and their impacts on the development of domestic suppliers (box 2.5). There is great heterogeneity across African countries in the response to AGOA market access preferences. Evidence suggests that for export

Box 2.5 Trade preferences as catalytic aid?

Immediately after the European Union granted duty-free and quota-free access to Bangladesh under the Everything but Arms (EBA) initiative in 2001, knitwear exports from Bangladesh to the European Union more than doubled, from \$1.3 billion in 2000 to \$3 billion in 2004. During the same period, knitwear exports from Bangladesh to the United States also increased by \$30 million. Much to the surprise of many, such generous trade preferences resulted not in trade diversion from the rest of the world to the preference-granting markets, but in trade creation to the rest of the world. What could explain this finding?

Trade preferences can result in a long-term win-win scenario for all parties concerned.^a The European Union gained from giving trade preferences to Bangladesh under the EBA because its lost tariff revenues were outweighed by gains from the lower prices resulting from higher entry into exporting in Bangladesh. Preferences raised the profits of potential exporters in Bangladesh, inducing greater firm entry exports to the European Union. But as firms overcame the fixed costs of production and exporting, some began to export to other markets, and exports from Bangladesh to all markets rose. Moreover, Bangladesh solidified its position as a major apparel exporter to the European Union, even after the conclusion of the Multi-fibre Arrangement (MFA) quota regime in 2004. The strict origin requirements of the European Union's EBA and its potential encouragement of greater local value added through nurturing stronger domestic suppliers may have helped explain these durable benefits.

The long-term impacts of the African Growth and Opportunity Act (AGOA) on the apparel export performance of African countries were more nuanced. At first, aggregate African apparel exports to the United States boomed after AGOA was enacted, and they then declined after MFA quotas ended in 2004 and preference erosion ensued (with competition from Asian giants). They have stagnated in recent years. The aggregate picture, however, is based on four different country-level stories (figure B2.5.1). Countries mostly in Central and West Africa, such as Cameroon, never took meaningful advantage of AGOA (panel a). Countries mostly in Southern Africa, such as Eswatini (formerly Swaziland), experienced a boom right after AGOA was enacted, followed by a bust (panel b). Countries such as Lesotho experienced growth and then stagnation (panel c). And countries in East Africa, such as Ethiopia, saw fairly sustained success, albeit starting late in some cases (panel d).^b

As for other countries in these regions, in Madagascar the contraction in apparel exports to the United States after the MFA phase-out was driven by a tremendous exit of firms. In Mauritius, firms did not exit but contracted their exports sharply until a relaxation of the AGOA rules of origin in 2009 prompted a revival. The sustained dynamism of Kenya and the late growth in Ethiopia were driven largely by new firms entering the market after 2010 rather than by incumbent firms that benefited from large preference margins during the early AGOA period. Thus trade preferences do not seem to have nurtured longer-term comparative advantage in African countries.

(Box continues next page)

success, preferential access per se is not sufficient but needs to be complemented by specific domestic policies: lower tariffs, a reduced regulatory burden, and enhanced connectivity.³⁶ In some cases, as in Ethiopia, trade preferences are fundamental to offsetting a country's cost disadvantages stemming from lower labor productivity and higher logistics costs (relative to countries such as Vietnam) and so help attract FDI.³⁷

Geography matters

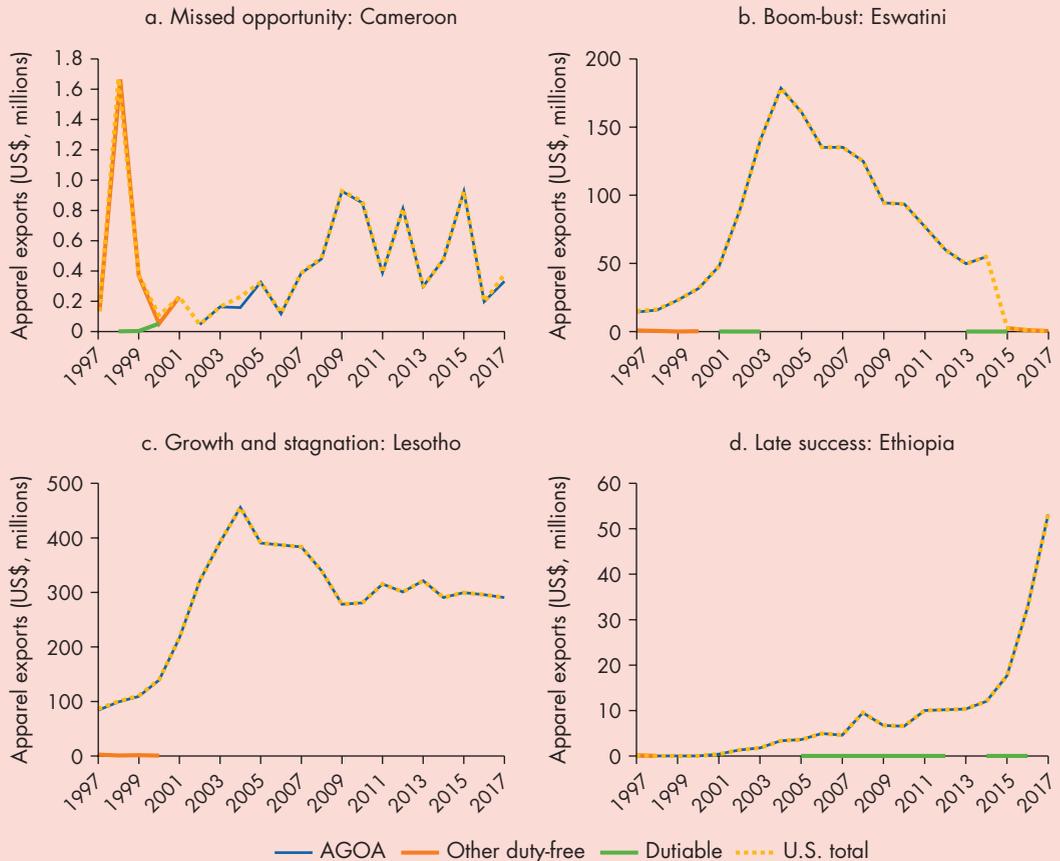
Proximity to the hubs in the global trade network—China, Germany, Japan, and the United States—matters for GVC participation. Many value chains are not global but regional. Vietnam's proximity to its regional suppliers of electronic inputs—such as China, Japan, Korea, and Singapore—clearly helped

its GVC participation in the electronics sector (see box 2.1). Has remoteness prevented countries in Latin America and Sub-Saharan Africa from participating in GVCs? The total distance from Argentina or Chile to the GVC hubs is almost 40,000 kilometers and that from Malawi or Mozambique is more than 30,000 kilometers. These distances contrast with those for countries specialized in advanced manufacturing and services GVCs and innovative GVC activities, which average 18,000 kilometers.

The automotive sector relies heavily on fairly short regional value chains for at least three reasons. Automotive components such as car seats or engines can be heavy, bulky, and easily damaged, thereby increasing transportation costs. Just-in-time production and high product variety often require that subcomponents be produced near final assembly. And

Box 2.5 Trade preferences as catalytic aid? (continued)

Figure B2.5.1 Four stories of AGOA apparel exports from Africa



Source: WDR 2020 team, using data from the World Bank's Developing Countries' Trade and Market Access in the European Union and the United States database (U.S. section).

Note: Exports are classified by tariff regime eligibility by product-country-year and do not account for preference use. AGOA = African Growth and Opportunity Act.

a. Cherkashin et al. (2015).

b. Fernandes et al. (2019).

final assembly often happens in large end markets with local content requirements in return for market access, such as in Brazil, China, India, and South Africa.³⁸ Morocco took advantage of its geographical proximity to the EU market to become Africa's largest producer of passenger vehicles in 2017, surpassing South Africa.³⁹

Inefficient infrastructure and delays in clearing customs are important sources of high trade costs. The performance of a GVC is often severely impaired

by its weakest link, such as customs delays. Supply chain disruptions are especially costly when firms cannot easily resort to alternative suppliers. Trade delays associated with inefficient connectivity can be a large deterrent for relational GVCs requiring coordination and "just-in-time" delivery. Weak contract enforcement and the need for stronger cooperation and repeated interactions among the several agents participating in the chain may be severely curtailed by a remote location or inadequate air connectivity.

