

Chapter 1

Preliminaries: Concepts, Trends, and Frameworks

This chapter presents background that will provide context for the rest of the report, including key concepts and frameworks, recent trends in the emergence of production sharing, and a discussion on the potential benefits and risks of joining global supply chains.

Supply Chains

A supply chain is normally defined as a group of economic units that provide a range of tangible and intangible value-adding activities needed to bring a good or service from its conception, through the different production phases, to final delivery to consumers. The supply chain often includes a lead unit that specifies what is to be produced by whom and when. This lead unit typically exercises some control over the chain even if it doesn't have ownership of it.¹ As such, the units tend to work in tandem such that the different inputs are produced according to the right specifications, and distributed in the right quantities, to the right locations, and at the right time. Throughout, the goal is typically to minimize costs for the total system.

It is common to use the term *supply chain* to refer to the network of a particular firm, such as Nike's supply chain. The term *value chain* is more commonly used in a broader context to refer to the industry, as in the footwear value chain. Increasingly, however, both terms have been employed indiscriminately, as we do in this report. When a supply chain encompasses establishments that are located in different countries, the term *global supply chain* is used.

¹The coordinating role can be exercised by a firm but also by other units, such as a trader, a wholesaler, or a supermarket.

While a global supply chain is basically a group of establishments working together from the design to the distribution of a product, data are often lacking that would enable economists to know whether the observed trade transactions are effectively part of an international production network. This is why economists have been using broader definitions to measure participation of countries in global supply chains. In Chap. 2 we introduce some of these definitions as well as the measures applied to them.

The term *value chain* suggests that the production process moves in a linear manner, from upstream to downstream stages, a configuration sometimes likened to that of a snake. But production processes can have quite different configurations. For instance, they can take the form of spiders, in which parts from different locations arrive in a central location for final assembly; or of complex combinations of spiders and snakes (Baldwin & Venables, 2013). Moreover, intermediate inputs can bend back, as country A imports an intermediate good from country B that itself uses other inputs from country A (Bhagwati, 2013). In our analysis we follow the convention in the literature and continue to use *value chain* even when referring to these more complex production configurations.

Offshoring Strategies

Firms follow different strategies to unbundle their production processes. One is to delegate part of the production process to an affiliate in another country. This is normally referred to as *vertical FDI*—in other words, a vertically linked affiliate produces an input that will be used downstream in the multinational’s supply chain.² Another strategy is to outsource part of the production process to an entirely independent firm in the other country. This is known as *foreign outsourcing*.

The term *offshoring* is then used in the literature to refer to the international fragmentation of production that takes place through either vertical FDI or foreign outsourcing. We will follow the same convention here and use the term *offshoring* when there is no need to make an explicit distinction between vertical FDI and foreign outsourcing.

Each strategy—vertical FDI or foreign outsourcing—has advantages and disadvantages. For instance, one advantage of vertical FDI is that it potentially eliminates the need for costly renegotiations of a contract after an agreement has been reached. On the other hand, foreign outsourcing eliminates the fixed incurred costs of opening an affiliate.

²A different motive for FDI is to replicate the entire production process in another country, typically to save on transportation and other costs and to avoid tariffs. This is referred in the literature as horizontal FDI.

The decision to use vertical FDI or foreign outsourcing is known as the *internalization decision*. The factors involved in making this decision are addressed in Chap. 3 when we examine what the internalization decision and its determinants imply for the strategies of the Latin American countries regarding accessing GVCs: should countries in the region promote links between local suppliers and global buyers? Or should they seek to attract vertically linked affiliates to their shores?

Why Do Firms Fragment Production Internationally?

We are all familiar with the wine-for-cloth example used by David Ricardo in the early 1800s to illustrate his theory of comparative advantage. Even if Portugal could produce wine and cloth with less labor than England, both countries would gain by specializing in the good that they could produce more efficiently—that is, the good in which they had a comparative advantage. While Ricardo was thinking about final goods, the same concept applies to tasks performed in making those goods. For instance, if making clothes requires two tasks, and at a certain point in time those tasks could be separated geographically, the country producing cloth would gain by offshoring the task in which it has the least advantage while keeping the other task at home. This is true even if the country has an advantage in both tasks. In this way, offshoring allows home workers to focus on the tasks that they do relatively better.

