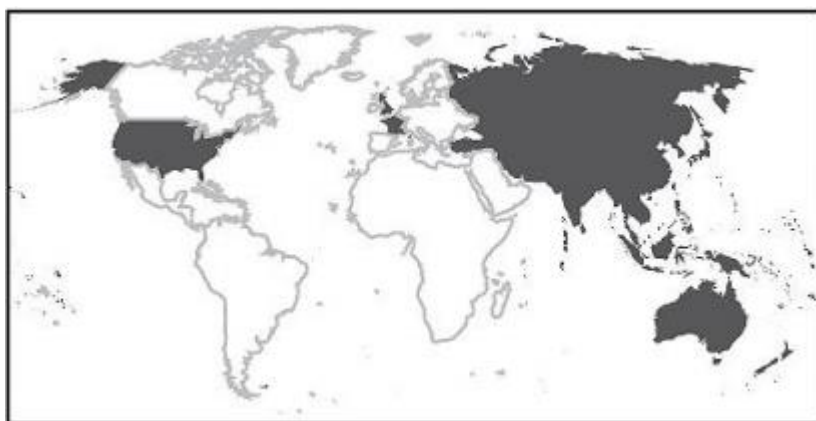


Bolstering East Asian-Latin American value chains through digitally deliverable services



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Bolstering East Asian-Latin American value chains through digitally deliverable services

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FEALAC funded project

Value chain development for deeper integration of East Asia and Latin
America

Abstract

The liberalization by Asian and Latin American economies of their trade regimes has seen digitalization becoming increasingly important for export competitiveness and productivity growth. This report has tracked the growth and sources of digitally deliverable services in Latin American and Asian manufacturing, agricultural and services value chains. It shows that digitally deliverable services play a growing role in export-driven production in the FEALAC region, but most of them are supplied by domestic service providers. However, there was the fast growth in Latin American-Asian digitally deliverable services trade in the past 15 years. Some “hidden complementarities” in digitally deliverable services between Latin America and Asia seems to exist. On one hand, Latin American firms are increasingly using Chinese financial services. In addition, they are drawing on sophisticated IT services and services using disruptive technologies such as blockchain and AI from Japan, the Republic of Korea, Singapore and the Philippines. On the other hand, Brazil, Chile, Costa Rica and Colombia are emerging as exporters of digitally deliverable services such as gaming, animation and e-commerce. Brazil, in particular, has become a source for Agtech applications.

As the business ecosystems in Asia and Latin America become more digitized and produce new digital services, there will be greater opportunities to also expand bilateral digitally deliverable services trade. For example, there are excellent opportunities for promoting cooperation and forums for Asian and Latin American companies to learn more about Latin American and Asian fintechs, logtechs, agtechs and creative industries such as animation, and vice versa. FEALAC members can also develop new initiatives that catalyse productivity and digitally deliverable services trade, such as smart manufacturing test beds, smart city forums as well as a FEALAC blue economy initiative and fund. To further incorporate high-value-adding, digitally deliverable services into their manufacturing, agriculture and other sectors, Asia and Latin America must uphold commitments to duty-free electronic transmissions and the free transfer of data across borders.

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1. Introduction

As Asian and Latin American economies have liberalized their trade regimes, imports have become increasingly important for their export competitiveness and productivity growth (Faúndez, 2011). In recent years, improvements in broadband and cloud computing have expanded opportunities for Asian and Latin American businesses to trade in specialized IT, financial, engineering and other business services, and to incorporate these services into their own products and services. Many of these business-to-business services are today digitally deliverable,¹ meaning they can be transferred to the customer digitally without face-to-face interactions that might be needed in, for example, tourism, medical and transport services. In addition, Asian and Latin American businesses in such traditional sectors as manufacturing and agriculture have set out to develop digital solutions and services internally, as a means of creating new value for their customers and to differentiate themselves from their rivals.

Recognizing the power of digitally deliverable services to add value to traditional and emerging industries, the member countries of the Forum of East Asia-Latin America Cooperation (FEALAC) are considering policies and initiatives to amplify the use of digitally deliverable services in their businesses' value chains. However, knowledge about the use of East Asian digitally deliverable services in Latin American industries and vice versa is still limited, as are policy ideas on how such services can best be promoted in bi-regional value chains. The purpose of this paper is to bridge these knowledge gaps by assessing:

¹ "Digitally deliverable services" follows the United States Bureau of Economic Analysis definition of five categories of services: (a) business, professional and technical services such as computers and information services, legal, architectural, consulting and advertising services; (b) royalties and licence fees paid for the use of intellectual property; (c) financial services such as online banking and investment activities, such as market research and buying and selling shares; (d) insurance services such as digital transmission of premiums and payments for claims online; (e) and telecommunications services including video conferences, email and Internet access services. These categories overlap significantly with the definition of knowledge-intensive business services (KIBS), which has in some other recent studies included six categories: (a) communications services; (b) insurance services; (c) financial services; (d) computer and information services; (e) royalties and licence fees; (f) and other business services (merchandising and other trade-related services, operational leasing services, and miscellaneous business, professional and technical services). This report proposes using "digitally deliverable services" and "B2B ecommerce in services" interchangeably, and in general assume that these types of services are largely knowledge-intensive.

- The extent and composition of digitally deliverable services in Latin American and East Asian value chains in general, and in bi-regional value chains between Latin America and East Asia, in particular;
- Policy barriers and frictions to interregional trade between Latin America and Asia in digitally deliverable services;
- Actionable policy proposals to bolster digitally deliverable services in Latin American-East Asian value chains;
- Opportunities to develop new data and research on digitally deliverable services, especially in Latin American-Asian value chains.

This paper is structured as follows. Section II describes the way digitally deliverable services are used to create new value across industries, and how some of the leading Asian and Latin American companies are both procuring and producing digitally deliverable services. Section III assesses the growth of digitally deliverable services in Asian and Latin American agricultural, manufacturing and services value chains, and the frictions and challenges to Asia-Latin America from digitally deliverable services trade. Section IV reviews emerging opportunities for FEALAC members to amplify digitally deliverable services in their value chains. Section V concludes by summarizing the findings and discussing future research needs.

2. How services create new value across industries

In the post-World War II era, manufacturing, mining and agricultural companies tended to be vertically integrated – developing and producing services needed for producing their products internally. However, aided by the IT revolution, in the 1990s companies began to outsource non-core services, such as legal, financial, advertising, business process outsourcing, accounting and software development services, to specialized external providers. Some of these providers were foreign companies. As a result of this expanding “trade in tasks”, world trade in services tripled in 2000-2015 with India, the United States, the Philippines, Eastern Europe and Costa Rica expanding their role as global services hubs.

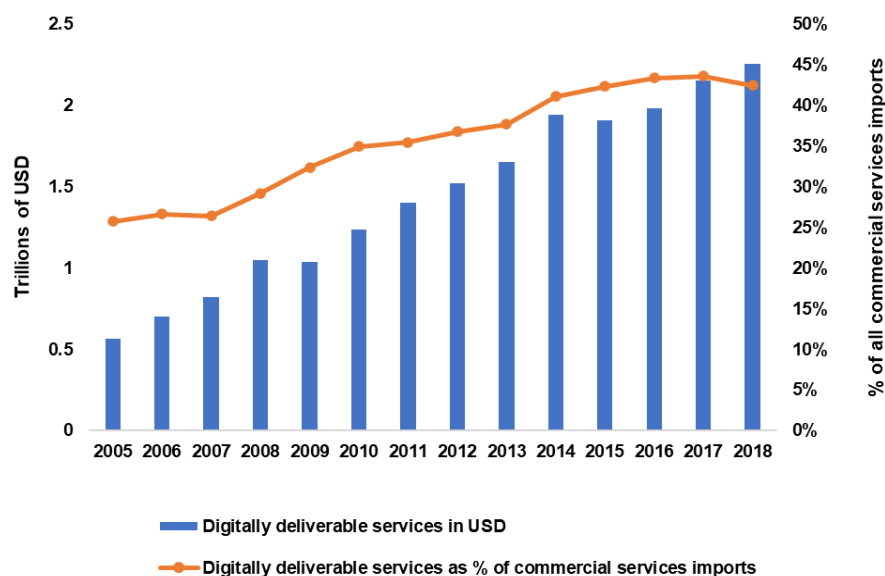
In more recent years, companies have turned to outsourcing even the more complex and sophisticated services and non-standardized tasks to external vendors. One key driver has been firms’ interest in accessing specialized services that would differentiate

them from their competitors and enhance their productivity.² Procuring services from outside vendors has also become easier thanks to increasingly fast and reliable broadband connections; cloud computing that enables seamless, collaborative, remote workflows and pay-per-use service models; and growing sophistication of emerging market digital service providers to perform complex cognitive tasks. In addition, online work platforms such as Freelancer, TopTal, and Upwork have enabled firms of all sizes to quickly vet and hire talent from around the world in such lines of work as coding, search engine optimization, design, animation, and marketing. Increasingly, these services are sold across borders. Even if research suggests that especially research and development (R&D)-intensive manufacturers with non-standardized products prefer vendors that are closely co-located with them, in general firms across industries have significantly increased their sourcing of services from foreign providers (Bailey, Corradini and De Propriis, 2018).

As a result, world trade in digitally deliverable services has grown four-fold in the past 15 years to about 40 per cent of all commercial services trade (figure 1). Of course, just as is the case of goods trade, not all digitally deliverable services that appear in trade data are necessarily outsourced to a third-party provider: trade data may also capture intra-firm flows. For example, an Asian automaker's subsidiary in Mexico may procure IT, data science and engineering services from the company's headquarters in Asia.

² Competitive pressures intensified for manufacturers facing competition from foreign rivals are found to be likelier to use services that differentiate themselves from their rivals. For the summary see Lodefalk, 2015.

Figure 1: Growth of global imports of services and digitally deliverable services, 2005-2018



Source: Author's calculation, based on WTO data.

Use of digitally deliverable services in production among FEALAC regional firms

Both anecdotal and econometric evidence suggests that the use of high-value-adding imported services fuels firms' productivity and export competitiveness (Bartelme and Gorodnichenko). For example, in the FEALAC region, ASEAN manufacturers' intensive use of imported services has likely enabled them to both reap greater export market share in manufacturing and diversify their export markets (Avendano, Bontadini, Mulder and Zaclicever, 2019). In addition, the use of specialized service providers sharpens firms' focus on their core business, which promotes the productivity growth of firms and economies (see Haven and van der Marel, 2018). Conversely, there is by now significant evidence that restrictions to services imports undermine goods and services producers' productivity and exports (see, for example, Nordås and Rouzet, 2016).³

The FEALAC region's leading companies have been avid users of digitally deliverable services, especially from the leading global IT companies, but also from smaller

³Arnold et al. (2014) found that fewer operational restrictions in banking, transport, insurance, and telecommunications made both domestic and foreign manufacturers in India becoming more productive.

providers in other FEALAC markets (table 1) (Embraer, 2017).⁴ Some prominent examples include Brazilian aerospace giant Embraer's use of United States cloud computing, AI and autonomous vehicle technologies, Thai construction giant Siam Cement Group's use of United States company R3's blockchain-based invoicing solutions, and leading Mexican hospital chain Salud Digna's use of the Republic of Korea biomedical company Lunit's AI technologies in medical diagnostics.⁵

Many Asian and Latin American Governments have actively promoted their companies' access to sophisticated services. For example, in Thailand, the Government's Thailand 4.0 effort promotes the use of high-value-adding services in such traditional sectors as automotive manufacturing, electronics, tourism, agriculture, food production among others (Oxford Business Group, 2020). In Mexico, the Government has backed the Program for the Development of the Software Industry (PROSOFT) that supports the capabilities of more than 700 services firms that supply services to traditional manufacturing sectors as well as to emerging sectors such as biotech.⁶

The FEALAC region's manufacturers and agrobusinesses are also becoming service providers themselves. For example, Embraer's "IKON" tool – created as a result of its partnership with Amazon Web Services – helps Embraer's customers to monitor the health of their aircraft, while Siam Cement Group's digital platforms and 3D modelling help building contractors procure construction materials and increase the efficiency of construction projects.⁷ These developments are positive; manufacturers like Embraer that not only procure but that produce digital services have been found to be more productive and competitive in export markets.⁸

⁴ On Baosteel case, see Honeywell Forge, "The World's Biggest Steel Manufacturer Becomes One of the Smartest" <https://www.honeywell.com/us/en/honeywell-forge/baosteel-success-story>, accessed December 2020, and Wang Ying (2020). On Komatsu, see Takahashi (2017), "On Sime Darby, see Sime Darby (2019) and Sime Darby, "Open palm traceability dashboard, Darby website at <https://www.simedarbyplantation.com/sustainability/open-palm-traceability-dashboard>, accessed December 2020. On Cemex, see Cemex (2018); on Anglo-American see, for example, *Australian Mining* (2020).

⁵ On Embraer, see Embraer (2017); on Siam Cement Group, see Wood (2019); on Salud Digna, see Lunit (2018).

⁶ See "PROSOFT", <https://prosoft.economia.gob.mx/>, accessed December 2020.

⁷ "Embraer Launches Predictive Maintenance System IKON with Big Data and Analytics Based on Amazon Web Services Cloud, Press release, 19 June 2019 <https://embraer.com/global/en/news?slug=1206610-embraer-launches-predictive-maintenance-system-ikon-with-big-data-and-analytics-based-on-amazon-web-services-cloud>.

⁸ See, for example, Lodefalk (2015).

Table 1: Examples of digitally deliverable services sourced and developed by Asian and Latin American businesses

Company	Type	Use of foreign services	Development of services in-house for own or client use
Embraer (Brazil)	Aircraft manufacturing	Use data analytics from Amazon Web Services ProServe and Claranet to pinpoint and solve potential aircraft issues before they occur.	Embraer's "IKON" tool created as a result of AWS partnership enables new aircraft health monitoring service to Embraer customers. The tool generated 96% productivity gains in the aircraft analysis and data processing.
Sian Cement Group (Thailand)	Cement, construction	Uses United States company R3's blockchain-based Procure to Pay service to efficiently invoice and pay its suppliers.	SCG has created a digital service to enable contractors to procure construction materials. The company also offers customers Building Information Modelling (BIM), a 3D model-based process that combines architectural practices and structural design to increase the efficiency of construction projects.
Salud Digna (Mexico)	Hospitals, healthcare with 94 clinics in Mexico	Uses Republic of Korean company Lunit's medical AI solutions and United States company FUJIFILM Medical Systems United States medical imaging to accelerate and improve radiologists' diagnostics.	Uses cloud computing and advanced diagnostic equipment for data-driven preventive medicine that enable low-income Mexicans to be diagnosed and treated early. Use digital technologies to shorten patients' wait times.
Sime Darby Berhad (Malaysia)	Farming, palm oil production	Uses DXC technology, United States end-to-end IT services company, for a range of business process services.	Has developed an intelligent seed traceability service where seeds are tracked from their origin and pollination and fields in which they are planted. Provides customers an app to see the provenance of the seeds they have purchased and the traits their palms will display once planted.
BaoSteel (China)	Steel manufacturing	Uses United States company Honeywell's High-Performance Fusion welding machine management system that leverage IoT and AI to automate core manufacturing processes, improving operator accuracy by some 96 percent.	By using intelligent technologies like remote maintenance operations, big data, and AI, the company's Baoshan production unit in Shanghai has operated smoothly 24 hours a day during COVID-19. Digitization has enabled two 200-meter-long

			major production lines in Baoshan run fully unmanned.
Komatsu (Japan)	Mining equipment	Uses United States graphics processing unit manufacturer NVIDIA to develop AI solutions for visualizing jobsite processes and development in real-time. Data gathering is done by intelligent cameras on heavy equipment and drones, among other equipment.	Develops and delivers video and gaming applications and AI to construction sites to boost safety and productivity.
CEMEX (Mexico)	Building supplies	Uses IT and finance, accounting and HR solutions from IBM.	Has invested in Concrete Sensors, an Internet of Things company focused on construction for data to make decisions with a high degree of accuracy. The combination of data and concrete lab calibration enables customers to save money and shorten construction projects by weeks.
Anglo American and TIMining (Chile)	Mining	Anglo-American uses IT services from Accenture.	Especially to respond to COVID-19, Anglo-American and TIMining have developed digital twin technology to provide mine operators real-time 3D visual replica of mines and anticipate problems and resolve them remotely.

Growing use of digital service in production processes, and improving capabilities to perform and transmit services digitally, are also opening new opportunities for Asian and Latin American services providers to access new customers beyond borders. There are prominent examples of thriving digital service providers across the FEALAC region. For example, the Mexican company Softtek offers cost-saving niche IT solutions for leading global firms from delivery centres in Mexico, Argentina, Brazil, Spain, China and India.⁹ The Chilean company Mediastream enables multinationals such as BBVA and Claro to manage the creation, publication and classification of their video contents to more than 70 million users worldwide (Suominen, 2017). The Philippine company SPi Global (2020) offers IT and Business Process Outsourcing

⁹ See "Company Overview", About Us, Softtek, <https://www.softtek.com/about/company-overview>, accessed December 2020.

(BPO) services to more than 500 multinationals, including in Asia, from its offices in Manila as well as in Latin America from Mexico and Nicaragua.¹⁰

However, there is as yet little systematic data and analysis about the use and production of different types of digitally deliverable services in FEALAC economies, or their impacts on firms and economies' productivity and trade. The next chapter is aimed at starting the rectification of this knowledge gap with data on FEALAC region firms' use of domestic and imported digitally deliverable services, and the origin and growth of those services.

3. Digitally deliverable services in Latin American and East Asian value chains

How do firms in the FEALAC region use digitally deliverable services in their value chains, particularly to bolster their export competitiveness? To what extent and how do firms in Asia use digitally deliverable services from Latin America in their value chains, and vice versa?

This chapter seeks to answer these questions in two steps: (a) through the use of the WTO's services trade data on the growth and composition of FEALAC member countries' digitally deliverable services exports and imports in 2005-2018; and (b) through a sharper resolution provided by the OECD's Trade in Value Added (TiVA) database that reveals the countries and industries that used these digitally deliverable services in 2005-2015. WTO data cover practically all FEALAC countries, TiVA covers several FEALAC member countries, including Argentina, Australia, Brazil, Cambodia, China, Chile, Colombia, Costa Rica, Indonesia, Japan, the Republic of Korea, Malaysia, Mexico, New Zealand, Peru, the Philippines, Singapore, Thailand and Viet Nam. The following two sections of this chapter assess each in turn.

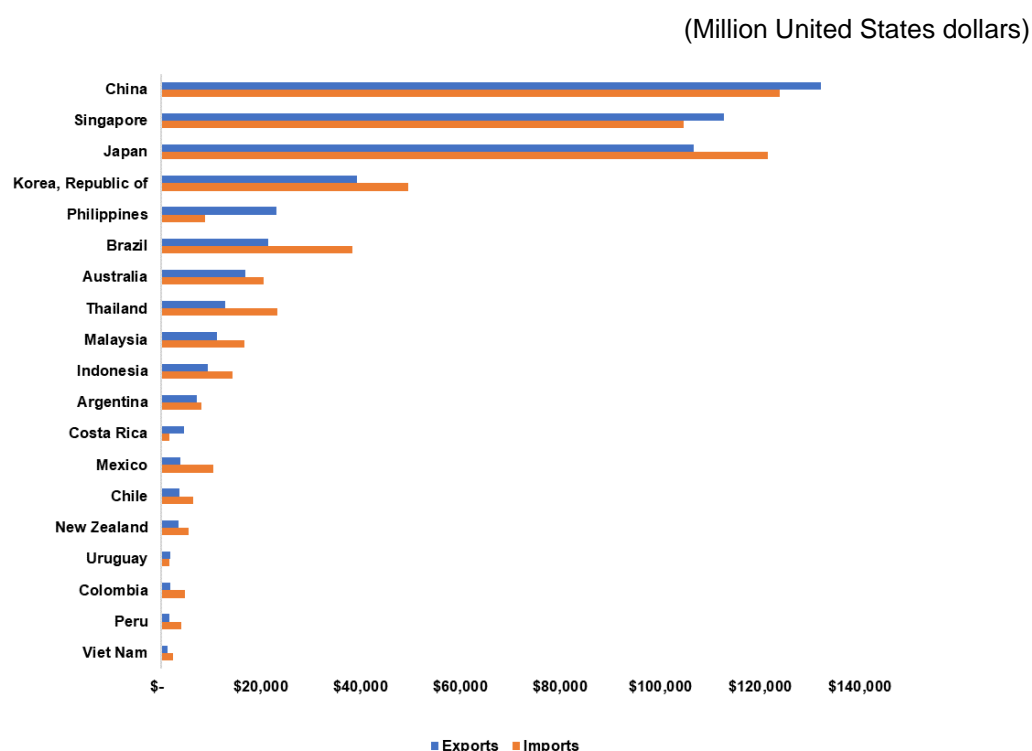
3.1 Growth of digitally deliverable services in Latin American and East Asian services trade

Per the WTO data on services trade, in 2018, China, Singapore, Japan, the Republic of Korea, the Philippines and Brazil were the FEALAC region's leading exporters and

¹⁰ See "Corporate Profile", About Us, SPi Global, <https://www.spi-global.com/about-us/#overview>, accessed October 2020.

importers of digitally deliverable services (figure 2).¹¹ China cemented its position as FEALAC region's leading digitally deliverable service exporter during the past decade, surpassing both Japan and Singapore.

Figure 2: Digitally deliverable services exports and imports in selected Asian and Latin American Economies, 2018



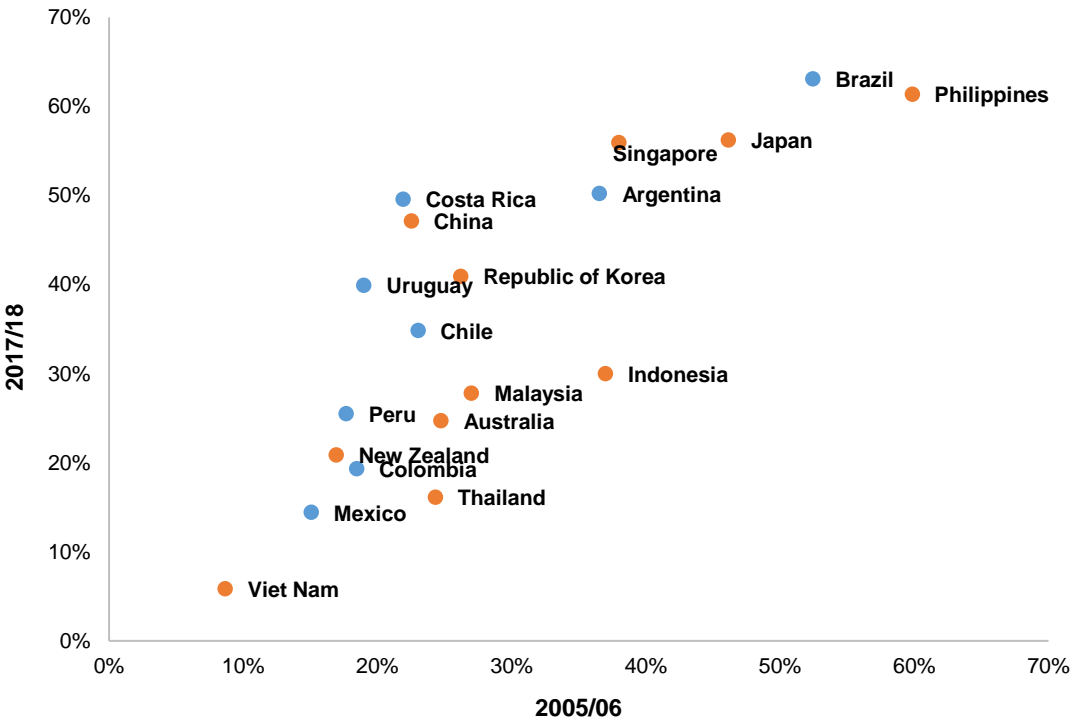
Source: Author's calculation, based on WTO data

In much of Asia and Latin America, the growth of digitally deliverable services exports has outpaced the growth of total services exports. As a result, the share of digitally deliverable services of the two regions' respective services export has grown. Overall, in Asia, digitally deliverable services exports grew from 32 per cent of all services exports in 2005/06 to 44 per cent in 2017/18, and in Latin America, from 25 per cent to 33 per cent in the same periods. This growth has been against the backdrop of overall robust annual growth in total services exports (14 per cent in Asia and 6 per cent in Latin America).

¹¹ Digitally deliverable services are composed of insurance and pension, financial, telecommunication, computer information, research and development, professional and management consulting, technical and trade-related services, and charges for intellectual property.

The growth in the share of digitally deliverable services exports of all services exports was particularly robust in Argentina, Brazil, Chile, Costa Rica, China, Japan, Singapore and Uruguay (figure 3). Notably, Costa Rica and Chinese digitally deliverable services exports grew about 500 per cent in 2017/18, to make up one-half of services exports in Costa Rica and 47 per cent of Chinese services exports, respectively, from less than a quarter in 2005/06. The Philippines also has had a robust 22 per cent year-on-year growth in its digitally deliverable services exports. Latin America’s leading digitally deliverable services exporters, Argentina and Brazil, doubled their digitally deliverable services exports during the same period, attaining 15 per cent and 13 per cent average annual growth, respectively. By 2017/18, digitally deliverable services made up half of the Argentine services exports, while for Brazil the growth was 63 per cent of services exports. With a strong comparative advantage in manufactured products, Mexico’s services exports have grown more modestly, and digitally deliverable service exports have risen in lockstep.