Trade costs can also shape a country's positioning in GVCs. In sequential (or snakelike) GVCs, trade costs compound along the value chain and occur at a higher incidence in the downstream stages than in the upstream stages. This situation may give remote countries an incentive to specialize in upstream stages and more central countries an incentive to specialize in downstream stages.⁴⁰ Inefficient transport and logistics services and weak competition in these services amplify the trade costs in many manufacturing GVCs with multiple border crossings and can offset other competitive advantages such as low labor costs.⁴¹

Strong evidence of the negative role played by longer geographical distances for GVC participation, both backward and forward, can be found using the Eora database. This evidence is driven mainly by manufacturing sector GVCs (see box 2.2).⁴² The longer geographical distances to the GVC hubs in China, Germany, and the United States increase a country's likelihood of specializing in commodities, whereas countries closer to the GVC hubs are more likely to participate in limited manufacturing GVCs. Geographical proximity also matters more for trade in GVCs than for trade in final goods.⁴³

Enhanced connectivity can overcome geographical barriers and promote GVC participation

The disadvantage of a remote location can be addressed by improving transport and communication infrastructure as well as the regulatory framework—especially competition—governing these services. The most remote countries, such as landlocked ones, have policies for important “linking” services such as transport and telecommunications that are perversely restrictive.⁴⁴ Better connectivity would influence the predictability, reliability, and timeliness of GVCs.⁴⁵

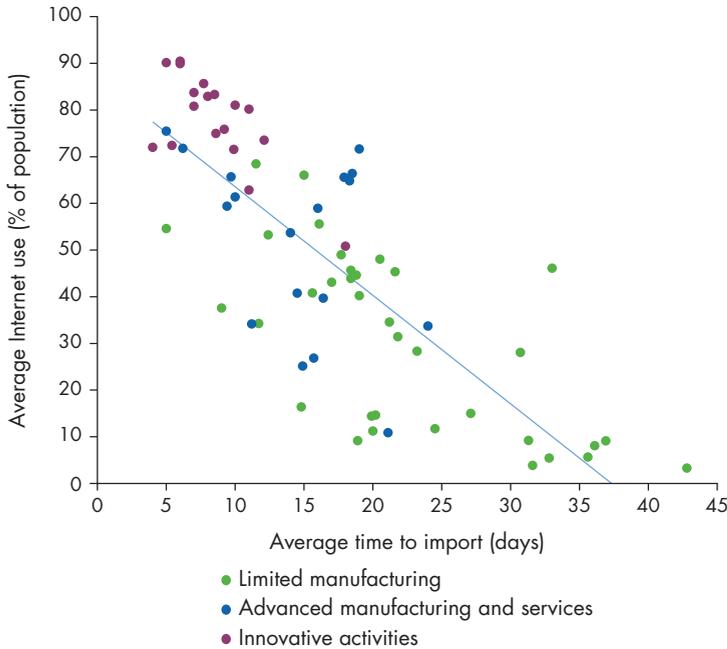
Transport costs remain, according to developing country suppliers, the main obstacle to entering, establishing, or upgrading in GVCs.⁴⁶ The geographic centrality of a country can attract downstream production stages in GVCs. But geographic centrality is more related to centrality in the transport network than to distance. Perhaps more important for GVC participation is economic distance. Countries in Central Asia, while central in the distance to neighbors, are isolated because of their poor-quality transport networks, their lack of affordable transport services for containers, and the missing links along main infrastructure corridors.⁴⁷ These issues impair their participation in the downstream stages of GVCs. Similarly, slow and

unpredictable land transport keeps most Sub-Saharan African countries out of the electronics value chain.⁴⁸ Estimates suggest that improving trade facilitation halfway to global best practices would stimulate trade in the Sub-Saharan Africa region to a far greater extent than eliminating all import tariffs.⁴⁹ And although air transport could help bridge slow land transport or long geographical distances, its high cost limits low-income country exports to goods with very high unit values (such as gold and silver), time-sensitive goods (fast fashion clothing), and perishable goods (cut flowers).⁵⁰ A day of delay in transit due to a different transport mode choice has a tariff equivalent of 0.6–2.1 percent, and the most sensitive trade flows are those involving parts and components.⁵¹ Meanwhile, the private provision of cold storage logistics infrastructure has enabled the development of the Ethiopian floriculture value chain, whereas lack of such infrastructure is limiting the upgrading potential in Bangladesh's aquaculture value chain.⁵²

High logistics costs inhibit landlocked countries from participating in GVCs for electronics and fruits and vegetables.⁵³ The average number of days from a warehouse in the origin economy to a warehouse in the destination country in 2006–15 varied greatly for different types of GVC participation (figure 2.5). Imports by countries specializing in innovative GVC activities need less than nine days on average to reach a warehouse, but one additional week is required for countries specializing in advanced manufacturing and services GVCs, such as the Philippines, Portugal, and Thailand. By contrast, the average time to import exceeds one month in countries specializing in commodities (not shown in figure 2.5): 42 days to import in Ghana and 92 days to import in Iraq. Infrastructure gaps are partly responsible for longer delays in Africa, while the lack of electronic systems and to a lesser extent customs administration and inspections account for more than half of the total delays, according to the Doing Business database (figure 2.6). A large portion of long transport times in Sub-Saharan Africa is attributed to cargo dwell times at ports.⁵⁴ Despite an already favorable location, Vietnam reduced its average time to import during the period the electronics GVC sector expanded, but its connectivity remains worse than that of its regional competitors such as Thailand (see box 2.1).

An inability to meet requirements for timely production and delivery hurts GVC participation. Trade in parts and components in international production networks is more sensitive to logistics performance than trade in final goods and is more likely to suffer

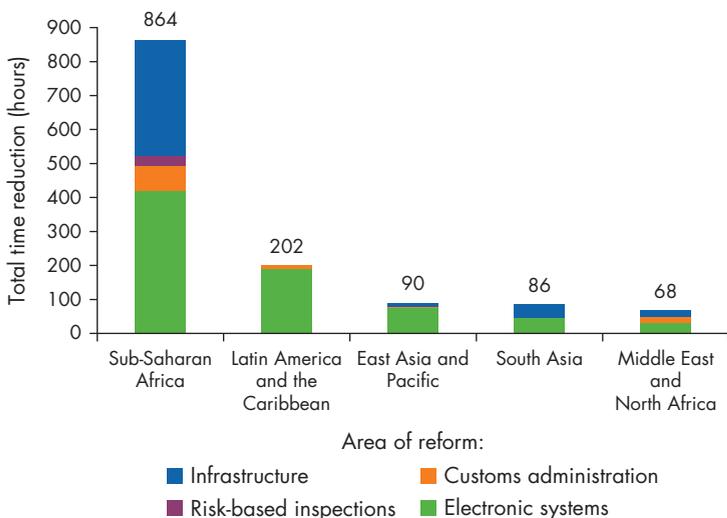
Figure 2.5 Connectivity is associated with specialization in more advanced GVCs



Sources: WDR team, based on World Bank's WDI and Doing Business databases and GVC taxonomy for the year 2011.

Note: The bivariate regression line between average time to import and average Internet use is shown in blue. Figure excludes countries specializing in commodities. Averages are over 2006–15.

Figure 2.6 Improving customs and introducing electronic systems are as important as infrastructure for African trade



Source: World Bank 2017, 31.

Note: The time reduction captures reforms that were implemented and had a positive impact on the time for trading across borders indicator from 2016 to 2017. The reforms recorded during this period are aggregated in four wide-ranging categories: electronic systems, customs administration, risk-based inspections, and infrastructure. Regions with no reforms on time are excluded from the figure.

in the face of higher uncertainty in bilateral international transport times.⁵⁵ Evidence from the Eora database indicates that better scores in the logistics performance index are linked to stronger backward GVC participation (see box 2.2). Unpredictability in border clearance times for imports lowers survival rates for manufacturing exporters in 48 developing countries.⁵⁶ Moreover, the quality of the national road infrastructure matters for timely delivery to global markets. For Indonesian manufacturing firms, a higher road density in a firm's province and in neighboring provinces increases the probability of exporting.⁵⁷

Connectivity is not confined to the physical supply chain of goods; it also includes effective communication between the participants in GVCs. Two ways that improve effective communication are use of the Internet and of the English language.