While the theory of comparative advantage has been around for two centuries, the international fragmentation of production and the emergence of global supply chains—at least on its current scale—is a relatively recent phenomenon. One could then ask, why didn't firms engage more in cross-border production sharing in the past? The short answer is that until recently, a number of factors limited the degree to which the production of a good could be unbundled. Many of these limitations, however, have receded in recent years in response to certain trends. In this report we will examine the importance of many of these trends; nevertheless, at this point we can offer some preliminary conjectures regarding which trends have facilitated the surge in cross-border production sharing.

Reduction in trade costs. Traditional barriers, such as tariffs, have been falling worldwide, particularly since the Uruguay Round of multilateral trade negotiations about 20 years ago. While the present Doha Round has progressed very slowly, many tariff barriers have continued to fall in several parts of the world, particularly in response to the more than 160 regional trade agreements that have come into force since 2000. Figure 1.1, for example, shows world simple averages for ad valorem MFN-applied rates and for the percentage of dutiable imports in three different years. Today, most countries have ad valorem tariff rates below 10 %, and the percentage of dutiable imports tends to be below 70 %. Of course, there are still many sectors and countries with high trade barriers, but there is no doubt that in most parts of the world today those tariff barriers are significantly lower, providing critical incentives for trading blocks of fragmented production across borders.

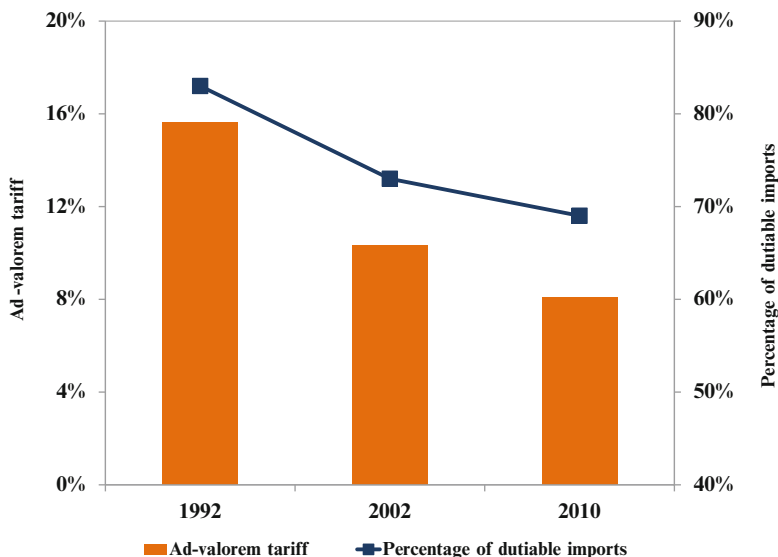


Fig. 1.1 Measures of Import Restrictions, World Averages *Note:* The ad valorem tariff rates and the percentage of dutiable imports are calculated as simple averages across countries. *Source:* Authors' calculations based on data from TRAINS

Reduction in transportation costs. The cost of transporting intermediate inputs is also a factor discouraging the geographical relocation of production bundles, particularly in distant locations. Transport costs have been falling since the introduction of the steamship and the steam locomotive in the late 1700s and the early 1800s. But recent developments have accelerated this trend. For instance, bigger vessels and aircraft capable of exploiting larger-scale economies are continuously being introduced in the transport industry; cargo is increasingly containerized, and competition on commercial shipping routes has intensified in recent years. As a result, transport costs have continued to fall. Figure 1.2, for example, shows the average ad valorem freight rates associated with the exports of 135 countries to the US in 1974 (vertical axis) and 2006 (horizontal axis). Most points are located above the diagonal line, indicating that transport costs have sharply declined in most parts of the world. The reduction in freight rates therefore adds to the decline in traditional barriers such as tariffs, making total trade costs in most parts of the world a fraction of what they were in the past.

