

Chapter 2: Trade in Intangible Assets along Global Value Chains and Intellectual Property Protection

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Trade in Intangible Assets along Global Value Chains and Intellectual Property Protection

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Trade is becoming increasingly intangible, but current trade statistics do not capture the international trade in the services of intangible assets through global value chains (GVCs). The increasing importance of intangibles in international trade has made intellectual property (IP) protection an even greater area of concern. Intangible assets include patents, trademarks, copyrights, brand names, product designs, software, databases, and certain types of business organization structures (Cummins 2005).

International trade along GVCs constitutes a new international division of labor, where lead firms specialize in high value-added tasks, such as research and development (R&D), product design, branding, marketing, and retailing, while non-lead firms are in charge of transforming raw materials, manufacturing parts and components, and assembling and testing final products. Value chain-based modern trade has not only amplified the flow of trade in intermediates but also created a new means of exporting intangible assets, expanded the scope of traditional exchanges of final goods or primary products between nations to include trade in services of intangible assets, and significantly strengthened the role of intangibles in international trade.

This new means of exporting services of intangibles greatly differs from conventional trade in intangible assets, where owners of these assets charge licensing fees or royalties through licensing agreements on a variety of IP, including software, patented technologies, trademarks, and designs. Some intangible assets, such as logistics management skills and organization structures, cannot be codified; in fact, they cannot be sold or licensed. For instance, factoryless manufacturers, such as the Japanese

clothing group Fast Retailing Co. Ltd., British home appliances company Dyson Ltd., and Apple Inc., do not license their IP to third parties. Instead, they use their IP to organize and manage their value chains and outsource all fabrication activities to contract manufacturers. They gain returns on their IP by selling tangible products that are assembled or made by contract manufacturers mostly in the developing world. Multinational corporations (MNCs) prefer to keep their IP in-house because IP protection has limitations even in countries with the best institutions. In fact, this is a major rationale for direct investment—to deploy IP internationally without allowing it to leave the firm. Combining IP with foreign direct investment (FDI) is another way to export services of intangible assets to global customers. Direct investment by Toyota Motor Corp., Mercedes-Benz AG, and General Motors Company are typical examples of these export activities (Fu and Ghauri 2020).

In terms of value added, IP and other intangibles add on average twice as much value as tangible capital to products manufactured and traded along value chains. One-third of the value of products bought come from intangibles, such as technology and branding, and about one-sixth is return on physical capital, which is mostly owned by firms in the developing world. That leaves half of the value added coming from labor (WIPO 2017). These shares are averages; for some hi-tech products and popular brands, the share of IP in value added is much higher. For example, in the iPhone X, Apple's intangible assets embedded in the phone, including the iOS operating system, the design, the Apple logo, and marketing, account for almost 59% of the iPhone's retail price of \$1,000 (Xing 2020a). Similarly, Nike Inc. captured an average of 43.8% of the value added of its products sold in the global market with its strong brand, aggressive marketing activities, and innovative designs (Nike 2018).

Despite the importance of intangible assets and their significant contribution to value-chain trade, GVC analysis is focused primarily on tasks related to the manufacture of tangible intermediates and the assembly of parts into final products. Less attention is being paid to the specialized contributions of lead firms, which add value to final products with intangible assets. The popular trade in value added (TiVA) database of the Organisation for Economic Co-operation and Development (OECD) does not include trade in intangibles via GVCs by factoryless manufacturers. The TiVA database, constructed with current trade statistics, simply uses international input-output tables to decompose officially reported gross trade value according to country of origin. Because of this it only covers value added at manufacturing stages, which are just a part of GVCs. Even some studies on servicification within GVCs—Heuser and Mattoo (2017), for example—examine only services, such as finance, logistics, and transportation, embedded at the fabrication and assembly stages of the production process (i.e., services necessary for the production of physical components and final products).

Exports of services of intangibles via GVCs challenge the consistency and applicability of the system for trade statistics to measure the contribution of intangible assets to international trade and national income. Trade statistics are calculated based on the value

of goods crossing national borders: if goods are shipped across a country's border and declared to customs, the shipment is recorded as an export from that country (i.e., the physical crossing of a national border is a necessary criterion for including the value of goods in trade statistics). A case in point: the compilation of the International Trade in Goods Statistics in the European Union depends primarily on customs records, which basically mirror the physical movement of goods across borders (UNECE 2015). Crossing borders, however, is no longer necessary for factoryless manufacturers to export their products to international markets, because all their products are assembled or made by foreign contract manufacturers and shipped to international markets from the country of manufacture.

In the current system, customs officers in home countries cannot trace the international trade activities of factoryless MNCs. Factoryless goods makers also retain the ownership of their products assembled by contract manufacturers before the products are sold to final users (Bayard, Byrne, and Smith 2015). When contract manufacturers ship those products to foreign downstream firms for intermediate or final users in international markets, they only declare the cost of manufacturing to customs. Because of this the value added of intangible assets embedded in those goods is not recorded in the trade statistics of any country even if the goods cross national borders. For example, Foxconn Technology Co. Ltd., a major assembler for Apple, only declares the production cost of iPhones to customs in the People's Republic of China (PRC) when it ships them to the United States (US). Exports in services of the intangibles embedded in tangible products manufactured via the outsourcing activities of MNCs are largely missing in conventional trade statistics (Xing 2020b).

International trade has long been a critical engine of economic growth. The factoryless phenomenon emerged as a result of the aggressive outsourcing activities of MNCs, and it is playing an increasingly important role in the globalized economy (Feenstra and Hanson 1996). Failing to recognize the impacts of factoryless manufacturers on international trade not only leads to a misunderstanding of the trajectory of today's unprecedented globalization but also, more importantly, understates the contribution of value-chain trade to the growth of the world economy. Factoryless manufacturers, such as Apple and Nike, are lead firms of GVCs. The sales of their products in the global market are part of value-chain trade, but those sales either do not cross national borders (as in the case of Nike shoes made in Viet Nam and sold there) or they cross a border only once (e.g., iPhones exported from the PRC to the US). So, strictly defining GVC trade as intermediate exports that cross a border twice (World Bank 2020) undoubtedly underestimates the importance of GVCs in the promotion of trade, industrialization, and economic growth.

Moreover, in the age of GVCs, firms from developing countries primarily specialize in the fabrication of tangible goods. But MNCs in industrialized countries are increasingly specializing in the development of intangible assets. The case of the iPhone (Xing 2020a) and the smile curve of information and communication technology

(Meng, Ye, and Wei 2020; Meng and Ye forthcoming) intuitively show this international division of labor along value chains. The gains of industrialized countries from globalization depend less on physical goods and more on intangible assets. It is estimated that intangible assets account for 27% of income in the manufacture of GVCs in OECD countries (Alsamawi et al. 2020). Developed countries also own most patents and international trademarks. The European Union, Japan, and the US together accounted for 82.5% of patents registered at the three major patent offices in those regions in 2013. The OECD indicator of international intensity of trademarks relative to gross domestic product (GDP) finds that no developing country was in the top 20 from 2010 to 2012 (Durand and Milberg 2018).

The discussion so far clearly shows that failing to count trade in intangibles along GVCs understates the degree to which developed countries benefit from unprecedented globalization. More importantly, it distorts the trade balance between industrialized and developing countries. The evolution of international trade from the classic cloth-for-wine trade to trade in tasks requires a fundamental reform of the method of compilation of trade statistics. For measuring trade activities in the age of GVCs, it is imperative to include the trade in services of intangible assets embedded in physical products. Doing this would give economists and policymakers a more accurate understanding of the role of MNCs in the global economy, enabling them to more accurately assess both the benefits of globalization for developed countries and trade balances between developed and developing countries. It is true that MNCs tend to transfer IP ownership to their foreign affiliates for tax purposes. In these cases, the earnings derived by affiliates from IP are recorded as part of foreign investment income in current accounts, not as exports of IP-related services (Jenniges et al. 2018). But this kind of IP arrangement could render the income of intangible assets invisible in a country's GDP (de Haan and Haynes 2018).

This chapter differs on this point from Alsamawi et al. (2020), Cummins (2005), and Chen, Los, and Timmer (2018), who argue that national account statistics are missing out on a sizable set of intangible assets. This chapter, however, does not intend to challenge the accuracy of national accounts or discuss whether factoryless manufacturers, such as Apple and Nike, should be classified as distributors or manufacturers. Rather, it emphasizes the important role of factoryless manufacturers in 21st century international trade, which is dominated by GVCs. It argues that, for a more accurate understanding of the benefits of value chain-based trade in the age of GVCs, the concept of exports should be expanded from tangible products to include the intangibles embedded in physical products.

Within GVCs, intangible assets determine the roles performed by MNCs and the income they receive. Intangible assets have grown to become a major source of national income for advanced economies, but at the same time their capacity to make physical goods has gradually diminished. IP protection is no longer simply a matter of encouraging innovation; it is more importantly about protecting new sources of income for countries. To coordinate fragmented production processes and maintain the smooth operation of

value chains, GVC lead firms should engage in intensive information exchanges with other firms involved in their value chains. They may have to share technological parameters, product standards, designs, and other information with their suppliers and contract manufacturers to do this. Those information flows entail a risk of appropriation by potential competitors. Because of this IP protection is more critical for value-chain trade than for traditional trade in finished products, where reverse engineering is necessary for imitation (Durand and Milberg 2018). But the advancement of technologies, such as 3D printers, has made the replication of sophisticated technological products increasingly easy and cheap. The quality of a country's institutions for IP protection could therefore determine whether the country could be integrated with GVCs or not.

