



# Institutional quality and participation in global value chains

DAVID DOLLAR AND MATTHEW KIDDER

One way to think about products that have complex value chains is that they are contract-intensive goods. That is, they often involve many exchanges among different firms, each facing some risk of contract nonperformance by others in the chain. This chapter reviews research on global value chains (GVCs) showing that, other things equal, countries with better institutions such as stronger property rights and rule of law participate more in GVCs.<sup>1</sup> It investigates whether this finding holds up within countries. Using China as an example, it finds that Chinese cities that score better on property rights and government efficiency are more likely to have firms involved in GVCs. It also applies the findings on institutions and GVCs to African economies, which have only a small role in GVCs, finding that many African economies have weak institutions or neighbors with weak institutions, an important reason for their small role in GVCs.

Ever since Ricardian trade theory emerged in 1817, economists have considered that relative comparative advantage in productivity should promote specialization within a country. At the firm level these classical theories describe why firms might participate in GVCs. For example, a firm in China may have a global comparative advantage in production processes that are labor intensive but perhaps a comparative disadvantage in other stages of production. The firm should offshore the processes in which it has a comparative disadvantage and export the labor-intensive portion of production.

But these classical frameworks are inadequate for crafting policies to deepen GVC participation because they do not account for asymmetric information. Consider another example. Policymakers may want to advance the competitiveness of

domestic industries that use higher technologies and employ higher skilled workers. The textbook Ricardian solution would be for the government to sponsor investment in technologies that boost the productivity of desirable industries, thus giving these industries a Ricardian comparative advantage. The implication is that the product in this industry could then be exported, thus expanding the country's GVC participation in this industry. But it is not clear that such simple plans for economic development will prove fruitful without a careful consideration of economic institutions. Institutions can resolve or worsen distortions arising from asymmetric information, and classical models remain silent on this point.

To promote GVC participation in industries that drive economic development, policymakers have to improve domestic institutions and take regional initiatives to improve the institutions of neighboring countries. This chapter thus studies how domestic institutional quality and the institutional quality in neighboring countries influence the integration of domestic industries in GVCs. It looks at new empirical research on institutions and GVC participation and on the effects of institutions in neighboring countries. Finally, it examines Africa's involvement in GVCs to show what is holding back its participation.

## Institutions and participation in global value chains

The business services industry in China illustrates the challenges that institutions create in expanding global competitiveness in a sector. Chinese policymakers would like to promote the global

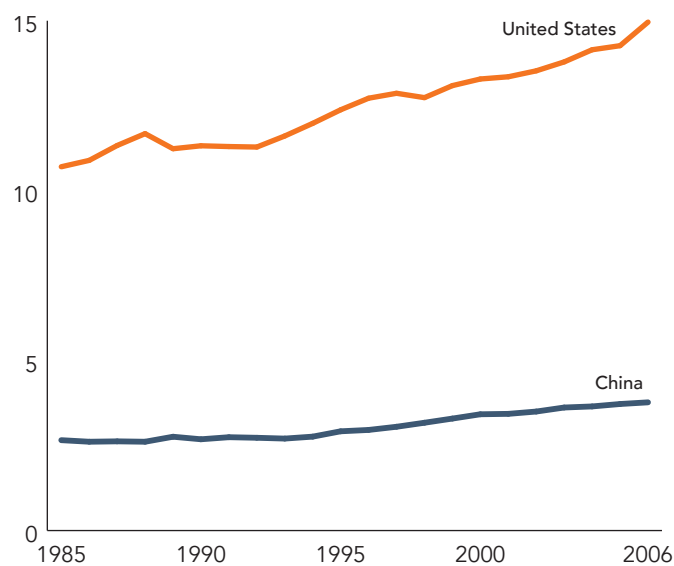
competitiveness of industries that are more skill intensive and higher on the value chain. The business services industry has both of these desired qualities. But it is unclear which policies will build the comparative advantage and deepen GVC participation in business services. Classical trade models might suggest that Chinese business services should already have a comparative advantage. The Chinese economy has an abundance of the primary production factors of business services: both a strong information technology infrastructure and a large, educated work force. Despite these strengths, its business services sector is smaller than that in a developed country such as the United States.

Looking at the share of information, computing, and other business services as a share of total value added for China and the United States over 1985–2005 reveals a clear gap (figure 7.1). This gap should puzzle policymakers who apply classical reasoning. Chinese business services should already have a comparative advantage, but the industry is still small and largely underdeveloped.

This chapter sheds additional light on such puzzles by showing that institutions are fundamentally important, both for comparative advantage and for deepening GVC participation in industries that produce a more complex and customized product. The output of business services fits both categories. The

**FIGURE 7.1** Value added in business services as a percentage of GDP in China and the United States, 1985–2005

Percent of 2005 GDP



Source: EU KLEMS database and the associated CIP database (<http://euklems.net/index.html>, accessed 1 September 2016).

Note: The figure shows value added in KLEMS (K-capital, L-labor, E-energy, M-materials, and S-purchased services) industries 71–74 as a share of total value added in the economy.

chapter shows the importance of the U.S. legal system in driving the gap between Chinese and U.S. businesses in this sector. By providing strong protection for contract disputes, the U.S. legal system contributes to the U.S. comparative advantage, which makes the United States a leading exporter of business services.

The case of business services can be extended to other industries. The importance of legal institutions increases as products become more differentiated. In manufacturing the underlying logic is that there is a thinner market for differentiated goods than for commodities. Thin markets, with fewer potential buyers, lead to what is called a “hold-up,” where there is an incentive to renegotiate terms after production has begun. For example, the completed engine of a Boeing jet may be more difficult to sell than a shipment of agricultural products if the buyer decides to cancel the order after production is complete. This moral hazard problem leads to market inefficiencies if legal institutions cannot enforce contracts. The legal system can reduce this problem if the court can transfer legal ownership of real property, thus forcing the defaulting party to pay.