The emergence of logistics companies. The number of logistics companies in the world has increased rapidly since the 1970s. Data from Dun & Bradstreet, for example, indicate that between 1970 and 2011, supply chain management firms and freight forwarders have multiplied by three and eight times, respectively. Logistics companies offer a wide range of services—from the preparation of documents, such as commercial invoices and bills of lading, to support activities, such as freight consolidation, warehousing, shipping, and distribution. All these services facilitate the movements

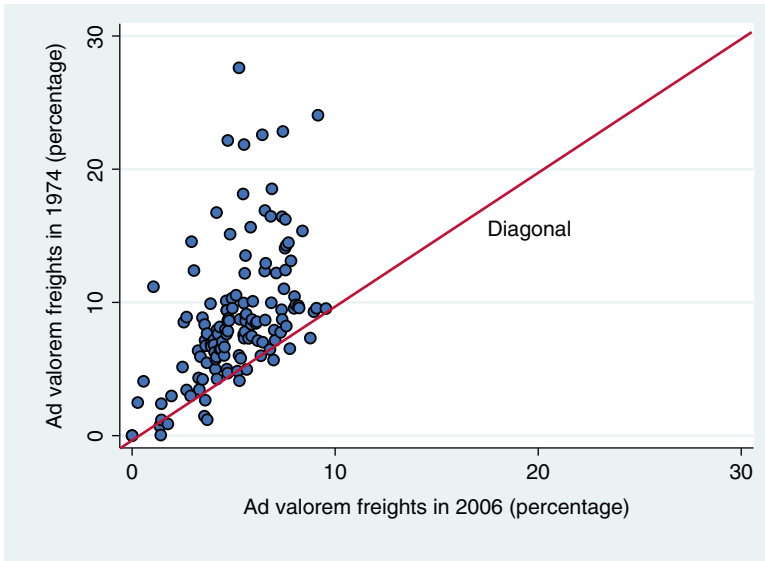


Fig. 1.2 Ad Valorem Freight Rates of Exports to the US, Country Averages *Note:* The figure shows fitted ad valorem rates derived from country regressions that control for changes in the mix of products traded over time. See Hummels (2007). *Source:* Authors’ calculations based on *U.S. Imports of Merchandise* of the U.S. Census Bureau

of goods across borders. The surge of logistics companies has also been accompanied by attempts by a few firms to become truly globally oriented. For instance, in 2012, UPS, a major logistics company based in the US, announced the acquisition of TNT Express, a Dutch logistics firm with a strong presence in Europe; the move was designed to fill a gap in UPS’s Europe operations.³ The rise of these global logistics companies and the ever-growing worldwide network of places that they serve have greatly helped firms propel their supply chains around the world. Support for this claim can be found in the words of Victor Fung, chairman of Li & Fung, the well-known garment company and world leader in buyer-driven supply chains:

There is absolutely no way we could conduct our business today without the growth of people like UPS, who describe what they do as synchronized commerce. With this logistical support to move products and components, you are able to achieve faster turnaround times...⁴

The surge of specialized logistics services and platforms has intensified in recent years to meet the demand of many firms for assistance in creating seamless supply chains.

³According to *The Economist*, March 24, 2012.

⁴Speech by Victor Fung to the Executive Committee of the Federation of Indian Chambers of Commerce and Industry, Bangalore, October 11, 2011.

Reduced information costs and improved communications. In the last two decades, production processes, international trade, and commerce in general have been impacted by vast increases in computerization power, the Internet, massive growth in the network capacity of optical fiber, and a range of inexpensive information transmission capabilities. There have been major improvements in the quality, capacity, and reliability of communication technologies, including faxes, emailing, and videoconferencing. Before these developments, proximity was necessary to keep the costs of coordination low (Baldwin, 2012). But today, the transmission of information and communication over vast distances is fast, accessible, and accurate. The result has been lower costs for coordinating and monitoring blocks of production at a distance, which facilitates the unbundling of production to distant locations. Additionally, improved information technology has also been very helpful in facilitating the transmission of previously tacit knowledge through codification and industry-level standards (Sturgeon, 2008).