This chapter focuses on three important issues related to trade in intangibles. First, it addresses the failure of trade statistics to record trade in intangibles via GVCs. Its analysis of official data on imports by Japan and the PRC from the US of laptop computers and mobile phones shows that Apple's sales in the two countries are completely missing from the official trade statistics. The missing export phenomenon is also observed in Nike's sales in the PRC. Examining the case of the iPhone X trade illustrates why conventional trade statistics fail to capture trade in intangibles. It shows that in PRC-US trade, four US factoryless goods producers, Apple, Nike, Advanced Micro Devices Inc. (AMD), and Qualcomm Inc., have derived enormous income from selling to customers in the PRC the services of their intangible assets embedded in tangible goods assembled or produced by their foreign contract manufacturers. Counting that income as a US export to the PRC would substantially increase the figure for US exports in services to the PRC and reduce the calculated trade imbalance between the two countries.

Second, to measure the contribution of all US foreign affiliates to international trade, this chapter introduces a new concept—trade in factor income, or TiFI. This is used to reestimate bilateral trade between the US and the PRC. Using TiFI not only eliminates the double counting issue of conventional trade statistics but also expands the scope of trade from tangible goods to include intangible assets. This approach constitutes a further improvement in the measurement of trade with international input–output tables. The chapter closes with an argument for the importance of IP protection for securing the welfare of developed countries and for expanding the participation of developing countries in GVCs.

Does Apple Export Its Products to Overseas Markets? A Case Study in the Trade of Intangibles

This question may sound strange. In fact, Apple is the world's largest maker of information and communication technology. iPhones, iPads, and iMacs are trendy and globally popular electronic gadgets. In 2018, Apple's sales totaled \$153.5 billion in overseas markets, one of the highest figures among US companies (Apple 2018). But despite being a major exporter, trade statistics give a completely different picture of

Apple's role in US exports. In terms of conventional trade statistics, Apple is not seen as a large US exporter. Boeing Co., with \$71.0 billion in overseas sales in 2018, less than half of Apple's foreign sales, has long been regarded as the largest US exporter. In fact, Apple does not even appear in the list of the top 100 US exporters compiled by the *Journal of Commerce*.

The passion of Chinese consumers for Apple products turned the PRC into Apple's largest overseas market, with PRC sales of \$51.9 billion in 2018 (Apple 2018). But going by official data on PRC imports and exports as a reference, Apple did not export a dollar's worth of goods to the PRC. According to the United Nations (UN) Comtrade Database, a repository of official international trade statistics provided by UN members, the PRC, in 2018, imported \$2.6 million from the US in laptop computers, tablets, and other portable data processors, as defined in Harmonized System (HS) 847130. The PRC also imported \$1.5 million from the US in mobile phones, as defined in HS851712. In total, the PRC imported \$4.1 million from the US in laptop computers, mobile phones, and similar products included in the two HS categories. The definitions of the two categories imply that all Apple products fall into the two groups.

Comparing Apple's sales in the PRC with the official trade statistics presents a puzzle: does Apple actually export its products to that country? Apple's \$51.9 billion in sales to the PRC in 2018 is more than 12,000 times larger than the PRC's reported total imports in laptop computers and mobiles from the US in 2018. The disparity between the official trade data and Apple's sales figure is too large to be explained by statistical errors or by Apple's extraordinarily high gross margins. The sales figure includes the income Apple derived from its intangible assets and services, which might exaggerate the disparity. But the gap remains huge even if the cost of producing the goods sold by Apple was used as a basis for the comparison. The production cost of the Apple products sold in the PRC in 2018 was an estimated \$32.1 billion, almost 8,000 times the PRC's imports from the US in laptop computers and mobile phones that year. Table 2.1 shows the PRC's imports from the US in laptop computers and mobile phones from 2015 to 2018, and compares them with Apple's annual sales in the PRC, along with the corresponding manufacturing costs. The disparities are significant and prevail for all years. Given all that, the only possible explanation for the disparity is that the official trade statistics do not recognize even one dollar of Apple sales in the PRC as a US export. It is evident that current trade statistics are not capable of recording the flows of value-chain trade and, as a result, a substantial share of exports by US factoryless manufacturers is "missing" from official trade statistics.

Apple's foreign sales are not just missing from the trade statistics tracking bilateral trade between the PRC and the US: they are also missing from the statistics for all US trading partners. A similar phenomenon can be readily observed for Apple's sales in the bilateral trade between Japan and the US. UN Comtrade data show that in 2018 Japan imported \$8.7 million from the US in laptop computers and mobile phones, as defined by HS847130 and HS851712. Apple reported, however, that it had \$21.7 billion

in sales in Japan, equivalent to 2,500 times reported Japanese imports (Apple 2018). The total manufacturing cost of those Apple products is estimated at \$13.4 billion, more than 1,500 times reported Japanese imports. Table 2.2 shows the value of Japanese imports from the US in laptop computers and mobile phones from 2015 to 2018, and compares those figures with Apple's annual sales in the country, along with the corresponding manufacturing costs. A dramatic disparity is immediately visible between reported Japanese imports, Apple's sales, and the manufacturing cost of Apple products during the period. This case adds support to the argument that conventional trade statistics fail to measure trade in intangibles via GVCs.

Table 2.1: People's Republic of China Laptop and Mobile Phone Imports from the United States, and Apple Sales to the People's Republic of China, 2015–2018

Year	A ^a PRC imports from the US in laptops and mobile phones (\$ million)	B Apple sales in the PRC (\$ billion)	C Manufacturing cost of Apple products sold in the PRC (\$ billion)	B/A ('000)	C/A ('000)
2015	1.67	58.72	35.17	35.2	21.1
2016	3.60	48.49	29.53	13.5	8.2
2017	2.98	44.76	27.53	15.0	9.2
2018	4.05	51.94	32.05	12.8	7.9

PRC = People's Republic of China, US = United States.

^a The sum of the PRC's imports from the US in Harmonized System 847130 and 851712.

Source: Y. Xing. 2021. Factoryless Manufacturers and International Trade in the Age of Global Value Chains. *GRIPS Working Paper*. DP 21-02. Tokyo: National Graduate Institute for Policy Studies.

Table 2.2: Japan Laptop and Mobile Phone Imports from the United States, and Apple Sales to Japan, 2015–2018

Year	A ^a Japanese imports from the US in laptops and mobile phones (\$ million)	B Apple sales in Japan (\$ billion)	C Manufacturing cost of Apple products sold in Japan (\$ billion)	B/A ('000)	C/A ('000)
2015	7.30	15.71	9.41	2.2	1.3
2016	8.61	16.93	10.31	2.0	1.2
2017	8.24	17.73	10.91	2.2	1.3
2018	8.69	21.73	13.41	2.5	1.5

US = United States.

^a The sum of Japan's imports from the US in Harmonized System 847130 and 851712.

Source: Y. Xing. 2021. Factoryless Manufacturers and International Trade in the Age of Global Value Chains. *GRIPS Working Paper*. DP 21-02. Tokyo: National Graduate Institute for Policy Studies.

The missing export phenomenon is also present in trade in labor intensive goods, such as apparel and footwear. According to the UN Comtrade Database, the PRC, in 2018, imported \$209.3 million in apparel and footwear from the US, as defined by HS62 and HS64. Comparing this figure with Nike sales in the PRC raises the parallel question: does Nike export its products to the PRC? This is after all Nike's largest overseas market. In 2018, Nike sold \$5.1 billion in athletic apparel and footwear to consumers in the

PRC, almost 25 times the PRC's apparel and footwear imports from the US that year, as reported by official trade statistics. It is estimated that the total manufacturing cost of those Nike products is about \$2.9 billion, roughly 14 times the value of the PRC's imports reported by the official trade statistics (Xing 2021). The HS62 and HS64 definitions imply that Nike products should be classified into the two categories by trade statistics if they were shipped to the PRC from the US. Table 2.3 shows the PRC's apparel and footwear imports from the US during 2015–2018, along with Nike's sales in the PRC and the corresponding manufacturing costs. The huge gap between the PRC's import figures and Nike's sales figures is visible over all 4 years. Nike is the largest seller of athletic footwear and apparel in the world. Nike's statement that “virtually all Nike products are manufactured by independent contractors. Nearly all footwear and apparel products are produced outside the United States” (Nike 2018) explains why, according to conventional trade statistics, Nike's sales in the PRC add nothing to US exports to the PRC.

Table 2.3: People's Republic of China Apparel and Footwear Imports from the United States, and Nike's Sales to the People's Republic of China, 2015–2018

Year	A PRC apparel and footwear imports from the US (\$ million)	B Nike sales in the PRC (\$ billion)	C Manufacturing cost of Nike products sold in the PRC (\$ billion)	B/A	C/A
2015	107.25	3.07	1.66	28.6	15.4
2016	146.35	3.79	2.04	25.7	13.9
2017	119.77	4.24	2.35	35.4	19.6
2018	209.33	5.13	2.89	24.5	13.8

PRC = People's Republic of China, US = United States.

Sources: Y. Xing. 2021. *Factoryless Manufacturers and International Trade in the Age of Global Value Chains*. GRIPS Working Paper. DP 21-02. Tokyo: National Graduate Institute for Policy Studies.