Another challenge is that contracts are not complete, in the sense that a contract cannot specify an agreement for every possible contingency. Thus, in many conditions even the best contract will not provide a remedy. A well-functioning legal system can alleviate contract incompleteness if the system equitably protects rights. Both contract enforcement and equitable protection of rights thus interact at an industry level with the contracting intensity of the industry. The more differentiated and contract-intensive the product, the more severe is the asymmetric information problem in the absence of equitable protection and credible enforcement.

Looking at the 10 most and 10 least contract-intensive manufacturing industries, as estimated by Nunn (2007), reveals that the most contract-intensive industries generally have a finished product that incorporates a higher level of technology and thus is higher in economic development (table 7.1). Given this distribution of institutional sensitivity across industries, it is not surprising that institutions have a strong influence on economic growth and development (Robinson, Acemoglu, and Johnson 2005). Policymakers in resource-rich economies and developing economies naturally want to make contract-sensitive industries more globally competitive.

In addition to legal systems, financial institutions are fundamental to deepening global competitiveness and GVC participation. And as with legal institutions, how important financial institutions are in fostering GVC participation differs across industries. Funding projects in contract-intensive industries can be constrained by asymmetric information, just as in the goods market, partly because asymmetric information in the goods market causes uncertainty in the returns of the investors who own capital in these industries. Indeed, property rights protection is a more binding constraint on investment than external access to finance (Johnson, McMillan, and Woodruff 2002). In addition, transparency and consistency in accounting methods in estimating returns on investment can be more important for projects with complex transactions than for simple exchanges.

**TABLE 7.1 Ten most and ten least contract-intensive manufacturing industries**

Rank	Most contract intensive	Least contract intensive
1	Photographic equipment manufacturing	Poultry processing
2	Compressor manufacturing	Flour milling
3	Analytical laboratory instrument manufacturing	Petroleum refining
4	Engine equipment manufacturing	Corn milling
5	Electronic component manufacturing	Aluminum sheet manufacturing
6	Packaging machinery manufacturing	Aluminum production
7	Book publishers	Fertilizer manufacturing
8	Breweries	Rice milling
9	Musical instrument manufacturing	Primary nonferrous metal
10	Aircraft engine part manufacturing	Tobacco drying

Source: Nunn 2007.

The role of informal institutions such as social networks is somewhat different from that of formal institutions. Informal institutions can benefit groups that are less likely to participate in GVCs. And they often arise where formal institutions cannot resolve asymmetric information problems (Leff 1978; McMillan and Woodruff 1999; Bigsten and others 2000; Rauch and Trindade 2002; and Guiso, Sapienza, and Zingales 2009). But they are not perfect substitutes. And they do not follow the rule that the institution be equally shared by all agents in an economy. If informal institutions such as social networks favor a group that is less likely to participate in GVCs, they could reduce GVC participation at the industry level.

The expansion of GVCs across international borders encounters meaningful discontinuities for both countries and industries: institutions vary across countries, while sensitivity to these institutions varies across industries. To understand how institutions affect the pattern of GVC participation, Dollar, Ge, and Yu (2016) bring industry- and firm-level evidence to this question. The industry data trace interactions in the value chain through input-output linkages, while the firm data help in understanding the determinants of GVC participation.

### Industry evidence

Institutional quality at the country level is positively related to participation in more complex GVCs. The distinction between complex and simple trade flows is made possible by new measures of GVC participation developed by Wang and others (2016) and Wang, Wei, and Zhu (2015), which build on Koopman, Wang, and Wei (2014). This new industry–country measure spans 35 industries and 41 countries from 1996 to 2011. The measure gives a rich picture of GVC participation by decomposing trade flows based on value added. One benefit of this decomposition is that

it can differentiate trade flows that cross borders multiple times (complex GVC participation) from those that cross only once (simple GVC participation).

At the industry level, Dollar, Ge, and Yu (2016) found a positive correlation between GVC participation and all measures of institutional quality (see table A7.1.1 in annex 7.1). Country measures of institutional quality, taken from the Worldwide Governance Indicators data set of Kaufmann, Kraay, and Mastruzzi (2010), include rule of law, government effectiveness, political stability, regulatory quality, and absence of violence/terrorism. The key finding is that industries more sensitive to institutions have higher participation in complex GVCs in countries that have better institutions. This result appears to be robust against several different statistical specifications and holds for all measures of institutional quality. The relationship is less robust for simple flows that cross only one border.<sup>2</sup>

There is no support at the industry level for rule of law or government effectiveness significantly affecting simple GVC flows, but Dollar, Ge, and Yu did not rule this possibility out. The point estimates from the statistical exercise are still positive for rule of law and government effectiveness on simple GVC participation, but the standard errors are large enough to make these estimates insignificant. In other words, both rule of law and government effectiveness could be important even for simple GVC participation, but the study is inconclusive on this point. Qualitatively, it is clear that the relationship between institutions and GVCs is statistically more established for complex GVC participation than for simple participation.

The second fact that Dollar, Ge, and Yu (2016) discovered is that complex GVC flows tend to be exported to countries that have worse institutions. They found that the effects of institutional quality on GVC development is completely opposite in upstream source countries than in downstream direct importing countries. Direct importers with weak institutional quality show a faster growth in GVC production linkages with their upstream suppliers. This may support Jones (2011), who found that the availability of intermediate goods is positively related to economic development. Economic development is positively related to institutional quality.

Recall the finding from Nunn (2007) that higher technology industries that produce a more specialized product are more sensitive to institutional quality. Thus, poor institutions can constrict the domestic production of these type of intermediate goods. With fewer domestic intermediate goods available, domestic firms in developing countries can have an incentive to find foreign intermediates. This gives a clear channel for poor institutions to be positively related to foreign sourcing of upstream intermediates. But Dollar, Ge, and Yu (2016) did not explicitly identify this channel, so other channels may be driving faster GVC growth in importers with weak institutional quality. One channel could be processing trade, but again this channel was not explicitly identified.