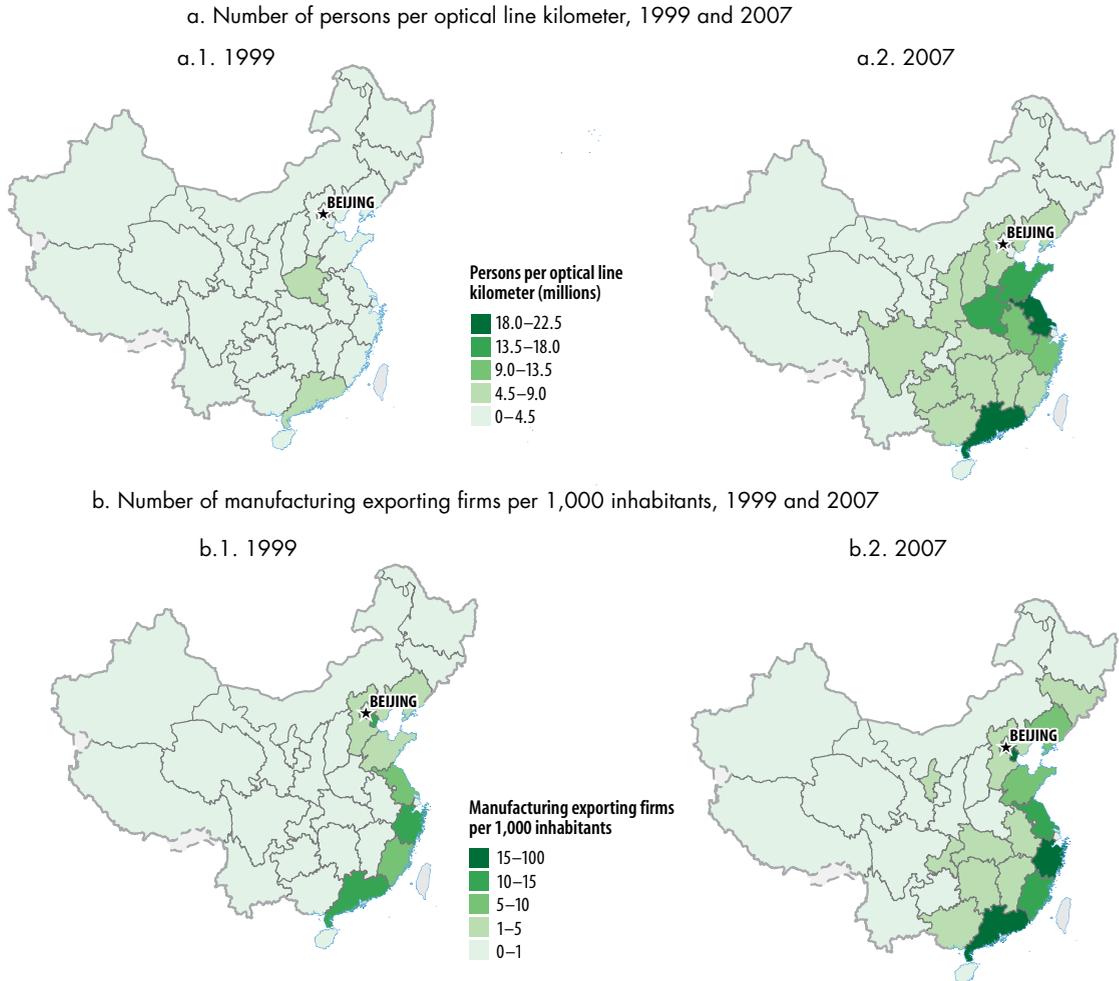
Stronger Internet usage could be linked to stronger GVC integration for at least two reasons. First, a large percentage of inputs embodied in exports—about 30 percent—are services such as logistics, information and communication technology (ICT), and other business services that rely on the Internet. Second, firms in GVCs need to communicate with both their suppliers and their customers through Internet-based technologies.

Countries in which a higher average share of the population is using the Internet exhibit stronger backward GVC integration (see box 2.2). In China, expanding Internet access from coastal provinces to hinterland provinces increased the density of manufacturing exporters in hinterland provinces, controlling for differences across provinces in changing skills, capital, and transport infrastructure (map 2.1).⁵⁸

But many countries still have very low Internet coverage, particularly those specializing in commodities. Over 2006–15, only 21 percent of the population of these countries used the Internet, and coverage was even lower than 5 percent in Burkina Faso, Burundi, and Mali. This coverage contrasts sharply with that in countries participating in advanced manufacturing and services GVCs, where half the population on average are online. And this share exceeds three-quarters in countries focusing on innovative GVC activities, with coverage of over 85 percent in Denmark, Finland, and Sweden (see figure 2.5).

English skills have helped India and the Philippines become attractive offshore destinations for business services, including not only call centers but also increasingly complex services such as information technology and finance serving the United Kingdom and the United States. Morocco and Tunisia have become destinations for French firms.

Map 2.1 Growth in Internet density and exporter firm density across provinces in China, 1999 and 2007



Source: Fernandes et al. 2017.

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A higher portion of people speaking English in a country is positively correlated with forward GVC participation (see box 2.2), and proximity has been shown to be more relevant for GVC trade than for trade in final goods.⁵⁹ Language frictions inhibit knowledge spillovers in GVCs, such as in Myanmar, where high communication barriers between domestic managers and Chinese, Japanese, and Korean managers limit the productivity spillovers from FDI.⁶⁰

Institutional quality matters

Among the top 25 most politically unstable countries over 2006–15, only the Philippines and Thailand participated in advanced manufacturing and services GVCs, and only Israel in innovative GVC activities. How

important is the quality of institutions, all else being equal, for countries’ participation in GVCs?

Weak contract enforcement is a significant deterrent of traditional trade flows, and GVCs are particularly sensitive to the quality of contractual institutions. Because the performance of a GVC depends on the strength of its weakest link, production delays driven by weak contract enforcement could be particularly harmful to GVCs. The presence of relationship-specific investments (such as for the customization of products) and the exchange of large flows of intangibles (such as technology, intellectual property, and credit) reinforce the potential role of institutional quality as a significant determinant of relational GVC participation.⁶¹ GVC linkages relying heavily on institutional quality also tend to be particularly “sticky,” which calls for reputational mechanisms

of cooperation that partly substitute for the absence of formal contracting. Under some circumstances, vertical integration through FDI may serve as a direct (albeit imperfect) substitute for strong contract enforcement in the host countries.

Evidence based on the Eora database reveals that political stability greatly matters for backward GVC integration (see box 2.2). Sectors that rely more on contract enforcement see greater increases in GVC participation (and in gross exports) in countries with better institutional quality, after controlling for resource endowments, geography, tariffs, and macroeconomic cycles (see box 2.2). If Mozambique increased its rule of law index to the cross-country median, its backward GVC participation level would rise by 29 percent, while its forward GVC participation level and its exports would grow by 32 percent.⁶² By contrast, countries characterized by lower political stability exhibit higher forward GVC participation (see box 2.2). On average across countries, this is driven by participation of the mining sector in GVCs. Indeed, higher average political stability in the 2000s reduced the likelihood of countries specializing in commodities in 2011. Poor institutional quality linked to land and property rights in Côte d'Ivoire and Ghana has hampered growth in their agriprocessing GVCs (pineapples and cocoa).⁶³

PTAs, especially those with deep provisions, can improve domestic institutions because they help import both reform and technical and financial assistance and so result in stronger GVC participation.

Over the last decades, most tariff liberalization has arisen from the negotiation of bilateral and regional PTAs by developing and developed countries. Tariff reductions (and certainty about those reductions) are an important benefit of PTAs, but more countries are signing bilateral and regional PTAs that go beyond simple market access. The depth of trade agreements is associated with the international fragmentation of production because behind-the-border policies need to be disciplined in trade agreements for GVCs to operate efficiently.