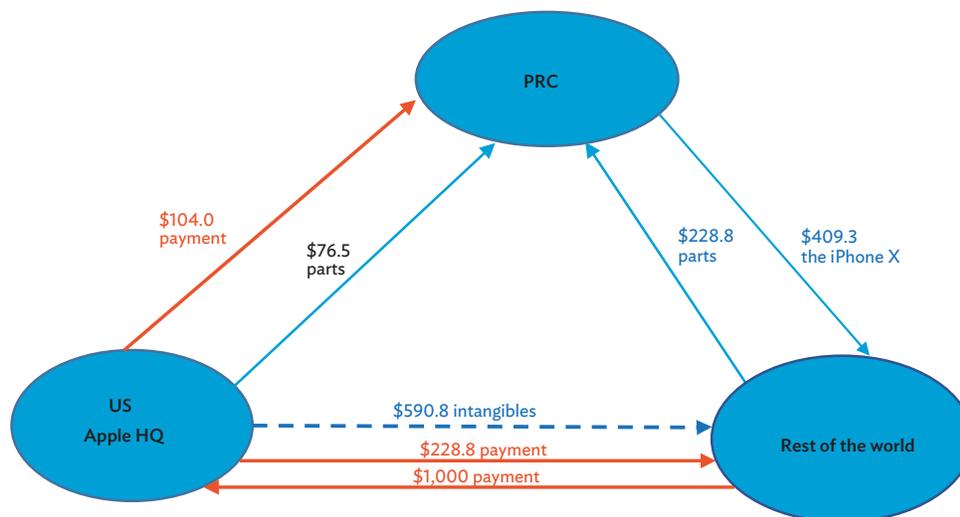
Exporting without Crossing Home Borders: The Case of the iPhone X

Two major reasons explain the inconsistency between the picture depicted by trade statistics and the reality that Apple exports billions of dollars in consumer goods yearly to foreign destinations. First, almost all Apple products sold in overseas markets are assembled in and shipped from factories outside the US, (i.e., they do not cross US borders to enter international markets). As a result, they are not regarded as US exports by the customs of any country. For example, all Apple products sold in the PRC are shipped directly from the company's contract manufacturers Foxconn, Luxshare Precision Industry Co. Ltd., Pegatron Corp., and Wistron Corp., which are all in the PRC. Second, even if Apple products were counted as exports of the manufacturing countries—for example, the iPhones exported from the PRC to Japan—the value added associated with Apple's intangible assets and services would not be counted as part of these exports. This is explained by Apple's contract manufacturers having no

ownership of these products; they are only responsible for the assembly of ready-to-use Apple products. The contract manufacturers only declare the manufacturing costs of the assembled Apple products to customs when they ship them abroad. Hence, the value added of Apple's intangible assets embedded in all its products is not recorded by customs in any country, a clear-cut case of a vanished US export.

The export of an iPhone X can be used for an intuitive explanation of the inability of conventional trade statistics to trace trade in intangibles via GVCs. Assume the iPhone X is sold in the rest of the world, not in the PRC or the US. Figure 2.1 shows trade and income flows between the PRC, the US, and the rest of the world for the manufacture and sale of the iPhone X, which retails at \$1,000. A teardown analysis reveals the production cost (the cost of all parts and assembly service) totals \$409.3 to which Apple adds \$590.8 in intangible assets: the iOS operating system, the brand, product design, and marketing and retail networks (Xing 2020a). To make an iPhone, Foxconn in the PRC imports \$76.5 worth of parts and components from the US and \$228.8 from the rest of the world. As a result, the sale of a \$1,000 iPhone X represents a total export volume of \$714.6 for the world economy—\$305.3 in parts exported to the PRC plus the \$409.3 iPhone X exported by the PRC. It must be emphasized that trade statistics report only the \$76.5 in parts shipped directly from the US to the PRC as a US export, about one-tenth of the total export value generated by the sale of a \$1,000 iPhone X abroad. Clearly, the trade statistics greatly underestimate the actual US export value of an iPhone sale.

Figure 2.1: Mismatch between iPhone X Trade and Income



HQ = headquarters, PRC = People's Republic of China, US = United States.

Note: Blue lines indicate flows of goods associated with the production and export of the iPhone X; red lines denote corresponding flows of income.

Source: Y. Xing. 2020. How the iPhone Widens the US Trade Deficit with China: The Case of the iPhone X. *Frontiers of Economics in China*. 15 (4). pp. 642–658.

Figure 2.2 shows the income flows, denoted by the red lines, do not match the trade flows. More specifically, (i) the PRC received only \$104.0 for the assembly service and parts made in the country, despite the reported \$409.3 export; (ii) trade statistics show the PRC imported \$305.3 in parts from the US and the rest of the world for assembly of the iPhone X, but there is no corresponding income flowing from the PRC to those regions, because Apple paid its suppliers in the US and the rest of the world directly; and (iii) as a result of selling the iPhone X in the rest of the world, the US received \$1,000 in income from abroad, but there is no trade flow corresponding to the \$1,000 received. This analysis of iPhone trade clearly shows that conventional trade statistics only capture the value of physical goods crossing borders, and cannot trace exports in services of intangible assets embedded in physical goods. Those statistics fail to reflect the “exports” of the services of the intangible assets embedded in tangible goods.

Trade in Intangibles between the People’s Republic of China and the United States

US Census Bureau data show the US had a \$420 billion trade deficit in commodity trade with the PRC in 2018, accounting for almost half of the total US trade deficit in goods. That persistent and rising trade deficit triggered an ongoing trade war between the two countries. Besides macroeconomic factors, such as differences in savings rates, the inconsistency between current trade statistics and value chain-based modern trade is one of the major factors for the apparently huge trade imbalance between the two. A few studies (e.g., Xing and Deter 2010; Koopman, Wang, and Wei 2014; Xing 2020a) show the foreign value added in US figures on PRC exports greatly exaggerates both the PRC’s exports and its trade surplus with the US. While foreign value added inflates the PRC’s bilateral trade surplus, the emergence of factoryless goods producers has resulted in US exports to the PRC being underestimated. By outsourcing all fabrication tasks to foreign contract manufacturers, many US firms have adopted a new business model for marketing their products in the PRC. Instead of selling made-in-US goods, they sell products with US brands, designs, and technologies that are made or assembled in the PRC or third countries.

Every year, US factoryless manufacturers sell billions of dollars of tangible products, such as iPhones, Nike shoes, AMD central processing units, and Qualcomm chipsets, in the PRC and earn billions in income from that market as a return on their intangible assets and services. In 2018, Apple’s net sales in the PRC totaled \$51.9 billion; Qualcomm’s \$15.1 billion, Nike’s \$5.1 billion, and AMD’s \$2.5 billion. The total PRC revenue of the four companies was \$74.6 billion. The extraordinarily high gross profit margins—43.8% for Nike’s products and 55.0% for Qualcomm’s—show the US companies captured a significantly large share of the value added of the products sold in the PRC. What Chinese customers actually buy from those factoryless manufacturers are the services of their intangible assets embedded in tangible goods assembled and produced by foreign contractors. These activities, however, are not treated as US exports to the

PRC because conventional trade statistics are designed for the classic cloth-for-wine trade, not value chain-based modern trade. Compared with exports of agricultural products and airplanes, exports in services of intangible assets via GVCs create both jobs and income for the US economy—and hence they should be considered as a new type of export in the age of GVCs.

Table 2.4 shows the estimated income earned by Apple, Nike, AMD, and Qualcomm on their intangible assets through the sale of tangible goods in the PRC. It is worth emphasizing that the estimated income includes neither the value added by their contract manufacturers, such as TSMC, nor that by local service staff in the PRC.¹

Table 2.4: Income by Apple, Nike, Advanced Micro Devices, Qualcomm from Intangibles in the People's Republic of China, 2018
(\$ billion)

Company	Apple	Nike	AMD	Qualcomm	Total
Sales in PRC	51.9	5.1	2.5	15.1	74.6
Income on intangibles	18.3	1.4	0.8	7.4	27.9

AMD = Advanced Micro Devices Inc., PRC = People's Republic of China.

Source: Y. Xing. 2021. *Factoryless Manufacturers and International Trade in the Age of Global Value Chains. GRIPS Working Paper. DP 21-02.* Tokyo: National Graduate Institute for Policy Studies.

As Table 2.4 shows, of Apple's total \$51.9 billion sales in the PRC, the company earned \$18.3 billion, which represents the payment for its intangible assets, such as the Apple brand, iOS operating system, product design, marketing activities. In terms of bilateral payments, the \$18.3 billion is part of the payment made by Chinese consumers for the services of Apple's intangible assets. Nike derived an estimated \$1.4 billion from the PRC as a return on its brand, design, and marketing activities. Of Qualcomm's \$15.1 billion PRC sales, \$7.5 billion can be attributed to the value added by its intangible assets. In all, the four factoryless manufacturers earned a total of \$27.9 billion by selling the services of their intangible assets to Chinese customers. The international division of labor along value chains, as illustrated by the iPhone (Xing and Detert 2010; Xing 2020a) and the smile curve (Meng and Ye forthcoming), suggests that MNCs from developed countries generally specialize in the tasks of creating intangible assets, while firms from developing countries perform the tasks of material fabrication and product manufacturing. "Trade in tasks" refers to the international use of services of intangible assets in the manufacture of tangible products. Hence, from the perspective of value-chain trade, the \$27.9 billion constitutes 2018 exports to the PRC by the four US companies.