So, complex GVC participation in contract-intensive industries is significantly influenced by the quality of domestic institutions. Countries with weaker institutions deepen their upstream

GVC participation to countries with better institutions. And the growth of GVC participation is positively related to better institutions. These findings suggest that institutional quality is an important determinant of an industry's ability to fragment its production processes across international borders.

### ***Firm-level evidence for China on domestic institutions and firm and city characteristics***

Firm data allow modeling the mechanism that drives a firm's selection into different types of GVC categories. This analysis can help policymakers create policies that increase participation in GVCs. There is strong evidence that local institutions play a significant role in firms' participation in GVCs. This suggests that local governments have considerable scope to affect participation in GVCs both by directly influencing other economic institutions and by indirectly providing support by building appropriate infrastructure.

Dollar, Ge, and Yu (2016) evaluated the firm's participation choice using a cross-section of 11,709 firms in 120 Chinese cities that were surveyed in the World Bank Enterprise Survey. The dataset allows for measurement of the sourcing and exporting behavior of firms. Thus, it is possible to tell whether a firm uses imports in production and whether a firm exports final products. The two categories create four subcategories of firms:

- Those that use domestic inputs strictly for domestic consumption.
- Those that use imports for domestic consumption.
- Those that use imports for foreign consumption (export production).
- Those that use domestic inputs for export production.

These categories define types of participation in GVCs. Complex participation, in this context, can be thought of as firms that import intermediate goods and export their products.

The data also have several measures of institutional quality and other firm and city characteristics that can be used to determine the effect of those characteristics on the probability that a plant will participate in GVC production. The institutional quality characteristics include contract enforcement, access to credit, customs efficiency, and government intervention.<sup>3</sup> These measures can be thought of as proxies for legal, financial, trade, and government institutions. Likewise, firm characteristics such as productivity, capital intensity, and size, as well as city characteristics such as transportation infrastructure and economic development, can be evaluated to determine the most important predictors of GVC participation.

On the quality of local institutions in the Chinese cities studied, the main finding is that firms have a higher probability of participating in GVCs the more contracts are enforceable, the less the government intervenes, the more efficient the customs processes (see table A7.1.2 in annex 7.1), and the better access firms have to credit. But there is some variation in the relationship between institutions and the type of GVC participation. For example, better contract enforcement increases the probability that a firm will participate in exporting, but the effect is not significant for plants that import but do not export. This suggests

that foreign buyers may have some sensitivity to contract enforcement and may be more willing to buy from firms in areas with stronger rule of law.

Among firm characteristics ownership type directly influences GVC participation and interacts with institutional quality. The highest probability of GVC participation is in firms with foreign ownership, followed by those with private and corporate ownership. State ownership significantly lowers the probability of GVC participation. Further, how local institutions affect GVC participation also depends on ownership type. The decision of state-owned enterprises to participate in GVCs is not significantly affected by local institutional quality. But there is strong evidence that the decision of foreign firms to participate in GVCs is sensitive to domestic institutions in China, showing that domestic institutional quality is more binding for foreign firms than for state firms. One explanation is that state firms can have stronger informal institutions than foreign firms. For example, they may be able to lean on political connections to manage contract disputes in their favor, whereas foreign firms must rely on the legal system. Thus, informal institutions can crowd out GVC participation to the extent that informal institutions explain different participation rates by ownership type.

At the city level there is evidence in China that lower transportation costs, lower labor costs, higher economic development, and higher innovation are all positively correlated with higher firm GVC participation. Lower transportation costs are often achieved through technology and infrastructure investments, which may be necessary, if not sufficient, to develop deeper GVC participation. Even the best trade channel into an undeveloped region may do little to promote GVC participation if other aspects of the economic environment do not support such participation. However, high transportation costs can certainly restrict GVC participation, especially in resource-based economies where infrastructure still lags behind that in developed countries.

The positive correlation of GVC participation with lower labor costs should be weighed carefully against comparative advantage in China. China has an abundance of labor and a comparative advantage in industries intensive in low-skilled labor. So lower wages should be correlated with higher GVC participation in China. But it cannot be concluded that lowering wages in a sector is generally helpful in promoting GVC participation or comparative advantage.

In sum: Less government intervention, higher customs efficiency, better contract enforcement, and more access to bank loans significantly increase the probability that firms will participate in GVCs.

### ***Institutions in neighboring countries***

That a country or locality's institutions affect its participation in GVCs is an intuitive result. What may be more surprising is the evidence, summarized here, that neighboring countries' institutions matter for GVC participation. In particular, neighboring-country institutions may have more impact on the efficiency of business-to-business linkages in industries that tend to be more intensive in contracts.

The more differentiated or tailored a good, the thinner is the market for the good and the more severe is the hold-up problem.<sup>4</sup> In other words, highly differentiated goods are more sensitive to the institutional environment. In manufacturing the 747 passenger aircraft, Boeing uses reaction engines, which are not available in open markets and which do not have reference prices established by its manufacturers (firms like Rolls Royce and General Electric). The price, quantity, and especially the characteristics are determined in a usually incomplete negotiation between Boeing and the engine supplier because the engine is a differentiated good adapted to the model of aircraft. In the language of Williamson (1975), there is fundamental transformation that creates a specific relationship. Thus, the quality of domestic institutions is a direct channel that can affect these contract-intensive industries more than less contract-intensive industries, such as undifferentiated agricultural products.