Figure 3: Share of digitally deliverable services exports in selected Asian and Latin American economies’ services exports, 2005/06 and 2017/18

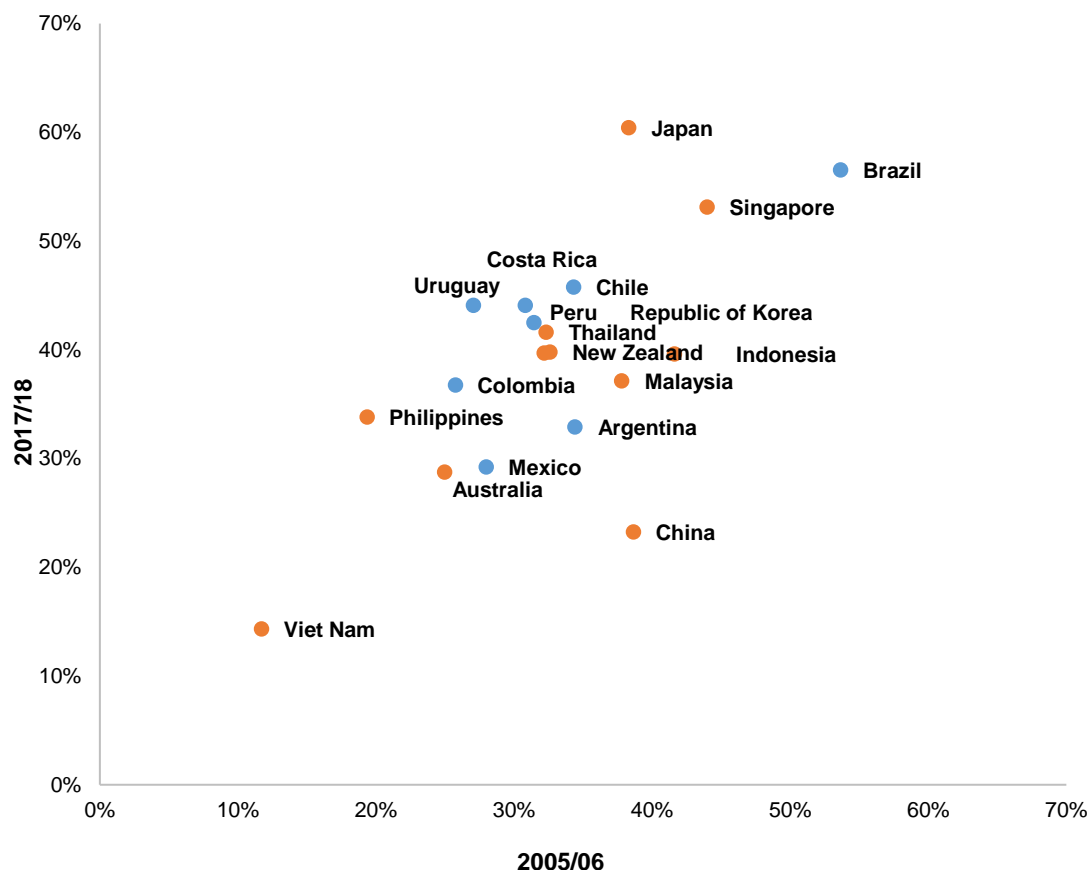


Source: Author’s calculation, based on WTO data.

On the import side, most major FEALAC countries have recorded an increased share of digitally deliverable services in their service imports. Digitally deliverable services have grown, especially Japanese services imports in which grew from 38 per cent of all imports in 2005/06 to 60 per cent in 2017/18 (figure 4). Also, Costa Rica, the

Philippines, Singapore, Peru, Uruguay, and Viet Nam have expanded the share of digitally deliverable services in their services import baskets. The exception is China, whose imports of digitally deliverable services as a share of all services imports dropped drastically from nearly 40 per cent in 2005/06 to 23 per cent in 2017/18, showing that China has expanded its overall commercial services imports very rapidly at 35 per cent per year during the 2005/06-2017/18 period suggesting that China has succeeded in cultivating a robust domestic base of digitally deliverable services providers and internalizing its services value chains, a development paralleled by China's internalizing the production of parts and components in product supply chains (Suominen, 2019).

Figure 4: Share of digitally deliverable services imports in selected Asian and Latin American economies' services exports and imports, 2005/06 and 2017/18

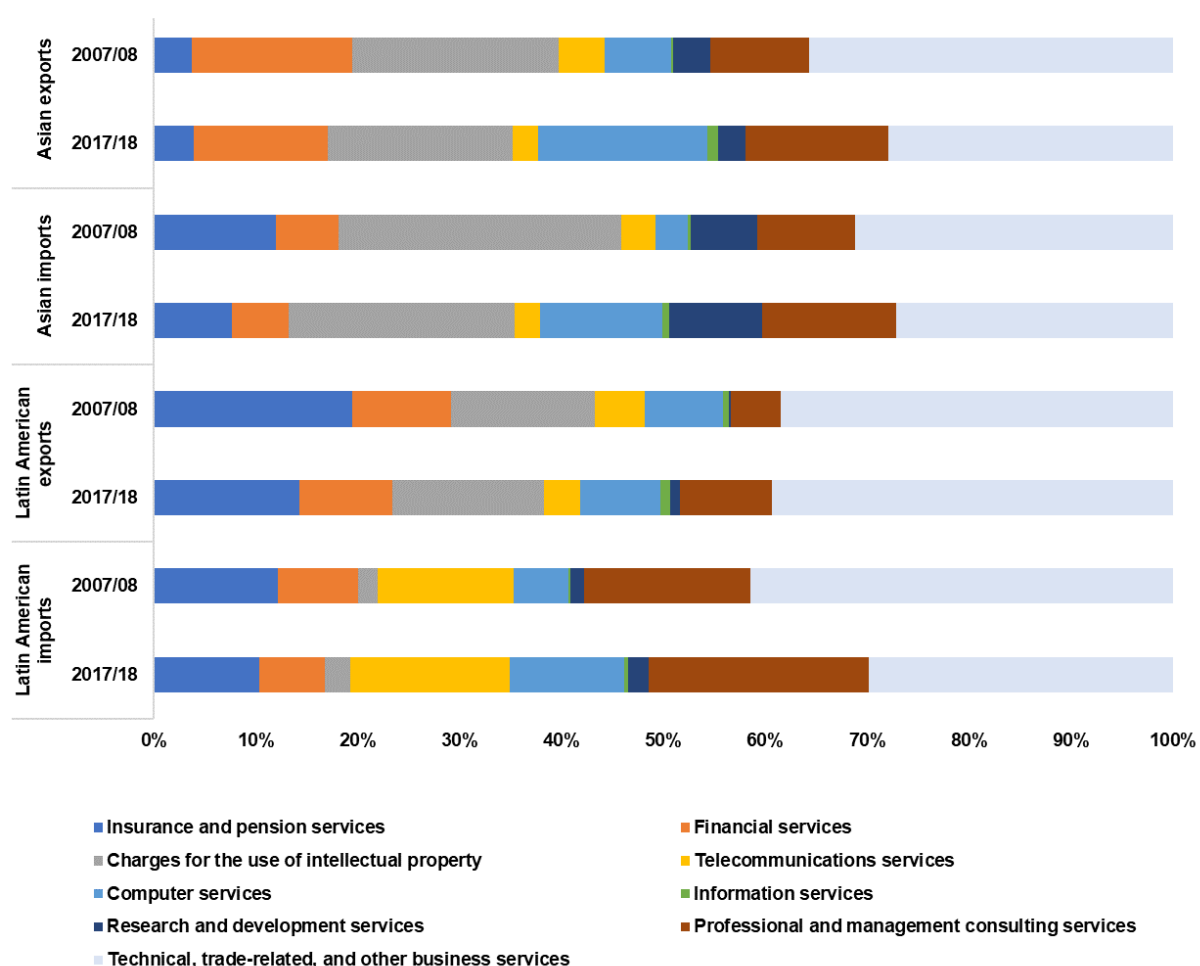


Source: Author's calculation, based on WTO data.

As for the composition of the digitally deliverable services trade, in Asian and Latin American economies it has increased, especially computing and professional services, in their digitally deliverable services export baskets during 2007-2008 and 2017-2018 (figure 5). China, the Philippines, and Viet Nam notably increased their share of

computing services exports and imports, while Thailand increased its financial services exports (see Appendix figures 1 and 2). In Latin America, the share of computing services grew significantly in Argentine, Brazilian and Costa Rican digitally deliverable services exports during 2007/08-2017/18 (Appendix figures 3 and 4). This reflects the growth of IT and software development services in those countries. In Costa Rica's case, significant investments from prominent United States technology companies such as IBM, Microsoft and Amazon Web Services have propelled Costa Rica's digitally deliverable services exports (case study 1). On the import side, the composition of Asian and Latin American digitally deliverable services baskets has remained more or less unchanged; the share of management consulting services and telecommunication services has grown steadily in Latin America's digitally deliverable services import baskets.

Figure 5: Composition of digitally deliverable services exports and imports in selected Asian and Latin American economies, 2007/08 and 2017/18



Source: Author's calculation, based on WTO data.

Case study 1. Latin America's services superpower: Costa Rica's digitally deliverable services in Asia

Long a leading BPO hub, Costa Rica has in recent years catapulted itself into a sophisticated IT services provider to global corporations that have invested in facilities in Costa Rica and outsourced operations there, to support their development of cloud services, data analytics and robotic process automation (RPA), and augmented and virtual reality, among others Alvarado, 2019). The watershed event for Costa Rica was the 1997 investment by Intel that opened a microchip plant near the capital, San José. Subsequent investments were made by Sykes, a United States-based BPO, Hewlett-Packard and IBM, followed by Citibank, Procter & Gamble and Amazon, which by outsourcing back-office operations to Costa Rica, helped to build up the country's technical talent pool. A Californian enterprise-software provider and Amazon partner, VMware opened an office in Costa Rica in 2012, leveraging its Costa Rica operations as back-office technology support to human resources, legal affairs, marketing and finance.

Notably, Amazon opened its first customer service centre in Costa Rica in October 2008, and Amazon Web Services has since made a number of investments in Costa Rica. By now, Amazon employs more than 5,000 workers and provides human resources support for Amazon's United States, European and Latin American operations, customer experience operations in Mexico and Brazil, and cloud-computing operations globally (González, 2017). In 2014, Amazon projected US\$60 million in exports of services from Costa Rica (*Estrategia y Negocios*, 2014). In another notable development, in 2019 IBM opened the IBM Cybersecurity Center in Costa Rica (Alvarado, 2019). Microsoft has announced plans to move to the technology hub in San José to unify its sales, customer service and operations (Legal Team Costa Rica, 2019). By 2019, Costa Rica was home to 157 service providers such as call centres, BPO, digital technology and design services.

These companies have translated into new digitally deliverable services exports. While data are limited, it is likely that the notable, 500 per cent growth in Costa Rican digitally deliverable services exports in 2007-2018 reflects the growth in investments in. and outsourcing from Costa Rica by the many large United States' technology companies that then export services, especially to the United States and Latin America, and possibly to companies operating in China. Costa Rica's success in attracting foreign technology companies is, in part, due to the years of proactive work by the investment promotion agency CINDE as well as aided by San José city government's opening of

a Special Zone for Economic Development (ZEDE) to enable value-added services and innovations (Legal Team Costa Rica, 2019).

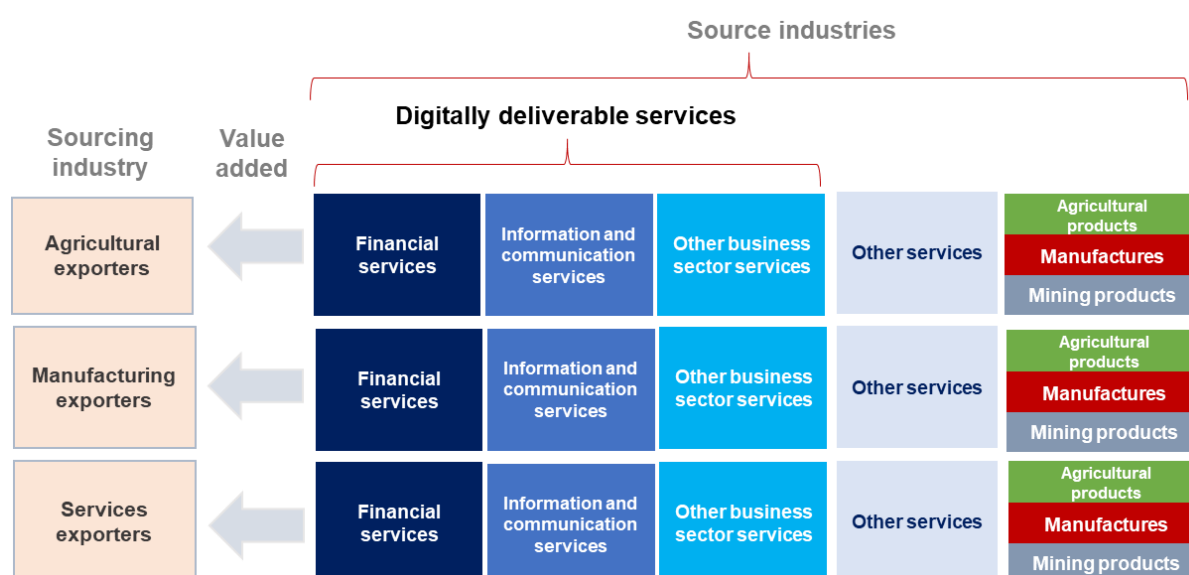
3.2 Sources and types of digitally deliverable services in Asian and Latin American services exports and imports

How much digitally deliverable services trade is there then between Asia and Latin America, and what is the contribution of Latin American digitally deliverable services to Asian value chains, and vice versa?

The OECD TiVA database starts to provide answers for the 2005-2015 period. “Digitally deliverable services” here are defined as information and communication, financial and insurance, and other business services. Figure 6 assesses the use of these services in three main industries – agriculture, manufacturing and services – and particularly their use by export-driven companies in these major sectors, given the potential of imported services to enhance Asian and Latin American industries export competitiveness.¹² Figure 6 illustrates how data in subsequent analysis and graphs are treated. Granted, these digitally deliverable services are not always delivered through digital means. For example, financial and insurance or information services can just as well be delivered on-site and in person, not merely remotely and digitally.

¹² “Other business services” includes legal and accounting activities, activities of head offices, management consultancy activities, architectural and engineering activities, technical testing and analysis, scientific research and development, advertising and market research, and rental and leasing activities.

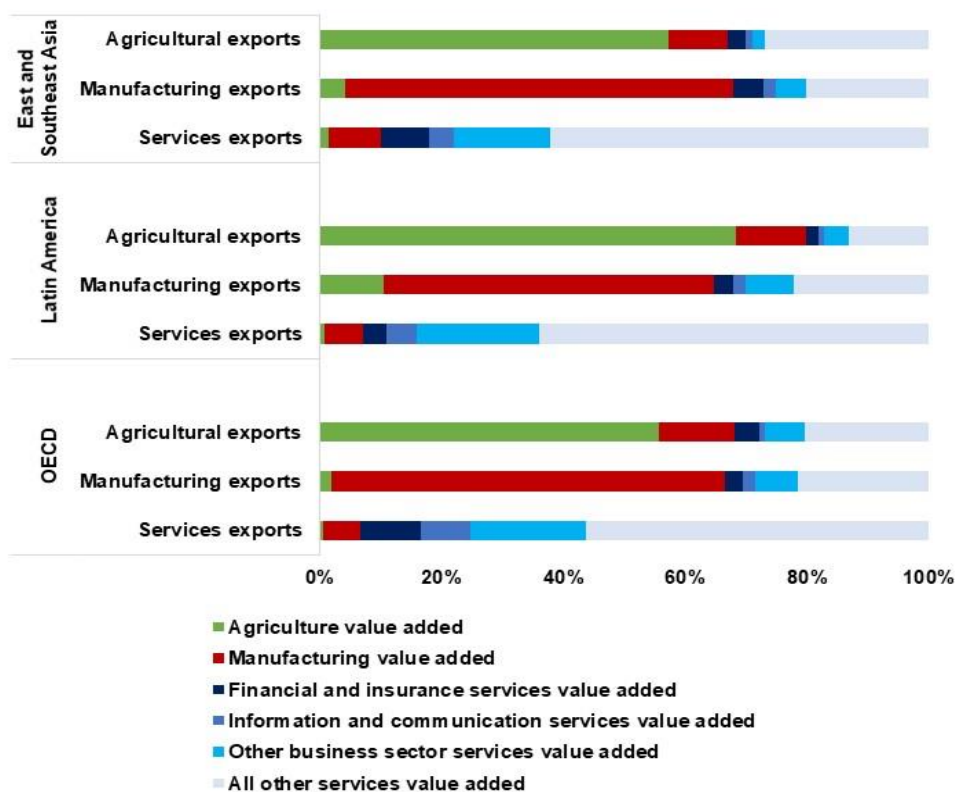
Figure 6: Digitally deliverable services in value chains



The TiVA data yield three main stylized facts about digitally deliverable services in Asia and Latin America.

First, while the role of digitally deliverable services has grown in East Asian and Latin American countries' services trade in the past 15 years, the role of digitally deliverable services in Latin American and Asian firms' value chains – in sectors such as agriculture, manufacturing and services – is still limited, compared to the value-added offered by other services, manufactured products, parts and components, and agricultural produce and raw materials. For example, in 2015, digitally deliverable services made up: (a) less than 10 per cent of the value-added in Asian and Latin American gross agricultural exports; (b) 11 and 13 per cent, respectively, of the two region's manufacturing exports; and (c) 27 and 29 per cent, respectively, of their services exports (figure 7). The patterns are similar for OECD countries, where the share of digitally deliverable services of the value-added in agricultural and services exports was somewhat higher than in Asia or Latin America.

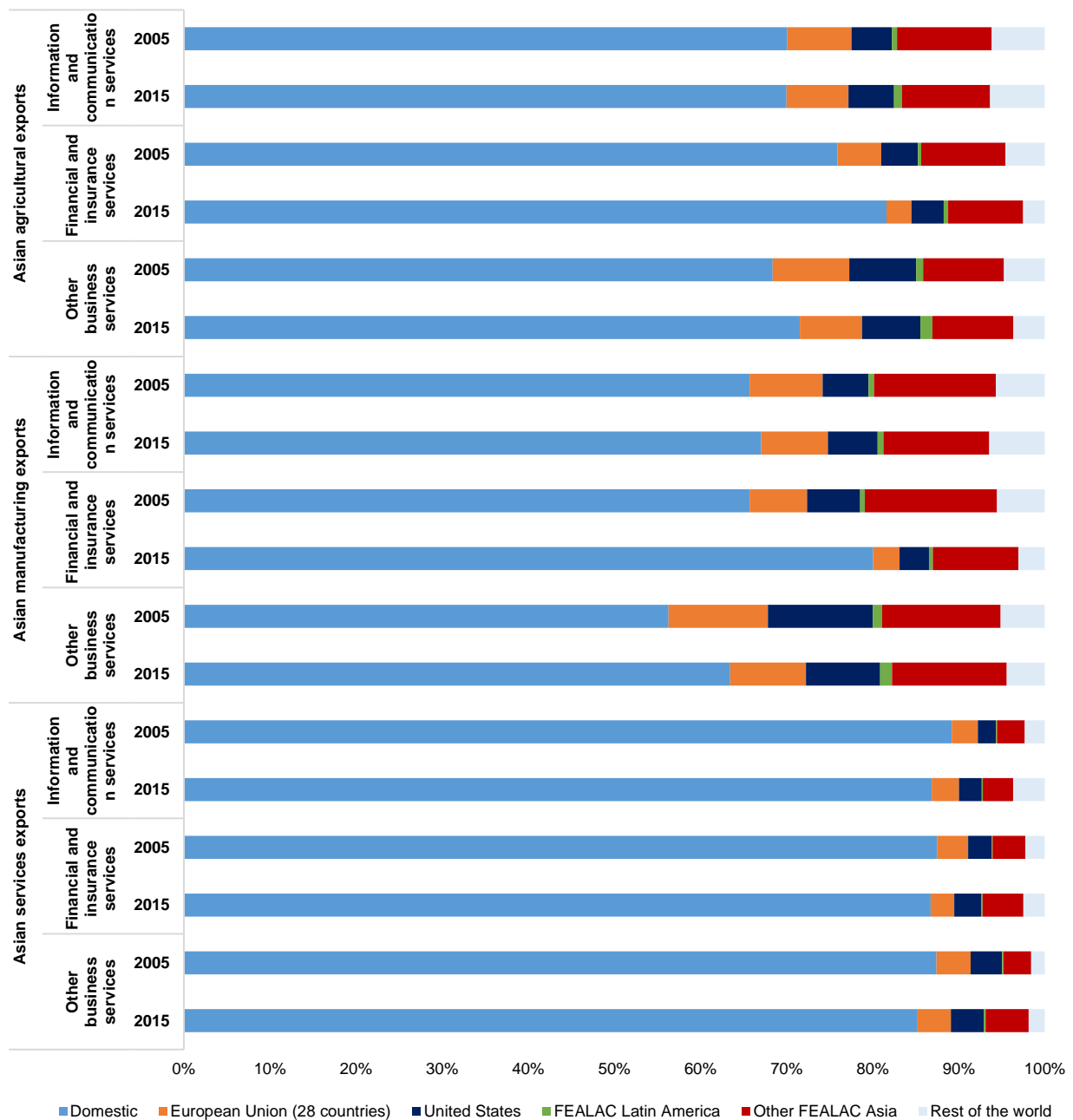
Figure 7: Share of digitally deliverable services as value-added in East and South-East Asian, Latin American and OECD region agricultural, manufacturing and services exports in 2015, by type of service and exporter region



Source: Author's calculation. based on the OECD TiVA database.

Second, Asian and Latin American exporters still source digitally deliverable services largely from their domestic markets; however, manufacturers in both regions are also using imported digitally deliverable services in their exports (figures 8 and 9; Appendix figures 5, 6 and 7). FEALAC members such as Japan, the Republic of Korea and China as well as the United States were significant sources of imported digitally deliverable services used by Asian producers in 2015. South-East Asian economies are likelier than the large Asian economies to source digitally deliverable services from foreign markets, such as China, the United States and Europe. Overall, Latin American digitally deliverable services make up a very small share of Asian exporters' value chains.

Figure 8: Main sources of digitally deliverable information and communications, financial and other business services incorporated into Asian agricultural, manufacturing and services exports, 2005 and 2015

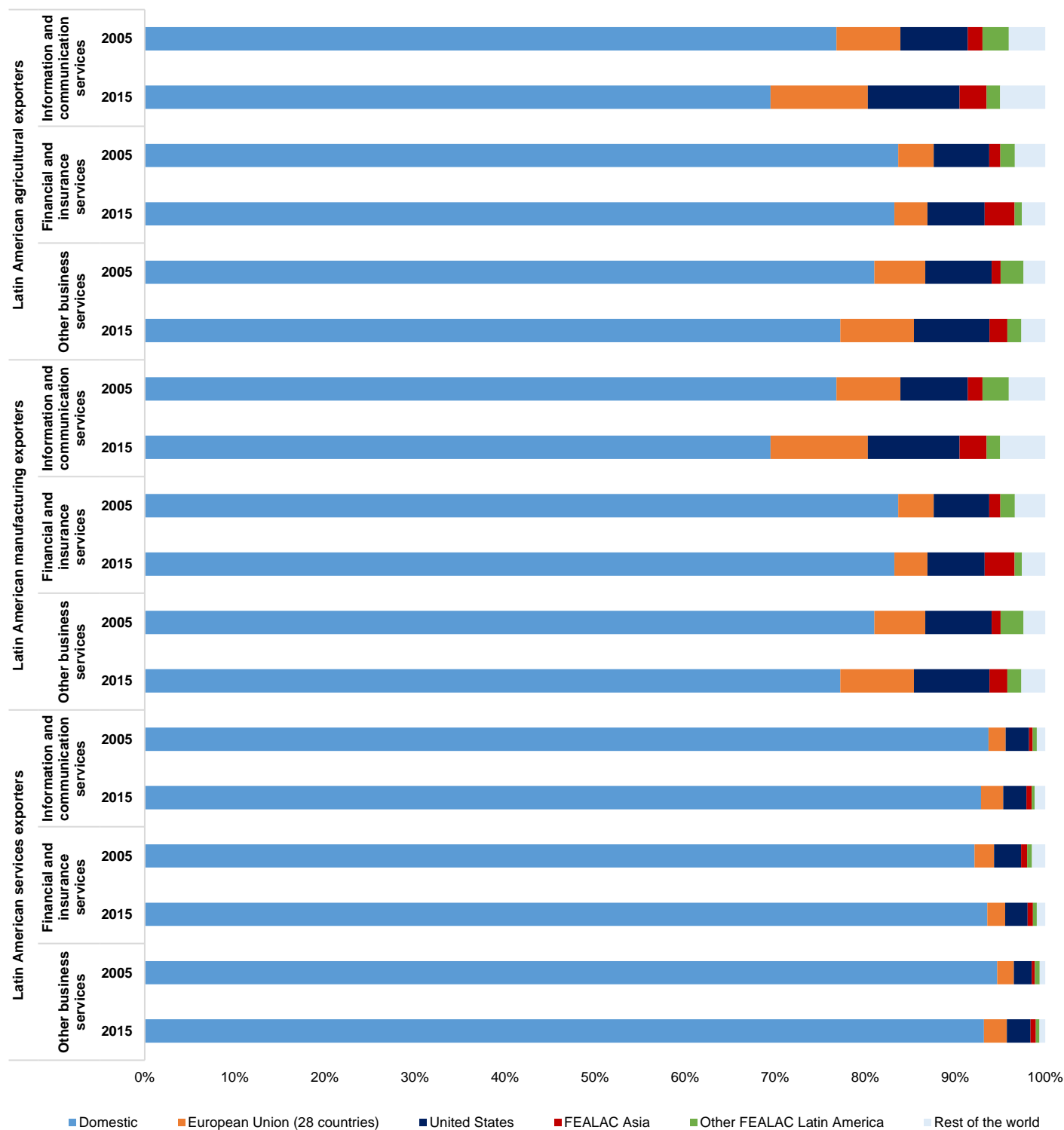


Source: Author's calculation, based on the OECD TiVA database.

Similarly, in Latin America, agricultural, manufacturing, and services exporters procure digitally deliverable services primarily from their home markets. Domestic digitally deliverable services make up about three-quarters of all digitally deliverable services used in Latin American agricultural and manufacturing exports, and more than 90 per cent of services exports. The exception is Mexico, where digitally deliverable services imports from the United States, Europe and, increasingly, Asia make up nearly 60 per

cent of all digitally deliverable services incorporated in Mexican manufacturing exports, and almost 40 per cent of digitally deliverable services incorporated into Mexican agricultural exports (Appendix figures 8, 9 and 10). Chile and Peru have increasingly integrated Asian digitally deliverable services into their manufacturing and agricultural exports. In general, however, Latin America's sourcing of digitally deliverable services from Asian FEALAC members is still quite limited.

Figure 9: Main sources of digitally deliverable information and communications, financial and other business services incorporated into Latin American agricultural, manufacturing and services exports, 2005 and 2015



Source: Author's calculation, based on OECD TiVA database.