US Census Bureau data show the US exported \$57.1 billion in services to the PRC in 2018. If the income derived by the four US companies from the PRC was classified as US exports to the PRC in services, its service exports to the PRC would increase by 48.9% to \$85.0 billion, and its overall trade balance (goods and services) with the PRC would shrink by 7.3% to \$352.1 billion (Table 2.5).

¹ See Xing (2021) for details of the methodology used in this estimation.

Table 2.5: United States Factoryless Manufacturers and Their Trade with the People's Republic of China
(\$ billion)

US Services Exports to PRC			US Trade Deficit with PRC ^a		
Official	Adjusted for factoryless manufacturers	Change	Official	Adjusted for factoryless manufacturers	Change
57.1	85.0	48.9%	(380.0)	(352.1)	7.3%

() = negative, PRC = People's Republic of China, US = United States.

^a Includes trade in goods and services.

Source: Y. Xing. 2021. Factoryless Manufacturers and International Trade in the Age of Global Value Chains. *GRIPS Working Paper*. DP 21-02. Tokyo: National Graduate Institute for Policy Studies.

Clearly, adding the services exports of intangibles by the four US factoryless manufacturers would substantially increase the volume of US exports to the PRC and reduce the trade deficit. This is not a simple statistical trick for artificially narrowing the trade imbalance between the two countries: it is the adjustment necessary to make trade statistics appropriate for GVC trade. In a nutshell, recognizing the income derived by US factoryless manufacturers from their intangibles as part of US exports should narrow the trade gap and significantly mitigate the bilateral trade imbalance. The logic for this adjustment in the current reporting practice is straightforward. When Chinese consumers and firms buy their products, such as iPhones, Nike shoes, Qualcomm chipsets, and AMD central processing units, they pay not only for the production costs of these products, but, more importantly, also for the value added of intangible assets embedded in the physical goods. Ignoring the income of US factoryless manufacturers from their PRC sales not only greatly understates the benefits of the US trading with the PRC but also surely distorts calculations of the bilateral trade balance.

Trade in Factor Income between the People's Republic of China and the United States

An important objective of exports is to derive income from foreign markets. Exporting products directly to foreign countries, building factories abroad, and outsourcing production to foreign contract manufacturers are different business models, but they have the same objective: making profit. The four US companies discussed in the previous section are only a small part of the overall picture of US multinational companies exporting services of intangibles via GVCs. As mentioned earlier, FDI combined with IP is a popular means of earning returns on intangible assets in the global market. For example, an estimated 90% of the market value of the S&P 500—the 500 largest firms on the US stock market, most of which are involved in international trade—came from intangible assets in 2020 (Ocean Tomo 2020).

The proliferation of GVCs has blurred the difference between direct investment and international trade. The complexity and sophistication of GVCs due to the increasing inter- and intra-firm trade in intermediate goods and services, which may cross national borders multiple times, has also made it difficult to determine “who creates what for

whom?” and “who gets factor income and from where?” For example, a large number of US brand goods (e.g., Tesla Inc.’s PRC-made Model 3 vehicles) are produced by US firms invested in the PRC and sold in that market via FDI channels. Those sales are treated as domestic transactions in the PRC. In conventional international trade statistics, none are regarded as a US export to the PRC. Profits associated with those sales are also counted as part of the PRC’s GDP. From the viewpoint of factor income, however, the return on both tangible and intangible capital embodied in those sales undoubtedly belongs to US-owned firms. If those products are sold on the Japanese market, conventional trade statistics will treat them as PRC exports to Japan—none will be regarded as US exports to Japan. Clearly, current trade statistics are defined by territory (country borders) rather than the ownership of factor income, which causes a “what you see (domestic sales or trade flows) is not what you get (income)” problem in mapping GVCs.

To overcome this, a new measure of trade—trade in factor income (TiFI), proposed by Meng et al. (2021), should be considered. TiFI is based on a new intercountry input–output model that considers firm ownership information and FDI channels. It takes advantage of both teardown-type case studies (e.g., Xing 2020a) with explicit consideration of the investments of MNCs and trade activities around the world and the intercountry input–output model based on the trade in value added (TiVA) measure for removing all double counting (Koopman, Wang, and Wei 2014; WTO 2017; OECD 2019). TiFI defines the US-owned factor income induced by the PRC’s final demand as US exports to the PRC. It can also be seen as a kind of “beyond border” trade measure that extends the concept of commercial presence used in measuring trade in services to include goods (WTO 1994). Using TiFI can therefore significantly improve the understanding of the nature and distribution pattern of factor income along complex GVCs.

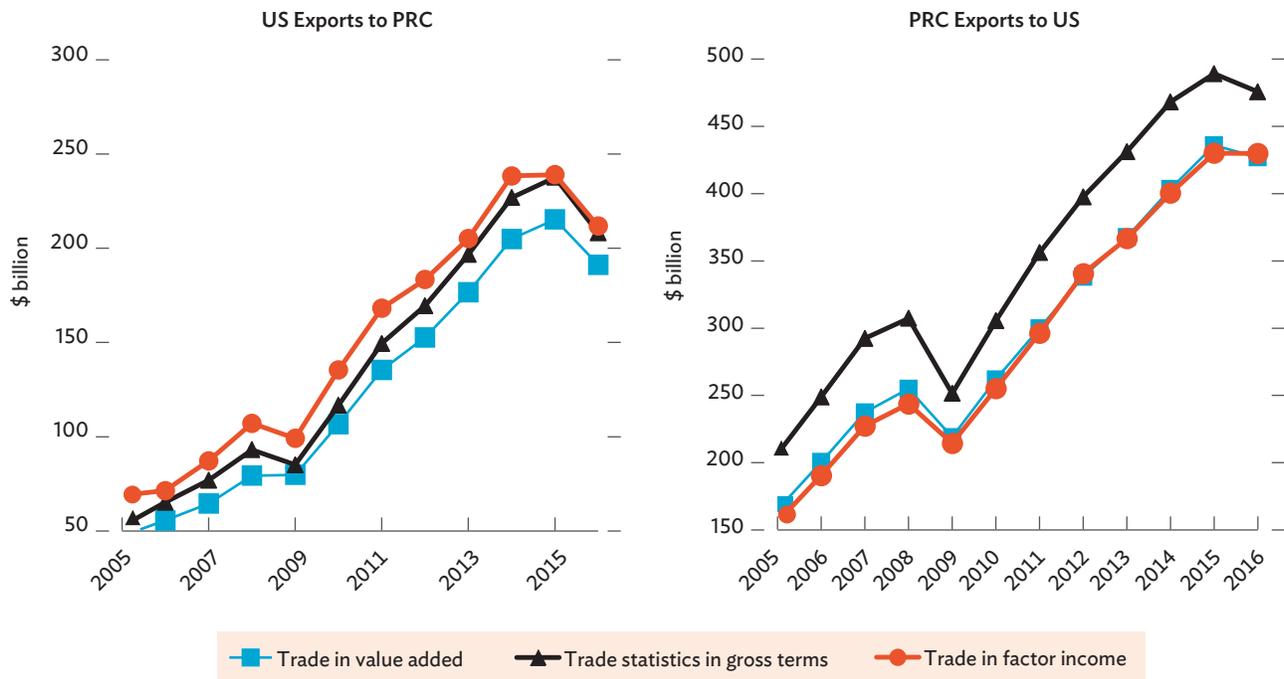
In the context of PRC-US trade, TiFI defines US exports to the PRC as the income belonging to US-owned factors and induced by the PRC’s final demand. US-owned factor income includes the return on the tangible and intangible assets of US-owned firms within and outside the US via FDI channels, US domestic labor compensation, and net US government taxes. The PRC’s exports to the US are PRC-owned factor income induced by US final demand. PRC-owned factor income includes the same three elements as US-factor income.

With these newly defined concepts of exports, the trade balance between the US and the PRC can be reestimated.² Figure 2.2 shows three different measures of the bilateral trade between the two countries from 2005 to 2016: (i) gross trade flows; (ii) TiVA and TiFI based on the OECD’s Activities of Multinational Enterprises database, including intercountry input–output tables split according to firm ownership (Cadestin et al. 2018); and (iii) this chapter’s estimation of sectoral and bilateral FDI data (Meng et al.

² The treatment of factor income, especially the return to capital associated with trade, is different from the concept of national income in the national accounting system. For example, the return to the capital gain of US-owned firms in the PRC is, by definition, part of the PRC’s GDP. Most of that capital gain may be added to the PRC’s gross national income, but capital gains are generally owned and controlled by US-owned firms. TiFI emphasizes the owner who essentially controls the firm rather than the firm’s location.

2021). US exports to the PRC in TiFI terms are on average 20.3% (ranging from 49.4% in 2005 to 10.7% in 2016) higher than in TiVA and 8.2% (ranging from 31.8% in 2005 to 0.6% in 2016) higher than in traditional gross terms. PRC exports to the US in TiFI terms are on average 1.6% (ranging from 5.1% in 2005 to 0.7% in 2016) lower than in TiVA and 16.0% (ranging from 24.2% in 2005 to 9.6% in 2016) lower than in traditional gross terms.

