

**Unlocking Latin America's export potential in final and intermediate services:
The definition of a research agenda using new statistics¹²**

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**SABBATICAL REPORT carried out at the:
Institute of Social Studies, Erasmus University Rotterdam, The Netherlands
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15 June 2017

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² As agreed with my UN supervisors, this report focuses in particular on research theme C of the original research proposal. This is mainly because my Sabbatical was 11 instead of 17 weeks. Due to two conferences I had to organize in December and Christmas holidays, I initiated the sabbatical on 9 January 2017 instead of 1 December 2016. Also, commitments in ECLAC did not allow me to extend this period abroad.

³ The author is grateful to Rolando Avandano (OECD), Filippo Bontadino (University of Sussex) and Dayna Zalcicever (ECLAC) for their contributions and to comments from participants in seminars at OECD, United Nations University and University of Maastricht, University Complutense of Madrid, University of Granada, University of Groningen, University of Sussex, and the World Trade Organization. A special thanks to Peter van Bergeijk, Annet van Geen and the Institute of Social Studies of Erasmus University Rotterdam for hosting me.

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Executive summary

The analytical and political interest for trade in services has increased since a few years around the world as it was demonstrated they account for almost half instead of less than one quarter of global trade. This “surprising” result was found using new statistics on trade in value added, showing that about half of internationally traded services are incorporated as intermediates in the exports of goods. Increased interest also stems from the faster growth of trade in services, in particular modern services facilitated by internet, compared to that of trade in goods. The rapid expansion of different types of services was driven in part by the fast spread of global value chains (GVCs) from the 1990s onwards, although these seem to have reached a plateau at the beginning of this decade.

Latin America and the Caribbean’s attention on services exports has also grown over time. This partly results from the stagnating global demand for their goods, in particular commodities, since 2013. Flat commodity demand led to large drops in their prices and overall export revenues in South America especially in the last few years. Moreover, the recent commodity price cycle led to the re-primarization and concentration of the region’s export basket. In this context, many countries are looking for new sources of export growth and diversification. Several countries in the Caribbean and Central America are traditionally specialized in tourism, while some others (such as Chile and Panama) have a strong comparative advantage in transport services. The dynamics of these categories is strongly linked to GDP growth cycles in the case of tourism and trade in goods in the case of transport. In contrast, exports of modern services have suffered less from the deceleration in global trade. Few countries in the region, however, are specialized in this category of services covering a large range of activities including telecommunications, computer, and information services, finance and insurance, and a large of other business services (research and development, professional services and management accounting services, and technical services).

Another motivation to focus more on services trade is that this sector increasingly dominates the economies of Latin America and Caribbean (LAC). In most countries this sector has expanded its participation and reached at least two thirds of GDP, employment and inward foreign direct investment (FDI). This structural transformation of the region’s economies is a natural process of economic development, but its pace has accelerated after the turn of the century due to the region’s premature deindustrialization. However, the high share of services in aforementioned economic variables is not mirrored in the countries’ gross exports of goods and services, being only between 20% and 25%, except for countries in the Caribbean and Panama.

In this context, this report has three main goals. First, evaluate recent advances in both the region and globally with respect to the measurement of both direct services trade and indirect services trade as measured by the incorporation of services as intermediates in goods exports. This evaluation is important as traditionally few countries published data on exports and imports of services in terms of specific categories and geographical breakdown. Moreover, many countries did not have specific tools to measure trade in modern services, which in turn were underreported in their Balance of Payments. Second, assess the competitiveness of the region, subregions and countries in global services exports and trade over the past decade. Third, evaluate the incorporation of both domestic and intermediate services into the exports of manufactures for a subset of seven economies of the region for which new trade in value added statistics are available: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico and Peru.

The following conclusions and recommendations emerge from this report. First, some progress has been made regarding trade in services statistics, but major challenges remain. About half of the 14 member countries of the Latin American Integration Association (ALADI) are following guidelines of the 2010 Manual on Trade in Services Statistics. This manual recommends compilation guidelines and disaggregation of the services categories following both the fifth and sixth Manuals of the Balance of

Payments (ALADI, 2016). In most ALADI countries, the disaggregation of services trade has also improved from 2000 onwards. However, only four nations publish data by trading partner, while only one country registers trade by the four modes of delivery. Moreover, many countries publish only few data on trade in modern services, due to a lack of adequate surveys or other data sources. Information on the incorporation of services value added into the exports of goods sectors is available from 2010 onwards through the publication of different inter-country input output tables (IIOTs). The three most important IIOTs that include Latin American countries are the World Input Output Database (WIOD), Trade in Value Added (TIVA) database and the South American IO table. These include between 2 and 10 countries of the region with data that run up to 2014.

On the basis of these results, it is recommended countries step up their efforts to improve their trade in services statistics. Specific needs are a further disaggregation of trade in modern services, breakdown by trading partners and four modes of services provision. In particular, countries need to accelerate the implementation of the sixth manual of the Balance of Payments and 2010 Manual on Trade in Services Statistics. While in some cases this requires additional resources for central banks or statistical agencies to carry out specific surveys that capture better these traded services, in others it means strengthening the institutional cooperation framework between public and private institutions to share statistics, such as customs, tax authorities, supervisory bodies, chambers of commerce, and professional organizations. It is also important to step up technical advice and training workshops by the International Monetary Fund, United Nations Statistics Division, ECLAC and/or ALADI, as well as North-South and South-South cooperation between central banks and statistical offices on these issues.