Looking at the setting from the service providers' vantage point, Latin America is a minor market for Asian digitally deliverable service providers, and Asia is a rather small market for Latin American service providers. For example, only 5.2 per cent of Latin American IT providers' global sales to manufacturing exporters stem from sales to Asian manufacturing exporters, and only 2 per cent of Latin American IT providers' sales to global agricultural exporters globally stem from sales to Asian agricultural exporters (table 2). For Asian suppliers of digitally deliverable services, Latin American industries are a very small market (table 3). For example, only 0.5 per cent of all IT services produced in China, and sold to manufacturing exporters, are sold to Latin American manufacturers.

Table 2: Relevance of Asian agricultural, manufacturing, and services exporters as customers to Latin American financial, IT and other business service providers (expressed as a percentage of sales to Asian industries out of the total global sales made by Latin American)

Supplier economies of services	Buyers of services								
	Asian agricultural exporters			Asian manufacturing exporters			Asian services exporters		
	Financial services	IT services	Other business services	Financial services	IT services	Other business services	Financial services	IT services	Other business services
Chile	0.09%	0.63%	0.32%	2.35%	8.15%	4.05%	0.12%	0.43%	0.37%
Mexico	0.10%	1.82%	0.35%	0.67%	5.01%	1.33%	0.08%	1.02%	0.47%
Argentina	0.36%	0.88%	0.64%	1.73%	1.30%	1.82%	0.04%	0.04%	0.12%
Brazil	0.08%	0.96%	0.34%	0.75%	4.69%	2.19%	0.03%	0.45%	0.19%
Colombia	0.01%	0.56%	0.11%	0.28%	8.82%	1.82%	0.03%	0.37%	0.31%
Costa Rica	0.04%	0.09%	0.06%	2.32%	4.29%	3.36%	0.08%	0.13%	0.32%
Peru	0.04%	2.08%	0.31%	0.39%	14.17%	2.27%	0.02%	0.38%	0.21%
Latin America	0.09%	0.83%	0.31%	0.94%	5.21%	2.50%	0.04%	0.26%	0.20%

Source: Author's calculation, based on OECD TiVA database.

Note: The percentages reflect the share of all services supplied to a broad economic sector by services providers in countries in the left-hand column. For example, for Mexican IT service providers that sell their services to manufacturing exporters, Asian manufacturing exporters represented 5 per cent of all global sales to manufacturing exporters. Asian agricultural exporters made up 2 per cent of Peruvian IT companies' global sales to agricultural exporters.

Table 3: Relevance of Latin American agricultural, manufacturing and services exporters as customers to Asian financial, it and other business service providers (expressed as a percentage of sales to Latin American industries of total global sales made by Asian)

	Buyers of services								
	Latin American agricultural exporters			Latin American manufacturing exporters			Latin American services exporters		
Supplier economies of services	Financial services	IT services	Other business services	Financial services	IT services	Other business services	Financial services	IT services	Other business services
Australia	0.06%	0.08%	0.09%	0.20%	0.19%	0.20%	0.01%	0.01%	0.01%
China	2.21%	2.35%	2.67%	0.58%	0.51%	0.56%	0.06%	0.06%	0.11%
Indonesia	0.17%	0.25%	1.09%	0.17%	0.17%	0.34%	0.00%	0.01%	0.01%
Japan	1.23%	1.53%	2.00%	0.18%	0.21%	0.24%	0.02%	0.02%	0.03%
Republic of Korea	1.68%	2.39%	2.27%	0.25%	0.26%	0.30%	0.03%	0.04%	0.03%
Malaysia	0.23%	0.53%	1.00%	0.31%	0.38%	0.40%	0.00%	0.01%	0.01%
New Zealand	0.09%	0.16%	0.24%	0.15%	0.18%	0.22%	0.03%	0.03%	0.09%
Philippines	0.22%	0.47%	1.51%	0.43%	0.49%	0.48%	0.00%	0.00%	0.01%
Thailand	0.27%	0.41%	1.10%	0.27%	0.28%	0.36%	0.01%	0.01%	0.01%
Viet Nam	0.10%	0.15%	0.14%	0.19%	0.20%	0.20%	0.01%	0.01%	0.02%
East and South East Asia	1.18%	1.40%	1.99%	0.42%	0.35%	0.39%	0.01%	0.02%	0.03%

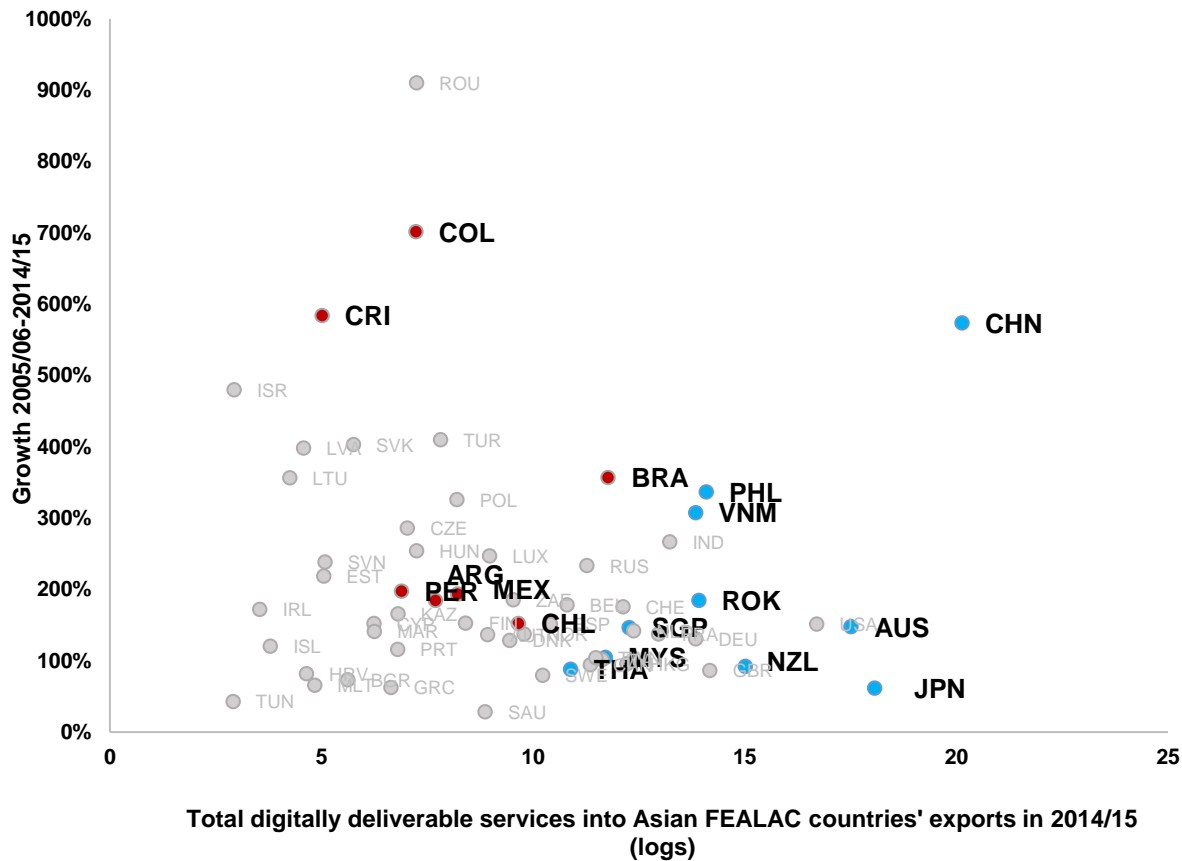
Source: Author's calculation, based on the OECD TiVA database.

Note: The percentages reflect all the digitally deliverable services supplied by providers in countries in the left-hand column, including domestic market. For example, Latin American manufacturing exporters made up only 0.51 per cent of Chinese IT service providers sales to manufacturing exporters worldwide.

The third stylized fact is that while the use of Asian digitally deliverable services is still limited in Latin American value chains and vice versa, bi-regional digitally deliverable services flows have grown dramatically since 2005. For example, Asian procurement of digitally deliverable services soared from Latin American countries such as Chile, Colombia and Costa Rica in 2005-15, while Latin American firms' procurement of digitally deliverable services from China, Japan, and the Philippines has grown markedly (figures 10 and 11).

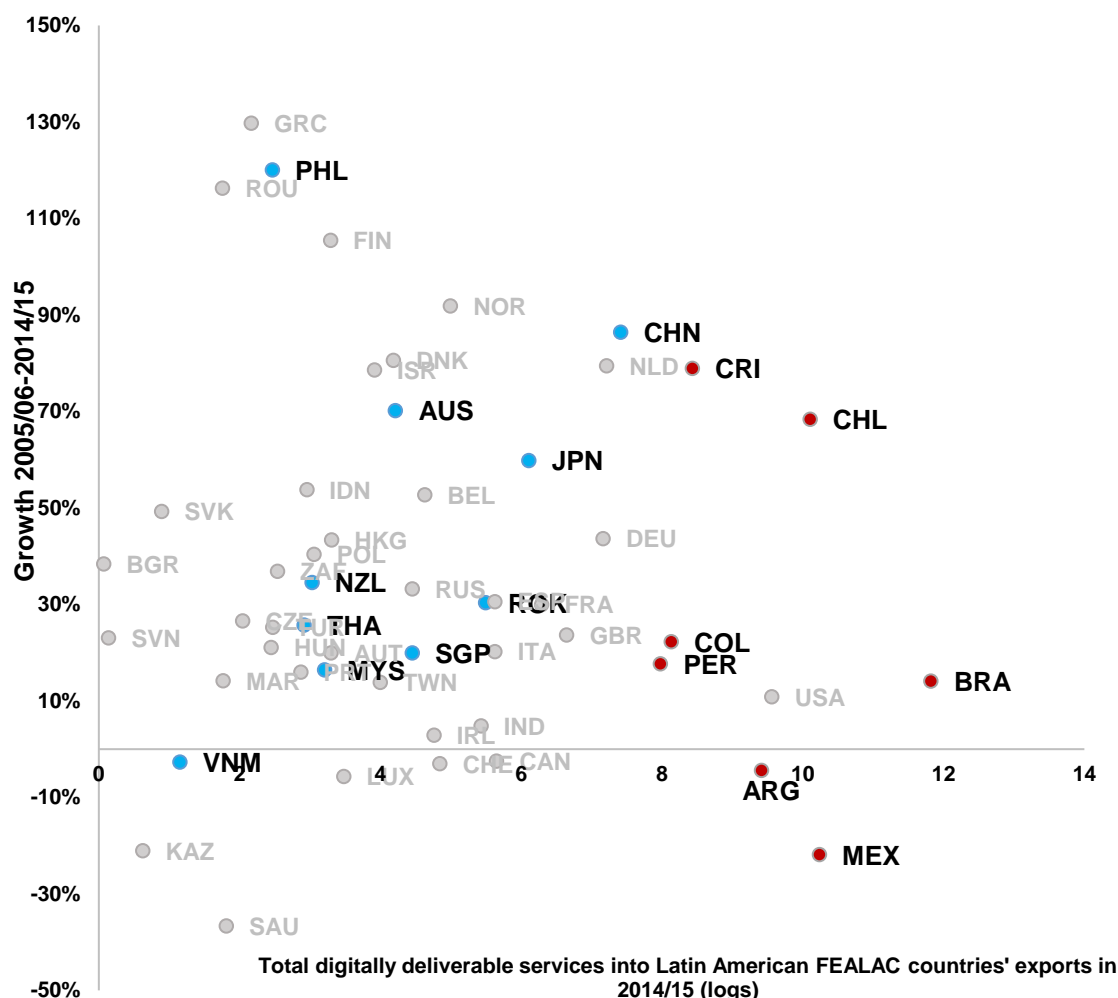
For example, Asian manufacturing exporters increased their sourcing of digitally deliverable services from Costa Rica and Colombia by almost four- and six-fold, respectively, in 2005/06-2014/15 (Appendix figures 11, 12 and 13). Meanwhile, Latin American agricultural and manufacturing exporters more than doubled sourcing from the Philippines from 2005 to 2015, and Chinese providers nearly doubled their presence in Latin American value chains (figures 14, 15 and 16). Asian and Latin American providers face competition from smaller European countries. Asian and Latin American producers have also been drastically increasing their sourcing of services from Eastern European and Nordic providers.

Figure 10: Growth of selected source economies in digitally deliverable services incorporated into Asian agricultural, manufacturing and services exports in 2014/15, by source country, growth from 2005/06 to 2014/15, and volume in 2014/15



Source: Author’s calculation, based on the OECD TiVA database.

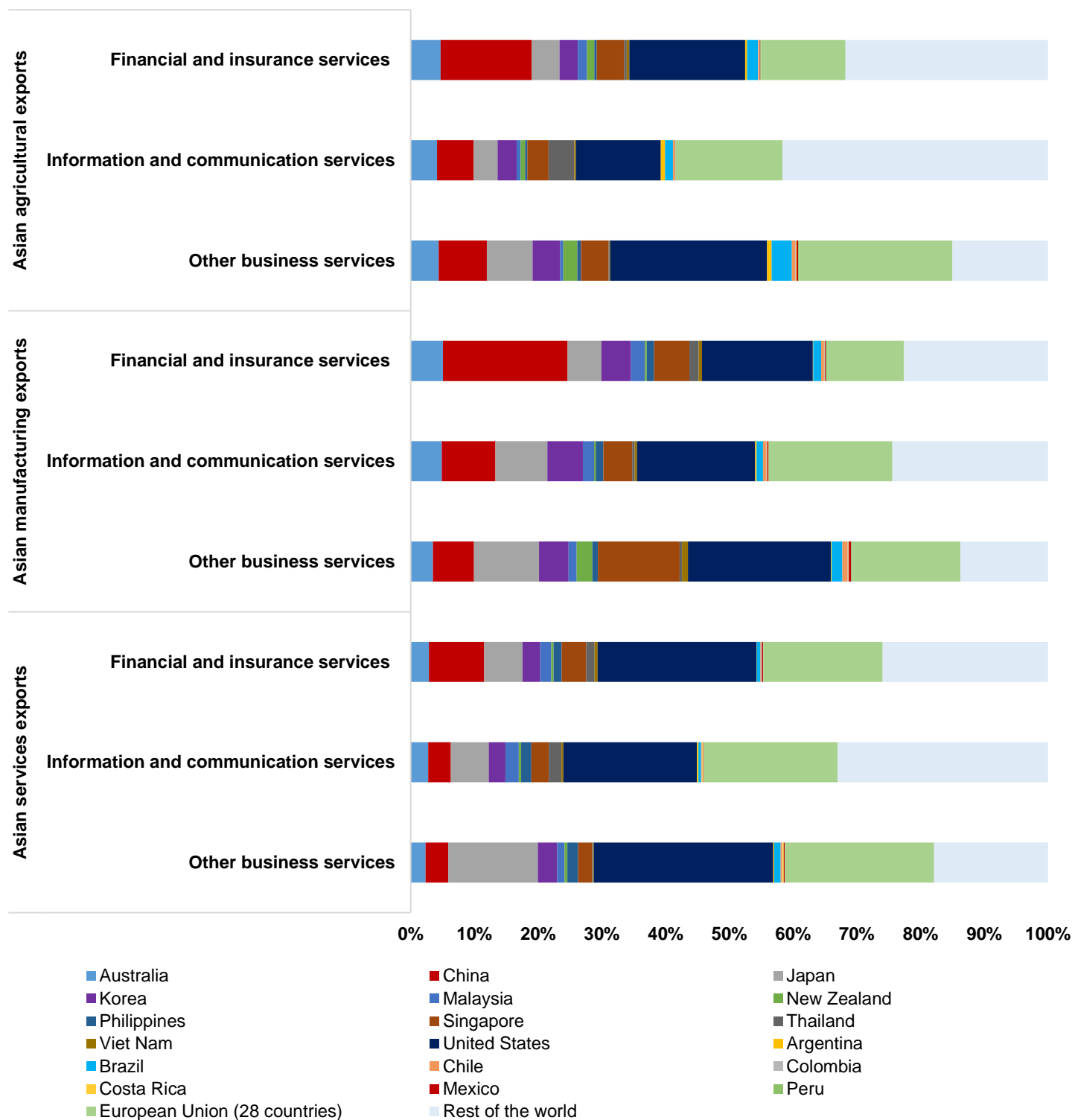
Figure 11: Growth of selected source economies in digitally deliverable services incorporated into Latin American agricultural, manufacturing and services exports in 2014/15, by source country, growth and volume



Source: Author's calculation, based on the OECD TiVA database.

The fourth set of stylized facts is on the specific digitally deliverable services imports used in specific industries. The United States, Europe and China are significant sources of financial and insurance services in Asian manufacturing and agriculture (figure 12, Appendix figures 17, 18 and 19). China's growth into a source of financial and insurance services reflects the growing role of Chinese banks as providers of banking and financial services to corporate clients in Asia, especially in such sectors as manufacturing, agriculture and construction.

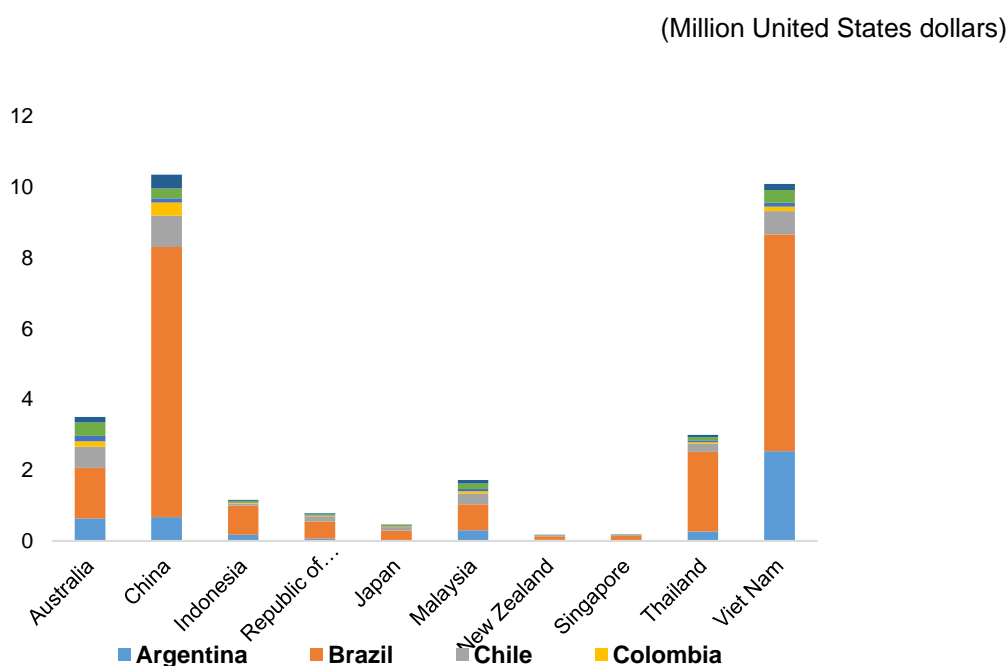
Figure 12: Main sources of digitally deliverable services imports incorporated into Asian agricultural, manufacturing and services exports in 2015, by type of digitally deliverable service and source economy



Source: Author's calculation, based on the OECD TiVA database.

A closer look reveals that Brazil is the main Latin American source of digitally deliverable services incorporated into Asian exports, followed by Chile and Argentina (figures 13, 14 and 15). While Mexico plays a smaller role, some Mexican IT providers that have successfully serviced United States firms in Mexico have grown to supply Chinese industries (case study 2). Brazilian digitally deliverable services are used by China-based manufacturers, Singaporean services sectors, and for Chinese, Thai and Viet Nam agricultural exports – which may reflect the provision of Brazilian technical and professional services to Viet Nam-based agricultural producers (some of which may have Brazilian ownership). Viet Nam and Brazil have, in recent years, made rather significant efforts to cooperate with each other in agricultural production. For example, Brazil has worked with Viet Nam in providing machinery, equipment and technology for converting sugar-cane products into electricity, and to facilitate animal breeding and animal feed production (*People's Army Newspaper*, 2016). Brazil has also worked with Thailand on technologies for ethanol production.¹³

Figure 13: Latin American sources of digitally deliverable services incorporated into Asian agricultural exports by Asian exporting economies and Latin American source economies, 2015

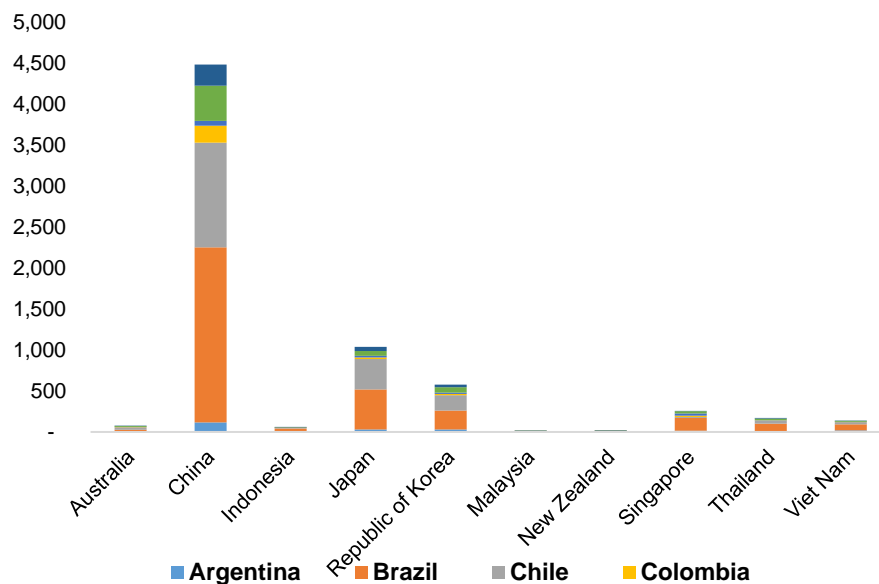


Source: Author's calculation, based on the OECD TiVA database.

¹³ Brazil has also invited Thai researchers to visit some Brazilian agencies such as Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), a state-owned research corporation that develops technologies for the agricultural sector. In general, these efforts reflect Brazil's work on South-South cooperation. See Sergio Schlesinger (2014) and Ministry of Foreign Affairs, Kingdom of Thailand (2015).

Figure 14: Latin American sources of digitally deliverable services incorporated into Asian manufacturing exports in 2015, by Asian exporting economy and Latin American source economy

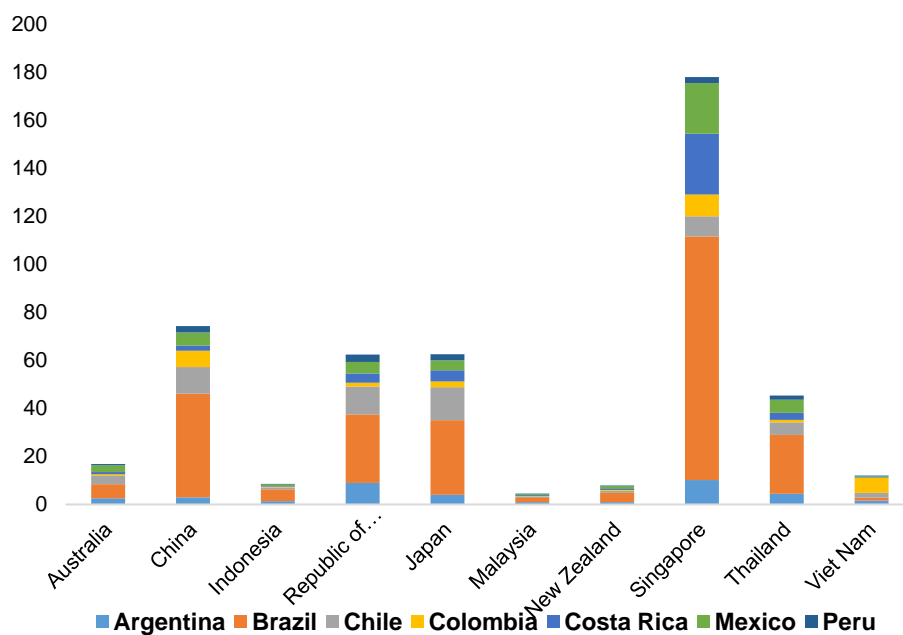
(Million United States dollars)



Source: Author's calculation, based on the OECD TiVA database.

Figure 15: Latin American sources of digitally deliverable services incorporated into Asian services exports in 2015, by Asian exporting economy and Latin American source economy

(Million United States dollars)



Source: Author's calculation, based on the OECD TiVA database.

Case study 2. Mexican software for Chinese nearshoring

Mexican company Softtek is Latin America's leading provider of IT services and business process solutions, such as software development, testing, security and support, business process outsourcing (BPO), IT infrastructure management, security and support, virtual and augmented reality solutions as well as data analytics such as AI, predictive analytics, and optimized sourcing and procurement.

Founded in 1982, Softtek is credited with coining the term "nearshore" during its work in the 1990s with United States clients who looked to outsource IT operations to Mexico (Softtek, 2008). Today, it serves more than 400 leading corporations through more than 30 offices in North America, Latin America, Europe and Asia, including in the Chinese cities Beijing, Shanghai, Xiamen and Xian. Softtek launched services to Asian clients when it acquired the Chinese information technology firm I.T. UNITED in 2007, and opened a Global Delivery Centre in Beijing. In July 2009, Softtek announced a new Global Delivery Centre in the city of Wuxi.

In addition to serving Chinese corporations, Softtek has, by way of its presence in China, attracted customers from around the world who had operations in China. One such client is the Australian Olympic Committee, which selected Softtek as its IT partner and provider at the Beijing 2008 Olympic Games, specifically to provide system configuration and testing services between Beijing and Sydney, and network infrastructure setup at the press centre and the Olympic Village.

Softtek's success in Asia can perhaps be attributed to its understanding and capabilities, cultivated with United States companies, about the demands and requirements of large companies that look to outsource sophisticated services, and its well-timed entry – accelerated through the acquisition of a local firm with existing customer relationships – to service Chinese corporate customers during a period of very rapid growth in China.

In addition, Softtek has kept evolving as customer needs and requirements have become more exacting and new technologies emerged. For example, to provide better service for its client China Pacific Insurance Company (CPIC), one of the largest insurance providers in China with more than 139 million customers, Softtek recently partnered with Israeli IT company Nemesysco (2020). The objective is to leverage its voice analytics technology and emotion detection solution in order to improve CPIC's claims process and streamline the processing of legitimate claims (PR Newswire, 2020a).