Figure 2.2: Bilateral Trade between the People's Republic of China and the United States by Three Different Measures, 2005–2016



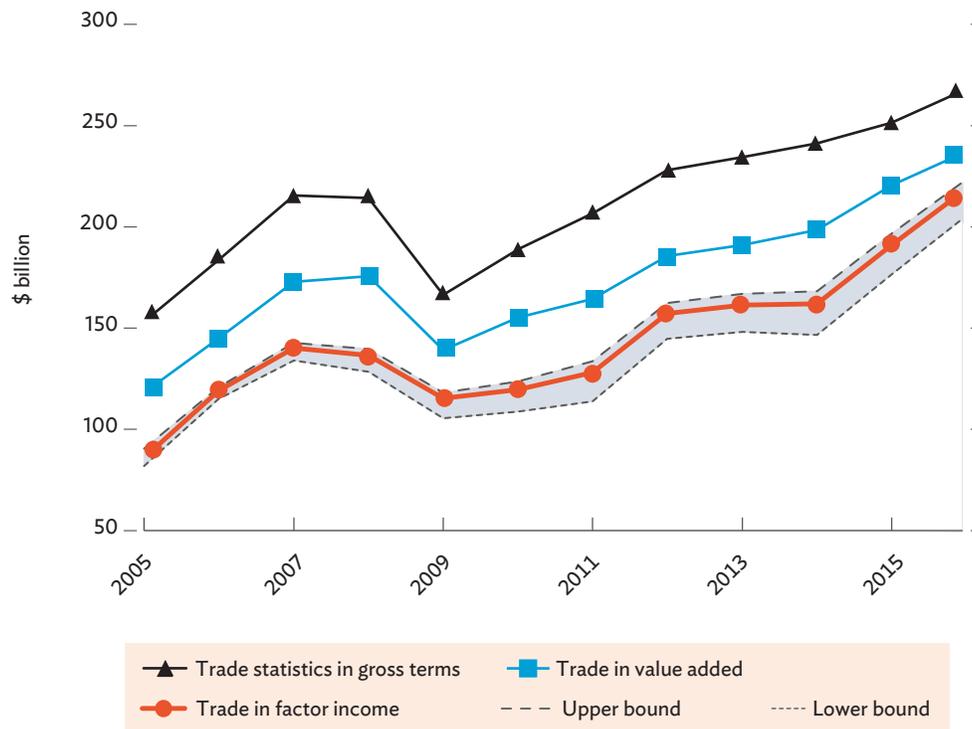
PRC = People's Republic of China, US = United States.

Source: B. Meng, Y. Gao, J. Ye, M. Zhang, and Y. Xing 2021. Trade in Factor Income and the US-China Trade Balance. *IDE Discussion Paper*. No. 819. Chiba, Japan: Institute of Developing Economies – Japan External Trade Organization.

Using the estimates in Figure 2.2, the PRC-US trade balance can be calculated in terms of TiFI and compared with calculations of the trade balance using other measures. Figure 2.3 shows the PRC's trade surplus with the US, measured using TiFI, is about 68.0% of that measured by gross trade volumes on average from 2005 to 2016. Compared with the trade surplus computed with TiVA, which supposedly removes the distortion associated with foreign value added, the bilateral trade balance measured by TiFI was 17.4 % smaller on average during the period.³

³ Besides the TiFI measure, some approaches also attempt to investigate the US-PRC trade balance in income terms. For example, Li et al. (2018) show the PRC's trade surplus with the US in national income terms was 61% smaller in gross terms and 22% smaller in value-added terms in 2012. Bohn, Brakman, and Dietzenbacher (2021) show the US trade deficit with the PRC in income terms was 82% of that in value-added terms in 2014. The approach of Li et al. (2018), however, is based on a single national income-output model without explicit consideration of double counting of intermediates via GVCs, although they separate each sector in the PRC input-output tables used by domestic and foreign-invested companies. The approach of Bohn, Brakman, and Dietzenbacher (2021) is based on a world input-output model, but they do not explicitly consider the difference of production functions (technologies) between domestic- and foreign-owned firms within the same sector of the input-output system.

Figure 2.3: Trade Surplus between the People's Republic of China and the United States by Three Different Measures, 2005–2016



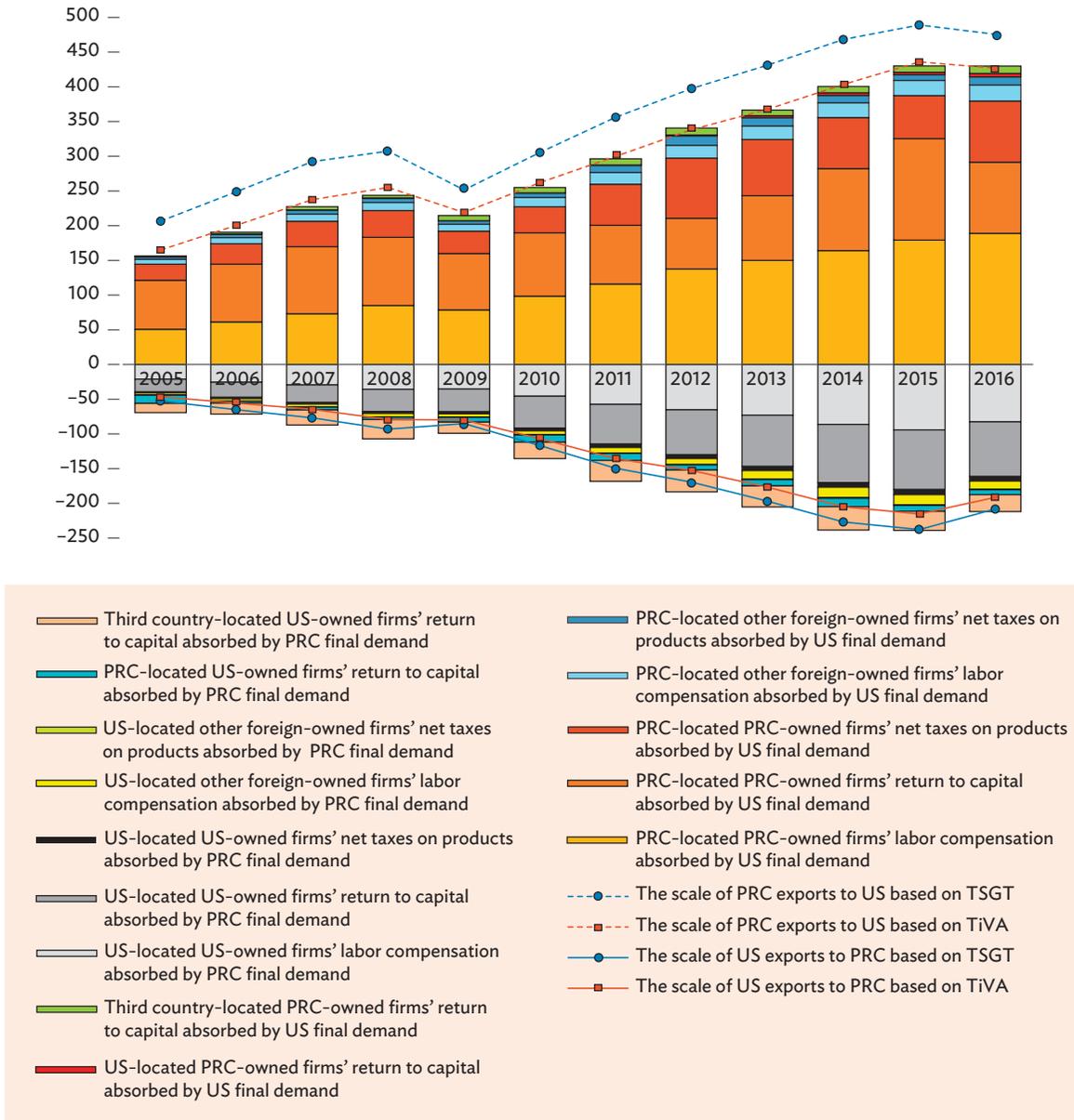
Note: The upper and lower bounds give the confidence interval of the estimation according to different technologies adopted by foreign-invested firms in the foreign-direct-investment host countries.

Source: B. Meng, Y. Gao, J. Ye, M. Zhang, and Y. Xing 2021. Trade in Factor Income and the US-China Trade Balance. *IDE Discussion Paper*, No. 819. Chiba, Japan: Institute of Developing Economies – Japan External Trade Organization.

These phenomena are presented in detail in Figure 2.4, which shows the sources of the TiFI-based PRC-US trade surplus by different factors. The figure shows the value added of PRC-located and PRC-owned firms and that of US-located and US-owned firms are the main components of the PRC-US trade balance. These two factors play, by definition, the same role in determining the conventional TiVA-based PRC-US trade balance. Therefore, the main difference between TiFI and TiVA for measuring the bilateral trade balance is in the treatment of the return to capital of each country's MNCs located overseas. Based on this chapter's definition of TiFI, the return to capital of PRC-located US-owned firms absorbed by the PRC's final demands is treated as a US export to the PRC, which are considered to be domestic transactions in the conventional TiVA measure. The return to capital of US-owned firms located in third countries absorbed by the PRC's final demands is also treated as a US export to the PRC in TiFI and designated as the value-added exports of third countries to the PRC in the conventional TiVA measure. The considerable difference between TiFI and the calculation of the TiVA-based approach in terms of measuring the US-PRC trade balance using TiFI is therefore mainly due to the huge presence of US-owned MNCs along GVCs that earn more factor income from their tangible and intangible capital in overseas markets than PRC-owned firms (Figure 2.4). In addition, as Figure 2.3 shows, the TiFI-based estimation of the PRC-US trade surplus in 2016 is close to the estimation using the conventional TiVA-based approach. This could be explained by the convergence of the

two measures being the result of the return to capital of PRC-owned MNCs in overseas markets, induced by increasing US final demand and decreasing the return to capital of US-owned MNCs in overseas markets, induced in turn by the PRC's final demand.⁴

Figure 2.4: Trade Surplus Sources between the People's Republic of China and the United States According to Trade in Factor Income



PRC = People's Republic of China, TiVA = trade in value added, TSGT = trade statistics in gross terms, US = United States.