Contract enforcement and intellectual property rights. Global production networks necessarily entail contracting relationships between agents in different countries with different legal systems and contracting institutions. Uncertain and ambiguous practices in contract enforcement can undermine international transactions. The problem can be particularly acute in international supply chains because they tend to involve significant relationship-specific investments. Likewise, weak intellectual property rights can undermine the delegating of links of the value chain to other parties for fear of intellectual property infringement and the unauthorized use of technical and production knowledge by the other party. Recent trends in contract enforcement and property rights have reduced these fears. For instance, the costs of enforcing contracts have consistently declined worldwide, particularly in the industrialized countries.⁵ The world has also seen a remarkable improvement in the protection of intellectual property rights, particularly with the recent conclusion of the WTO agreement on Trade-Related Aspects of Intellectual Property Rights, or TRIPS (Maskus, 2012). Such developments have improved the willingness of firms that engage in international fragmentation of production to engage with foreign suppliers and their countries' institutions.

What Do Countries in Latin America and the Caribbean Stand to Gain?

Global value chains provide countries with opportunities to industrialize at a faster pace than in the past. Many of today's industrialized countries developed by building entire supply chains within their own territories, with all the challenges, costs,

⁵Based on comparisons between 2003 and 2012 from Doing Business data on enforcing contracts.

and time that this entails (Baldwin, 2012). The emergence of GVCs, however, is allowing nations to industrialize much more rapidly by joining international production networks rather than by building entire supply chains at home. Fragmentation and vertical specialization are enabling countries to participate in world markets by eliminating the need to master all the aspects involved in the production of a final good (Baldwin, 2011). This has been the path to industrialization taken by some Asian countries and, more recently, by some Eastern European countries as well.

The gains from participating in global value chains can also be measured in terms of increased trade opportunities that did not exist in the past. The fragmentation of production and the relocation of slices of the value chain across various countries opens up new opportunities for trade diversification, an issue of particular importance for Latin America and the Caribbean. The export base of our region is highly concentrated in natural resource-intensive sectors, a trend that has intensified during the last decade with the emergence of China. While specialization in the region's factor-abundant sectors provides the basis for important gains from trade, complete specialization in natural resources could also have negative consequences. The literature referring to these risks is long and well known. Some examples are the notion that natural resource-intensive goods might produce too much instability in the economy due to their high price volatility, which, in the absence of appropriate hedging opportunities, can hurt growth (Larrain, Sachs, & Warner, 1999). Negative consequences can also be related to the familiar concept of Dutch disease (Corden, 1984) or to the notion that natural resource-rich countries concentrate their resources in land, crops, and extractive equipment, leaving minimal incentives to invest in human capital which, in turn, inhibits diversification towards more technology-intensive, higher-return activities, with the result of undermining future growth (Leamer, Maul, Rodriguez, & Schott, 1999).

Beyond the issue of natural resources, export diversification per se has been justified on other grounds. For instance, a diversified export base can help to protect countries from sector-specific shocks and their negative effects on export revenue, income, and growth. Countries that expand their exports beyond a limited number of products also lower their risks of worsening their terms of trade (see, e.g., Hummels & Klenow, 2005). Other arguments are based on a direct link between export variety and growth that result from productivity gains arising either from learning by exporting or from having a better resource allocation (see, e.g., Feenstra & Kee, 2004; Lederman & Maloney, 2003).

Participation in global production networks has also been associated with other benefits, including learning, technology transfers, and knowledge spillovers. Evidence of successful cases of learning within the chain can be found in many sectors, such as apparel (Gereffi, 1999), motorcycles (Fujita, 2011), agroindustry (Cafaggi et al., 2012), and the computer industry (Kawakami, 2011). In some cases, knowledge and skills that first-tier suppliers absorb from global players also diffuse to other firms (Poon, 2004).

Learning from interaction with global actors might confer different benefits, such as improving production processes, attaining consistent and high quality, and/or increasing the speed of response (Humphrey & Schmitz, 2000).

In this way, the acquisition of various forms of knowledge, including technical and managerial, and the further diffusion of this knowledge, constitute additional benefits from accessing international supply chains. Box 1 shows an example in which the

Box 1: Chili Pepper and Knowledge Transfer in Global Supply Chains

How knowledge is transferred from a lead firm to its supplier can be illustrated with the case of a Colombian firm, Hugo Restrepo y Cía's. The example is interesting for at least two reasons. First, the transfer of knowledge occurred in the agribusiness industry instead of the often discussed high-tech industries, showing that learning from global players can occur in traditional sectors. Second, the knowledge transfer was not limited to the core technology of the agribusiness industry but also included managerial aspects.