Japanese and Chinese manufacturing and services exporters are the leading Asian buyers of digitally deliverable services from Latin America. Singapore-based exporters procure digitally deliverable services from Brazil in particular. These flows from Latin America to Asia have likely grown in the past five years. For example, Asian companies are procuring digitally deliverable services from Latin America in such growth sectors as gaming and audio-visual production and e-commerce (case studies 3 and 4).

Case study 3. Latin American gaming and animation on Asian consoles and phones

Propelled by cloud computing, streaming services, and the proliferation of smartphones and internet connections, the global animation and video games industry has ballooned to US\$ 264 billion by 2019 – larger than global sales of big data and analytics solutions or the global market for bread (PR Newswire, 2020b).

Latin American countries such as Argentina, Brazil, Colombia and Costa Rica have become important developers of games and service providers for the global gaming industry. Latin American providers offer various services, such as character and environment design, modelling, programming, special effects, sound design, language quality control, augmented and virtual reality, and customization of contents for Spanish and Portuguese-speaking audiences (Chulis, 2012). Among their clients are several leading Asian, United States and European companies, such as Nintendo, Sony, Microsoft and Apple, that produce gaming consoles and other products that enable gamers around the world to play. Latin America's gaming industry grew rapidly after many of these global giants opened their platforms to independent developers and small studios (Barclay, 2016).

Colombian company Brainz, which develops original productions and stories for mobile games, has positioned itself to service the Asian market in particular. Brainz has formed partnerships with: (a) Gamevil, a Republic of Korea leader in mobile game publishing companies, with which it produced the Mark of the Dragon video game; and (b) ZQ Games, a Chinese developer of multiplayer online and mobile games, with which it developed Social Street Soccer that became highly popular in Asian markets (*Procolombia*, 2014a). Brainz also formed a partnership some years ago with Square Enix, a Japanese company. Another Colombian company Below the Game has worked with Sony (*Procolombia*, 2014b).

Latin America's success in supplying international markets, including Asian markets, with games is, in part, due to the region's Governments. Brazil's animation industry

has benefited from state funding and support for development of talent. In Colombia and Costa Rica, export promotion agencies have taken game developers to such flagship industry events as the Game Connection Fair and Game Developers Conference, where they met with console companies and game distributors from markets such as Japan, the Republic of Korea, China, United States, United Kingdom, Germany, Japan and Finland (*Procolombia*, 2021; *A.M. Costa Rica*, 2019). A number of Japanese companies, such as Sony, Nintendo, Square Enix Holdings and Epic, have also visited Latin American markets such as Chile, to learn about local game developer talent (ProChile, 2020).

Latin America's gaming developers' success with global customers is attributed to their high quality and creativity, and ability to gauge customer trends and preferences in Spanish-speaking markets. Some developers like Brainz have immersed themselves in trends in Asian markets. National export promotion agencies' support has brought visibility to the region's developers. The region's firms can be well-placed to supply traditional Asian industries as well, given the expansion of gaming approaches in construction, industrial design, healthcare, education, medicine, and vehicle manufacturing. There are also opportunities in the gaming sector for service providers and data analysts, such as firms specialized in machine learning on in-game analytics; customer acquisition, retention, and cross-selling, and classification of player behaviour.

Case study 4. Moving Asian companies to the ecommerce era: Brazilian VTEX's cloud-based commerce capabilities

As the COVID-19 crisis has accelerated consumers and corporate buyers' migration online, businesses around the world have grown increasingly interested in holistic ecommerce capabilities that enable them to present attractive and well-functioning interfaces for their customers, manage their suppliers, orchestrate payments, analyse data on online transactions and behaviour, and put in place order management systems to accelerate the order-to-cash cycle.

One of the world's long-time leading ecommerce markets, Brazil has a vibrant and sophisticated ecosystem of ecommerce, payments and logistics solution providers that service local online sellers and help global brands to localize their online presence to the Latin American market. One such firm is commerce company VTEX, which in 2020 attained unicorn status. VTEX has been working for the past 20 years both with (a)

such companies as Coca-Cola, Carrefour, L'Oréal and WalMart to create their online presence in Brazil and Latin America, and (b) Latin American leaders such as Anheuser-Busch InBev to develop their global ecommerce capabilities (VTEX, 2020a). VTEX's software brings together parts of the customer's purchase journey and includes all key sales channels – online store, marketplace store, physical store and phone-based sales.

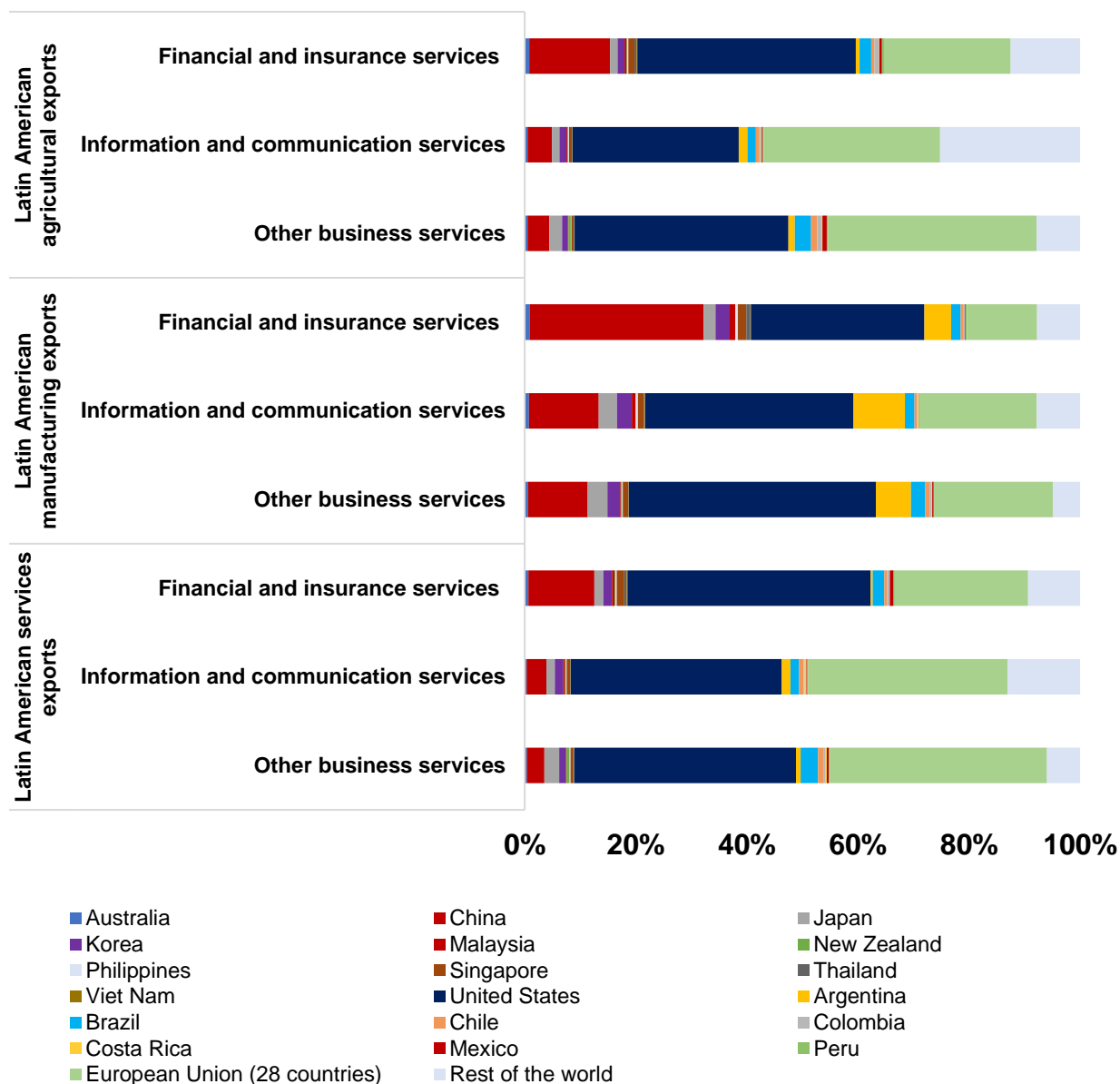
VTEX has, in the past three years, expanded its presence from Latin America to the United States and European markets, where it has multiple offices, for example in Milan and Barcelona. As it has globalized VTEX has also been hired by global companies to deploy in Asian markets, and by Asian customers. For example, VTEX has developed and manages Chinese Lenovo's subsidiary Motorola Mobility's direct-to-consumer stores in India and Japan as well as Stanley Black & Decker's B2B stores in India and the Republic of Korea. VTEX has also created online capabilities for Xiaomi, the Chinese ecommerce marketplace, as it has launched its online presence in Mexico. VTEX has also used Ububba, a Republic of Korea marketplace for affordable and trendy children's goods, to launch its United States presence via an omni-channel model, with a brick-and-mortar retail store in Los Angeles alongside the digital marketplace (Pop, 2020).

VTEX's growing success with Asian customers reflects its strong groundwork and development of a value proposition with Latin American customers and multinationals in Latin America as well as its flexibility to operate in any geography. For example, Xiaomi chose VTEX because of its scalability, speed to market, unique microservices architecture that results in a high-quality web software, and native pixels that enable Xiaomi to track and assess users' activities (Garza, 2020). Ububba benefited from VTEX's seamless omni-channel model of integration of physical stores and online presence. VTEX has also employed a flexible, revenue share-type monetization model that is universally attractive to small businesses. To service its Asian customers better, at the end of 2020, VTEX (2020b) opened an office in Singapore, which is a hub of ecommerce talent.

For Latin American exporters, a notable pattern is the prominence of China as a source of financial services value-added incorporated into Latin American agriculture and manufacturing exports (figure 15, Appendix figures 20, 21 and 22). This reflects the forceful internationalization of Chinese banks over the past decade (case study 5). Added to this in recent years has been growing collaboration in Asian and Latin American fintech sectors. For example, China's AliPay has successfully partnered with

Mexican digital payment platform Openpay, while Huawei (2017) has integrated the core components for the Brazilian bank, Caixa (BBVA, 2018).

Figure 16: Main sources of digitally deliverable services imports incorporated into Latin American agricultural, manufacturing and services exports in 2015, by type of digitally deliverable service and source economy



Source: Author's calculation, based on the OECD TiVA database.

Case study 5. Chinese financial services expanding their footprint, including in Latin America

China has grown over the past decade into a provider of financial and insurance services to industries around the world, including to FEALAC countries' manufacturing and agricultural sectors. This reflects the forceful internationalization of the four largest Chinese banks – the Industrial & Commercial Bank of China Ltd. (ICBS), China Construction Bank Corp., Agricultural Bank of China Ltd. and the Bank of China. By 2016, three of these giants posted larger increases in overseas lending than in domestic corporate loans (Rogers, 2017). Today, the four banks appear on the Financial Stability Board's list of 30 "global systemically important banks" (Yap, 2017).

The leader in terms of overseas loan volume is the Bank of China, whose overseas assets and loans have grown by 50 per cent during the past three years, to 23 per cent of its loan portfolio. In 2019, ICBC, China Construction Bank and Bank of China overseas loans grew by 22 per cent, 31 per cent and 11 per cent, respectively (Lakhwani, 2017). In addition, smaller banks such as the China Merchants Bank and China Everbright have entered international markets and increased their loan books quickly.

Chinese banks have also expanded to the Latin American market. In the third quarter of 2019, the total assets of the Latin American subsidiaries of Chinese banks amounted to US\$ 11.2 billion. One contributor to these volumes is merger and acquisition activity, such as ICBS's 2012 purchase of the Standard Bank of South Africa, which operated in Argentina, and 2013 purchase of the BicBanco of Brazil.

The ICBC, Bank of China, China Construction Bank and Haitong Bank have branches and subsidiaries in Argentina, Brazil, Chile, Mexico, Panama and Peru (Ugarteche and Leon, 2019). The bank branches (ICBC in Uruguay, Haitong Bank in Brazil, and Bank of China in Argentina and Panama) do not have their own capital and mostly provide trade finance; however, the subsidiaries (ICBC in Mexico, Brazil, Argentina and Peru, the Bank of China in Mexico, Brazil and Chile, and CCB in Brazil, Chile and Peru) act as normal banks in the national financial system.

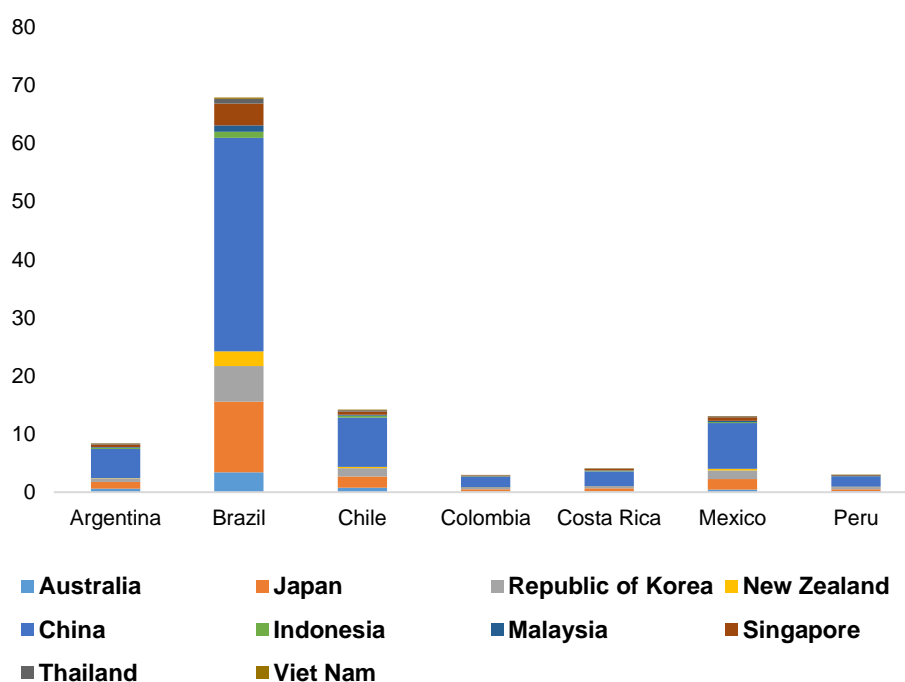
The expansion of Chinese banks in Latin America has been well-timed, to help replace the de-risking and retreat of United Kingdom and United States international banks from the region in the wake of the global financial crisis of 2007/08, and perhaps from the expansion of Latin America-China trade. In addition, Chinese banks have benefited significantly from the Government of China's financing activities in Latin America. China's

commercial banks often support the Government’s “policy banks” such as the China Development Bank or the Chinese Export-Import Bank (ExIm Bank). Between 2005 and 2018, these two entities issued US\$ 141 billion in loans to Latin American countries – for example, to port and railway projects and other rather low-yield, steady activities. China’s commercial banks then support bankable amenities around these projects such as shopping centres or new property developments (The Economist, 2020).

Brazil is the leading user of Asian digitally deliverable services in agricultural exports. Mexico is meanwhile Latin America’s most prominent user of Asian digitally deliverable services value-added in manufacturing exports (figures 17, 18 and 19). While China’s role is the most significant of all analysed Asian countries, Japan remains an important source of digitally deliverable services for Latin American industries. For example, Japanese providers of blockchain, Internet of Things (IoT) and artificial intelligence (AI) applications have played an important role in bolstering the productivity of the Latin American mining sector (case study 6). while Japanese and Republic of Korean providers are using AI to enhance Latin American health-care services (case study 7).

Figure 17: Asian sources of digitally deliverable services incorporated into Latin American agricultural exports, 2015

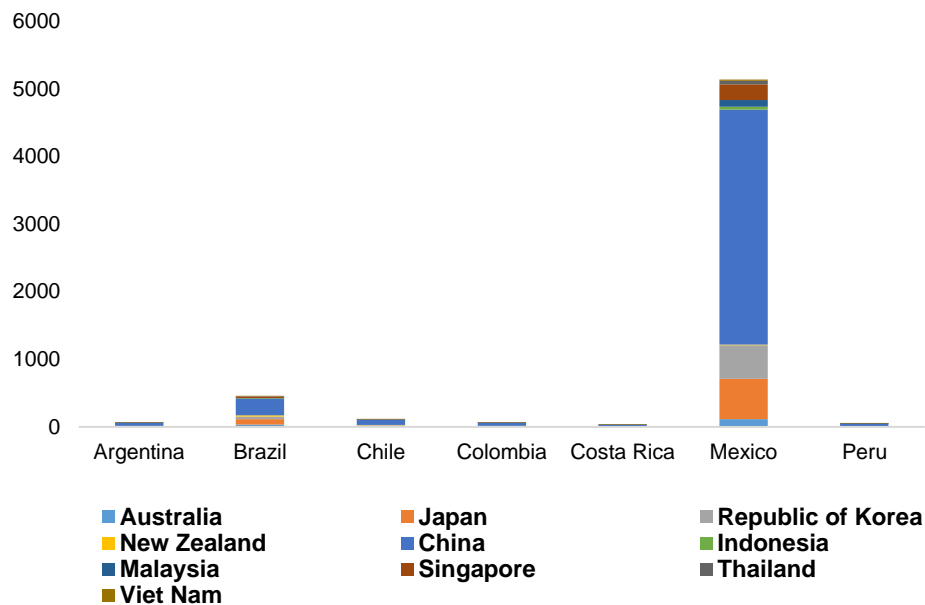
(Million United States dollars)



Source: Author’s calculation, based on the OECD TiVA database.

Figure 18: Asian sources of digitally deliverable services incorporated into Latin American manufacturing exports, 2015

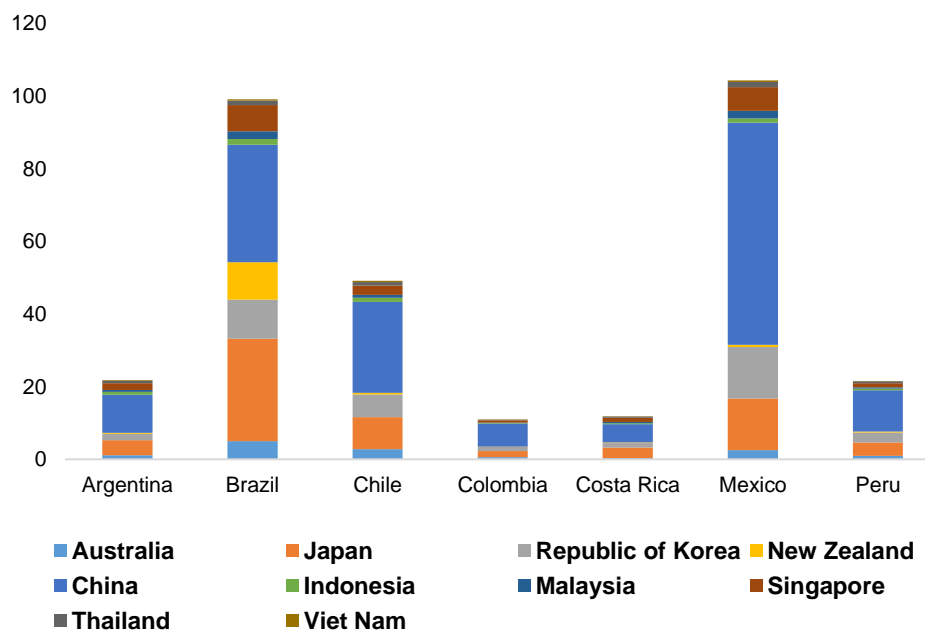
(Million United States dollars)



Source: Author's calculation, based on the OECD TiVA database.

Figure 19: Asian sources of digitally deliverable services incorporated into Latin American services exports, 2015

(Million United States dollars)



Source: Author's calculation, based on the OECD TiVA database.

Case study 6. Bolstering the productivity of Latin American farms and mines with Japanese Internet of Things and Big Data

Mining has traditionally featured heavy machinery and hazardous working conditions in remote regions. Today, however, digitization, Internet of Things and robotization are making it possible for large mines to be operated by a handful of humans who use digital technologies, data and robots to identify mineral deposits, manage day-to-day operations in mines and optimize mine operations in real-time.

In Latin America, where mining sites are commonly contractor-operated, contractors have turned to Japanese providers for smart mining tools, such as mine operating suites and data analytics. One prominent provider to a number of mines in Chile and Brazil is Wenco International Mining Systems, a Hitachi Construction Machinery subsidiary, which offers a suite of mine data solutions that boost productivity, decrease operating costs and help extend equipment life (Hitachi, 2020).

Wenco's solutions are widely adopted in Latin America. For example, KGHM's Sierra Gorda mine in Chile has implemented Wenco Fuel Dispatch, an automated dispatching service, to improve the efficiency of its fuelling process and reduce waiting times at fuelling stations.

Thiess, the world's largest mining contractor, uses Wenco's Mine Performance Suite that brings together fleet management, high-precision machine guidance and predictive maintenance, among other processes, to operate the Antofagasta's Centinela mine in northern Chile. A leading provider of technology and communications systems to mining firms in Chile, Peru, Dominican Republic and Panama, Brazil's Tecwise Sistemas de Automação has partnered with Wenco to operate the Chinchillas and Pucamarca mines, highlighting the opportunities Wenco offers to respond quickly to client needs in a scalable manner (Wells, 2019).

Wenco and other technology providers are succeeding by tackling two major trends in mining. The first is the practically universal demand for accurate data and insight. Surveys show that mining operators worldwide share the same pain points – how to aggregate data from different sources to create a single view to drive action, break organizational silos, reduce the operating costs and save energy (Chen, 2020). In addition, many mines are maturing and yielding lower ore grades, and times to develop new mines are growing, which pressures mine operators to better identify high-yield locations and gain new efficiencies (Durrant-Whyte and others, 2015).

Case study 7. Asian AI services delivering better health-care outcomes for Mexicans

Artificial intelligence (AI) is dramatically expanding doctors' capabilities to diagnose patients and prescribe medicine and treatments. Mexican hospital chain Salud Digna, one of the largest hospital networks in Mexico with 94 clinics in 24 States, has been at the forefront of adopting AI and other technologies to diagnose patients and prescribe treatments.

In 2019, Salud Digna rolled out a diagnostics solution in partnerships with FUJIFILM Medical Systems USA, whose Synapse system allows clinicians to quickly share medical images with doctors on digital networks, and the Republic of Korea biomedical company Lunit, which provides AI-driven analytics of medical images transmitted by FUJIFILM (Han-soo, 2020). The solution was initially aimed at 20 radiologists in Salud Digna's hospitals, to enable them to improve their efficiency and reading accuracy of the about 2 million radiography and mammography images processed by Salud Digna annually.

In pilot testing, Lunit's AI solution has helped to increase the performance level of non-radiology physicians by as much as 20 per cent, and to provide a high level of accuracy – the chest X-ray has an accuracy rating of 97-99 per cent and mammography X-ray has a 97 per cent accuracy rating (Lunit, 2018). Doctors using the solution also receive a worklist prioritization feature to assist them to improve the productivity of diagnostics work.

Lunit AI has succeeded in Mexico by offering a compelling value proposition to the Mexican health-care sector; its solution can help Mexican hospitals overcome their shortage of radiologists, who are fewer than one per facility, and to enable low-income Mexicans to access early and preventive care, improve their chances of survival and avoid costly medical interventions later on. The same value proposition has accelerated Lunit's expansion in Latin American markets as the demand for scalable X-ray diagnostics has soared amid COVID-19. Lunit's AI solution for reading chest X-rays has, with COVID-19, become used and tested in more than 10 countries, including Brazil and Panama (Imaging Technology News,2020).

The Philippines has grown into an important source of digitally deliverable services for Latin American exporters. This reflects, in part, the growth of Philippine companies in serving in particular the Mexican manufacturing sector, possibly as suppliers to Republic of Korean and Japanese manufacturers operating in Mexico. The Philippine services sector has diversified and grown more sophisticated in recent years, and is poised for further growth. For example, while the more standard BPO tasks that the

Philippines has offered for years are increasingly automated, Philippine providers have been strengthening their capabilities in such growing industries as cybersecurity, mobile apps development, social media, data science, health-care information management, animation and gaming (Ken Research, 2019).

3.3 Friction in Asia-Latin America interregional trade in digitally deliverable services

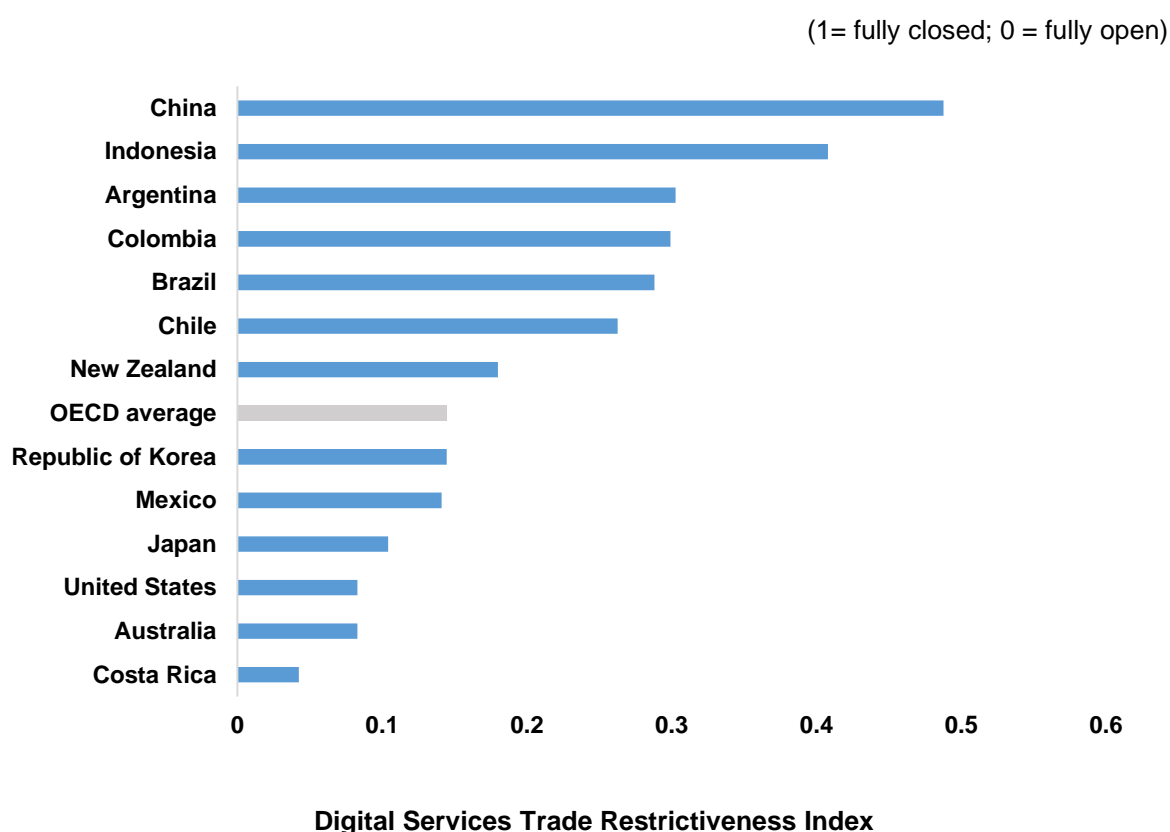
Trade in digitally deliverable services between Latin America and Asia is still limited. Most digitally deliverable services used in Asian and Latin American value chains originate either from providers in their own regions or from the United States or Europe. A straightforward explanation is the two regions' respective comparative advantages and the familiar variables that limit bilateral trade flows, such as geographic distance and different languages. Most Latin American and many Asian countries do not have major comparative advantages in services; those that do, such as Costa Rica and the Philippines, have attained significant growth as suppliers of digitally deliverable services in members' value chains of FEALAC members.