Source: B. Meng, Y. Gao, J. Ye, M. Zhang, and Y. Xing 2021. Trade in Factor Income and the US-China Trade Balance. *IDE Discussion Paper*. No. 819. Chiba, Japan: Institute of Developing Economies – Japan External Trade Organization.

⁴ Once returns to capital are divided into tangible and intangible parts, as done by Alsamawi et al. (2020), intangible assets are divided into more detailed categories, as done by Fu and Ghaur (2021). Knowledge stocks of R&D expenditure are considered intangible assets in a dynamic input-output system, as done by Kuroda and Huang (2020). More policy-oriented research needs to be done on these aspects.

Protecting Intellectual Property in the Age of Global Value Chains

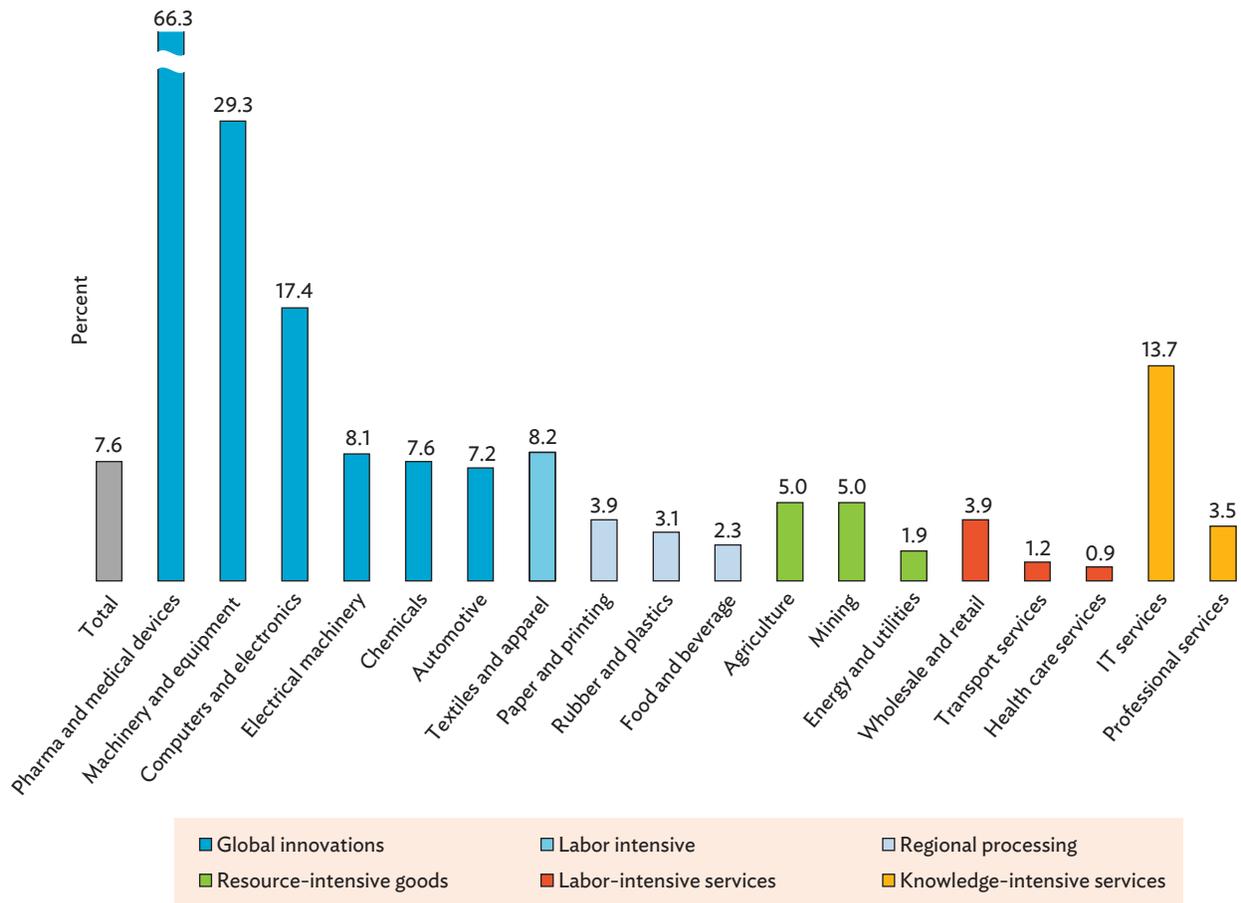
Intangible assets play a critical role in GVCs. As highlighted earlier, they are the only source of income for factoryless goods producers, such as Apple and Nike. Trade in tasks between developing and industrialized countries primarily means exchanging fabrication services for the services of intangible assets. Trading IP services through GVCs is proving to be a boon to IP owners. To date, the capital stock of MNCs from advanced economies consists primarily of IP (brands, trademarks, patents, in-house knowledge), and the contribution of MNCs to GVCs consists primarily of services from those intangible assets. Because the role of IP in GVCs is large and growing, a full understanding of GVCs is not possible without studying IP and related issues. Take, for example, the firms in the S&P 500: most are involved in GVCs, with an estimated 90% of their market capitalization coming from IP (Ocean Tomo 2020). In other words, most of the value of large MNCs is in their patents, brands, and other intangible assets, since they do not own much capital stock. Because an estimated 90% of their capital stock is IP, roughly 90% of their profits are a return on IP. The overseas earnings of US MNCs are about \$500 billion per year: 90% of that is \$450 billion, so overseas royalties plus overseas profits on IP total about \$580 billion a year for US firms, equivalent to one-quarter of their total corporate profits.⁵ Hence, the use of IP in GVCs is a key business line of MNCs and significantly increases their incentive to do R&D and to innovate. Without GVCs, MNCs in advanced economies would earn much less from their innovations.

Pharmaceuticals, machinery, and electronics are among the sectors in which GVCs are knowledge-intensive—and it is particularly in those sectors that IP rights protection is key. Automobiles and textiles are less knowledge-intensive, but they, too, are becoming more knowledge-intensive. From 2000 to 2016, all sectors in Figure 2.5 increased the share of their revenue derived from creating new IP through R&D and acquisitions. Overall, that share rose from 5.4% of revenue in 2000 to 13.1% in 2016. This trend is most apparent in certain sectors: machinery and equipment firms spent 36% of their revenue on R&D and intangibles; those in pharmaceuticals and medical devices spent 80%.

The growing emphasis on knowledge and intangibles favors countries with highly skilled labor, strong innovation and R&D capabilities, and robust IP protection. The rise in knowledge-intensive production and trade has been accompanied by an increase in trade in services, both direct and indirect. In 2017, gross trade in services totaled \$5.1 trillion, dwarfed by the \$17.3 trillion in global goods trade. Even so, trade in services has grown by more than 60% than trade in goods over the past decade (McKinsey 2019). The IP charges of some subsectors, including telecommunications, information technology, and business services, are growing two to three times faster.

⁵ For more information, see Ernst & Young LLP. TaxNews Update. 29 May 2019. <https://taxnews.ey.com/news/2019-1010-us-multinational-enterprisesrepatriated-a-record-665-billion-of-foreign-earnings-in-2018#:~:text=In%20its%20March%2027%2C%202019,to%20%24155%20billion%20in%202017>.