Participation in more advanced GVCs goes hand in hand with countries' engagement with more PTA partners (see figure 2.4). The Eora database reveals a supportive role for regional trade blocs and deep trade agreements in promoting countries' backward integration in GVCs. Specific trade agreements, such as those represented by the European Union and the Association of Southeast Asian Nations (ASEAN),⁶⁴ are linked to substantially higher backward GVC

integration for their members, and a positive if weak effect is also found for the North American Free Trade Agreement (see box 2.2).⁶⁵ The depth of trade agreements is particularly relevant now that countries are signing more deep trade agreements exhibiting higher backward GVC participation (chapter 8 discusses deep trade agreements in more detail). The African Continental Free Trade Area, which came into force in 2019, is expected to unleash opportunities for strong GVC participation in Africa. The channels for PTAs to nurture GVC participation include lower tariffs, larger FDI inflows, shorter distances to GVC hubs, and stronger regulatory frameworks that increase political stability.

But not all PTAs have been conducive to GVC participation. Mercosur has, if anything, impeded its members' backward GVC participation (see box 2.2).⁶⁶ Argentina exhibits low backward integration into GVCs because of its restrictive trade policies, but high forward GVC integration because of its rich natural resources. If Mercosur were to add deep provisions, such as commitments to investment and reforms to remove entry barriers and tackle anticompetitive business practices, Argentina's GVC integration would gain substantially.⁶⁷ Argentina now has only three PTA partners encompassing 57 enforceable deep provisions, compared with 18 PTA partners for Colombia and 19 for Peru (covering 250 and 263 deep provisions, respectively). With a Mercosur agreement as deep as the agreement among the EU, Colombia, and Peru in terms of the number of enforceable provisions, Argentina could increase its exports of parts and components to Mercosur members by 1–9 percent. Large potential gains for GVC participation from deepening existing PTAs (and from engaging in new deep PTAs) are also possible for the other Mercosur giant, Brazil.⁶⁸ But the impacts of PTAs on GVC participation can be subtle because the rules of origin under PTAs can influence how GVCs form and expand (box 2.6).

Transitioning up the GVC typology

Over 1990–2015, many countries upgraded their GVC categories. The Czech Republic moved from limited manufacturing GVCs in the 1990s to advanced manufacturing and services GVCs in the 2000s and to innovative GVC activities after 2010.

Several determinants identified here as conducive to stronger GVC integration help to explain the Czech Republic's transitions. After the downfall of

the Soviet Union in 1991, the geographical proximity of the Czech Republic (Czechoslovakia until 1993) to neighboring Austria and Germany and its supply of skilled labor at lower labor costs made the country an attractive location for FDI. In the 1990s, its shares of high-skilled workers (35 percent) and medium-skilled workers (57 percent) were almost identical to Germany's, while the average labor costs of a Czech worker were around \$13,800, or less than a third of Germany's \$49,000. The country's appealing labor picture led to strong FDI inflows, particularly in automotive and business services, and it was bolstered by the newfound political stability.

Although average manufacturing import tariffs were already low in the Czech Republic in the

early 1990s at around 5 percent, they had fallen to less than 2 percent by 2000. The Czech Republic's accession to the European Union in 2004 opened the doors for PTAs—the European Union being one of the deepest PTAs—and the number of PTA partners jumped from 0 to 45. The 2000s also launched a new era in which the country emphasized skill building and innovation. Internet use rose from 35 percent of the Czech population in 2005 to 75 percent in 2015. The share of high-skilled workers further climbed, reaching 40 percent by 2007, while R&D expenditure as a percentage of GDP grew from 1.1 percent in 2000 to 1.9 percent in 2015, ranking the Czech Republic among the countries with the highest innovation potential in the world.⁶⁹

Box 2.6 PTAs and GVCs: The role of rules of origin

Rules of origin, a central element of preferential trade agreements (PTAs), state that the eligibility of a final good for preferential tariff treatment requires the production or sourcing of some of its inputs within the PTA area. PTAs can affect firm-level decisions on intermediate input sourcing, and thus their GVC linkages, through two channels: preferential tariffs and rules of origin.

For preferential tariffs, inputs imported from PTA members face lower (often zero) tariffs than inputs sourced from nonmembers. Rules of origin distinguish goods originating from PTA members from goods originating from nonmembers with the objective of ensuring that goods imported by one PTA member from another benefiting from lower PTA tariffs truly originate from the PTA area and are not simply assembled from components originating in nonmembers.

Rules of origin can constrain PTA members by not allowing them to select the globally most efficient suppliers of intermediate inputs. In recent surveys, manufacturing firms in developing countries repeatedly pointed to rules of origin as a crucial nontariff barrier.^a Rules of origin are difficult to measure because of their legal complexity, but such measurements did improve for the world's largest PTA, the North American Free Trade Agreement (NAFTA).

A novel mapping of all input–output linkages embedded in NAFTA's rules of origin is constructed for each final good, identifying all intermediate inputs required for its production subject to rules of origin, and for each

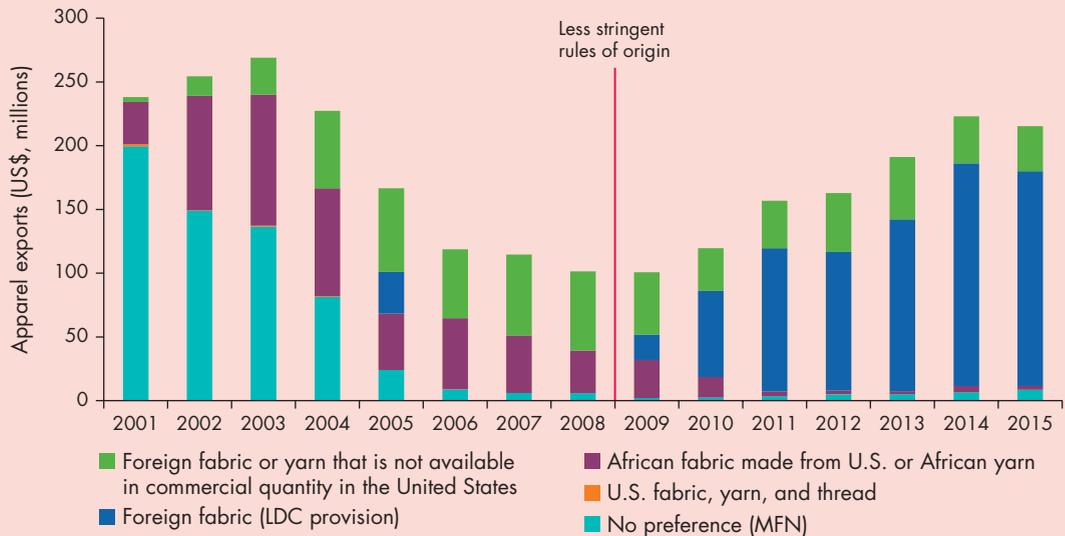
intermediate good, identifying all final goods that impose rule of origin restrictions on its sourcing.^b Regressions performed on the impact of these sourcing restrictions show that NAFTA's rules of origin significantly reduced the growth rate of Mexican imports of intermediate goods from nonmembers relative to the growth rate of imports of intermediate goods from members. On average, NAFTA's rules of origin have reduced the growth rate of imports of affected goods from nonmembers relative to NAFTA members by 30 percentage points. These findings reveal an effective strengthening of the regional GVC, Factory North America.^c But they also point to the trade diversion of PTAs through the deterrence of imports of intermediate goods from nonmembers.

Exemplifying the dramatic changes in sourcing decisions—and thus changes in patterns of GVC participation stemming from changes in rules of origin under a PTA—is the Mauritius apparel sector since 2000. Mauritius had been eligible for U.S. nonreciprocal trade preferences under the African Growth and Opportunity Act (AGOA) since 2001, but it experienced a swing between stringent rules of origin (2001–09) and liberal rules of origin (2009–15) in its exports of apparel to the U.S. market (figure B2.6.1). A shift across sources of fabric imports followed closely the swing in rules of origin, with fabric originating in African countries or the United States until 2009 and then almost entirely from outside Africa and the United States (mostly from Asian countries) from 2010 on.^d

(Box continues next page)

Box 2.6 PTAs and GVCs: The role of rules of origin (continued)

Figure B2.6.1 Mauritius's exports of apparel to the United States, by origin of fabric, 2001–15



Source: Office of Textiles and Apparel (OTEXA), International Trade Administration, U.S. Department of Commerce

Note: LDC = least developed country; MFN = most-favored-nation.