However, there is also friction that can be addressed, and opportunities seized, for the greater Asia-Latin America digitally deliverable services trade. For example, policy may be a source of friction in the flow of digitally deliverable services between Latin America and Asia, especially between certain country pairs. In the OECD's database of restrictions on digitally deliverable services imports, China and Indonesia are the most restrictive. Argentina, Colombia, Brazil, Chile are above OECD (2020) restrictiveness levels, while Mexico, Costa Rica, and Australia are open to digitally deliverable services (figure 20).

To be sure, preferential trade agreements, when in place, may attenuate policy friction. During the past 15 years, Latin American and Asian countries have reached 19 Trans-Pacific Free Trade Agreements, most with services chapters and some with ecommerce chapters. Among the notable agreements are: (a) the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) among Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Viet Nam, notified to the WTO in 2018; and (b) the 2004 Chile-Republic of Korea FTA and the 2005 Japan-Mexico FTA that started the wave of FTAs between Asia and Latin America (table 4) (ESCAP, 2020). The impact of these agreements on digitally deliverable services trade has yet to be analysed.

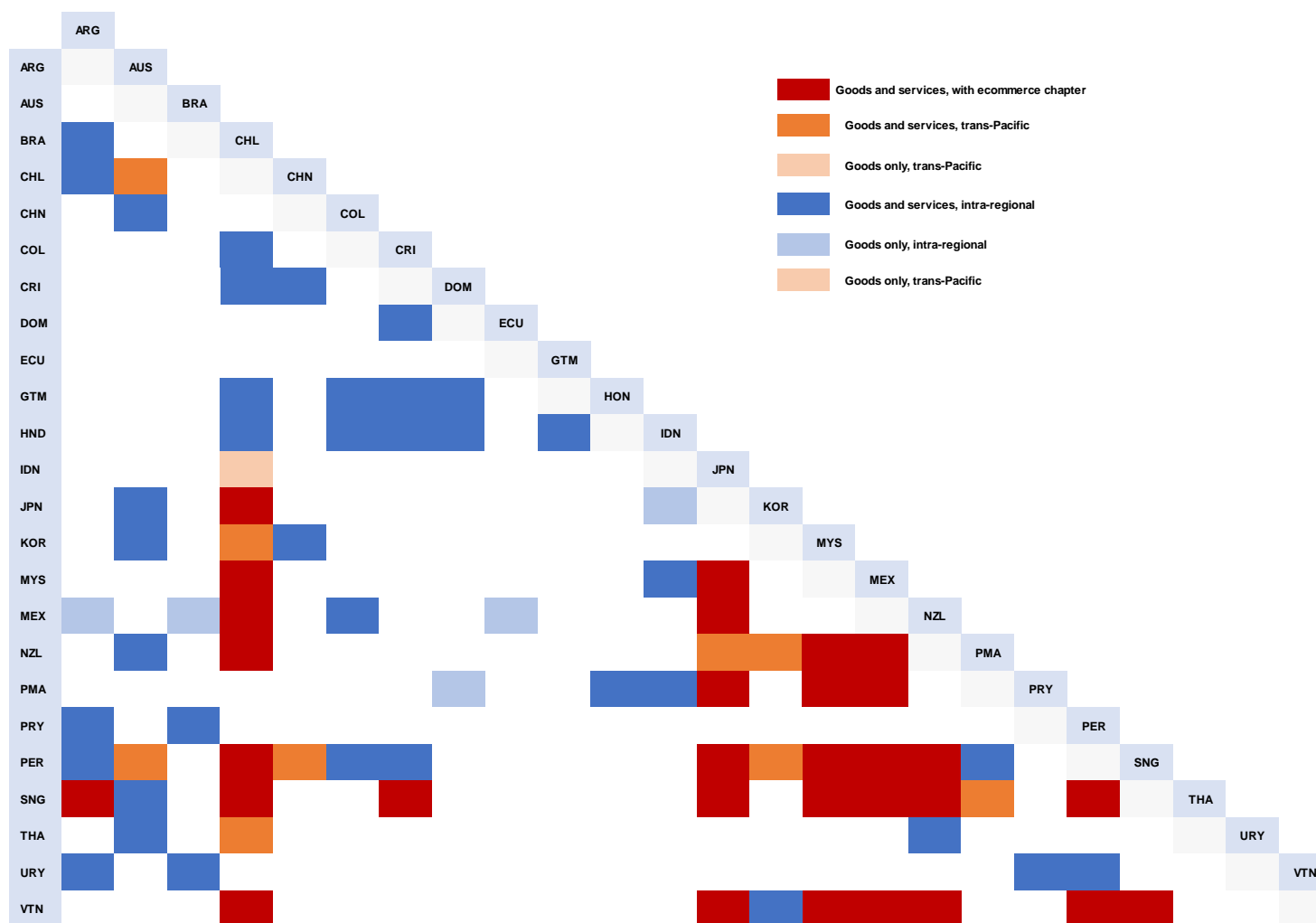
Differing national digital regulations (that may not be harmonized in trade agreements) may also complicate service providers' ability to service the various markets. After all, divergent national rules on such issues as data privacy, customer protection, customs treatment of electronic transmissions and Internet intermediary liability can create significant new compliance costs as well as complicate cross-border deliveries, much like divergent national product standards do for the goods trade. The OECD's index measuring heterogeneity of rules – the extent to which national regulations that have an impact on digitally deliverable services trade differ from each other across markets – reveals that China's regulations affecting digitally deliverable services are mostly different from just about all other FEALAC countries for which data are available (table 5). Meanwhile, Colombian, Costa Rican and Mexican regulations are quite similar to those of other Latin American nations as well as advanced Asian countries.

Figure 20: Restrictiveness of digitally deliverable services in selected Asian and Latin American economies



Source: Author's calculation, based on the OECD Digital Services Trade Restrictiveness Index.

Table 4: Bi- and plurilateral Trade Agreements among selected Asian and Latin American economies
(Agreements notified to the WTO)



Source: Author's calculation, based on information on various government websites.

Table 5: Differences across digital trade regulations among Asian and Latin American economies*

<i>Partner</i>	Argentina	Brazil	Chile	Colombia	Costa Rica	Mexico	China	Indonesia	Japan	ROK**	Australia	New Zealand	United States
Argentina		0.43	0.29	0.16	0.26	0.32	0.73	0.56	0.24	0.28	0.22	0.32	0.18
Brazil	0.43		0.34	0.31	0.21	0.14	0.34	0.27	0.26	0.14	0.29	0.15	0.32
Chile	0.29	0.34		0.28	0.18	0.32	0.44	0.37	0.20	0.29	0.22	0.36	0.18
Colombia	0.16	0.31	0.28		0.10	0.20	0.56	0.44	0.12	0.16	0.10	0.16	0.30
Costa Rica	0.26	0.21	0.18	0.10		0.14	0.46	0.34	0.10	0.11	0.12	0.18	0.24
Mexico	0.32	0.14	0.32	0.20	0.14		0.41	0.28	0.20	0.08	0.18	0.12	0.22
China	0.73	0.34	0.44	0.56	0.46	0.41		0.21	0.49	0.45	0.51	0.41	0.55
Indonesia	0.56	0.27	0.37	0.44	0.34	0.28	0.21		0.32	0.33	0.34	0.29	0.38
Japan	0.24	0.26	0.20	0.12	0.10	0.20	0.49	0.32		0.16	0.02	0.20	0.22
Republic of Korea	0.28	0.14	0.29	0.16	0.11	0.08	0.45	0.33	0.16		0.14	0.16	0.26
Australia	0.22	0.29	0.22	0.10	0.12	0.18	0.51	0.34	0.02	0.14		0.18	0.20
New Zealand	0.32	0.15	0.36	0.16	0.18	0.12	0.41	0.29	0.20	0.16	0.18		0.30
United States	0.18	0.32	0.18	0.30	0.24	0.22	0.55	0.38	0.22	0.26	0.20	0.30	

Source: Author's calculation, based on the OECD Digital Services Trade Restrictiveness Index (2020).

* Dark blue = more divergent regulations.

** ROK = Republic of Korea

Still another type of friction to trade in digitally deliverable services between the two regions is limited awareness of potential supply of services and, possibly in some areas, lack of interoperable standards for the deployment of sophisticated services. While bilateral business fairs and matchmaking events where Latin American service providers can meet Asian producers and vice versa have been stepped up – for example, by the Inter-American Development Bank – probably few companies in Asia think of Latin America as a source of digitally deliverable services. Likewise, few Latin American companies, while well aware of the calibre of Japanese, Republic of Korean, Singaporean and Chinese technology companies, would consider emerging economies of South-East Asia as suppliers of digitally deliverable services or incur the search cost to identify providers in that region.

At the same time, there are new opportunities for expanding Asia-Latin America digitally deliverable services. Of course, free trade agreements and good policies such as free flow of data and duty-free transmission of electronic goods matter. However, new business opportunities are coming into sight for growing bi-regional Asia-Latin America digitally deliverable services.

As detailed in the above case studies, there are many Latin American and Asian companies in such sectors as medical imaging, ecommerce, data analysis, and gaming and animation that have built a strong value proposition in their home and regional markets, leveraged it and, often, support from their export promotion agencies to create new opportunities across the FEALAC market. These companies have also built new social value – e.g., enabled the poor to access preventive health services, and improved productivity of large sectors such as manufacturing and mining firms. These ongoing positive trends can now be expanded. The following chapter explores potential target sectors and methods.

4. Harnessing emerging opportunities for digitally deliverable services in Asian-Latin American value chains

The data analysed above are somewhat limited, as they end in 2015 and digitally deliverable services are not sufficiently disaggregated. In recent years, specific opportunities have emerged that Asia and Latin American are leveraging and can develop further, for expanding the use of each other's services in their respective value chains.

First, as a result of COVID-19, firms across sectors have accelerated their digital transformation, and vast majorities of IT decision makers in both Asia and Latin America are likely to step up their ongoing migration in the cloud (ISG, 2020; Burden and others, 2020). This can create new flows of digitally deliverable services provided, especially by large cloud computing firms. In a likely sign of things to come, in 2019, Alibaba announced that it would provide cloud computing services to Brazil, including to Chinese companies operating in Brazil, via a partnership with the Brazilian company UOL Dive (*China.org.cn*, 2019).

Second, Asia and Latin America have both nurtured the rise of innovative technology companies that can add value in B2B supply chains. One example is agriculture. In recent years, Brazil has spawned hundreds of prominent data-driven Agtech startups that are providing digital services to the country's massive farming sector. For example, Agtechs are helping to streamline processes and deliver inputs "before the farm", provide precision farming, imagery diagnosis, remote sensing and telemetry to improve production "at the farm", and manage logistics, marketing and distribution "after the farm" (Azevedo, 2019). The Indian Council of Agricultural Research (2019), Brazil and India are collaborating on an Agtech incubation programme called Maitri. Similar programmes could also be established with South-East Asia and China, one of the world's largest Agtech markets. Conversely, Asian Agtech providers can find new markets in Latin America's vast agricultural sector. In fact, collaboration is already taking place; in 2020, Brazilian's association AgTech Garage and Enterprise Singapore hosted a forum where innovative Singaporean Agtechs could pitch to Brazilian agricultural producers in such areas as precision agriculture, nanotech, biotech and Industry 4.0 (AgTech Garage 2020).

Similarly, Chile has innovative technology companies in the salmon industry. What could be called "Salmontech" innovations, such as blockchain used for salmon traceability, could be used in Asian countries such as in Japan where consumers value high-quality fish and that has, since the 1980s, collaborated with Chile on salmon production techniques and technologies (Japan International Cooperation Agency, 2014).

Third, access to efficient financial and logistics services is key to the growth of Latin American and Asian businesses. In both regions, traditional providers such as large banks are looking to innovative players, especially to meet SME customers' needs better for more digitized and nimble service models, and to manage increasingly complex financial regulations. These, too, are available in both Asia and Latin America, where innovative Fintechs are meeting SMEs' financing needs and accelerating cross-border payments, and Regtechs are especially helping banks to manage regulatory

compliance. Singapore has emerged as a leading Fintech and Regtech hub with such prominent players as Funding Societies, Validus Capital, Aspire and Datarama; some Singaporean Fintechs have already ventured into Latin America. For example, in 2020, Singaporean payments Fintech Nium announced a partnership with Teledolar in Costa Rica, the first step in Nium's quest to help Latin American Fintechs, banks and financial institutions digitize (Alois, 2020). The partnership with Teledolar enables Nium customers to make real-time payments to Europe, the United Kingdom, and the United States. Latin American countries, such as Mexico, Colombia and Brazil, are at the forefront of the region's Fintech revolution and could similarly offer valuable services to the Asian financial services sector.

Similar synergies exist in Logtechs – logistics technology companies that provide uberized freight services, tracking of shipments, cargo consolidation services and other data-driven services. Logtechs enable traditional logistics providers to provide services at a lower cost and reach new customer segments, and cargo owners to efficiently access services that lower their shipping costs and time, and enable them to track their shipments. Brazil, where high logistics costs have for years arrested firms' competitiveness, is home to almost 300 Logtechs that could also benefit Asian customers, for example, in such markets as the Philippines where firms also face relatively high logistics costs (Distrito, 2020).

Fourth, Asian and Latin American national and city Governments are digitizing rapidly enabling, for example, the expansion of e-government services, and more digitized and streamlined provision of public services across areas such as transport, health care, energy, safety and education. Technology providers in Japan and the Republic of Korea, among others, are the global vanguard in public sector digital transformation. One example is customs clearance where Singapore and the Republic of Korea have built – with the help of companies such as MUFG Bank and NTT Data Corporation of Japan, and Samsung SDS of the Republic of Korea – AI and blockchain solutions that enable Governments to meet the challenging triple objectives of trade facilitation, border security and revenue collection (*In Sync*, 2018; Alexandre, 2018). Arcane and slow border clearance is the Achilles' heel of Latin American countries' trade and could certainly benefit from good practices and technologies employed in Asia.

A region with sprawling cities that struggle to meet burgeoning demand for efficient transportation, housing and access to basic services, Latin America could also benefit from working with Asian companies that provide digitally deliverable smart city technologies in such areas as urban transport and mobility, public safety and connectivity. Japanese, Republic of Korean, and Chinese companies have been global

pioneers in smart city technologies and have already made their way also to Latin America (case study 8). Such Asian cities as Bangkok, Tokyo and Singapore that have managed rapid urbanization with smart city technologies could also offer valuable lessons to Latin American city governments. For example, in preparing for the Olympics, Tokyo is looking to become a “super city” with autonomous driving, e-government services and digital payments (UBS, 2019). China, too, has carried out multiple smart city projects, including launching some 500 smart cities in the 2010s that leverage IoT, Big Data, and cloud computing technologies typically sourced from China. Singapore’s “Smart Nation” initiative includes such innovative technologies as on-demand public buses that use data analytics to pick up passengers directly at their location, and smart water meters that monitor water consumption data for households.

Case study 8. Smartening Latin American cities with Asian digital technologies

Latin America has urbanized particularly rapidly, and by 2025, about 90 per cent of Latin Americans will live in the region’s cities (Muggah, 2018). The new arrivals are constraining cities’ capacities to offer housing, utilities and transport, for example. There are also challenges to finance public projects and manage procurement processes. In response, a growing number of Latin American cities are adopting smart city technologies to manage their rapid growth. The region’s leading smart city is Colombia’s Medellín; Buenos Aires was an early adopter of systems for real-time traffic and crime monitoring; Rio has used technologies for urban safety; and Mexico City has built smart eco-friendly buildings (Szterenfeld, 2019).

Japanese and Republic of Korean companies such as NEC, LG CNS, Kaneka and NTT Communications have provided smart transport, digital government and safe city technologies for years in megacities across Asia, and have also made their way to major European and United States cities such as Lisbon, Santander, Las Vegas and San Francisco. They are also gradually being adopted by Latin America’s city governments.

For example, in 2011 NEC worked on Brazil’s first smart city project in Recife, and has more recently implemented facial recognition technology for the urban surveillance system in the city of Tigre in Argentina (NEC, 2011). The Republic of Korea’s LG CNS has built a smart bus management system in Pasto, Colombia, to enable the city to adjust bus operation intervals and allow passengers to check bus routes and arrival times (Sung-won, 2015).

Chinese companies have also gained a market share in Latin America's safe city markets, in countries such as Mexico and Ecuador that have leveraged Chinese equipment and software to update their public safety infrastructure (Dua Jr., 2020). Chinese surveillance company DaHua has donated thermal cameras to Argentina, Chile, Colombia and Panama to support cities in the fight against the COVID-19.

Fifth, the blue economy – exploitation and preservation of the marine environment – is another exciting future opportunity for Latin American and Asian economies. Digitally deliverable services or services that rely heavily on digital technologies such as imaging and physical sensors, satellite technologies, Big Data analytics, autonomous systems, biotechnology, sub-sea engineering and autonomous systems help to improve aquaculture site selection, exploitation of minerals and oil from ocean floors, monitoring fish stock movements and maritime ecosystems, managing oil spills and conserving coastal areas (OECD, 2019; and Ebarvia, 2018). This could be an emerging area of collaboration and services trade between Asia and Latin America. Japan, for example, has become a global centre of excellence in managing maritime resources through technology expertise that could be valuable in Latin America as well as the Caribbean Island economies.

In all these areas of potential joint opportunities, export and investment promotion agencies in the FEALAC region can continue to play their central role, and development banks can support joint projects and pilots. If the past is of guidance, in these efforts it is important to focus on companies that have timely and strong value propositions already tested in their home markets and regions and that are ready to scale further.

4.1 Broader transformations in bi-regional Asia-Latin America value chains

Amid these emerging opportunities, Asian and Latin American countries also need to keep their eyes on broader developments in regional and bi-regional supply chains that will also reshape trade in digitally deliverable services.

The first is reshoring. As Chinese labour costs have risen and the United States-China trade wars have flared during the past few years, Latin American businesses in particular have started to consider reshoring production to North and Central America, including Mexico (Kravchenko and others, 2019). For example, in 2019 the United States industrial pump maker Omnidex moved some production from China to Viet Nam, and the United States camera maker GoPro added a new production line in

Mexico, while maintaining production in China to serve non-United States markets (Jung, 2020). These trends were reflected in AT Kearney's 2019 Reshoring Index and manufacturing import ratio (MIR) that dropped for the first time since 2011: in 2019, the United States imported 12.1 cents worth of manufactured goods from 14 tracked Asian economies for every US\$1 of domestic manufacturing gross output, down from 13.1 cents in 2018 (van den Bossche and others, 2019).

COVID-19 has accelerated the United States manufacturers' reshoring and nearshoring plans, highlighting the importance of more responsive, flexible and reconfigurable value chains (ESCAP, 2019). Surveys suggest that as many as two-thirds of United States executives in the manufacturing and industrial sectors would like to bring manufacturing production and sourcing back to North America (Leonard, 2020). If reshoring from China to Mexico and other countries in the Americas continues, digitally deliverable services used by Chinese manufacturers, and typically provided by Chinese suppliers, may be replaced by digitally deliverable services sourced from Latin America, such as Brazil, Costa Rica, Colombia or Mexico.

Second, COVID-19 has also induced firms to consider internalizing production – for example, to make greater use of 3D printing as a means of pre-empting supply chain interruptions, and in general make their supply chains more responsive. The traditional response to supply chain shocks, in full display in the wake of the Japanese tsunami, has been to stock-up inventories, which adds to firms' costs and often results in redundant inventories. With 3D printing, inventories are virtual, which drastically reduces inventory management costs, redundancies and transport costs of parts and components (Suominen, 2019). In other words, the hallmark of the 1990s' wave of globalization, outsourcing of parts and components, may be yielding to more centralized, vertically integrated production models, where digital designs are crafted, and parts and components printed inhouse by the assembler itself. Alternatively, parts design may be done by outsourced providers and parts printed where they are assembled. Greater use of additive manufacturing techniques by manufacturers in Asia and Latin America could have a number of implications for digitally deliverable services from those regions. One positive prospect is that Asian and Latin American firms would have new opportunities to design and develop 3D printable parts and components for large manufacturers in those regions and globally.

Third, production may also evolve to "hyper-decentralized" systems that could disrupt traditional B2B value chains. One innovative pattern is distributed manufacturing, where production is done by a globally networked set of designers and engineers who develop products for virtual inventories, producers with 3D printers who design and

assemble the physical form, and logistics companies that distribute the output. To respond to COVID-19, numerous individuals and small and large firms around the world have participated in such software-driven “telefacturing” networks, providing designs and 3D printers to produce PPEs in order to respond to local shocks. These networks involve numerous companies and individuals as well as a range of services around the world – and create extraordinary flexibility and responsiveness to deal with localized supply shocks. Granted, leading companies were building such telefacturing networks even before the crisis. For example, in 2019, Siemens launched a network that brings together engineers, procurement managers and suppliers of 3D printed parts in the cloud (Siemens, 2019). These types of networks can open new opportunities for Latin American and Asian companies, both through participation in them as suppliers and the re-organization of their supply chains.

4.2 Actions to promote use of digitally deliverable services in bi-regional value chains

To encourage the development of synergies in digitally deliverable services, Asia and Latin America can usefully pursue concrete initiatives, such as:

- **The creation of a FEALAC Task Force for Supply Chain Resilience through Technology.** New supply chain models and responses, such as distributed manufacturing, provide entirely new opportunities to build resilience and flexibility in supply chains; however, they will likely also have significant impacts on firms’ business models as well as economic, trade and tax policies. Latin American and Asian firms that are testing and enabling distributed manufacturing approaches could work to create and pilot approaches in Latin America, and discuss with policymakers the regulations and capabilities needed for such networks to work efficiently;
- **The pursuit of matchmaking in fintechs, logtechs and agtechs.** Both Asia and Latin America are amid a “tech” boom, seeing the rise of well-funded startups intent on transforming and streamlining traditional industries such as lending, logistics and farming. These firms could have an important impact across FEALAC markets and could catalyse further value chain linkages in digitally deliverable services between Latin America and Asia. However, they often lack contacts and capital to scale quickly. FEALAC member governments and private sector partners have an excellent opportunity to organize forums and virtual showcases for startups in Asia and Latin America to display and demonstrate their solutions to potential partners across the FEALAC region. This would include, for example, leading banks, transport operators and agricultural businesses. Large companies’ corporate venture funds would also

be interested in startup solutions. FEALAC has already made efforts in this direction, such as an “Exploring Economic Complementarity in the Agro-industrial sector” project sponsored by Argentina (FEALAC, 2019). Entrepreneurs from Asia and Latin America could also use such a forum to establish new business relationships;

- **The establishment of smart manufacturing test beds.** Latin American and Asian companies have adopted smart manufacturing and farming techniques and technologies, and share a common interest in testing and scaling new smart manufacturing models. Businesses from the FEALAC region could develop new smart manufacturing pilots as well as scale existing ones with co-investments from governments and development banks. Further opportunities might be provided by startup competitions for startups conceived in Asia and Latin America that enable smart manufacturing technologies and techniques. The best solutions could be piloted, with donor support, by the firms that participate. The forum could also generate policy dialogues on national smart manufacturing strategies and proposals on the trade dimensions of smart manufacturing and servification, such as customs treatment of electronic transmissions;
- **The creation of an Asia-Latin America Smart City Forum.** Sprawling cities in Asia and Latin America have a growing need for smart city solutions, many of which are digitally deliverable. Both regions also share important expertise in ways to smarten cities and grapple with specific urban challenges, such as safety, transport and housing. FEALAC member countries could form a smart city forum where Asian and Latin American local government leaders could discuss their experiences and share best practices, learn about leading-edge technology solutions developed in Asia and Latin America, and access support for piloting and scaling smart city solutions. This could be done, for example, with the support of regional development banks;
- **The development of Asia-Latin America Blue Economy Fund and Partnership.** The ocean is a huge and shared resource of energy and nutrition for Asian and Latin American countries. Asia and Latin America could jointly develop digital technologies that enable them to nurture and cultivate the ocean. Both regions could benefit from pooling resources for developing common technologies. FEALAC members could, for example, launch a FEALAC Blue Economy Fund that would catalyse public and private sector funding for potentially promising technology solutions from across Asia and Latin America in preserving and cultivating the Pacific Ocean.

5. Conclusion and future research

Recent trade wars, COVID-19 supply shocks, and digitalization are gradually transforming Asian-Latin American value chains and the role of digitally deliverable services. In general, even if additive manufacturing enabled companies to “rebundle” goods production, services will likely continue unbundling as the cloud computing enables growing number of companies to outsource non-core services to specialized providers.