Figure 2.5: Knowledge Intensiveness of Global Value Chains—Change in Capitalized Spending on Intangibles as a Share of Revenue, 2000–2016^a



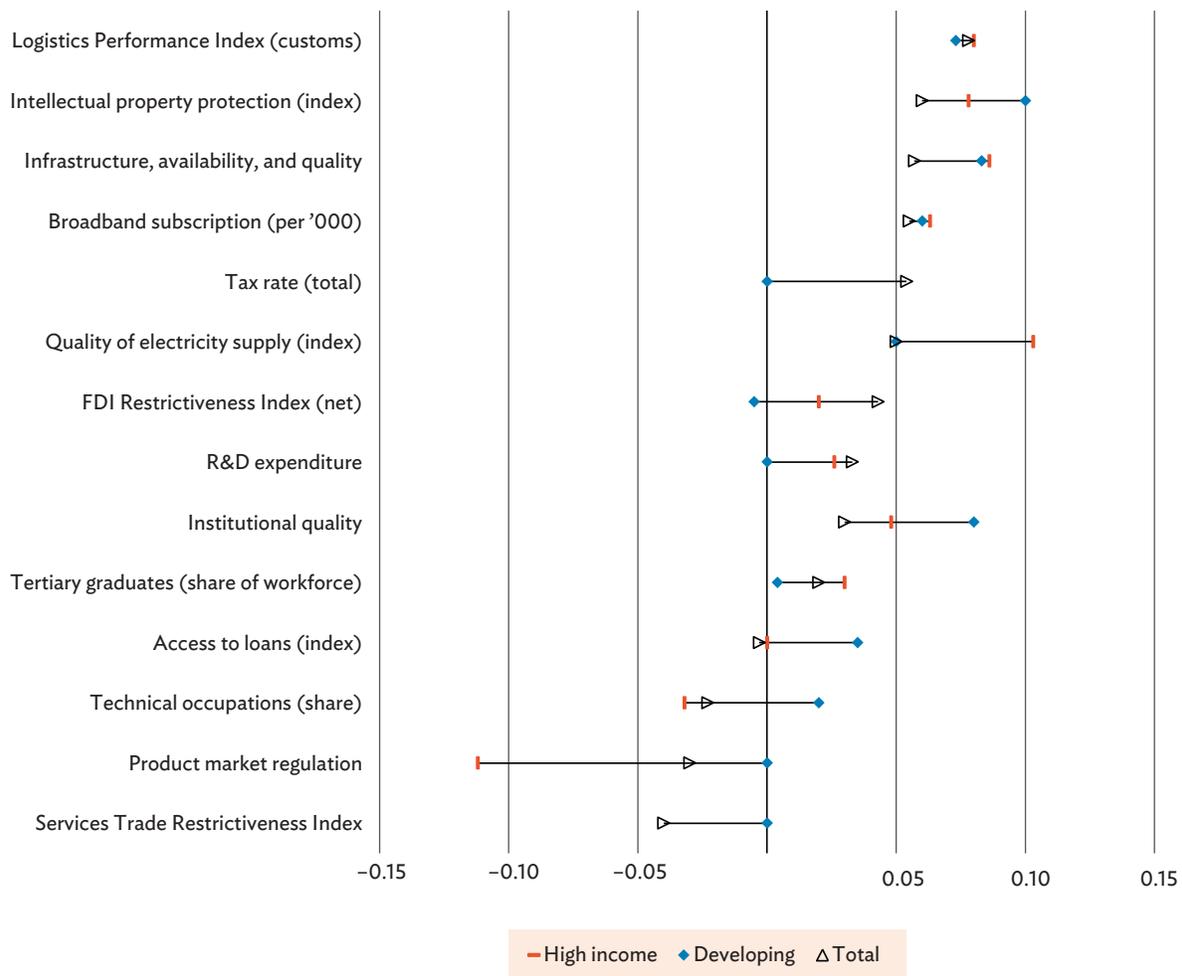
IT = information technology, R&D = research and development, SG&A = selling, general and administrative expense.

^a Intangibles include brands, software, and other intellectual property, capitalized based on the R&D and SG&A of about 24,500 nonfinancial companies, assuming a depreciation rate of capitalized SG&A at 20% and capitalized R&D at 15%. Capitalized expenses as of 2000 estimated based on multiplier to annual expenses from R. H. Peters and L. A. Taylor. 2017. Intangible Capital and the Investment-q Relation. *Journal of Financial Economics*. 123 (2). pp. 251–272. This uses different multipliers depending on company age.

Source: Authors based on McKinsey. 2019. *Globalization in Transition: The Future of Trade and Value Chains*. McKinsey Global Institute.

Since MNCs deploy their IP internationally, including in developing countries, they are naturally concerned about the protection of their IP rights. The International Property Rights Index 2020 shows that IP rights are generally very good in advanced economies and fairly good in most developing countries. The PRC scores modestly better than other large emerging markets, including Brazil, India, Indonesia, Mexico, Thailand, and Viet Nam. An OECD study examining key factors that affect GVC participation for advanced and developing economies found that IP rights protection is the single most important factor of GVC participation in developing economies, followed by quality and availability of infrastructure, institutional quality, and logistics (Kowalski et al. 2015) (Figure 2.6). This makes sense: to operate effectively, foreign investors need reasonably good infrastructure, logistics for moving goods in and out, and protection of their main asset—their intangible property.

Figure 2.6: Factors Affecting Global Value Chain Participation in Advanced and Developing Economies



FDI = foreign direct investment, R&D = research and development.

Source: Authors based on P. Kowalski, J. L. Gonzalez, A. Ragoussis, and C. Ugarte. 2015. Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies. *OECD Trade Policy Papers*. No. 179. Paris: Organisation for Economic Co-operation and Development.

Building strong IP protection is increasingly important in the age of intangibles. Advanced economies have a strong interest in IP rights protection globally because they want their firms to collect the maximum rent on their intangible assets. It also needs to be recognized that the interests of developed countries are substantially different from those of developing ones. Developing countries have an interest in implementing sufficiently strong IP rights protection to attract foreign investment, including in hi-tech sectors, but much of their benefit from an open development strategy comes from advanced technologies (i.e., diffusion to their own firms). This is a natural process that goes back at least to the 18th century, when US firms appropriated textile technology from Great Britain. Developed countries, however, own most of the IP in the world and benefit from the strongest IP rights protection possible. For example, advanced economies favor long-term patents for pharmaceuticals; developing countries favor shorter-term patents. The COVID-19 pandemic illustrates this tension. Firms in advanced economies moved quickly to develop effective COVID-19 vaccines. Leading developing economies, including India and South

Africa, proposed that World Trade Organization–based patent protection on those vaccines be waived. The proposal is still under discussion and that no consensus has been achieved yet. This is a good start on meeting the vaccine requirements of the developing world, but it is far from sufficient (Box 2.1).

Box 2.1: The Debate Over Waiving Patents for COVID-19 Vaccines

The effort to vaccinate the world against COVID-19 is a real-world example of the debate over strengthening versus weakening intellectual property (IP) rights protection for key technologies. The most effective vaccines against COVID-19 have been developed by pharmaceutical companies in developed countries.

As of summer 2021, most jabs had been delivered in rich countries; poor countries lagged far behind in both access and distribution. India and South Africa have proposed a waiver of the patents on and the compulsory licensing of these vaccines so that production in the developing world can quickly ramp up. This is a hotly debated issue with good arguments on both sides:

Arguments in favor of waiving patents and compulsory licensing (Mazzucato, Ghosh, and Torreele 2021):

- (i) IP rights were never designed for use during a health emergency. General exceptions have been made in the past to ensure patents are not a barrier to public health, for example, the exception for penicillin production during the Second World War.
- (ii) Epidemic-response research and development has never relied on classic market-based incentives, such as patents. Rather, the main drivers have been government research funding and advance-purchase commitments aimed at defraying risk. Massive public investments have reduced industry risk from these efforts.
- (iii) In a pandemic, it is imperative to remove as many barriers as possible to increase production, and patents are a fundamental and far-reaching obstacle.

Arguments for respecting patents (McMurry-Heath 2021):

- (i) The proposal to waive IP protection undermines the very system that produced the life-saving science in the first place. Moreover, it weakens the incentive for companies to take risks in their efforts to find solutions when the next health emergency arises.
- (ii) The fastest-developed COVID-19 vaccine (Pfizer Inc.'s) was created without government funding, and the timelines for all the vaccines developed by industrialized countries were dramatically shortened by private contributions—funding for labs, clinical-trial infrastructure, and the know-how needed to defeat the pandemic, amassed through decades of private investment and fueled by assurances of IP protection for discoveries made along the way.
- (iii) IP is the magic bullet that turns ideas into products. It also increases productivity by providing the legal certainty that enables companies to collaborate globally. It is the licensing of technology, not the abrogation of patents, that in the case of COVID-19 gets jabs.
- (iv) The scarcity of vaccines is not the result of IP concerns, but due to regrettable failures to tackle production and distribution challenges.

There is no simple right or wrong in this debate. It is likely that in the case of COVID-19 waiving patents would accelerate getting to grips with the pandemic, but it could well lead to a lessening of innovation in the future. This is the trade-off that the world has to confront.

Ideally, developing economies want to see their firms become owners of technology and brands. As a first step to this, the use of foreign knowledge acquired through direct investment enhances the productivity of workers, accelerates growth, and leads to spillover to domestic firms that become the suppliers of foreign firms. According to the International Monetary Fund, using foreign knowledge led to an additional 0.4 percentage points of labor productivity growth from 1995 to 2003 (Aslam et al. 2018). That quantitative effect then nearly doubled to 0.7% from 2004 to 2014, when developing countries experienced more than twice as much productivity from foreign knowledge than from their own R&D. This is indirect evidence that during this period GVCs were expanding and becoming more knowledge-intensive. Foreign knowledge for

production can be acquired through numerous ways: by licensing advanced technology, through inward direct investment, by legal diffusion of technologies (since IP rights are not meant to be permanent or complete), and IP theft.