- a. ITC (2015).
- b. Conconi et al. (2018).
- c. The term was coined by Baldwin (2013).
- d. Fernandes et al. (2019).

The productivity of the workforce and the availability of high-quality suppliers are major reasons for the country's continuing attractiveness to German and other multinationals.

The relative importance of different determinants for GVC participation depends on the type of GVC engagement and on the characteristics of countries. Bottlenecks specific to different regions and groups of countries hamper their backward GVC participation (box 2.7). To transition across types, all determinants and policy areas must be improved,

including tariffs, FDI, political stability, customs, and logistics. For countries in different regions, the relative importance of these determinants differ. For example, in Sub-Saharan Africa low FDI inflows are the most important factor deterring backward GVC participation, while for countries in the Middle East and North Africa (MENA) and in fragile and conflict situations, low political stability is the severest obstacle. Countries in South Asia, Latin America and the Caribbean, MENA, and the Pacific Islands stand to benefit the most from tariff liberalization.

Box 2.7 Most important determinants of GVC participation, by taxonomy group and region

The determinants of backward GVC participation differ across countries, depending on their type of GVC participation (table B2.7.1):

- An average country in the *commodities* group is characterized by low political stability (−0.6), low foreign direct investment (FDI) inflows, high manufacturing import tariffs (6.6 percent), low customs efficiency (35 days to import), and low scores in the logistics performance index (LPI, 2.6).
- Countries in the *limited manufacturing* group see on average improved political stability, 60 percent higher FDI inflows, 1 percentage point lower average tariffs (5.6 percent), improved customs efficiency (20 days to import), as well as improved LPI scores (2.8), relative to the commodities group.
- Countries in the *advanced manufacturing and services* group exhibit on average further improved political stability, substantially (150 percent) higher FDI inflows, substantially lower average tariffs by 3 percentage points (2.6 percent), better customs efficiency (13 days to import), as well as a higher LPI (3.3), compared with the limited manufacturing group.
- Countries part of the *innovative activities* group show on average improved political stability, 90 percent higher FDI inflows, lower tariffs by 0.9 percentage points (1.7 percent), higher customs efficiency (8.9 days to import), and a better LPI (3.8), relative to the advanced manufacturing and services group.

Overall, it is clear that to transition across different types of GVC participation, several policy areas require substantial improvements. The color-coded averages shown in table B2.7.1 suggest that the time to import improves substantially from the commodities to the limited manufacturing group, while tariff rates fall drastically from the limited manufacturing to the advanced manufacturing and services group. The relative importance of lower tariffs coincides with backward integration being much higher for countries specializing in advanced manufacturing and services than for countries in limited manufacturing (39.8 percent versus 24.1 percent). The innovative activities group sees improvements on all fronts, most notably in political stability and in logistics performance.

Based on the evidence from the cross-country regressions (see box 2.2), the most important bottlenecks hampering backward GVC participation shares of each World Bank region or group of countries can be summarized as follows, along with the hypothetical impacts of their improvements (table B2.7.2):

- *Backward GVC integration in South Asia, Sub-Saharan Africa, fragile and conflict situations, and the Caribbean and Pacific Islands would benefit the most from attracting FDI.* South Asia and Sub-Saharan Africa rank lowest among all regions in terms of FDI inflows. If South Asia and Sub-Saharan Africa were to improve their average FDI levels to those of the best-performer Europe and Central Asia (ECA) region, backward GVC participation for each would increase by an estimated 16 percent.^a If fragile and conflict situations improved

Table B2.7.1 Backward GVC participation and determinants, by taxonomy group

Taxonomy group	Average backward GVC participation share (%)	Average political stability index	Average FDI inflow (log)	Average tariff rate (%)	Average days to import	Logistics performance index
Commodities	13.9	−0.6	6.7	6.6	35.4	2.6
Limited manufacturing	24.1	−0.3	7.3	5.6	19.9	2.8
Advanced manufacturing and services	39.8	0.1	8.8	2.6	13.0	3.3
Innovative activities	37.3	0.8	9.7	1.7	8.9	3.8

Source: WDR 2020 team.

Note: Averages shown cover the period 2010–15, using the GVC taxonomy for the year 2015. See box 1.3 in chapter 1 for a description of the GVC taxonomy used in this Report. Dark blue relates to the best performance across taxonomy groups, dark red to the worst performance, and lighter shades to intermediate performance. FDI = foreign direct investment.

(Box continues next page)

Box 2.7 Most important determinants of GVC participation, by taxonomy group and region (continued)

Table B2.7.2 Backward GVC participation and determinants, by region and group of countries

	Average backward GVC participation share (%)	Average political stability index	Average FDI inflows (log)	Average tariff rate (%)
East Asia and Pacific	20.0	-0.2	7.3	5.6
Europe and Central Asia	28.9	-0.2	7.4	3.0
Latin America and the Caribbean	18.1	-0.2	7.2	6.3
Middle East and North Africa	14.7	-1.3	7.3	8.8
South Asia	16.1	-1.1	6.1	11.0
Sub-Saharan Africa	17.3	-0.5	6.0	8.6
Fragile and conflict situations	11.6	-1.3	5.4	9.0
Caribbean Islands	17.5	0.1	5.7	9.5
Pacific Islands	15.3	0.1	4.2	8.4

Source: WDR 2020 team.

Note: Averages shown cover the period 2010–15. In each region or group of countries, averages are computed based only on World Bank client countries. These groups include only countries that are eligible for lending and are part of the Eora database. Dark blue relates to the best performance across regions or country groups, dark red to the worst performance, and lighter shades or white to intermediate performance. FDI = foreign direct investment.

- FDI levels to those of the ECA, backward GVC participation could increase by 34 percent on average. For the Caribbean Islands, GVC participation is estimated to grow by 19 percent under that scenario, while for the Pacific Islands the increase would be a dramatic 40 percent.
- *Backward GVC participation in South Asia, the Middle East and North Africa (MENA), and the Pacific Islands would increase the most from import tariff liberalization.* South Asia imposes the highest average manufacturing import tariff rates across all regions (11 percent). If it reduced its tariff rates to those of the best-performer ECA (3 percent), backward GVC participation could increase by 20 percent. Under the same scenario, MENA and the Pacific Islands are estimated to experience growth in backward GVC participation rates of 14–16 percent.
 - *Backward GVC integration in MENA, South Asia, and fragile and conflict situations would increase the most from improved institutional quality.* MENA and South Asia rank lowest among all regions in terms of political stability. If MENA and South Asia improved their political stability to that of the best-performer East Asia and Pacific region, backward GVC participation in MENA would increase by an estimated 28 percent and by 20–36 percent in South Asia and in fragile and conflict situations.
 - *For Latin America and the Caribbean (LAC), lower tariffs could have a high payoff for GVC integration.* If LAC reduced its tariff rates from their average of 6.3 percent to the average rate of the best-performer ECA, 3 percent, backward GVC participation would increase by an estimated 7 percent.

a. For any given determinant, the magnitudes reported are obtained as a ratio of (1) the product between the difference in the determinant in the best-performer region and the determinant in the considered region/group and the estimated coefficient on the determinant in cross-country regressions and (2) the average backward GVC participation share in the considered region/group. Estimated coefficients are shown in Fernandes, Kee, and Winkler (2019).