On top of the direct channel, Miranda and Wagner (2015) show that neighbors' institutions could also matter, over and above the effect of own-country institutions. They followed the original work by Nunn (2007) but also included the role of neighboring country institutions, previously missing from the analysis. Own and neighbors' institutions are related, but they can have meaningful differences (figure 7.2). For Chile the neighboring rule of law measure is the average of rule of law of Argentina, Bolivia, and Peru, weighted by their respective GDPs. The diagonal line in figure 7.2 indicates equality between the institutional

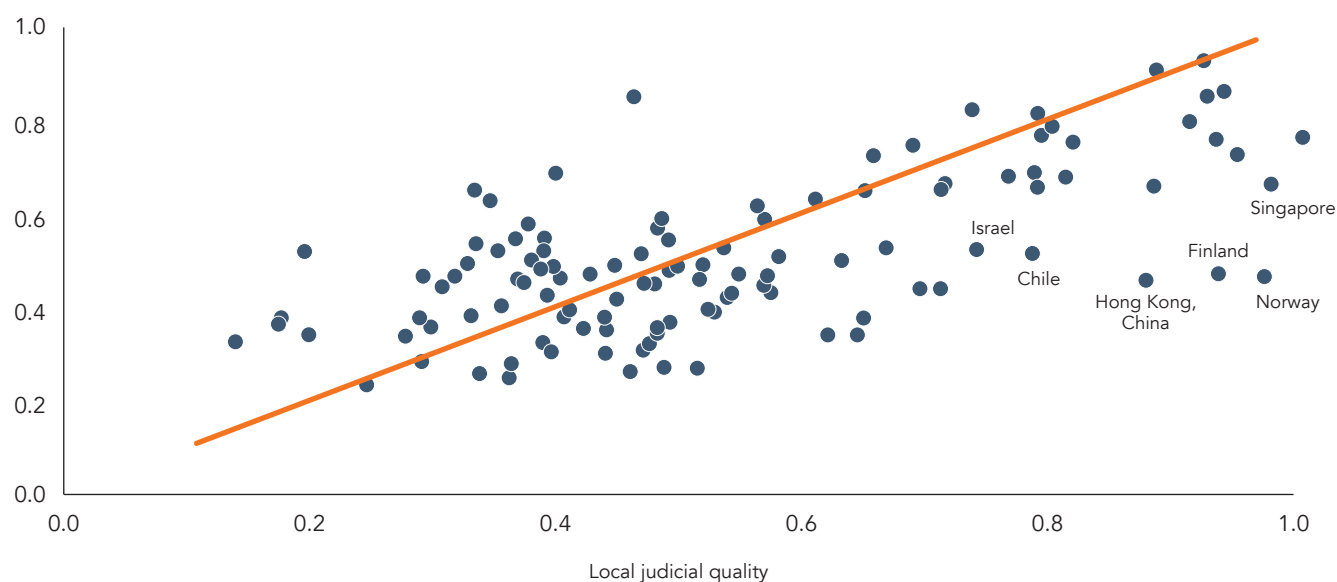
quality in a country and in that country's neighbors. Most countries are near the diagonal line, but there is variation, with some countries below the line. For example, Hong Kong, China; Singapore; Norway; Finland; Israel; and Chile have neighbors with weaker rule of law than their own. This could be a weak link for value chains when some parts of a productive process can be outsourced to nearby locations.

Using local and neighbors' institutions, Miranda and Wagner (2015) calculated the average revealed comparative advantage by country and industry, separating high contract-intensive industries (high share of differentiated inputs) and low contract-intensive industries, and countries having neighbors with high rule of law (as a measure of contract institutional quality) and those having neighbors with low rule of law. Having neighbors with weak contract enforcement reduces exports in contract-intensive industries (figure 7.3).

Miranda and Wagner (2015) also found that local institutions explain more or less the same amount of variation as the sum of physical and human capital (see table A7.1.3 in annex 7.1). They also explored what makes neighbors' institutions more relevant. Countries that share a common language and common colonial history would be expected to do more business together in contract-intensive sectors than countries that do not share those links. The more similar the countries, the more scope for "nearsourcing"—outsourcing tasks to nearby countries or regions. But precisely in that context, having neighbors with

**FIGURE 7.2** Relationship of own and neighboring countries' judicial quality (rule of law)

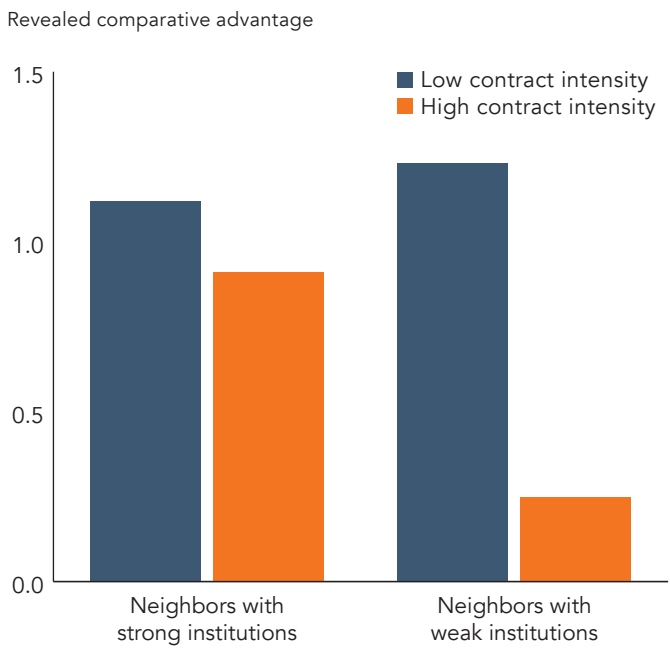
Neighbors' judicial quality



Source: Miranda and Wagner 2015 on local and neighboring countries. The rule of law index is from the Worldwide Governance Indicators 1998, using Nunn 2007 data and GeoDist data from the Institute for Research on the International Economy.

Note: Countries in the figure are those with a common land border with their neighbors. The diagonal line indicates equality between the institutional quality in a country and in that country's neighbors.

**FIGURE 7.3 Average revealed comparative advantage across industries and countries, controlling for local institutional effects**



Source: Miranda and Wagner 2015.

weak institutions appears even more binding for business, since firms would otherwise be connecting with each other much more frequently.