This report has tracked the growth and sources of digitally deliverable services in Latin American and Asian manufacturing, agricultural and services value chains. The result has been five main findings:

- Digitally deliverable services play a growing role in export-driven production in the FEALAC region, but digitally deliverable services from Latin America are used only to a limited extent by producers in Asia, and vice versa. Most digitally deliverable services in Asian and Latin American value chains are supplied by domestic service providers, with the role of regional providers growing, especially in Asia. The United States and Europe are important extraregional sources of digitally deliverable service;
- Asian and Latin American firms are using digitally deliverable services from Latin American and Asian providers, respectively, to a limited extent only. However, this disguises the fast growth in Latin American-Asian digitally deliverable services trade in the past 15 years. Asian manufacturing, agricultural and services exporters have significantly expanded their sourcing from providers in Costa Rica, Chile and Colombia, while Latin American producers have increased sourcing from China, the Philippines and Japan. China has had a remarkable run in becoming a significant source of digitally deliverable services for Asia as well as Latin American manufacturing, services and agriculture. China’s role has grown, especially as a source of financial services to the agricultural and manufacturing sectors;
- There are some “hidden complementarities” in digitally deliverable services between Latin America and Asia. The Latin American manufacturing, mining and services sectors are drawing on sophisticated IT services and services using disruptive technologies such as blockchain and AI from Japan, the Republic of Korea, Singapore and the Philippines, while Latin American manufacturers and agricultural firms are increasingly using Chinese financial services. The Chinese manufacturing sector is using Brazilian suppliers, and

companies in Singapore, China, the Republic of Korea and Japan look to Brazil, Chile, Costa Rica and Colombia for emerging digitally deliverable services such as gaming, animation and e-commerce. The agricultural sector in Thailand and Viet Nam leverage Brazilian digitally deliverable services, potentially Agtech applications;

- The low integration of Latin America's digitally deliverable services into Asian production and vice versa reflects largely their traditional comparative advantages. Policy frictions have been removed to a large extent by goods and services trade liberalization and Trans-Pacific FTAs that have proliferated during the past 15 years, some of which include sophisticated e-commerce chapters. However, China and Indonesia, in particular, still have restrictions on digital trade; the existence of complicated data privacy and transfer rules, especially in Asia, can impede cross-border trade in digitally deliverable services across the FEALAC region.

As the business ecosystems in Asia and Latin America become more digitized and produce new digital services, there will be greater opportunities to also expand bilateral digitally deliverable services trade. For example, there are excellent opportunities for promoting cooperation and forums for Asian and Latin American companies to learn more about Latin American and Asian fintechs, logtechs, agtechs and creative industries such as animation, and vice versa. FEALAC members can also develop new initiatives that catalyse productivity and digitally deliverable services trade, such as smart manufacturing test beds, smart city forums as well as a FEALAC blue economy initiative and fund. To further incorporate high-value-adding, digitally deliverable services into their manufacturing, agriculture and other sectors, Asia and Latin America must uphold commitments to duty-free electronic transmissions and the free transfer of data across borders.

There is also a need for more research in digital trade between Asia and Latin America, in at least three areas. First, data on value chains have become significantly more sophisticated in the past decade; however, there is a need for timelier data at a finer resolution on the use of different types of high-value services in value chains, including in the poorer countries that are seeking to integrate into global value chains. Second, the analysis of the impact of digitally deliverable services on firms' exports, productivity and development of new, innovative products and services is still nascent, as is the understanding of which types of firms best absorb and utilize digitally deliverable services for productivity gains. Third, much more research is needed on assessing the impact of the rapidly transforming digital policy landscape as well as the increasingly

encompassing e-commerce chapters in FTAs on digitally deliverable services trade and the use of digitally deliverable services in value chains.

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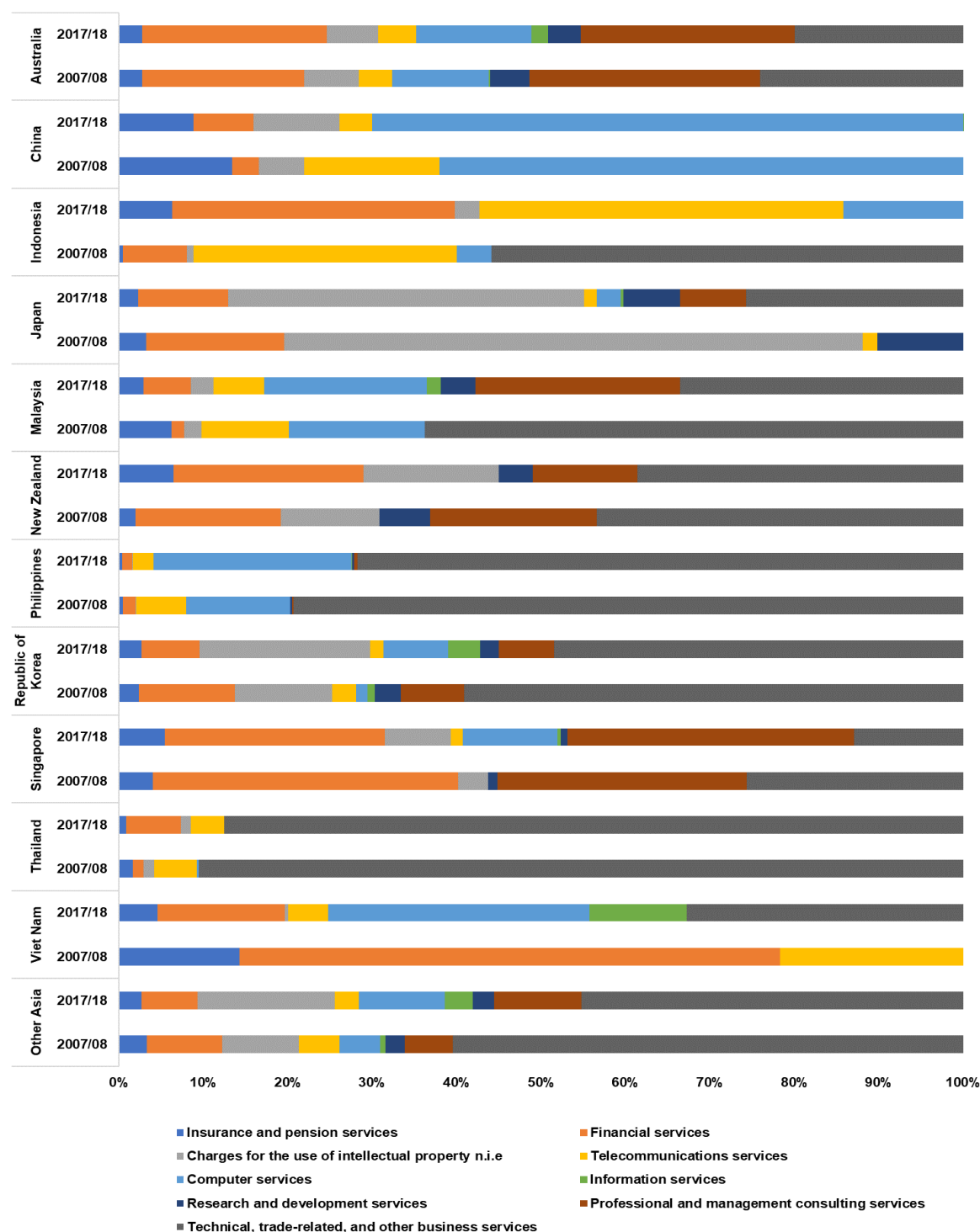
OECD Trade in Value Added (TiVA) database. Available at <http://www.oecd.org/sti/>

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World Trade Organization database. Available at <https://data.wto.org/>

Appendices

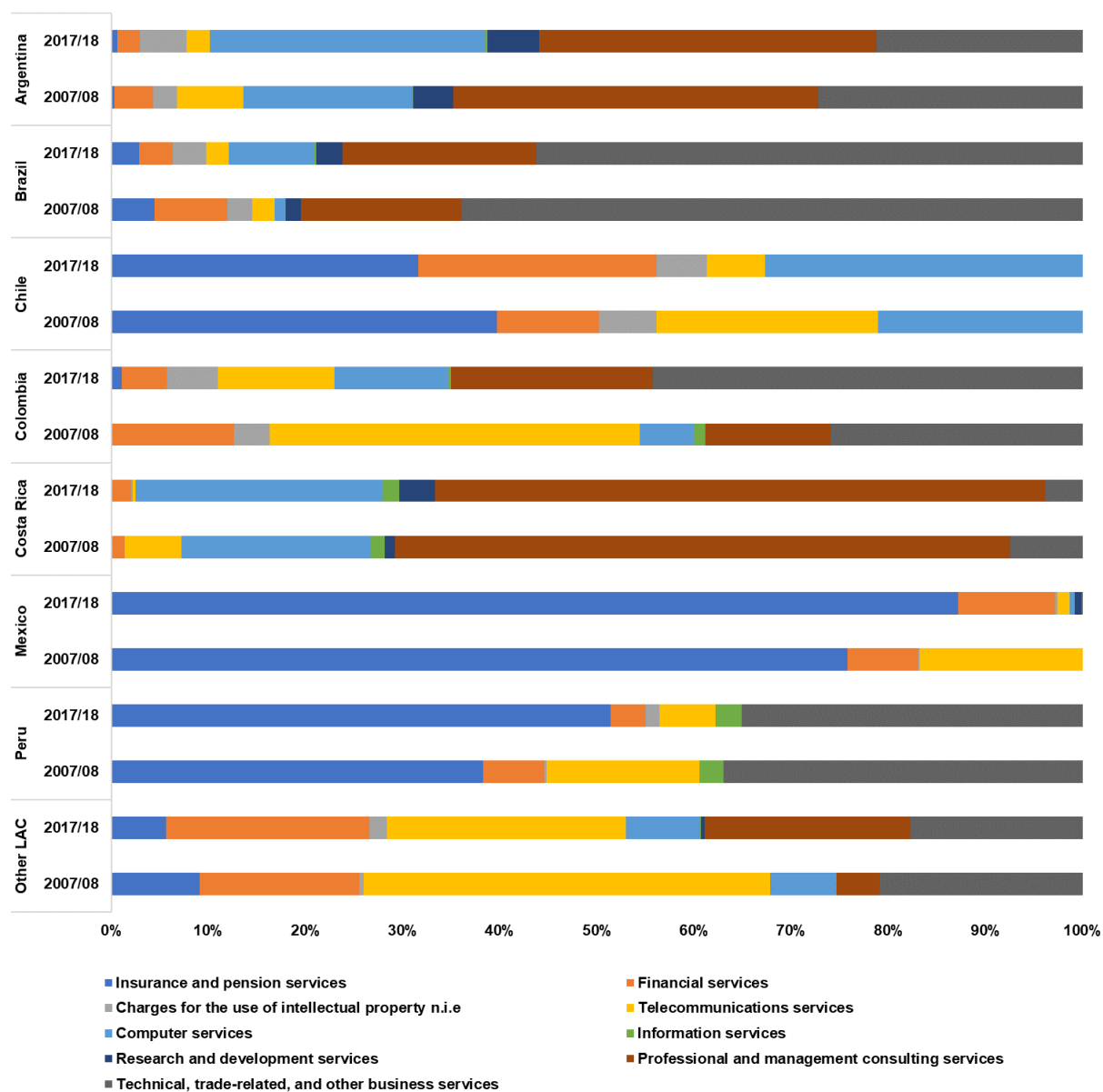
Appendix figure 1: Composition of digitally deliverable services exports in selected Asian economies, 2007-2018



Source: Author's calculation, based on WTO data.

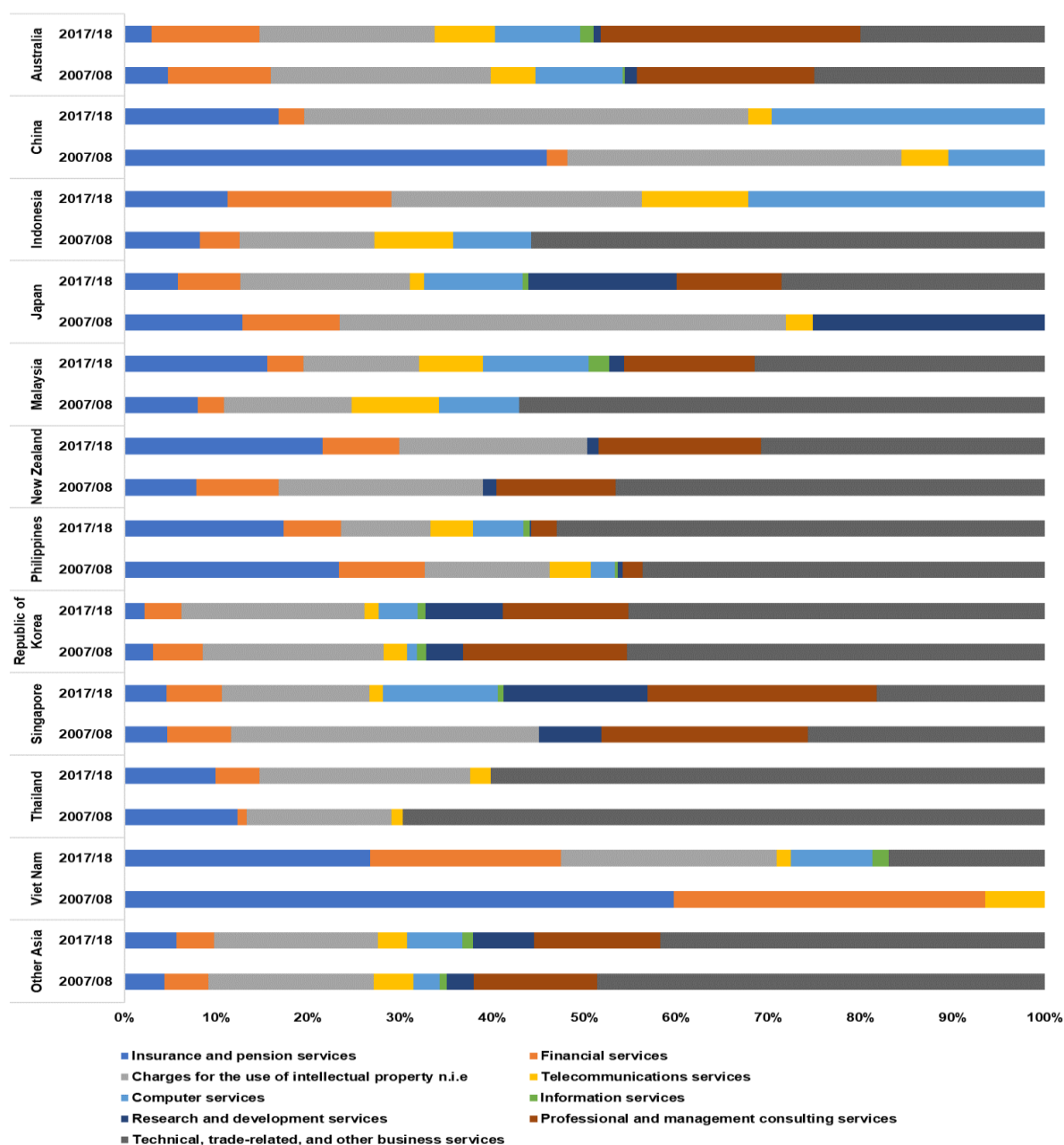
Note: Other Asia includes Brunei Darussalam, Cambodia, the Lao People's Democratic Republic, Myanmar and Mongolia.

Appendix figure 2: Composition of digitally deliverable services exports in selected Latin American economies, 2007-2018



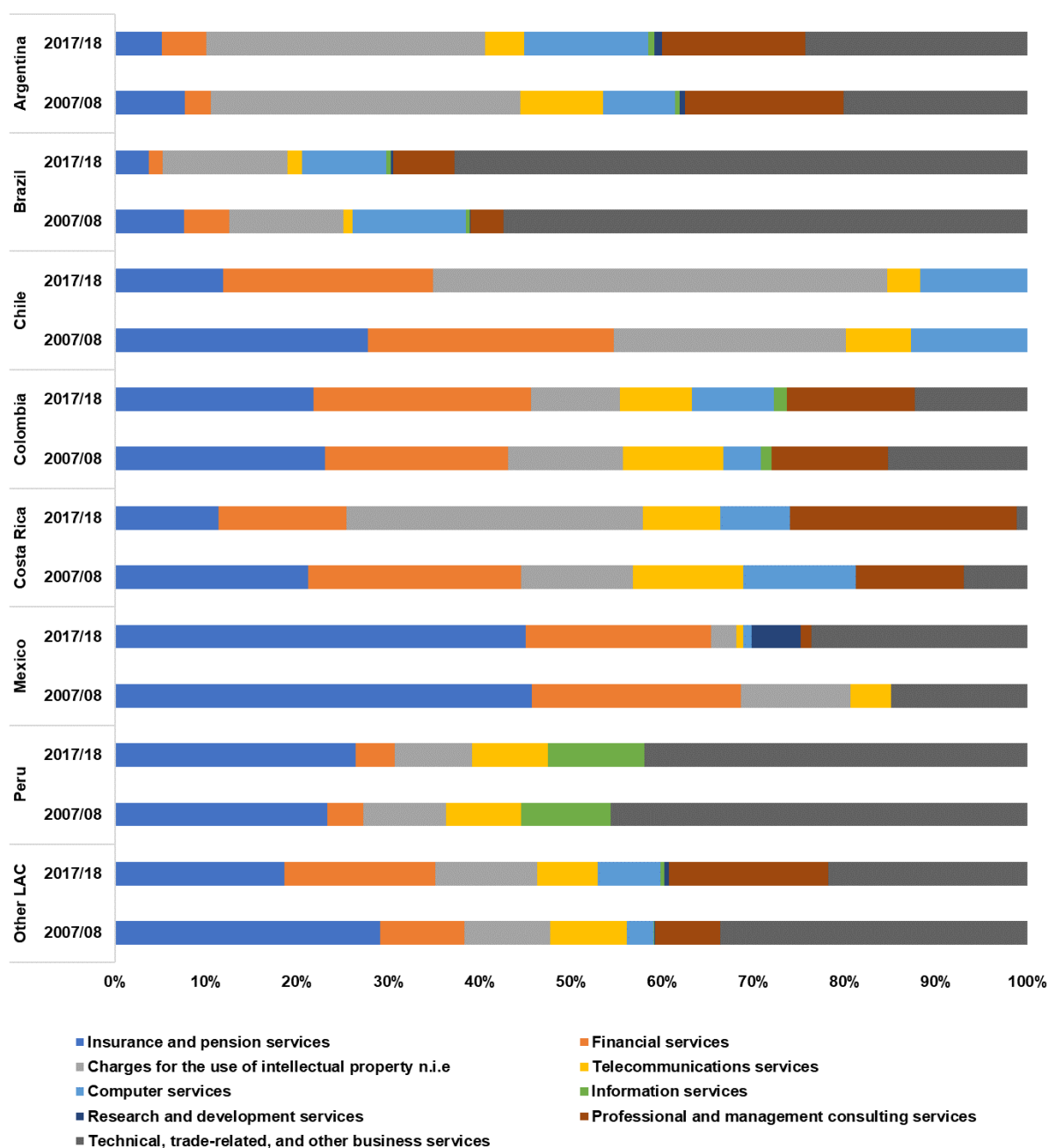
Source: Author's calculation, based on WTO data. Other Latin America Countries (OLAC) includes the Dominican Republic, Ecuador, El Salvador, Nicaragua, Panama, Paraguay, and Uruguay.

Appendix figure 3: Composition of digitally deliverable services imports in selected Asian and Pacific economies, 2007-2018



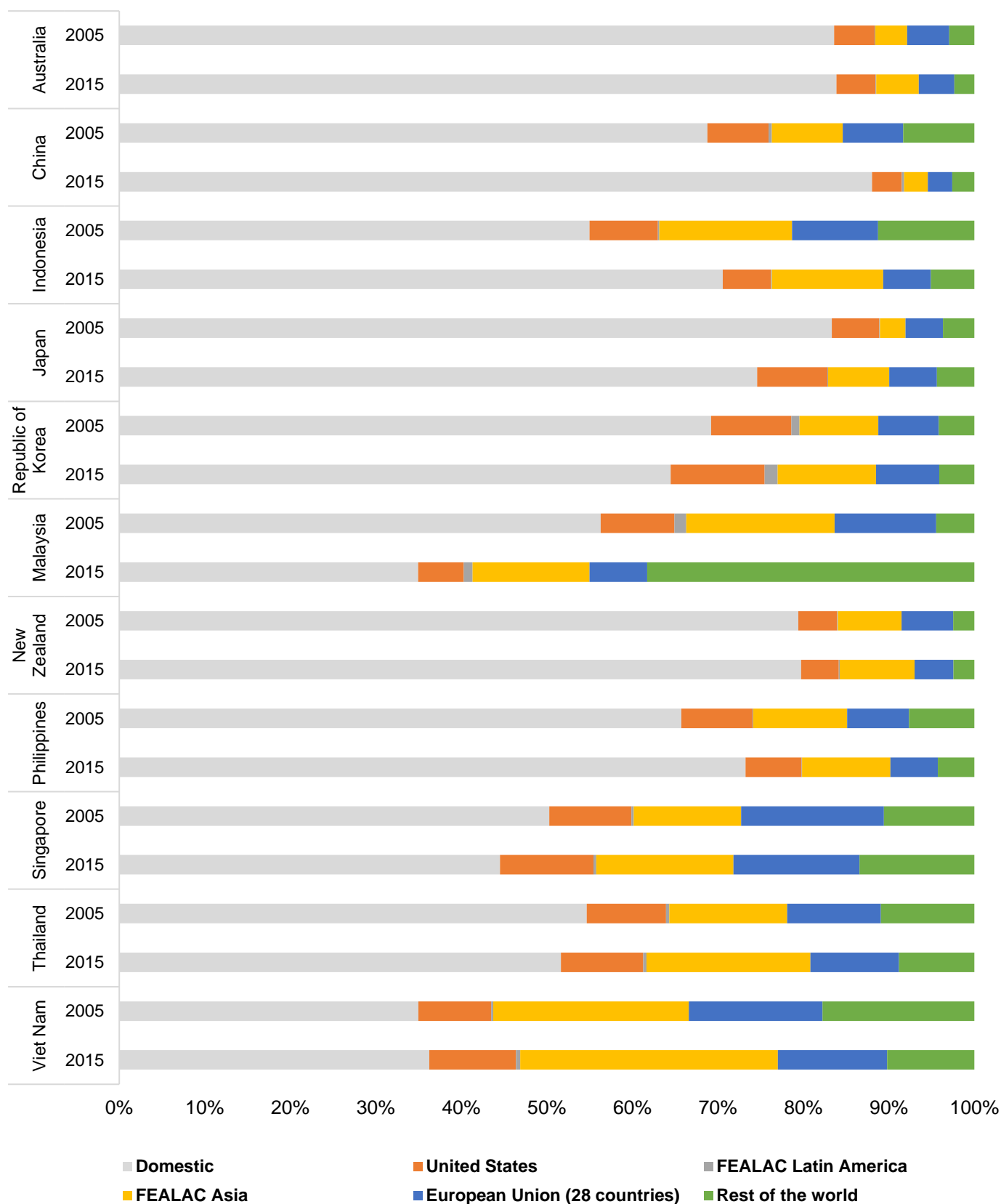
Source: Author's calculation, based on WTO data. Other Asia includes Brunei Darussalam, Cambodia, the Lao People's Democratic Republic, Mongolia, and Myanmar.

Appendix figure 4: Composition of digitally deliverable services imports in selected Latin American economies, 2007-2018



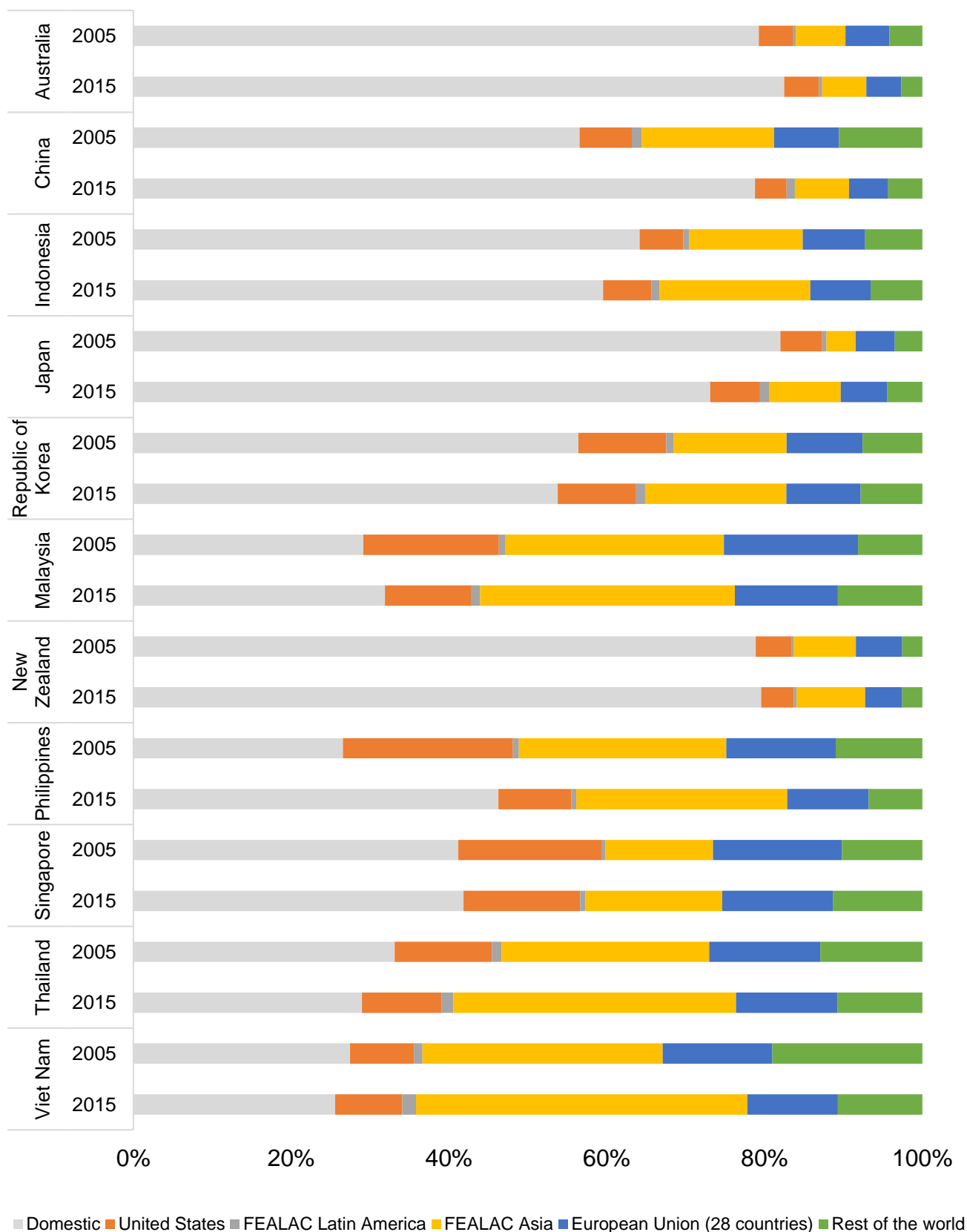
Source: Author's calculation, based on WTO data. Other Latin America Countries (OLAC) includes Dominican Republic, Ecuador, El Salvador, Nicaragua, Panama, Paraguay, and Uruguay.