Notes

1. In this chapter, the definition of *low-skilled worker* or *low-skilled labor* is based on International Standard Classification of Occupations (ISCO) categories, and it covers “elementary occupations,” labeled skill level 1 by the International Labour Organization (ILO). See <https://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm>.
2. *Economist* (2018).
3. Stithdiary (2018).
4. See appendix A for a description of the databases used in this Report. These results appear to contrast with those of the McKinsey Global Institute (MGI 2019), which argues that labor-cost arbitrage is a small share of the GVC activity that declined between 2007 and 2017. The difference in interpretations stems from differences in definitions and methodology. MGI defines *labor-cost arbitrage* as exports from countries whose GDP per capita is one-fifth or less than that of the importing country, and so convergence between developing and advanced countries will reduce labor-cost arbitrage. Importantly, it finds that the overall share of labor-cost arbitrage in goods value chains remained roughly constant at 18–19 percent from 2007 to 2017. Only for labor-intensive goods, such as textiles and apparel, does it note a significant decline in labor-cost arbitrage, albeit from high levels. Consistent with the analysis presented in this Report, it also observes a sharp increase in labor-cost arbitrage from 1995 to 2007 and finds labor-cost arbitrage is high and rising even in the most recent decade in some sectors, such as autos, and in some countries, such as the United States.
5. See Pathikonda and Farole (2017), who extend the traditional theory of factor content of trade to construct measures capturing the capabilities most relevant in the trade of GVC products, as defined by Athukorala (2010) and Sturgeon and Memedovic (2011).
6. Evidence from the Eora database shows a U-shaped relationship between GDP per capita and forward GVC integration across countries.
7. Engman, Farole, and Winkler (2018).
8. The Human Capital Index (HCI) database provides data at the country level for each of the components of the HCI as well as for the overall index, disaggregated by gender. The index measures the amount of human capital that a child born today can expect to attain by age 18, given the risks of poor health and poor education that prevail in the country where she lives.
9. See Yameogo and Jammeh (2019), based on Eora cross-country data for 23 African countries and their comparison to global evidence for 115 countries.
10. See Rocha and Winkler (2019) for a study using data from the World Bank’s Enterprise Surveys.
11. Rodrik (2018).
12. See the evidence in Abreha et al. (2019) based on the Eora database contrasting GVCs of Africa’s manufacturers to GVCs of other developing regions (including in South Asia and East Asia).
13. Olam (2016).
14. See Freund and Moran (2017) on how governments were successful in using FDI to increase Costa Rica’s and Morocco’s GVC participation.
15. See Godfrey (2015); Morris and Staritz (2014).
16. Farole and Winkler (2014).
17. This positive association is driven by GVC participation in the manufacturing sector only, while there is no association between FDI inflows and countries’ GVC integration of their agriculture, commodities, or services sectors. This could point to a more favorable role of efficiency-seeking or market-seeking FDI that looks for internationally cost-competitive destinations and potential export platforms. See Buelens and Tirpák (2017) for further evidence that bilateral FDI stocks are positively associated with the bilateral backward GVC participation as well as with bilateral gross trade.
18. Liu and Steenbergen (2019) use the World Bank’s Enterprise Survey data for 139 countries for 2006–18 to show that a lower foreign ownership presence is linked to lower backward GVC participation, measured by exporting and importing at the firm level. Based on the same source of data, Gould (2018) shows evidence of a strong link between foreign participation and integration into global production chains via exporting and importing for firms in the East and Central Asia region.
19. However, FDI inflows are important for forward GVC participation levels according to the Eora cross-country evidence (see box 2.2). The negative impact of FDI on forward GVC participation shares may also reflect the fact that some of the countries abundant in natural resources that exhibit very high values of those shares have low institutional quality (as shown later in this chapter) and attract relatively less FDI.
20. Kee (2015).
21. Alfaro-Ureña, Manelici, and Vasquez (2019) also highlight similar positive improvements for local suppliers that joined multinational supply chains in Costa Rica.
22. Kee and Tang (2016).
23. World Bank (2018).
24. Taglioni and Winkler (2016).
25. Antràs and de Gortari (2017).
26. World Bank (2018).
27. See Abudu and Nguimkeu (2019) focusing on Eora data for African countries and exploiting variation in countries’ tariff policies over time.
28. Narain and Varela (2017).
29. Rocha and Varela (2018).
30. The importance of lower tariffs on intermediate inputs to foster the use of imported inputs and improve export performance at the firm level is true both in countries poorly integrated into GVCs such as Nepal and Pakistan, as well as Peru (see Pierola, Fernandes, and Farole 2018) and in countries highly integrated into GVCs such as China (Bas and Strauss-Kahn 2015).
31. Kathuria (2018).
32. The overall trade restrictiveness index measures the uniform tariff equivalent of a country’s tariff and nontariff barriers that would generate the same level of import value for the country in a given year. See UNCTAD and World Bank (2018) for details on the methodology.

33. Sturgeon, Chagas, and Barnes (2017).
34. Hoekman and Özden (2005); Ornelas (2016).
35. An example of the loss of that market access illustrates its importance. The suspension of AGOA market access benefits by Madagascar because of its domestic political unrest in 2009 led to an outflow of Asian FDI and a reduction in exports of apparel to the United States by \$156 million, or 75 percent, within a year.
36. See Fernandes, Forero, et al. (2019).
37. Interviews with enterprises in Ethiopia and testimonies of foreign investors discussed in Fernandes, Forero, et al. (2019) indicate that lead apparel companies in GVCs would not have set up their production plants in Ethiopia had AGOA trade preferences not been in place.
38. Sturgeon and Thun (2018).
39. *Morocco World News* (2018).
40. Antràs and de Gortari (2017).
41. APEC and World Bank (2018).
42. A study by Kowalski et al. (2015) finds an important role for geographical distance from GVC hubs, based on Trade in Value Added (TiVA) data on GVC participation from the Organisation for Economic Co-operation and Development.
43. Johnson and Noguera (2017) find distance to be a friction for bilateral value added in exports (as well as for bilateral gross exports), whereas Buelens and Tirpák (2017) find that distance plays a bigger role in GVC trade relative to trade in final goods.
44. Arvis, Raballand, and Marteau (2010) emphasize the crucial role of an uncompetitive market structure in the transport sector in explaining the high logistics costs in landlocked countries. Using the World Bank's Services Trade Restrictiveness Index, Borchert et al. (2017) show that landlocked countries have more restrictive policies in the transport and communication sectors than coastal countries.
45. WEF (2013).
46. OECD and WTO (2013).
47. The evidence is provided by Briceño-Garmendia, Lebrand, and Abate (2018) using a novel measure of country connectivity that captures the cost, time, and reliability of the transport network that enables users to reach relevant economic destinations, including global GVC hubs.
48. Christ and Ferrantino (2011).
49. WEF (2013).
50. Arvis et al. 2011.
51. The estimates obtained by Hummels and Schaur (2013) are based on transport mode choices by U.S. importers. Similar magnitudes for the cost of a one-day delay in inland transit were found in the World Bank's Doing Business database by Djankov, Freund, and Pham (2010).
52. See Ponte et al. (2014).
53. Arvis, Raballand, and Marteau (2010).
54. Raballand et al. (2012).
55. A gravity model of trade is used to relate bilateral trade in parts and components or in final goods to the logistics performance index by Saslavsky and Shepherd (2014) and to transit times measured by Anson et al. (2017) using the database of parcel deliveries compiled by the Universal Postal Union.
56. Vijil, Wagner, and Woldemichael (2019).
57. Rodríguez-Pose et al. (2013).
58. See Fernandes et al. (2017), who also provide econometric results for a causal impact of Internet access on firm export participation in China.
59. Buelens and Tirpák (2017).
60. Khandelwal et al. (2018).
61. Levchenko (2007); Nunn (2007).
62. These computations assume an average (mean) sectoral contractual intensity.
63. See Amanor (2012).
64. ASEAN is a regional intergovernmental organization comprising 10 countries in Southeast Asia.
65. Johnson and Noguera (2017) also find that the EU and other preferential trade agreements, especially deep agreements, play an important role in decreasing the ratio of bilateral value added to gross exports, a sign of growth in global production fragmentation.
66. Mercosur is an economic and political bloc comprising Argentina, Brazil, Paraguay, Uruguay, and República Bolivariana de Venezuela.
67. This is one of the trade liberalization scenarios for Argentina, whose impacts are obtained from a dynamic computable general equilibrium model, as discussed by Martínez Licetti et al. (2018).
68. This finding is shown by Hollweg and Rocha (2018), based on the impact of deep PTAs in a gravity model of trade on bilateral trade in parts and components.
69. OECD (n.d.).