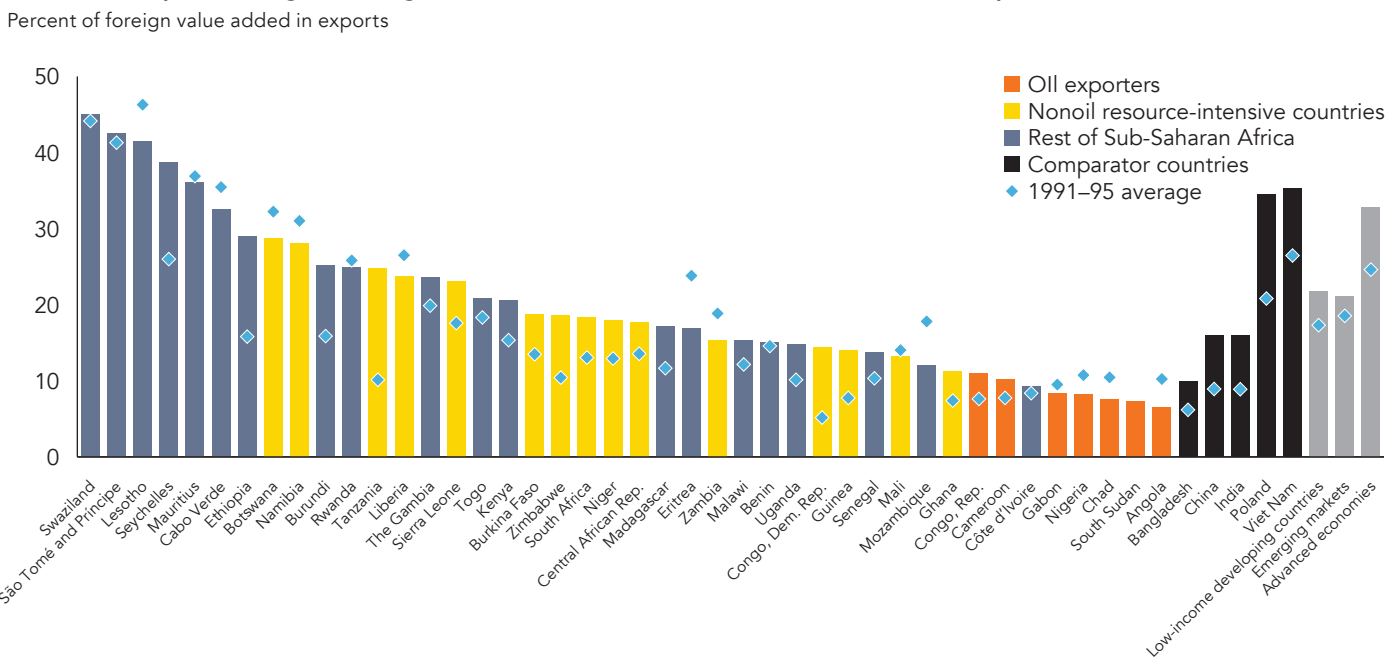
In sum, there seems to be a systematic relationship between what a country produces and the ability of its neighbors to enforce contracts. The analysis here focuses mostly on the lack of contract enforcement upstream, since it uses sectors that have contract-intensive procurement and so they are sensitive to suppliers with poor contract enforcement. Some tests show that downstream contract enforcement could also be important, as in sectors with more contract-intensive output—say, because of the need to customize the product before selling it, which requires certainty.

**African involvement in global value chains**

African economies have had little involvement in GVCs (Dollar 2016). One useful measure of position in the value chain is the share of imported value added in a country’s exports, a reflection of economies’ integration with each other and with the global economy (figure 7.4). For advanced economies one-third of exports were attributed to imported inputs in 2008–12, up from one-quarter in 1991–95. For low-income economies and emerging market economies other than in Sub-Saharan Africa, the average was 21–22% in 2008–12, up from 17–18% in 1991–95. Among developing economies Poland and Viet Nam are stand-outs, with imported inputs accounting for more than one-third of their export value.

About two-thirds of Sub-Saharan African economies fall below the average value-chain position for developing countries based on the value of their exports derived from imports (see figure 7.4). Oil exporters such as Angola, Chad, Nigeria, and South

**FIGURE 7.4 Depth of integration in global value chains of Sub-Saharan African and comparator countries, 2008–12**



Source: IMF 2015.

Sudan have almost no imported value added in their exports and fall on the far right side of the figure. To some extent these economies are subject to “Dutch disease,” with resource exporters tending to have high wages and appreciated exchange rates that make it difficult for them to diversify their exports. But this is only a partial explanation. These countries are all relatively poor, and their oil production is not sufficient to make their citizens wealthy.

On the left of the figure are countries with deeper GVC integration, but they tend to be resource-poor economies with small populations (Cabo Verde, Lesotho, Mauritius, São Tomé and Príncipe, Seychelles, and Swaziland). Countries with advanced tourism industries that rely on high-value-added imported inputs will also show up as having deep involvement in GVCs. Ethiopia is an interesting case of a populous yet resource-poor country with a high degree of GVC integration, which has grown substantially since 1995.

What accounts for Africa’s low involvement in GVCs? One factor, as mentioned, is Dutch disease. But many countries in Africa are not resource rich, and yet they still have low involvement in GVCs. And even where Dutch disease is an explanation, it should not prevent the development of modern manufacturing and services sectors. A key issue in most African economies is deficient infrastructure: unreliable power, poor roads and highways, and inefficient ports.