Appendix figure 5: Main sources of digitally deliverable services incorporated into Asian agricultural exports in 2005 and 2015, by exporting country



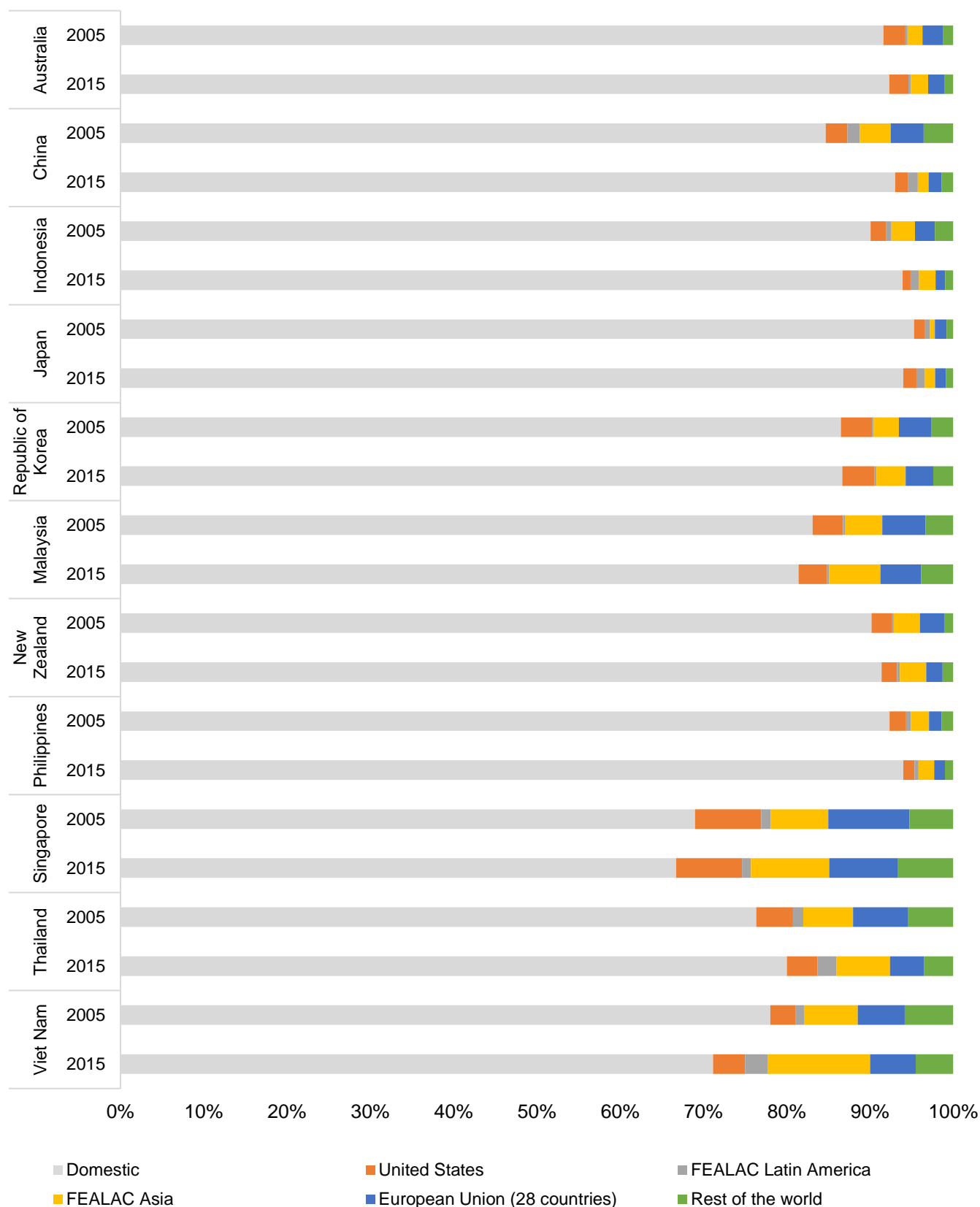
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 6: Main sources of digitally deliverable services incorporated into Asian manufacturing exports in 2005 and 2015, by exporting country



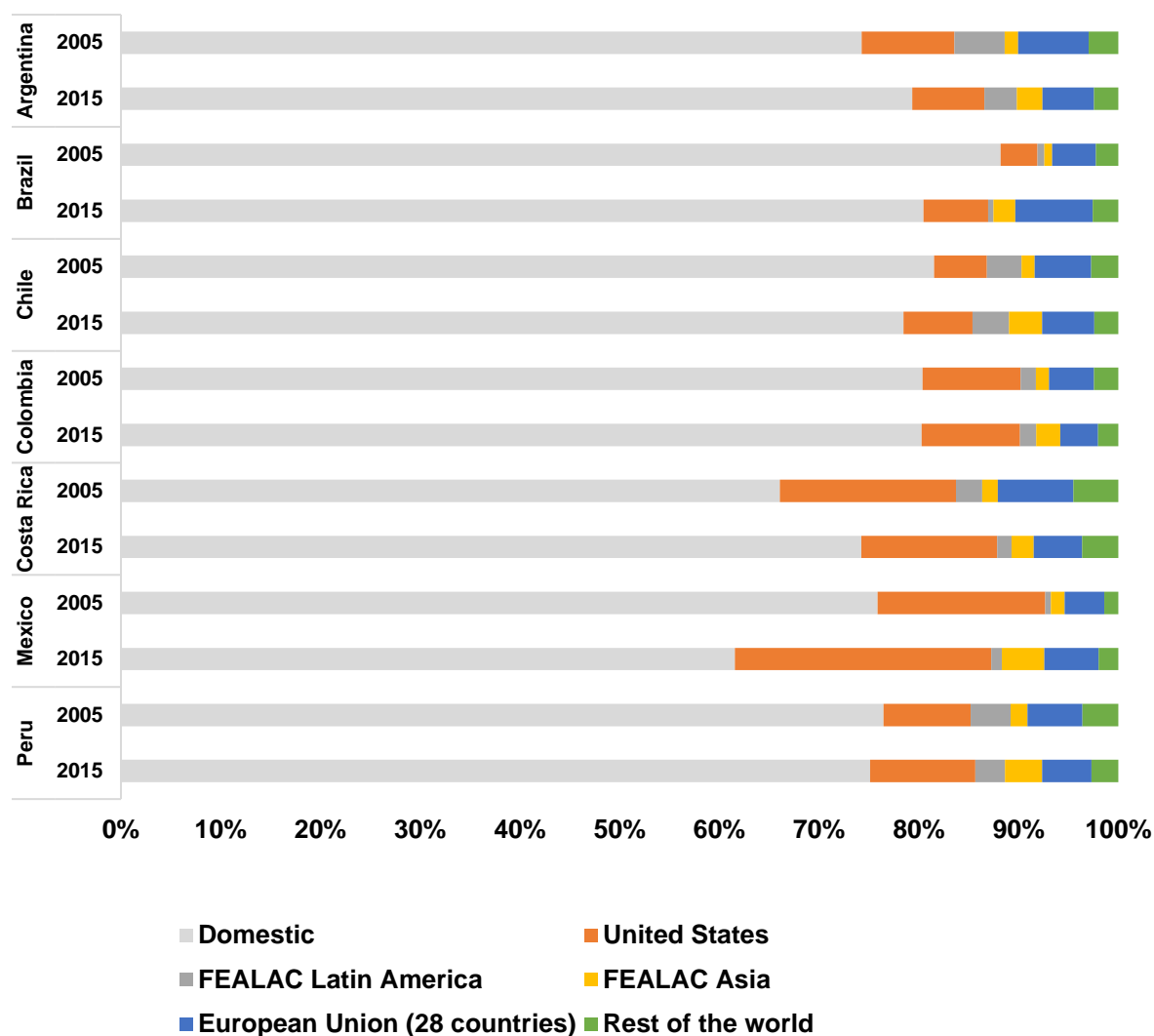
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 7: Main sources of digitally deliverable services incorporated into Asian services exports in 2005 and 2015, by exporting country



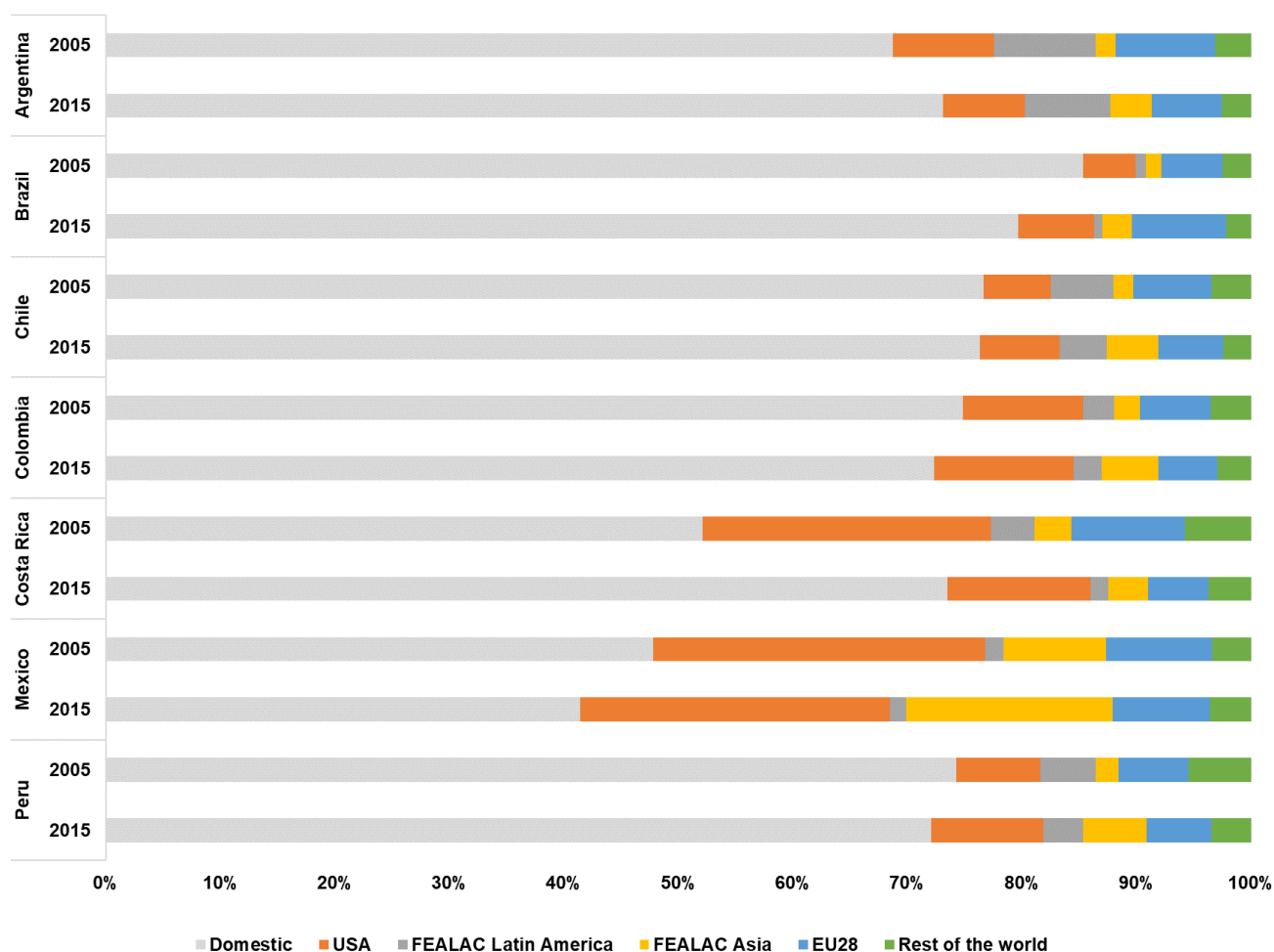
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 8: Main sources of digitally deliverable services incorporated into Latin American agricultural exports in 2005 and 2015, by exporting country



Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 9: Main sources of digitally deliverable services incorporated into Latin American manufacturing exports in 2005 and 2015, by exporting country



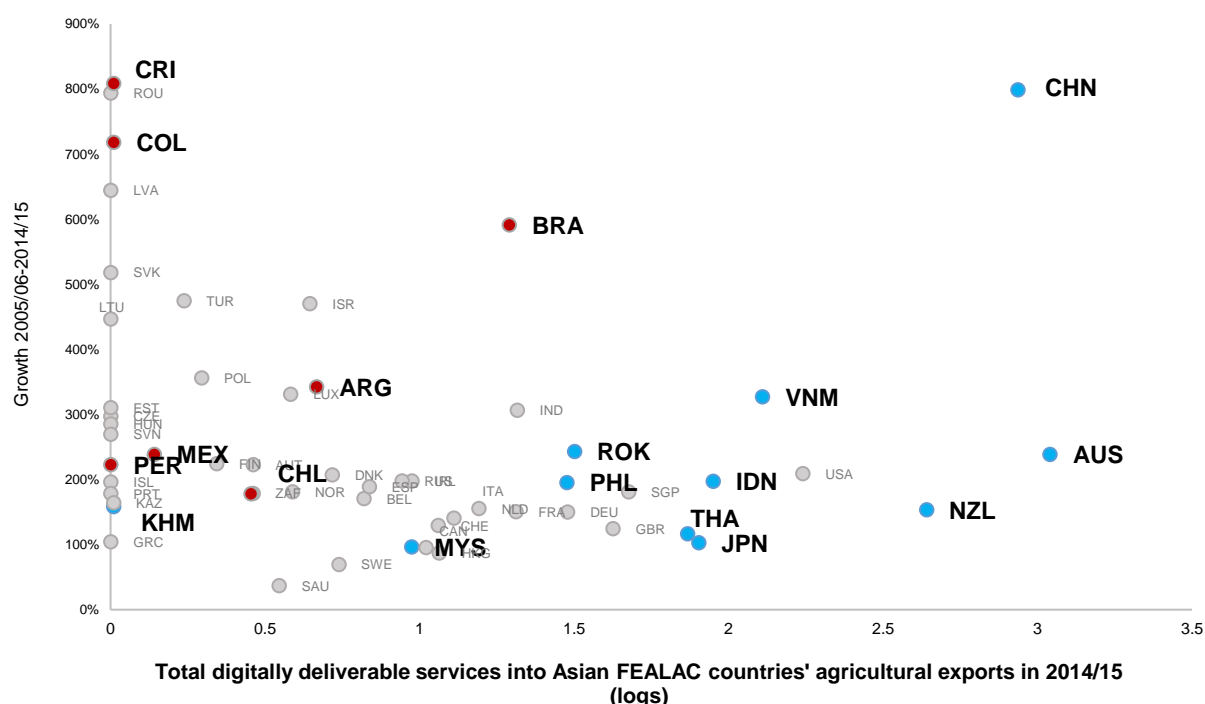
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 10: Main sources of digitally deliverable services incorporated into Latin American services exports in 2005 and 2015, by exporting country

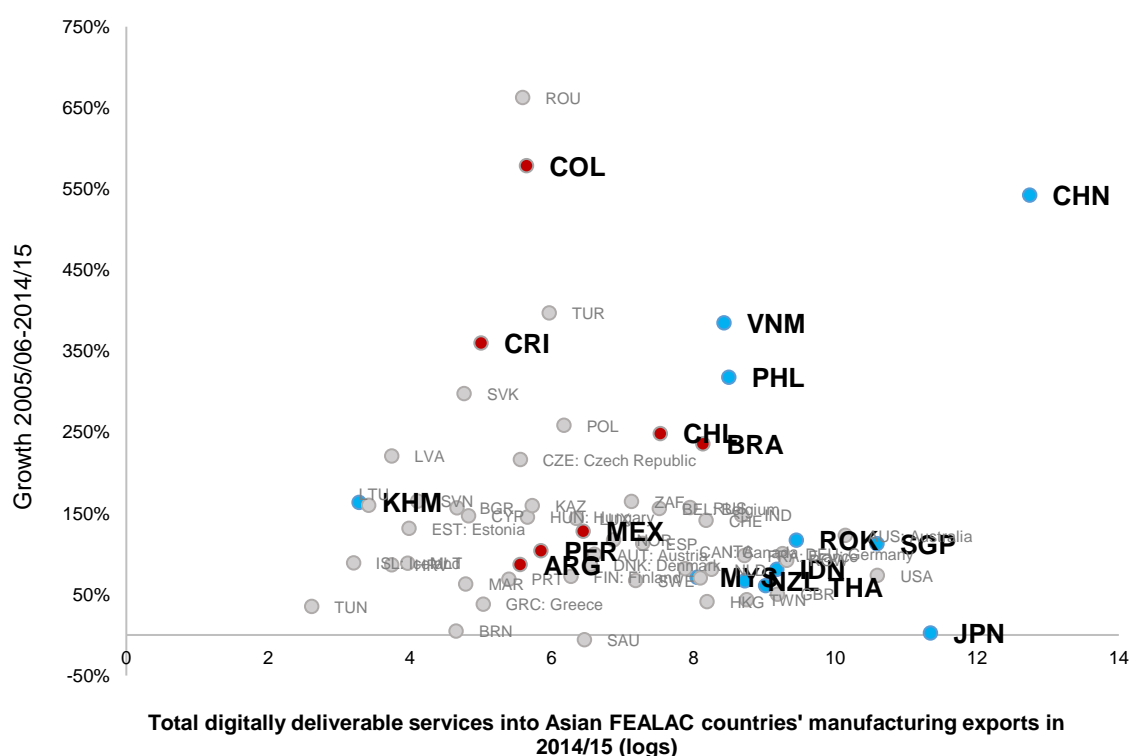


Source: Author's calculation, based on the OECD TiVA database.

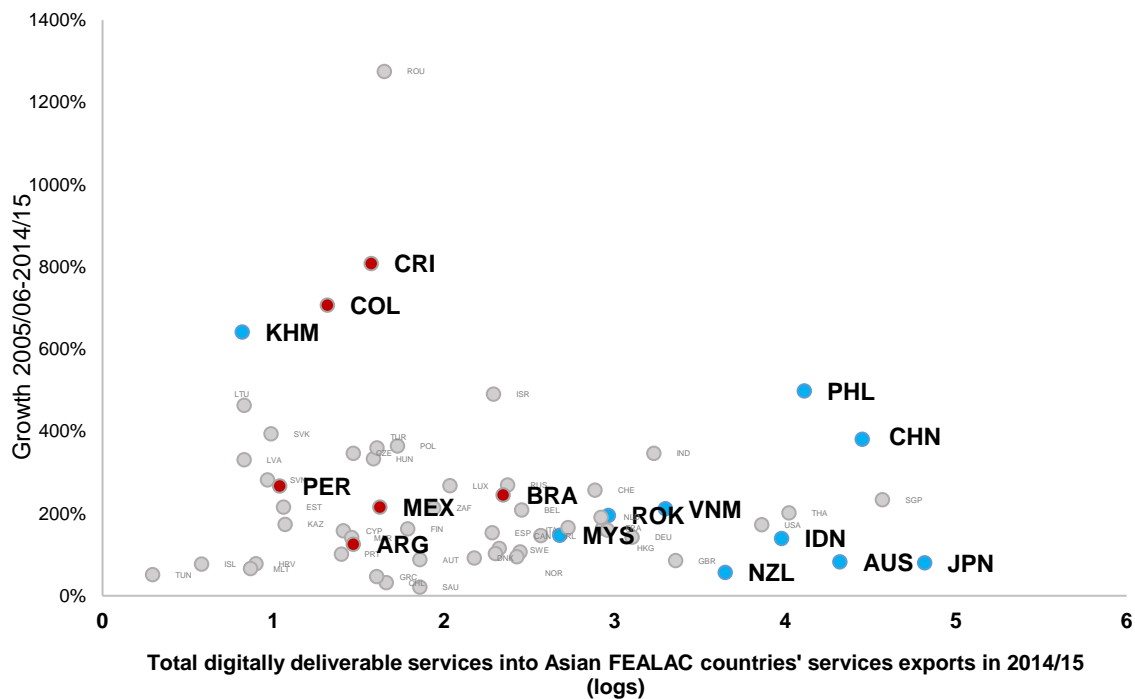
Appendix figure 11: Volume (in logs) in 2014/15 and total growth from 2005/06 to 2014/15 of digitally deliverable services incorporated into Asian agricultural exports in 2014/15, by source



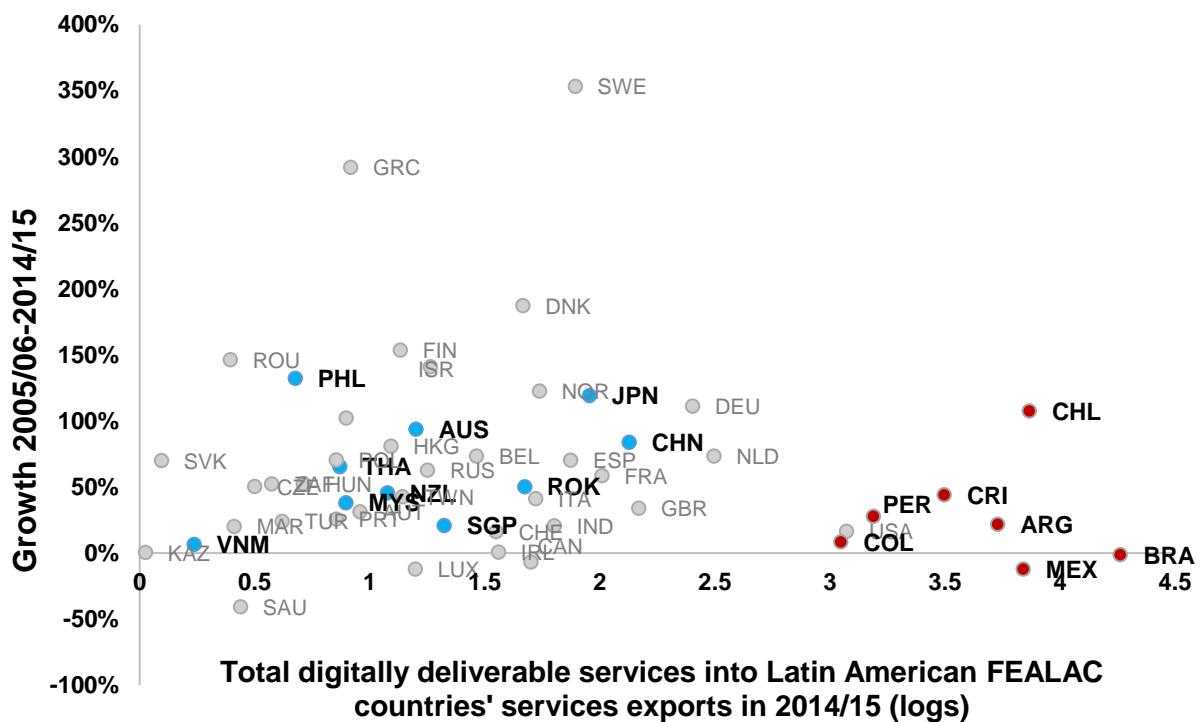
Appendix figure 12: Volume (in logs) in 2014/15 and total growth from 2005/06 to 2014/15 of digitally deliverable services incorporated into Asian manufacturing exports in 2014/15, by source



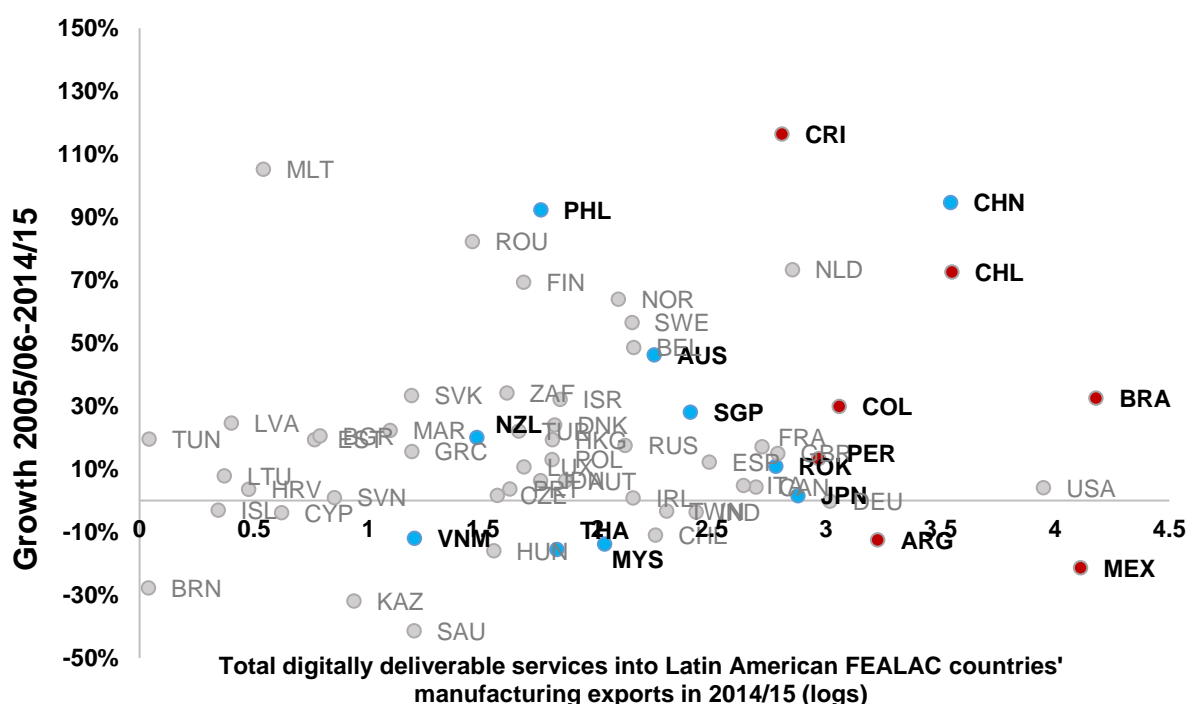
Appendix figure 13: Volume (in logs) in 2014/15 and total growth in 2005/06 to 2014/15 of digitally deliverable services incorporated into Asian services exports in 2014/15, by source