References

- Abreha, Kaleb Girma, Emmanuel K. K. Lartey, Taye Alemu Mengistae, Solomon Owusu, and Albert G. Zeufack. 2019. "Africa in Manufacturing Global Value Chains: Cross-Country Patterns in the Dynamics of Linkages." Background paper, Office of the Chief Economist, Africa Region, World Bank, Washington, DC.
- Abudu, Derrick, and Pierre Nguimkeu. 2019. "Public Policy and Country Integration to Manufacturing Global Value Chains: The Roles of Trade and Competition Policies, Labor Market Regulation, and Tax Incentives." Background paper, Office of the Chief Economist, Africa Region, World Bank, Washington, DC.
- Alfaro-Ureña, Alonso, Isabela Manelici, and José P. Vasquez. 2019. "The Effects of Joining Multinational Supply Chains: New Evidence from Firm-to-Firm Linkages." Unpublished working paper, University of California, Berkeley, Berkeley, CA.
- Amanor, Kojo Sebastian. 2012. "Global Resource Grabs, Agribusiness Concentration, and the Smallholder: Two West African Case Studies." *Journal of Peasant Studies* 39 (3–4): 731–49.
- Anson, José, Jean-François Arvis, Mauro Boffa, Matthias Helble, and Ben Shepherd. 2017. "Time, Uncertainty, and Trade Flows." ADBI Working Paper 673 (February), Asian Development Bank Institute, Tokyo.
- Antràs, Pol, and Alonso de Gortari. 2017. "On the Geography of Global Value Chains." NBER Working Paper 23456 (May), National Bureau of Economic Research, Cambridge, MA.

- APEC (Asia-Pacific Economic Cooperation) and World Bank. 2018. "Promoting Open and Competitive Markets in Road Freight and Logistics Services: The World Bank Group's Markets and Competition Policy Assessment Tool Applied in Peru, The Philippines, and Vietnam." Unpublished report, World Bank, Washington, DC.
- Arvis, Jean-François, Robin Carruthers, Graham Smith, and Christopher Willoughby. 2011. *Connecting Landlocked Developing Countries to Markets: Trade Corridors in the 21st Century*. Directions in Development: Trade Series. Washington, DC: World Bank.
- Arvis, Jean-François, Gaël Raballand, and Jean-François Marteau. 2010. *The Cost of Being Landlocked: Logistics Costs and Supply Chain Reliability*. Directions in Development: Trade Series. Washington, DC: World Bank.
- Athukorala, Prema-chandra. 2010. "Production Networks and Trade Patterns in East Asia: Regionalization or Globalization?" Working Paper Series on Regional Economic Integration 56 (August), Asian Development Bank, Manila.
- Baldwin, Richard E. 2013. "Global Supply Chains: Why They Emerged, Why They Matter, and Where They Are Going." In *Global Value Chains in a Changing World*, edited by Deborah Kay Elms and Patrick Low, 13–60. Geneva: World Trade Organization.
- Bas, Maria, and Vanessa Strauss-Kahn. 2015. "Input-Trade Liberalization, Export Prices, and Quality Upgrading." *Journal of International Economics* 95 (2): 250–62.
- Borchert, Ingo, Batshur Gootiiz, Arti Grover Goswami, and Aaditya Mattoo. 2017. "Services Trade Protection and Economic Isolation." *World Economy* 40 (3): 632–52.
- Borin, Alessandro, and Michele Mancini. 2019. "Measuring What Matters in Global Value Chains and Value-Added Trade." Policy Research Working Paper 8804, World Bank, Washington, DC.
- Braun, Matias. 2003. "Financial Contractibility and Asset Hardness." Mimeo, University of California, Los Angeles.
- Briceño-Garmendia, Cecilia, Mathilde Lebrand, and Megersa Abate. 2018. "Transport Connectivity: Cost, Time, and Networks in Europe and Central Asia." Unpublished working paper, World Bank, Washington, DC.
- Buelens, Christian, and Marcel Tirpák. 2017. "Reading the Footprints: How Foreign Investors Shape Countries' Participation in Global Value Chains." *Comparative Economic Studies* 59 (4): 561–84.
- Cherkashin, Ivan, Svetlana Demidova, Hiau Looi Kee, and Kala Krishna. 2015. "Firm Heterogeneity and Costly Trade: A New Estimation Strategy and Policy Experiments." *Journal of International Economics* 96 (1): 18–36.
- Christ, Nannette, and Michael Joseph Ferrantino. 2011. "Land Transport for Export: The Effects of Cost, Time, and Uncertainty in Sub-Saharan Africa." *World Development* 39 (10): 1749–59.
- Conconi, Paola, Manuel García-Santana, Laura Puccio, and Roberto Venturini. 2018. "From Final Goods to Inputs: The Protectionist Effect of Rules of Origin." *American Economic Review* 108 (8): 2335–65.
- Djankov, Simeon, Caroline L. Freund, and Cong S. Pham. 2010. "Trading on Time." *Review of Economics and Statistics* 92 (1): 166–73.
- Economist*. 2018. "Why Samsung of South Korea Is the Biggest Firm in Vietnam." April 12. <https://www.economist.com/asia/2018/04/12/why-samsung-of-south-korea-is-the-biggest-firm-in-vietnam>.
- Engman, Michael, Thomas Farole, and Deborah Winkler. 2018. "Firm Performance and Job Characteristics of Global Value Chain Participants in Bangladesh: Evidence from New Survey Data." Unpublished working paper, World Bank, Washington, DC.
- Farole, Thomas, and Deborah Winkler, eds. 2014. *Making Foreign Direct Investment Work for Sub-Saharan Africa: Local Spillovers and Competitiveness in Global Value Chains*. Directions in Development: Trade Series. Washington, DC: World Bank.
- Felbermayr, Gabriel, Feodora Teti, and Erdal Yalcin. 2019 (forthcoming). "Rules of Origin and the Profitability of Trade Deflection." *Journal of International Economics*.
- Fernandes, Ana Margarida, Alejandro Forero, Hibret Maemir, and Aaditya Mattoo. 2019. "Are Trade Preferences a Panacea? The African Growth and Opportunity Act and African Exports." Policy Research Working Paper 8753, World Bank, Washington, DC.
- Fernandes, Ana Margarida, Hiau Looi Kee, and Deborah Winkler. 2019. "Factors Affecting Global Value Chain Participation across Countries." Policy Research Working Paper, World Bank, Washington, DC.
- Fernandes, Ana Margarida, Aaditya Mattoo, Huy Nguyen, and Marc Schiffbauer. 2017. "The Internet and Chinese Exports in the Pre-Ali Baba Era." Policy Research Working Paper 8262, World Bank, Washington, DC.
- Freund, Caroline L., and Theodore H. Moran. 2017. "Multi-national Investors as Export Superstars: How Emerging-Market Governments Can Reshape Comparative Advantage." Working Paper 17-1 (January), Peterson Institute for International Economics, Washington, DC.
- Godfrey, Shane. 2015. "Global, Regional and Domestic Apparel Value Chains in Southern Africa: Social Upgrading for Some and Downgrading for Others." *Cambridge Journal of Regions, Economy and Society* 8 (3): 491–504.
- Gould, David Michael. 2018. *Critical Connections: Promoting Economic Growth and Resilience in Europe and Central Asia*. Europe and Central Asia Studies Series. Washington, DC: World Bank.
- Hoekman, Bernard, and Çağlar Özden. 2005. "Trade Preferences and Differential Treatment of Developing Countries: A Selective Survey." Policy Research Working Paper 3566, World Bank, Washington, DC.
- Hollweg, Claire H., and Nadia Rocha. 2018. "GVC Participation and Deep Integration in Brazil." Policy Research Working Paper 8646, World Bank, Washington, DC.
- Hummels, David L., and Georg Schaur. 2013. "Time as a Trade Barrier." *American Economic Review* 103 (7): 2935–59.
- ITC (International Trade Centre). 2015. "The Invisible Barriers to Trade: How Businesses Experience Non-Tariff Measures." Technical Paper MAR-15-326.E, ITC, Geneva.
- Johnson, Robert Christopher, and Guillermo Noguera. 2017. "A Portrait of Trade in Value-Added over Four Decades." *Review of Economics and Statistics* 99 (5): 896–911.