Another issue is economic governance. As discussed, well-developed economic institutions, such as property rights and the rule of law, have significant positive effects on development and on participation in GVCs. The Worldwide Governance

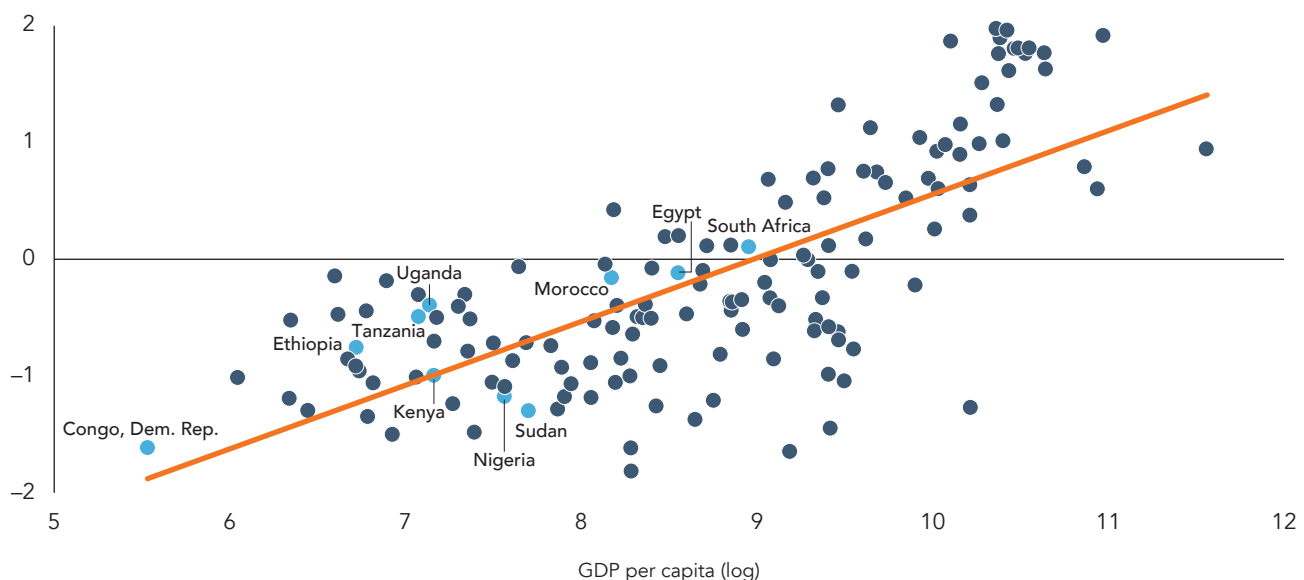
Indicators project of the World Bank publishes a Rule of Law Index that “captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (Kaufmann, Kraay, and Mastruzzi 2010, p. 4). All but six African countries are below average for the world (figure 7.5), not too surprising because there is a clear relationship between GDP per capita and the quality of economic institutions, and African countries are relatively poor and, on average, have weak institutions.

But there is a lot of dispersion across African countries. The regression line in figure 7.5 shows the typical relationship between per capita income and the rule of law. Countries above the line have unexpectedly good institutions for their level of development; countries below the line have unexpectedly poor institutions. This is important because countries generally compete with other countries at similar levels of development. If one country has good institutions among its cohort, it can expect to attract more investment and entrepreneurship and grow faster.

In fact, having a robust rule of law relative to level of development is closely correlated with faster growth. Among the large countries in Africa with broadly similar GDP per capita, Ethiopia, Tanzania, and Uganda are well above the regression line, Kenya sits right on the line, and Sudan and Nigeria fall well below the line. Thus, while the countries are at similar levels of development, Ethiopia, Tanzania, and Uganda (especially the last two) have better economic institutions.

**FIGURE 7.5 Institutional quality relative to development level in African countries: Association of Rule of Law Index and GDP per capita, 2010**

Rule of law index (mean = 0)



Source: World Bank Worldwide Governance Indicators ([www.govindicators.org](http://www.govindicators.org)); Feenstra and others 2015.

Note: The figure plots the Rule of Law Index for 146 countries in 2010 against per capita GDP measured in purchasing power parity (log scale). By design, the index has a mean of zero and a standard deviation across countries of 1.0. Labeled countries are the 10 most populous African countries.

The International Monetary Fund's *Africa Economic Outlook* for 2015 includes an estimate of the effect of improvements in the investment climate on African exports. The thought experiment adjusts different indicators from the average for Sub-Saharan Africa to the average for the rest of the world. The investment climate indicators are an index of infrastructure, credit to the private sector (a measure of financial sector depth and efficiency), a rule of law index, and the level of import tariffs (indicating how open or closed an economy is to world trade). The biggest potential gain—a 42% increase in exports—comes from improving infrastructure (figure 7.6). Credit to the private sector and rule of law are also important, accounting for potential increases in exports of 29% and 28%. African economies already have relatively low trade barriers, so reducing import tariffs to the average for the rest of the world boosts exports only 14%. The specific estimates in this kind of empirical exercise should be taken with caution. But the general point is valid: Africa could expand its involvement in global trade, including GVCs, through improvements in its investment climate, including infrastructure development, stronger financial sectors, and improved property rights and rule of law.

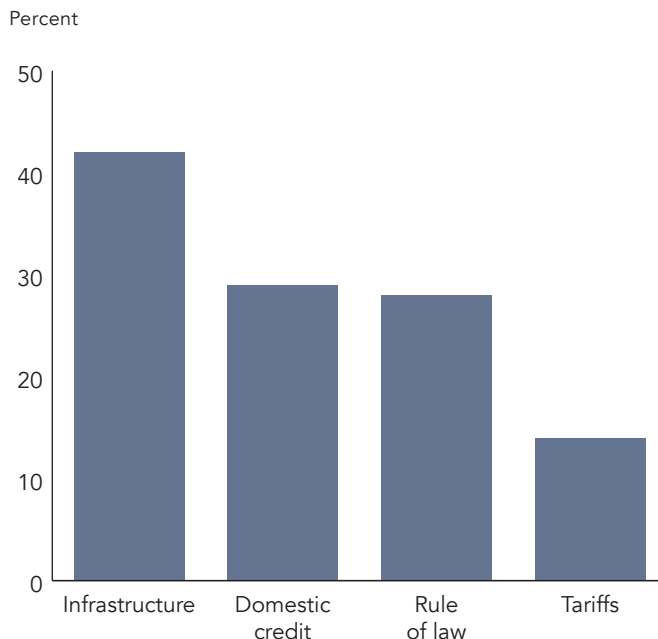
Of particular relevance for Africa are neighborhood effects, or the problem of reforming countries that have some or all neighbors with poor institutions. Some African economies have improved their economic institutions, and they tend to be the ones with faster growth and some initial involvement in GVCs. But in many cases, reformers are bordered by neighbors with poor institutions (map 7.1). There is a pocket of reform in Eastern Africa, including Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. But these countries are neighbored by Central African Republic, Democratic Republic of Congo, Eritrea, Somalia, and Sudan—all with poor institutions. In Western Africa, Ghana and Senegal are relative bright spots, but Guinea-Bissau and Nigeria drag down the neighborhood. The Southern part of Africa around South Africa is another bright spot.