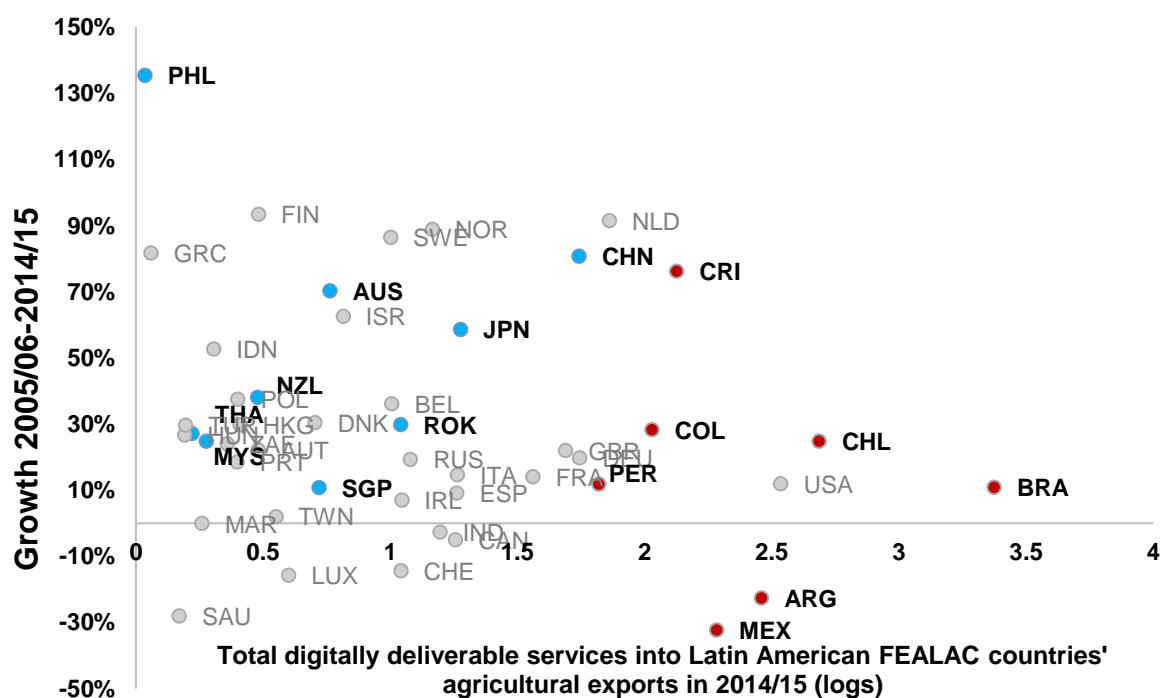
Appendix figure 14: Volume (in logs) in 2014/15 and total growth in 2005/06 to 2014/15 of digitally deliverable services incorporated into Latin American agricultural exports in 2014/15, by source



Appendix figure 15: Volume (in logs) in 2014/15 and total growth in 2005/06 to 2014/15 of digitally deliverable services incorporated into Latin American manufacturing exports in 2014/15, by source

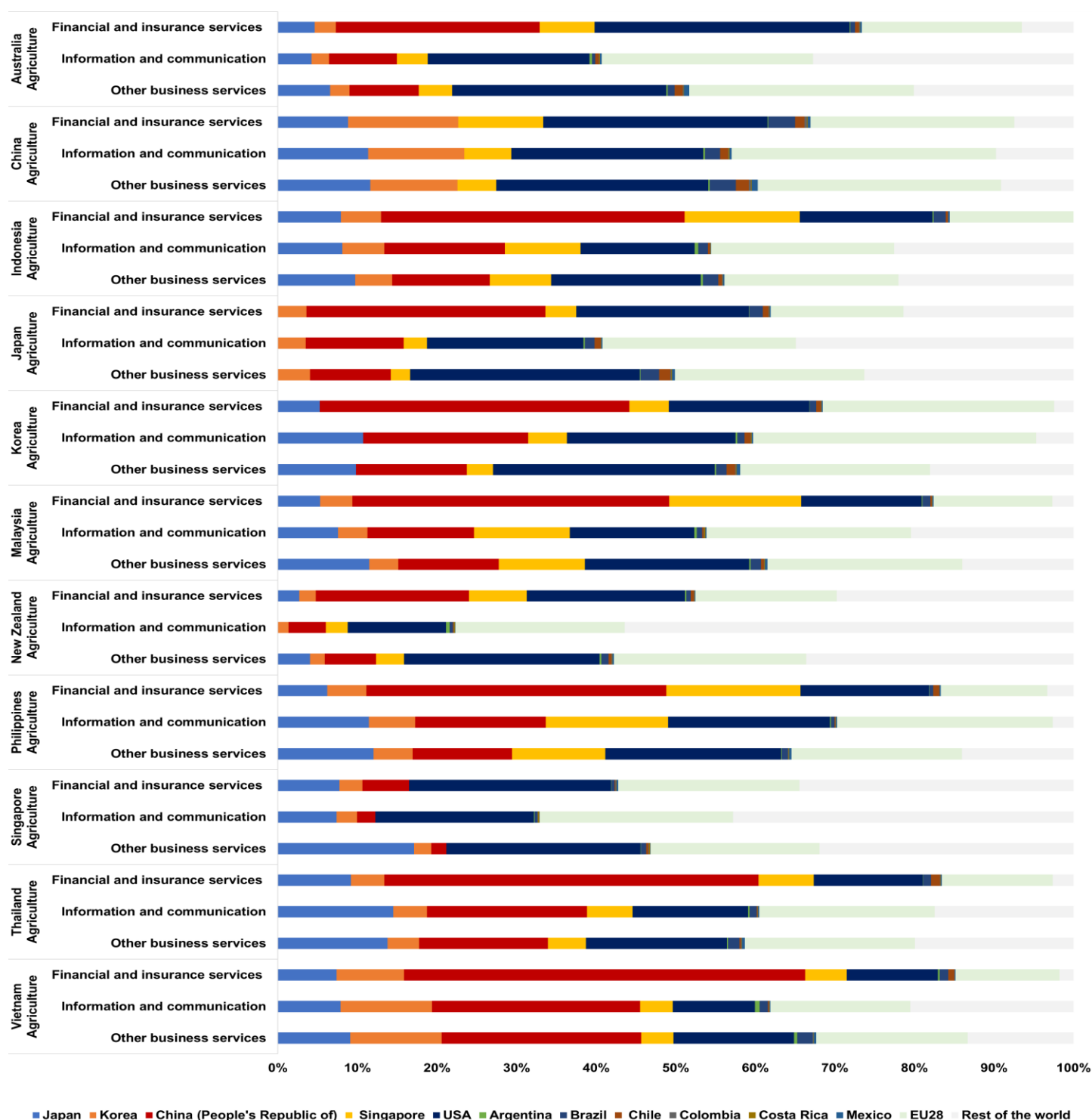


Appendix figure 16: Volume (in logs) in 2014/15 and total growth in 2005/06 to 2014/15 of digitally deliverable services incorporated into Latin American services exports in 2014/15, by source



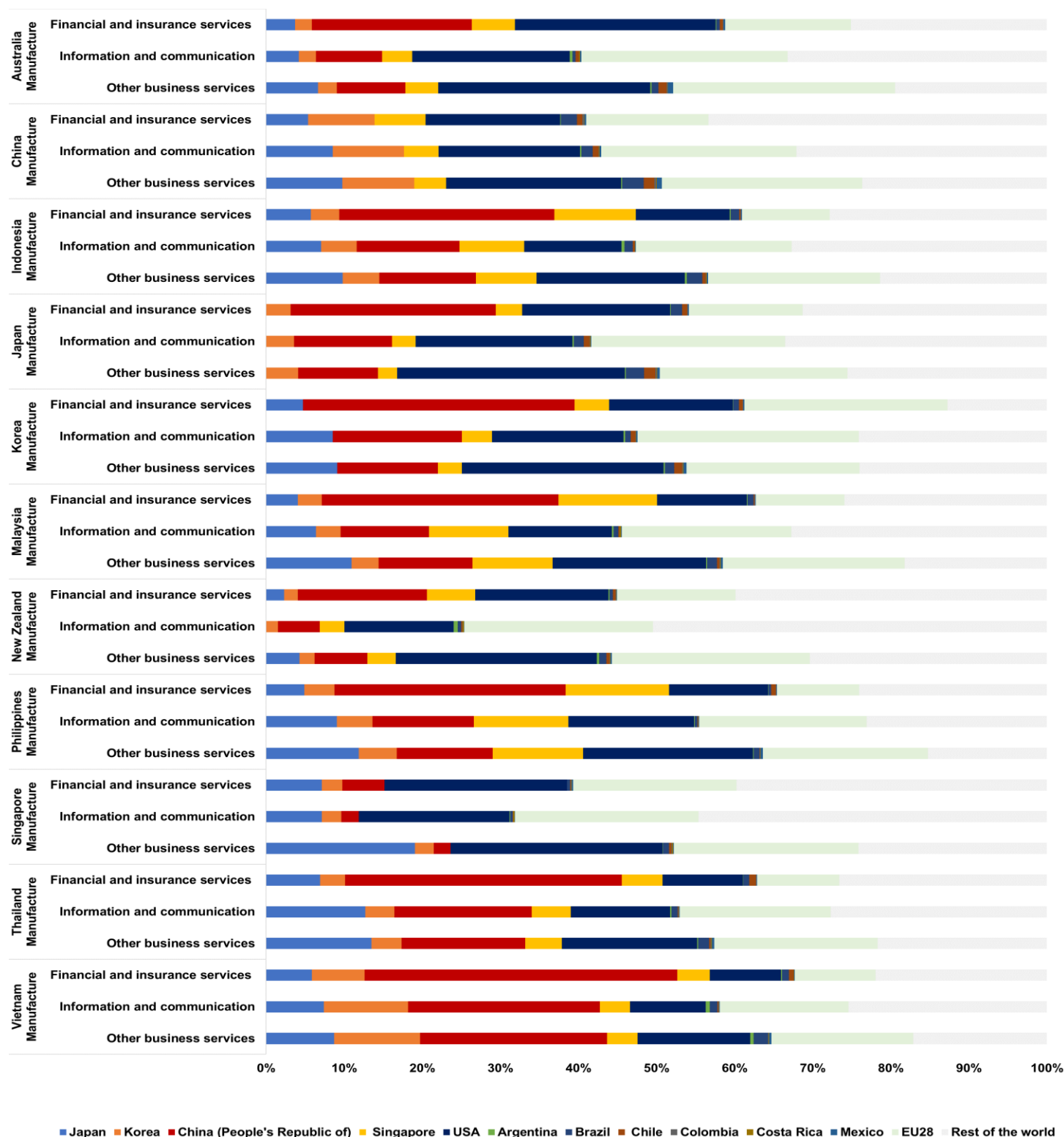
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 17: Main sources of imported digitally deliverable services incorporated into Asian agricultural exports in 2015, by exporting country and type of digitally deliverable service



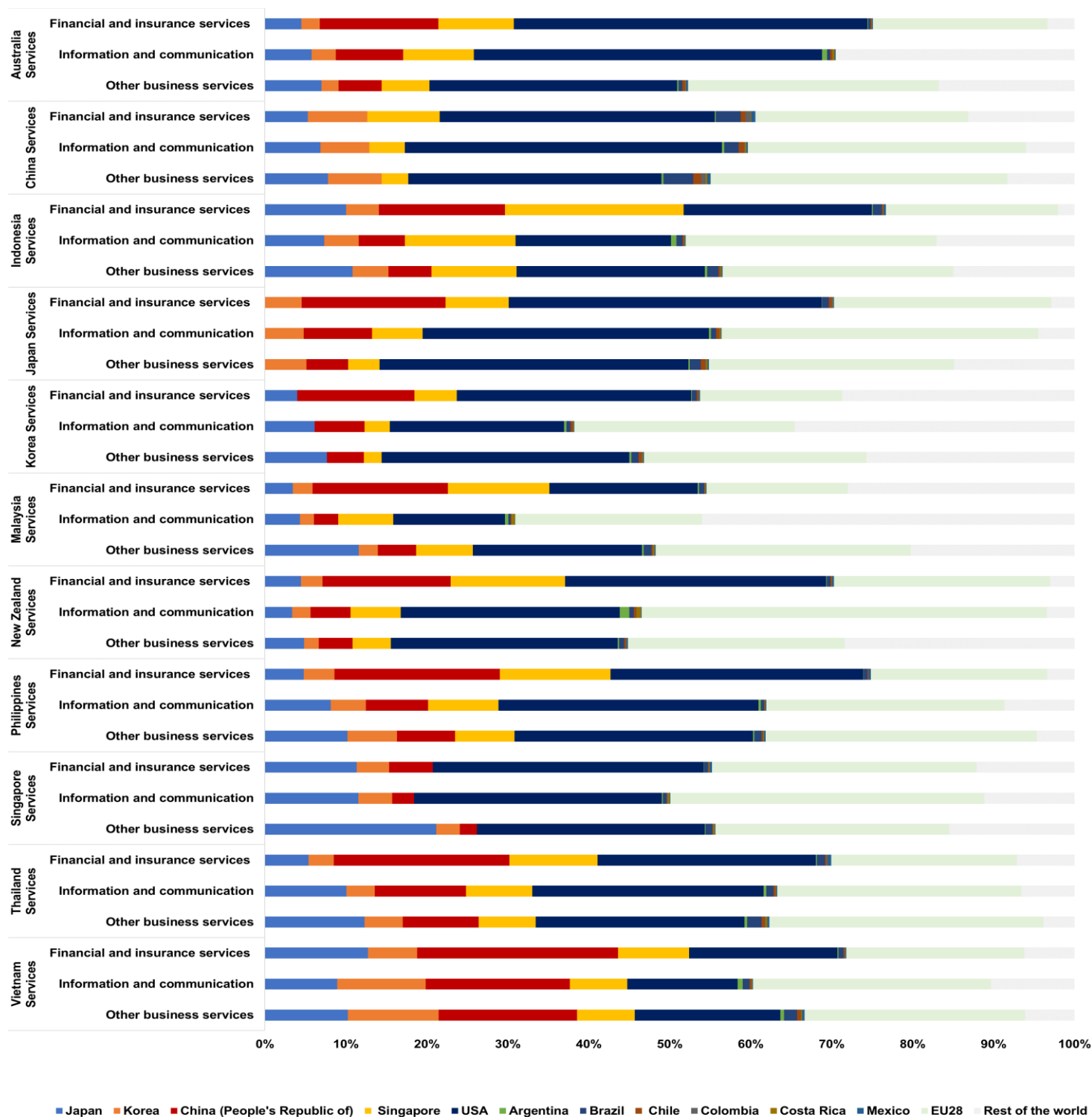
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 18: Main sources of imported digitally deliverable services incorporated into Asian manufacturing exports in 2015, by exporting country and type of digitally deliverable service



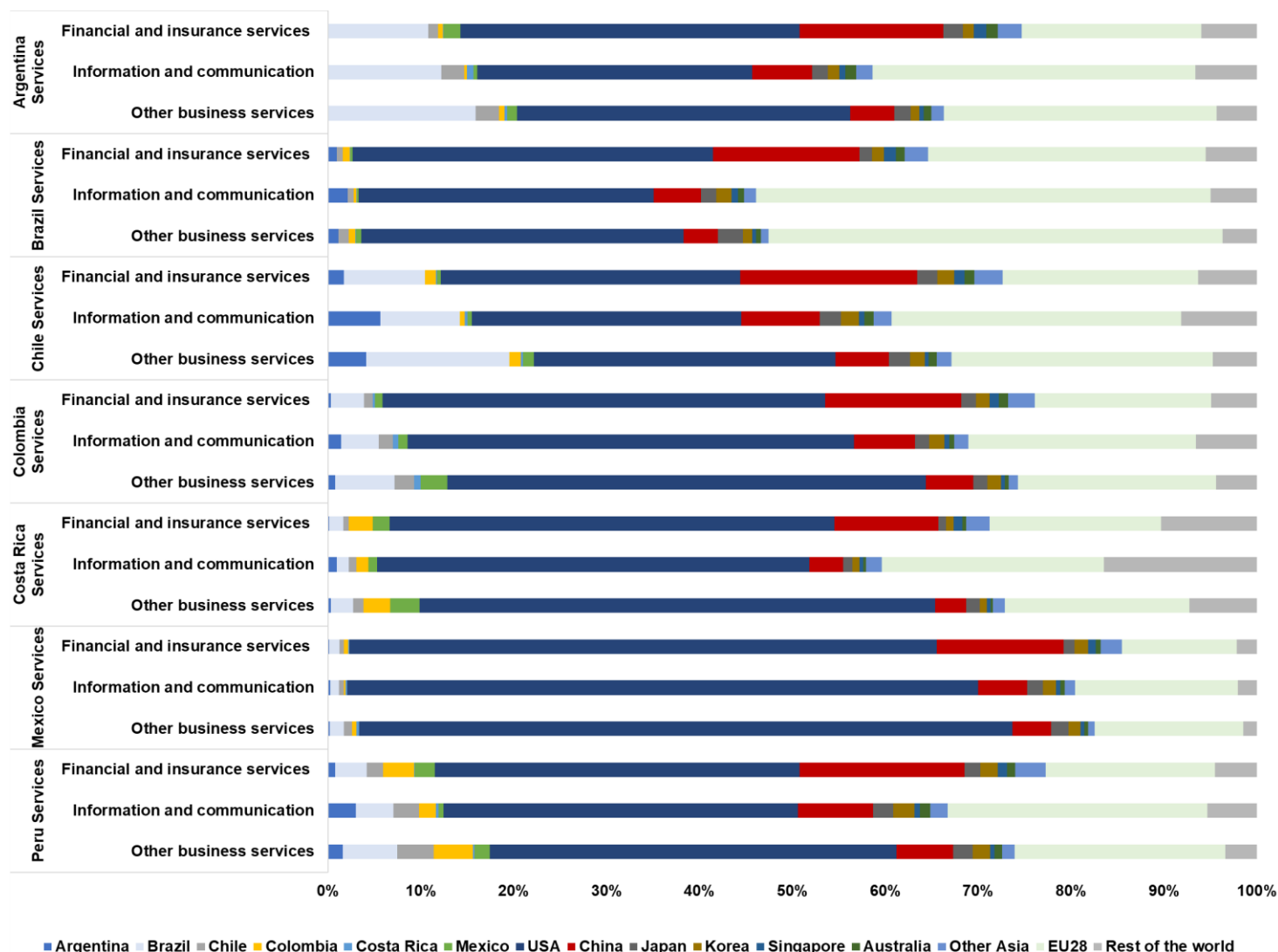
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 19: Main sources of imported digitally deliverable services incorporated into Asian services exports in 2015, by exporting country and type of digitally deliverable service



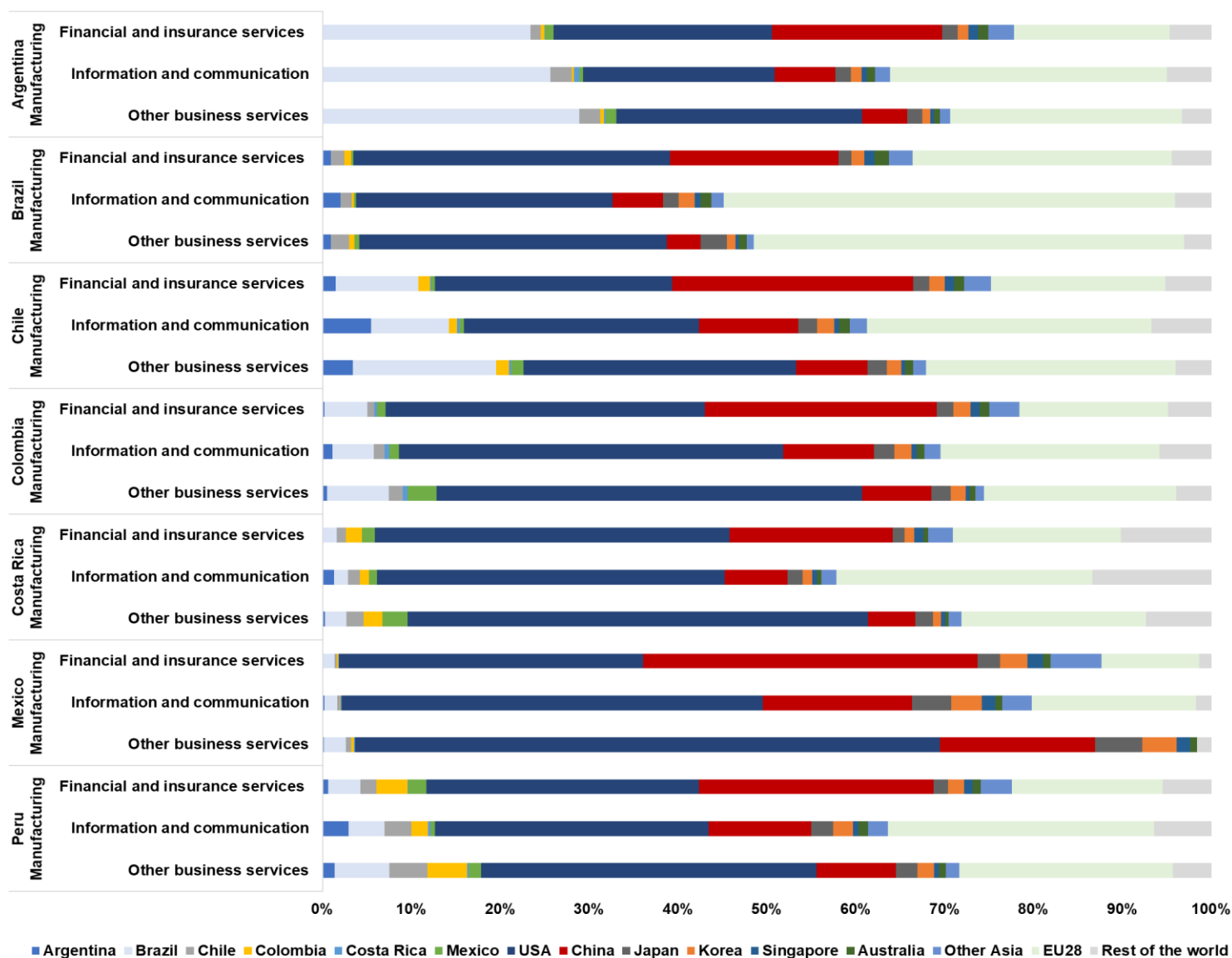
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 20: Main sources of imported digitally deliverable services incorporated into Latin American services exports in 2015, by Latin American exporting country and type of digitally deliverable service



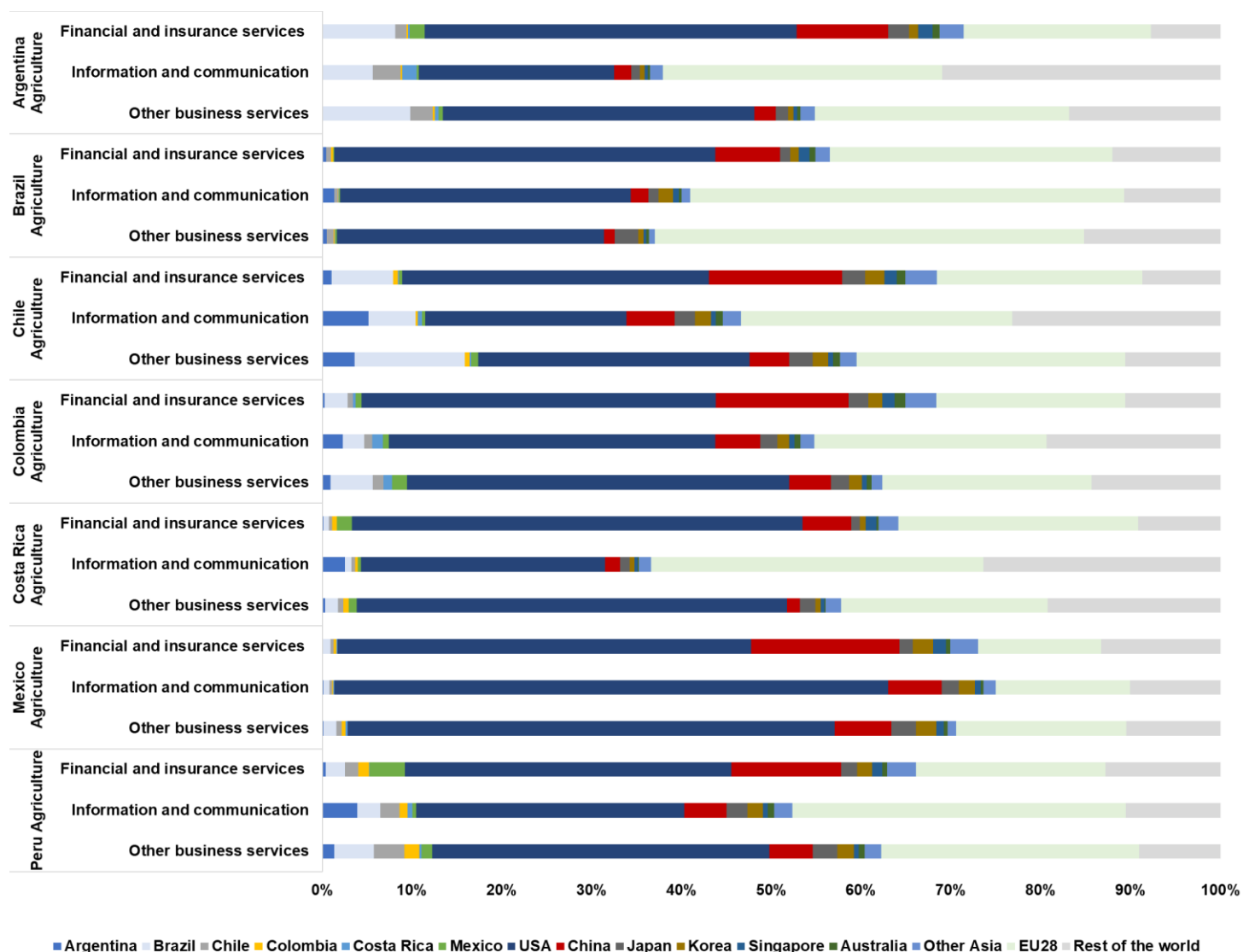
Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 21: Main sources of imported digitally deliverable services incorporated into Latin American manufacturing exports in 2015, by Latin- American exporting country and type of digitally deliverable service



Source: Author's calculation, based on the OECD TiVA database.

Appendix figure 22: Main sources of imported digitally deliverable services incorporated into Latin American agricultural exports in 2015, by Latin American exporting country and type of digitally deliverable service



Source: Author's calculation, based on the OECD TiVA database.

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