- Kathuria, Sanjay, ed. 2018. *A Glass Half Full: The Promise of Regional Trade in South Asia*. South Asia Development Forum. Washington, DC: World Bank.
- Kee, Hiau Looi. 2015. "Local Intermediate Inputs and the Shared Supplier Spillovers of Foreign Direct Investment." *Journal of Development Economics* 112 (January): 56–71.
- Kee, Hiau Looi, and Heiwei Tang. 2016. "Domestic Value Added in Exports: Theory and Firm Evidence from China." *American Economic Review* 106 (6): 1402–36.
- Khandelwal, Amit Kumar, Louise Guillouet, Rocco Macchiavello, and Matthieu Teachout. 2018. "Communication Frictions and Knowledge Transfers: Evidence from FDI." Paper presented at "Macroeconomics, Trade, and Finance Seminar," World Bank, Washington, DC, October 18.
- Kowalski, Przemyslaw, Javier Lopez Gonzalez, Alexandros Ragoussis, and Cristian Ugarte. 2015. "Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies." OECD Trade Policy Paper 179, Organisation for Economic Co-operation and Development, Paris.
- Levchenko, Andrei A. 2007. "Institutional Quality and International Trade." *Review of Economic Studies* 74 (3): 791–819.
- Liu, Yan, and Viktor Steenbergen. 2019. "The Role of FDI in Global Value Chains (GVCs): Implications for Sub-Saharan Africa." Unpublished working paper, World Bank, Washington, DC.
- Martínez Licetti, Martha, Mariana Iooty, Tanya Goodwin, and José Signoret. 2018. *Strengthening Argentina's Integration into the Global Economy: Policy Proposals for Trade, Investment, and Competition*. International Development in Focus Series. Washington, DC: World Bank.
- MGI (McKinsey Global Institute). 2019. *Globalization in Transition: The Future of Trade and Value Chains*. New York: McKinsey.
- Morocco World News. 2018. "WSJ: Morocco Is Leading Africa's Automotive Industry." October 1. <https://www.morocroworldnews.com/2018/10/254381/morocco-africa-automotive-industry/>.
- Morris, Mike, and Cornelia Staritz. 2014. "Industrialization Trajectories in Madagascar's Export Apparel Industry: Ownership, Embeddedness, Markets, and Upgrading." *World Development* 56 (April): 243–57.
- Narain, Ashish, and Gonzalo J. Varela. 2017. "Trade Policy Reforms for the Twenty First Century: The Case of Nepal." World Bank, Washington, DC.
- Nikkei Asian Review. 2018. "Samsung Suppliers in Vietnam Branch Out to New Frontiers." July 3. <https://asia.nikkei.com/Business/Business-trends/Samsung-suppliers-in-Vietnam-branch-out-to-new-frontiers>.
- Nunn, Nathan. 2007. "Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade." *Quarterly Journal of Economics* 122 (2): 569–600.
- OECD (Organisation for Economic Co-operation and Development). No date. "Business Brief: The Czech Republic's Fourth Industrial Revolution." <http://www.oecd.org/innovation/czech-republic-fourth-industrial-revolution.htm>.
- OECD (Organisation for Economic Co-operation and Development) and WTO (World Trade Organization). 2013. *Aid for Trade at a Glance 2013: Connecting to Value Chains*. Geneva: WTO; Paris: OECD.
- Olam. 2016. *Olam: Maximising Value and Purpose: Annual Report 2015*. Singapore: Olam. <http://olamgroup.com/investor-relations/annual-report-2016/>.
- Ornelas, Emanuel. 2016. "Special and Differential Treatment for Developing Countries." In *Handbook of Commercial Policy*, vol. 1A, edited by Kyle Bagwell and Robert W. Staiger, 369–432. *Handbooks in Economics*. Amsterdam: Elsevier.
- Pathikonda, Vilas, and Thomas Farole. 2017. "The Capabilities Driving Participation in Global Value Chains." *Journal of International Commerce, Economics and Policy* 8 (1): 1–26.
- Pierola, Martha Denisse, Ana Margarida Fernandes, and Thomas Farole. 2018. "The Role of Imports for Exporter Performance in Peru." *World Economy* 41 (2): 550–72.
- Ponte, Stefano, Ingrid Kelling, Karen Sau Jespersen, and Froukje Kruijssen. 2014. "The Blue Revolution in Asia: Upgrading and Governance in Aquaculture Value Chains." *World Development* 64 (December): 52–64.
- Raballand, Gaël, Salim Refas, Monica Beuran, and Gözde Isik. 2012. *Why Does Cargo Spend Weeks in Sub-Saharan African Ports? Lessons from Six Countries*. Directions in Development: Trade Series. Washington, DC: World Bank.
- Rocha, Nadia, and Gonzalo J. Varela. 2018. "Unlocking Private Sector Growth through Increased Trade and Investment Competitiveness in Pakistan." Unpublished working paper, World Bank, Washington, DC.
- Rocha, Nadia, and Deborah Winkler. 2019. "Trade and Female Labor Participation: Stylized Facts Using a Global Dataset." Background paper, World Bank-World Trade Organization Trade and Gender Report, World Bank, Washington, DC.
- Rodríguez-Pose, Andrés, Vassilis Tselios, Deborah Winkler, and Thomas Farole. 2013. "Geography and the Determinants of Firm Exports in Indonesia." *World Development* 44 (April): 225–40.
- Rodrik, Dani. 2018. "New Technologies, Global Value Chains, and Developing Economies." NBER Working Paper 25164, National Bureau of Economic Research, Cambridge, MA.
- Saslavsky, Daniel, and Ben Shepherd. 2014. "Facilitating International Production Networks: The Role of Trade Logistics." *Journal of International Trade and Economic Development* 23 (7): 979–99.
- Stitchdiary. 2018. "What Makes Bangladesh—A Hub of Garment Manufacturing?" July 18. <https://medium.com/@stitchdiary/what-makes-bangladesh-a-hub-of-garment-manufacturing-ce83aa37edfc>.
- Sturgeon, Timothy J., Leonardo Lima Chagas, and Justin Barnes. 2017. *Inovar Auto: Evaluating Brazil's Automotive Industrial Policy to Meet the Challenges of Global Value Chains*. Washington, DC: World Bank.
- Sturgeon, Timothy J., and Olga Memedovic. 2011. "Mapping Global Value Chains: Intermediate Goods Trade and Structural Change in the World Economy." Development Policy and Strategic Research Branch Working Paper 05/2010, United Nations Industrial Development Organization, Vienna.
- Sturgeon, Timothy J., and Eric Thun. 2018. "China: New Drivers of Growth: Case Studies of China's Automotive and ICT Hardware Sectors." Background paper, World Bank, Washington, DC.

- Sturgeon, Timothy J., and Ezequiel Zylberberg. 2016. "The Global Information and Communications Technology Industry: Where Vietnam Fits in Global Value Chains." Policy Research Working Paper 7916, World Bank, Washington, DC.
- Taglioni, Daria, and Deborah Winkler. 2016. *Making Global Value Chains Work for Development*. Trade and Development Series. Washington, DC: World Bank.
- UNCTAD (United Nations Conference on Trade and Development) and World Bank. 2018. "The Unseen Impact of Non-tariff Measures: Insights from a New Database." Report UNCTAD/DITC/TAB/2018/2, UNCTAD, Geneva.
- Viet Nam News. 2015. "Samsung R&D Centre Hitting Stride." December 3. <https://vietnamnews.vn/economy/279340/samsung-r-d-centre-hitting-stride.html>.
- Vijil, Mariana, Laurent Wagner, and Martha Tesfaye Woldemichael. 2019. "Import Uncertainty and Export Dynamics." Policy Research Working Paper 8793, World Bank, Washington, DC.
- WEF (World Economic Forum). 2013. "Enabling Trade: Valuing Growth Opportunities." WEF, Geneva.
- World Bank. 2017. *Doing Business 2019: Reforming to Create Jobs*. Washington, DC: World Bank.
- . 2018. *Global Investment Competitiveness Report 2017/2018: Foreign Investor Perspectives and Policy Implications*. Washington, DC: World Bank.
- Yameogo, Nadege Desiree, and Kebba Jammeh. 2019. "Determinants of Participation in Manufacturing GVCs in Africa: The Role of Skills, Human Capital Endowment, and Migration." Policy Research Working Paper 8938, World Bank, Washington, DC.