Hugo Restrepo y Cía's is the main provider of chili pepper paste for the Tabasco brand owned by the American firm McIlhenny Company. Large-scale hot sauce makers frequently outsource the production of chili pepper paste to growers in relationships that require continuous interactions to guarantee the quality of the chilies that go into the production process.

The relationship between McIlhenny and Hugo Restrepo began in the late 1970s with a few chili pepper seeds provided by McIlhenny and a great deal of trial and error on the part of Hugo Restrepo. Both firms agreed on a business model in which McIlhenny would provide expertise to Hugo Restrepo in exchange for exclusivity for the next 15 years, during which Hugo Restrepo could not produce for other clients. The relationship was established by a long-term agreement based on contracts that were renewed every 2 years.

At the beginning of this relationship, the quality of the chili pepper paste produced by Hugo Restrepo was low, so McIlhenny sent an experienced agronomist to Hugo Restrepo twice a year to check on the crop and advise on technological innovations. As a result, over the next 15 years, Hugo Restrepo acquired key technical knowledge on crop management and production, and its agronomists developed expertise. After the exclusivity period ended, the firm no longer needed the technical assistance from McIlhenny.

Armed with its new technical knowledge, Hugo Restrepo ventured out on its own and expanded its business. It entered into many relationships with small farmers of chili pepper in Peru as well as in Colombia, providing them with technical knowledge originally acquired from McIlhenny and with seeds. As such, Hugo Restrepo applied lessons learned from McIlhenny to guarantee itself a stable supply of high-quality chili pepper through permanent technical support and appropriate and long-term agreements based on contracts renewed every 2 years. Meanwhile, Hugo Restrepo focused its attention on other activities in the supply chain, such as packaging and logistics.

In this way, Hugo Restrepo acquired not only key technical knowledge from a global buyer but also a successful business model that the firm was able to replicate with growers that eventually became its own suppliers.

Source: Based on material from Meléndez and Uribe (2012).

learning of a Colombian supplier from a global firm comprised the transfer not only of technical capabilities but also of managerial skills needed to conduct a business. Additional benefits from participating in global production networks are associated with market access and the distribution channels developed by a brand leader.

Immense Opportunities but also Potential Risks

While the potential gains and benefits from joining global supply chains seem remarkable, there are also limitations and risks. For instance, evidence indicates that benefits from GVCs may only materialize under specific conditions related to the nature of inter-firm relationships, the level of absorptive capacity of the supplier, or the technology used in the supply chain, among others (Gereffi, Humphrey, & Sturgeon, 2005; Pietrobelli & Rabellotti, 2007, 2011; Schmitz, 2006).

Firms joining global supply chains not only must meet conditions but also face potential risks. We mentioned that global supply chains offer the potential for rapid learning, which seems to be supported by several analyses. However, the literature also highlights some of the limitations to acquiring knowledge from global players. One is that the learning process might be quite narrow in scope. For instance, research on the footwear supply chain shows that the contribution of the lead firms to their suppliers tends to be exclusively related to production; suppliers learn little about non-production activities, which tend to be part of the buyer's main functions, such as design and marketing. Findings generally show that knowledge is transmitted to the suppliers as long as the learning does not trespass on the lead firm's core competences (Humphrey & Schmitz, 2000).⁶

A related concern is that rapid learning from global buyers may lead to short-term gains but also long-term disadvantages. The hypothetical scenario is that of a small producer in a developing country that receives all the necessary instructions to supply a good to a particular buyer, but does not necessarily acquire a broader knowledge about how to break into the buyer's market on its own if the relationship with the global firm came to an end (Humphrey, 2004).

Finally, offshoring decisions regarding the location of a lead firm's suppliers can rapidly change. Many firms that fragment production internationally are constantly evaluating their sourcing strategies, including the option of reshoring. Some recent studies have indicated that between 15 % (MIT, 2012) and 20 % (Hackett Group, 2012) of US manufacturing firms engaged in offshoring are engaged in reshoring initiatives. Other studies have suggested that offshoring is diminishing (KPMG, 2012). Changes in offshoring strategies can certainly be quite damaging to the countries of the suppliers. A supplier sometimes must make specific investments to participate in a production network, such as tailor-made and customized inputs. If supply chain relationships end, suppliers in developing countries could be left with machinery and capital goods with little or no alternative use.