Beyond the use of foreign knowledge in production, middle-income countries naturally aspire to move up the technological ladder and build their own domestic capabilities. This can also be encouraged through GVCs if nations are willing to embrace the tougher IP demands under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (Athreye, Piscitello, and Shadlen 2020). As MNCs become willing to locate their production in different countries, industrialists in those countries, hoping to become part of a GVC, may be willing to conform to the IP standards required by MNCs—and often with more stringent enforcement (Brandl, Darendeli, and Mudambi 2019). In fact, the tightening of IP regulations and the deeper integration between countries through the convergence of regulatory standards (Rodrik 2018) occurs in parallel with the expansion of GVC trade (Timmer et al. 2014). This led Chang (2002) and other scholars to protest that the stronger and more effective institutions for IP rights protection demanded of developing countries are not fair, because they are merely an attempt to “kick away the ladder” to prevent these countries from joining the elite club of developed nations. The PRC’s rise shows, however, that opening up to MNCs and GVCs can be an effective strategy for technological development. Indeed, the PRC’s rapid growth and the effect of its prosperity on the growth of middle- and low-income countries is testament to the success of these strategies, although, as Gomory and Baumol (2001) point out, such a strategy can create conflicts when incumbent countries feel that their market share is threatened.

Beyond the PRC’s participation in GVCs, the country has adopted policies to force foreign MNCs to transfer strategically sensitive technologies to local firms (Branstetter 2018). These policies are a key component of the PRC’s long-standing ambition to see its national champions replace the firms of industrialized countries currently at the forefront of core technologies. In many cases, technology transfers are required by the PRC’s FDI regime, which closes off important sectors of the economy to foreign firms unless they enter into joint ventures with local entities that they do not control. In response, the US has taken unilateral actions to tighten technology transfer from outward investment (Lester and Zhu 2020). For instance, the Foreign Investment Risk Review Modernization Act, 2018 and related implementing regulations are designed to enhance the screening of PRC investments in many sectors. This will make it more difficult for PRC companies to invest in the US and it probably strengthened curbs on the practice in the PRC of acquiring technology through foreign investment. The US can also use its sanctions power to prevent US companies from investing in strategic sectors in the PRC. It remains to be seen whether the technology war between the US and the PRC will have a material effect on GVCs. It is not only the US that has pushed back against the PRC’s technology policies. The European Union reached an investment agreement with the PRC in December 2020 that, among its provisions, prohibits forced technology transfer and strengthens IP rights protection.

Various strands of research indicate that the optimal IP rights regime for attracting foreign technology depends on stage of development. Gentile (2020) finds that licensing foreign technology is more likely with better property rights in place, but only in upper-middle-income countries, not in low- or lower-middle-income ones, and that licensing is also only effective in the case of affiliates of foreign parents. An Asian Development Bank study finds that different forms of IP rights have a stronger effect on innovation at different stages of development (Lee, Kang, and Park 2020). The sequence that emerges from the Republic of Korea's experience is from petite patents at an earlier stage of development to designs in export-oriented sectors and trademarks in domestic market-oriented sectors, and finally to patents at the later stage of development. The general thrust of this research is that the expected benefit of improving IP rights varies depending on the stage of development. In other words, there is no "one size fits all" when it comes to IP rights protection.

The Trend Toward Trade-Related Aspects of Intellectual Property Rights-Plus

Although TRIPS encouraged the expansion of GVCs, a tendency in recent plurilateral trade deals has been to go beyond the provisions of TRIPS to TRIPS-plus. The US, in particular, has been at the forefront of moves to extend IP rights protection beyond those laid out in TRIPS. Some important TRIPS-plus provisions, which primarily concern pharmaceuticals, are:

- (i) **Data exclusivity.** This is the idea that, for a certain period, regulatory authorities are not allowed to rely on originators' safety and efficacy data to register a generic version of a drug. By implication, as long as the exclusivity lasts, generics producers have to submit their own data in order to enter a market. TRIPS, however, mandates data protection, but not data exclusivity. That provision obliges generics producers to repeat clinical trials, which they may not be able to afford, and these trials take time. This poses ethical questions, since repeating clinical trials implies withholding treatments that are already known to be effective from earlier trial participants. Alternatively, and more likely in practice, generics manufacturers have to delay the launch of their products until the end of the exclusivity period.
- (ii) **Patent term extensions.** These are provisions to extend the duration of a patent beyond the 20 years required by TRIPS in order to compensate for "unreasonable" delays in granting a patent or in registering a medicine.
- (iii) **Linkage between patent status and generic registration.** Regulatory authorities may not register generic versions of a pharmaceutical that is under patent. This is problematic because regulators probably lack the resources and manpower to check the patent status of each product. And where there is a patent, regulators might not have the expertise to assess whether it is valid, and if so, whether it has been infringed. Because of this, regulators will likely enforce all patents, even invalid ones, thereby creating additional and unnecessary hurdles for generic competition.

The linkage is also problematic because patents are private rights and, as such, they should be enforced by the rights of the holders and not by a government body.

- (iv) **Limitation of the grounds for compulsory licenses.** This could, for example, preclude issuing compulsory licenses for reasons of public health. Requirements to limit the grounds for issuing compulsory licenses are TRIPS-plus since the TRIPS agreement leaves countries free to determine the grounds for issuing compulsory licenses.
- (v) **Other TRIPS-plus requirements.** These deal with the administrative procedures related to patent applications or the granting and revocation of patents. One side effect of all TRIPS-plus provisions is that they complicate or delay the marketing of generics.

Conclusions

The rise of GVCs in tandem with great gains in the economic efficiency of MNCs has significantly changed the nature and structure of international trade and investment. At the same time, the complexity and sophistication of GVCs has increased due to transactions in intermediates multiple times across multiple borders and the emergence of factoryless manufacturers exporting services of intangible properties (IP including brands, trademarks, patents, and in-house knowledge) embedded in products via value chains. That increase in complexity and sophistication poses considerable challenges for conventional trade statistics, which should give an accurate understanding of “who gains what from where” in GVCs.

The challenge lies mainly in the fact that both the measure of conventional trade statistics in gross terms, and the measure of trade using an input–output-model in value-added terms, are based primarily on the value of goods and services crossing national borders (territory-based trade). This fails to accurately identify trade in intangibles along GVCs (beyond border–type trade) by factoryless goods producers, who use their IP to organize value chains and outsource all fabrication activities to contract manufacturers without licensing their IP to third parties, and MNCs that combine their IP with FDI investment in the production of factory goods. The dominance of GVCs in international trade requires a redefinition of the concept of exports and an expansion of the scope of exports to include trade in intangibles via GVCs and FDI activities.

The case study in this chapter begins by demonstrating that substantial exports by US factoryless manufacturers are “missing” from the official trade statistics. The four US factoryless companies (Apple, Nike, AMD, Qualcomm) used in the case study actually exported \$27.9 billion in services of intangibles assets to the PRC via their sophisticated GVCs in 2018. But these are not counted as US exports to the PRC by official trade statistics. If they were, the estimation of US services exports to the PRC in the same year would increase 48.9% and the overall trade balance between the two countries would shrink 7.3%. The measure based on the input–output model shows that if US-owned

factor income induced by the PRC's final demand via FDI channels for factory-goods production was earmarked as part of US exports to the PRC, the US-PRC trade deficit would, on average, be just 68.0% of the gross term and 82.6% of the value-added term during 2005–2016.

These findings clearly demonstrate that without a proper measure of trade in intangibles along GVCs, the importance of international trade as a critical engine of growth in the 21st century is being greatly underestimated, and the role of GVCs in promoting economic development and industrialization is being substantially misunderstood. The proliferation of GVCs has also resulted in a clear international division of labor between developed and developing countries, with the former specializing in the creation of intangibles and the latter in the tasks of manufacturing tangible products. Conventional trade statistics based on the classic cloth-for-wine trade have unambiguously and substantially underestimated the benefits reaped by developed countries from today's unprecedented globalization. More importantly, this chapter demonstrated that the continued use of conventional measures of trade could lead to a great distortion of the current state of bilateral trade relations between industrialized and developing countries.

At least three factors are driving the phenomenon of “what you see in trade statistics is no longer what you get in income terms.” First, MNCs may dilute their income (most of which is gained from their IPs) from subsidiaries operating in low-tax countries (which may not be the countries where the IP creation and value occurred) with income from subsidiaries in high-tax countries. This is to avoid taxation through international transfer pricing and other measures. Second, MNCs have strong incentives to strengthen IP rights protection and to encourage innovation, given both the relatively low cost of illegal copying or reproducing IP and the higher costs of R&D investment to create and maintain control of their IP. This is the reason most factoryless goods producers do not license their IP to third parties. And third, IP protection is no longer simply a matter of encouraging innovation. These days it is more importantly about protecting a new source of bread and butter for the home countries of MNCs.

For the first of the three factors, the OECD's standards of transparency and exchange of information for tax purposes (OECD 2002, 2014), and the endorsement of a global minimum corporate tax of 15% by the world's 20 largest economies, could potentially end the “thirty-year race to the bottom on corporate tax rates” (Strupczewski 2021). For the second factor, developing economies increasingly recognize that enhancing IP rights protection domestically (improving the relevant parts of the legal system and enforcing related regulations) not only helps attract and keep foreign investors but can also in the long run provide big incentives for their own innovation and brand-building. Internationally, the possible upgrading of TRIPS provides a basis for IP rights protection in the multilateral trading system. For the third factor, reaching a consensus on “mutual trust based” international investment rules with fair and equitable treatment of businesses is a crucial but challenging goal for supporting the development of

sustainable and transparent GVCs (Tuerk and Rosert 2016; Butler and Subedi 2017; UNCTAD 2018). Finally, a fundamental reform in the measurement of international trade, especially trade in intangibles along GVCs to better match and map income creation and distribution patterns in GVCs, warrants serious consideration. This may also require national account reforms.

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