### Policy implications

The quality of institutions affects comparative advantage and thus participation in GVCs. The stages of the production process differ in the extent to which they use simple labor, skilled labor, and capital (factor intensity). Activities also differ in their contract intensity. Producing a complete, homogeneous product with no imported content has simple or no contract intensity; growing and exporting bananas is an example. At the other extreme is producing a specialized part for a sophisticated electronics product. If done at arm's length, the purchasing firm has to have considerable confidence in the contract.

Developing countries in general have a lot of simple labor relative to skilled labor and capital. Given those factor endowments, which tend to change only slowly over time, the quality of institutions determines whether countries export simple, undifferentiated products or whether they can embed their production in more sophisticated value chains. Being involved in value chains, in turn, will accelerate technological upgrading, skill

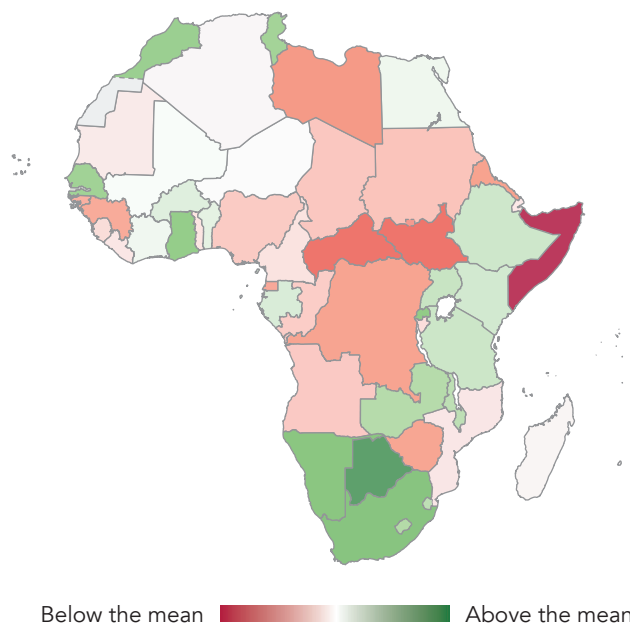
**FIGURE 7.6** Potential increase in trade in Sub-Saharan Africa from improvements in investment climate



Source: IMF 2015.

Note: Percent increase in Sub-Saharan Africa's trade if the variable moves from the average for Sub-Saharan Africa to the average for the rest of the world.

**MAP 7.1** Rule of law across Africa



Source: Worldwide Governance Indicators 2014.

Note: Countries are color-coded to reflect how strong or weak their institutions are on an index of property rights and rule of law, rescaled to have a mean of zero and a standard deviation of 1.0.



development, and capital accumulation. The quality of institutions relative to development level is crucial.

A general policy recommendation from this analysis is that developing countries need to improve their institutions—provide equitable protection of rights, increase the enforceability of contracts, require more transparency, adopt anticorruption measures, make customs processes efficient, and encourage financial deepening. The focus should be on reducing transaction costs so that a country's firms can easily join GVCs.

Improving institutions across the board is a big challenge, of course, and takes time. So, it is worth considering some

shortcuts that can enhance GVC participation. As seen in earlier chapters, deep trade agreements enhance GVC participation, probably because those agreements target specific institutional bottlenecks—such as improving customs administration and strengthening property rights and legal recourse. Deep agreements are going to be most powerful if several countries in a region all participate, improving neighbors' institutions. The Trans-Pacific Partnership had the potential to play this role in the Asia–Pacific region, and the U.S. abandonment of the agreement is a setback. So far China has not shown much interest in deep agreements, but that may change.

## ANNEX 7.1

## Results for Dollar, Ge, and Yu (2016) and Miranda and Wagner (2015)

TABLE A7.1.1 Summary of Dollar, Ge, and Yu (2016) industry results

Variable	(1)	(2)	(3)	(4)
$Insdep_{ict} \times Regulatory_{ct}$	0.040*** (0.010)			
$Insdep_{ict} \times Stability_{ct}$		0.042*** (0.008)		
$Insdep_{ict} \times Gov_{ct}$			0.034*** (0.010)	
$Insdep_{ict} \times Law_{ct}$				0.026*** (0.009)
$K-ratio_{ict} \times \ln(K-endow_{ct})$	0.0023*** (0.0001)	0.0023*** (0.0001)	0.0026*** (0.0001)	0.0025*** (0.0001)
$Skill-ratio_{ict} \times \ln(Skill-endow_{ct})$	0.066*** (0.012)	0.066*** (0.012)	0.065*** (0.012)	0.065***
R-squared	0.716	0.716	0.716	0.716
Fixed effects (country and industry and year)	Yes	Yes	Yes	Yes
Number of observations	8,995	8,995	8,995	8,995

\*Significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Note: Dependent variable is  $GVCP_{ict}$  (GVC participation index in industry  $i$  by country  $c$  at time  $t$ ). Coefficients are reported. Numbers in brackets are robust standard errors. The estimated equation is  $GVCP_{ict} = \beta_0 + \beta_1 insdep_{ict} ins_{ct} + \beta_3 k_{ratio_{ict}} \times k_{endow_{ct}} + \beta_2 Skill\ ratio_{ict} \times Skill\ endow_{ct} + \alpha_i + \nu_c + \delta t + \epsilon_{ict}$ , where  $insdep_{ict}$  is a measure of institutional sensitivity and  $ins_{ct}$  is one of 4 measures of country level institutional quality (regulatory, stability, government effectiveness, and rule of law). Capital endowments and skill endowments are also interacted with industry- and country-level measures of industrial intensities. The coefficient of interest is  $\beta_1$ , which is reported in the first four rows of this table. More details can be found in Dollar, Ge, and Yu 2016.