⁶It is also been argued that more mutually beneficial interactions are expected to occur when knowledge is more tacit (Giuliani, Pietrobelli, & Rabellotti, 2005).

In this way, joining international production networks can entail risks that potential participants should not ignore. Nevertheless, some of these risks can be manageable. For instance, even though lead firms are normally less willing to transfer knowledge in activities related to their core competences, suppliers can still tap into many segments that are not part of these core competences. For example, research on a horticulture chain showed that suppliers of supermarkets not only took part in production activities but eventually started operating in other areas, such as quality certification, packaging, and a range of logistics activities (Dolan & Humphrey, 2000).

Regarding the very real risk of being locked within the narrow knowledge of one buyer, there is ample evidence of firms that apply skills and capabilities acquired in one market to serve new markets and customers (Meléndez & Uribe, 2012; Navas-Alemán, 2011; Tewari, 1999). Some of these firms eventually develop their own brands (Cafaggi et al., 2012; Poon, 2004). Regarding reshoring, it is important to note that recent trends do not necessarily signal the end of offshoring. According to a recent study, most firms are still sending more production to other countries than the amount they are bringing back home (Hackett Group, 2012). Moreover, recent reshoring trends might just be a shift from a global sourcing strategy to a more regional sourcing strategy: Chinese firms serve those of other Asian countries, firms from Eastern European countries serve those of Western Europe, and firms in the US, Mexico, or elsewhere in Latin America serve firms in the Americas (MIT, 2012). Nevertheless, it is important to bear in mind that the mere possibility that offshoring strategies could reverse at any time should be a powerful reminder to potential suppliers that participation in global value chains is not only about entering into the network, but also about sustaining the capabilities that made the entry possible in the first place.

Rationale for Public Policy

As stated above, joining global value chains can provide many benefits to a country's economy, such as creating opportunities for trade diversification or providing access to technical/managerial knowledge. But the rationale for public policies cannot be based solely on the existence of potential gains and benefits. Public interventions should be justified on the basis of market failures such as externalities, coordination failures, or the inability of the market to provide a public good.

In this report we will present cases where public policy is required to address market failures that limit participation of firms in GVCs. For instance, in Chap. 3 we will show that the likelihood of joining international production networks may depend on the provision of certain public goods, such as transport infrastructure, or specific types of regulation, such as contract enforcement. In other cases, coordination among firms and the public sector may be necessary to provide collective goods, such as airport storage facilities. Coordination among firms may also be necessary in the case of industries related through backward and forward linkages. For example, an assembly plant might be unable to start operations in a given location because there are no

local suppliers of a particular component; but at the same time, a potential supplier of that component might not initiate production because there is no local downstream demand for that product and exporting is costly (Trindade, 2005).

Sometimes, the public intervention might be justified on the basis of externalities. For example, information generated by a supplier's successful search for international buyers may spill over to other suppliers. In particular, once a supplier has obtained a contract with a lead firm and establishes a good track record (showing in the process that the country as a whole is capable of delivering a good product), it is easier for other suppliers in the sector to follow without incurring the same costs as the initial supplier. In so doing, the followers obtain important benefits from the first supplier's initial investments (and simultaneously devalue the initial supplier's potential benefits from its searches). The private returns from establishing relationships with the buyer would accordingly be lower than the corresponding social returns, and thus the investment in developing those relationships would be suboptimally low. This provides a rationale for public intervention. Spillovers can also take place among the buyers. For example, the "discovery" by a buyer of a well-qualified local supplier may also benefit other buyers, and thus the private returns associated with any investment to assist that supplier in developing its skills and capabilities may be lower than the social returns. This gap between private and social returns also provides a rationale for intervention.

Therefore, there are many instances in which the existence of market failures could provide a rationale for public intervention in the area of GVCs. However, identifying specific market failures can be challenging. For instance, measuring the existence of spillovers might be difficult because they by no means occur automatically (see Blyde, Pietrobelli, & Volpe, 2014). Notwithstanding these challenges, countries should seek to substantiate as much as possible their interventions in GVCs on the basis of market failures.

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