TABLE A7.1.2 Summary of Dollar, Ge, and Yu (2016) firm results

Variable	(1) D2E	(2) I2P	(3) I2E	(4) D2E	(5) I2P	(6) I2E	(7) D2E	(8) I2P	(9) I2E	(10) D2E	(11) I2P	(12) I2E
Government intervention	0.437***	1.359***	1.638***									
Custom efficiency				0.428***	1.318***	1.563***						
Contract enforcement							0.406***	1.347***	1.622***			
Access to finance										0.487***	1.360***	1.655***
<i>Ownership structure</i>												
State-owned enterprises	-0.499***	-0.209	-0.572***	-0.51***	-0.210	-0.570***	-0.490***	-0.215	-0.59***	-0.424***	-0.213	-0.585***
Collective-owned enterprises	-0.769***	-0.714***	-0.928***	-0.78***	-0.732***	-0.973***	-0.775***	-0.72***	-0.93***	-0.756***	-0.710***	-0.921***
Private	0.042	-0.068	-0.097	0.050	-0.065	-0.085	0.0190	-0.072	-0.105	0.002	-0.062	-0.084
Hong Kong, China; Macao, China; and Chinese Taipei	0.437***	1.359***	1.638***	0.428***	1.318***	1.563***	0.406***	1.347***	1.622***	0.487***	1.360***	1.655***
Foreign	1.046***	1.621***	2.322***	1.030***	1.599***	2.281***	1.026***	1.605***	2.296***	1.070***	1.611***	2.310***
<i>Firm characteristics</i>												
Size	0.431***	0.434***	0.814***	0.424***	0.426***	0.801***	0.424***	0.426***	0.803***	0.407***	0.423***	0.797***
Age	0.011	-0.004	0.021	0.010	-0.007	0.008	0.008	-0.006	0.012	-0.0003	-0.007	0.011
Capital	-0.054**	0.334***	0.194***	-0.053**	0.336***	0.197***	-0.058**	0.332***	0.190***	-0.061**	0.334***	0.192***
<i>City characteristics</i>												
GDP per capita	-0.033	0.628***	0.448***	-0.080	0.554***	0.303***	-0.090	0.574***	0.350***	-0.028	0.587***	0.380***
City wage	0.348*	-0.420**	0.088	0.309*	-0.471**	0.037	0.540***	-0.339	0.277*	0.126	-0.444**	0.049
Research and development share	1.202***	1.176***	-0.166	1.188***	1.193***	-0.052	0.852***	1.045***	-0.512*	0.158	1.069***	-0.415
Transport cost	-0.253***	-0.138***	-0.363***	-0.26***	-0.106**	-0.294***	-0.237***	-0.15***	-0.37***	-0.269***	-0.163***	-0.405***

\*Significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Note: See Dollar, Ge, and Yu 2016 for technical notes. Standard errors are omitted.

**TABLE A7.1.3 Summary of Miranda and Wagner (2015) main**

Variable	Log of exports from country in industry				
	(1)	(2)	(3)	(4)	(5)
Neighbor's judicial quality × contract intensity ( $z_i Q_c^N$ )	0.159*** (0.494)	0.206*** (0.621)	0.252*** (0.675)	0.140*** (0.559)	0.244*** (0.708)
Local judicial quality × contract intensity ( $z_i Q_c$ )	0.200*** (0.395)	0.212*** (0.558)	0.220*** (0.605)	0.161*** (0.469)	0.196*** (0.612)
Other determinants of comparative advantage	No	No	No	Yes	Yes
Skill and capital interaction	No	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes	Yes
Fixed effects (country and industry)	Yes	Yes	Yes	Yes	Yes
Number of observations	18,383	8,148	8,148	12,934	7,988
$R^2$	0.736	0.770	0.772	0.776	0.774

\*Significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Note: Dependent variable is  $\ln x_{ic}$  (natural log of exports in industry  $i$  by country  $c$  to all other countries). Standardized beta coefficients are reported. Numbers in brackets are robust standard errors. The estimated equation is  $\ln x_{ic} = a_c + a_i + \beta z_i Q_c + \beta^N z_i Q_c^N + \gamma X_{ci} + \gamma^N X_{ci}^N + \epsilon_{ci}$ , with  $X_{ci}$  as a vector that includes other determinants of comparative advantage and skill and capital interaction for the local country and neighbors (with superscript  $N$ ). All variables except fixed effects are interactions between at least one industry-level variable and at least one country-level variable. All neighboring variables (with superscript  $N$ ) consist of interactions with country-level variables but refer to neighboring countries of country  $c$ , measured as a weighted average by neighbor's GDP. More details can be found in Miranda and Wagner 2015.

## Notes

1. This chapter summarizes the research findings of two background papers. A paper by Dollar, Ge, and Yu (2016) evaluates the impact of domestic institutions on global value chain (GVC) participation and is sponsored by the Research Institute for Global Value Chains at the University of International Business and Economics in Beijing. The second background paper by Miranda and Wagner (2015) examines the impact of foreign institutions in neighboring countries on domestic GVC participation and is sponsored by the Inter-American Development Bank.
2. The estimates of this regression are reported in Dollar, Ge, and Yu (2016).
3. Customs efficiency is a measure of the time needed for goods to clear customs.
4. A measure from Nunn (2007) is used that captures whether an industrial sector is especially sensitive to contracts. Nunn (2007) focuses on the share of an industry's inputs that are differentiated. This is implemented using the input-output matrix of a sector and identifying which sectors tend to have more inputs that are traded on a bilateral business-to-business relation as opposed to an input that can be bought in an arm's length transaction in a formal exchange. The distinction among different goods comes from the classification by Rauch (1999) according to whether inputs are traded in open markets with referenced prices or not. The case without is interpreted as a differentiated good.

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