Second, the region's market share in global services stagnated between 3.0% and 3.5% from 2005 to 2015. This conclusion is drawn from an analysis based on Balance of Payments data as reported by the World Trade Organization (WTO). This performance is disappointing compared to its competitors in Asia, like China, India and ASEAN, which all increased substantially their market shares. Latin America and the Caribbean performed a little better in modern services, as its global market share increased by 0.8 percentage points from 2005 to 2012, but fell slightly afterwards. Again, Developing Asia's performance was much better. The region's overall stagnant performance hides some variations across the four main subregional integration schemes: Mercosur and Central America improved their market shares, whereas the Pacific Alliance and CARICOM lost. All subregional schemes, except for Central America, experienced worsening trade balances in both total services and modern services during this period. At the country level, Brazil explains most of Mercosur's dynamic performance in different services categories. In Central America, countries that most expanded exports were Panama (in transport and financial services) and Costa Rica (in telecom, computer and information services). Opposite trends occurred in the Pacific Alliance, where Chile drove most of the loss of global market share of the Pacific Alliance in transport, while Mexico accounted for most of the market share drop in telecom, computer and information services.

On the basis of these results, it is recommended that countries and subregional integration schemes carry out more detailed analyses of their competitiveness, focusing in particular on the most dynamic segments of international trade in modern services. Moreover, more work needs to be done to understand differences in the performance of countries, which may in part result from more or less active public and private policies to promote specific types of (modern) services exports. Key areas to focus on are the development of human capital skills for specific services industries, the development of the IT infrastructure in terms of access to high-speed broadband, policies to attract and maintain foreign direct investment in targeted sectors, tax treatment of export, the regulatory environment to produce and import services, policies that promote the digital economy, and efforts to promote services exports.

Third, the analysis of indirect trade in services shows that within an international context the region does underperform in terms of the incorporation of intermediate services in their exports of manufacturing goods. This finding leads to a preliminary rejection of the hypothesis that the region's stagnant export

performance in goods trade over the past fifteen years is due to the insufficient incorporation of intermediate services in exports. However, a more detailed analysis and comparison with ASEAN countries point to several potential explanations on why intermediate services in Latin America do not seem to improve the region's manufacturing export performance. These international comparisons are based on inter-country input output tables produced under the Trade in Value Added (TIVA) initiative of the Organization for Economic Cooperation and Development (OECD) and WTO. These tables cover 63 countries, including seven from Latin America, over the period 1995 to 2011.

In Latin America, the domestic services value added intensity of manufacturing exports is higher than in ASEAN. In contrast, in ASEAN the imported services value added intensity of manufacturing exports is higher than in Latin America. One explanation for this result is that ASEAN countries are more integrated in regional production networks and value chains, which require relatively more imported services. Moreover, ASEAN countries export relatively more labor-intensive and technology-intensive manufactures that are more intensive in imported services, compared to Latin America which is more specialized in natural resource-intensive industries. The relatively higher domestic intensity of Latin American countries compared to those in ASEAN may also be the result of fewer restrictions on services markets in the former compared to the latter.

A comparison of seven Latin American countries included in the TIVA database shows that Brazil and Costa Rica are the countries with the highest domestic services content of manufacturing exports. The high domestic services content in Brazil contributes little to the international competitiveness of the manufacturing sector, as it mostly reflects the high prices of key services such as finance, logistics and telecom. In turn, these high prices result from low productivity, little competition and reduced investment levels. Mexico and Costa Rica are the countries with the foreign services value added contents of exports in 2011. This may result from the fact that the manufacturing sectors in these two economies are the most integrated in global and regional production networks.

Regressions are carried out to evaluate how domestic and imported services are associated to a country's manufacturing competitiveness in terms of changes in market share in global exports. The model includes various control variables, including the previous period's market share, unit labor costs, product market regulation, cost to export, size of the manufacturing sector, real effective exchange rate, and foreign direct investment intensity. In addition to these control variables, it turns out that the total domestic services content of manufacturing exports is negatively associated with global exports market shares, whereas total imported services positively. However, when the focus is on business services the results change: the domestic value added of renting machinery and equipment, research and development and other business services are positively associated to changes in global export market share for the average country. In turn, some other domestic services (finance and real estate) seem to impact negatively market share changes.

This third set of findings points to several recommendations. The above results could be expanded to more countries in the region and more recent years to the extent new data become available. Both OECD and ECLAC are in the process of updating their IIOTs and including more countries. On the basis of these findings, the heterogeneity between Latin America and developing Asia, on the one hand, and between Latin American countries, on the other hand, in terms of the intensity of different types of domestic and imported services should be further analyzed using econometrics. Possible drivers of these country differences in services intensities are types of specialization in natural resource, labor or technology intensive industries, forward and backward participations in global value chains, product and service markets restrictions, domestic presence of foreign firms in service sectors, and participation in free trade agreements. A third avenue for future work is studying the impact of different domestic and imported service intensities on manufacturing export performance. This requires linking these service intensities to performance measures of domestic service sectors. Moreover, this work could be extended to primary goods producing sectors.

Introduction

The service sector increasingly dominates the economies of Latin America and Caribbean (LAC). Services comprise many activities producing intangibles ranging from transport, communications, distribution, finance and real estate, business services, education, health, government and personal services. In most countries this sector accounts for at least two thirds of GDP, employment and inward foreign direct investment (FDI). Moreover, this sector's shares in the aforementioned aggregates have increased over the past three decades, resulting in part a decline in the shares of the primary (agriculture and mining) and secondary (manufacturing and construction) sectors. This structural transformation of the region's economies is a natural process of economic development, but its pace has accelerated after the turn of the century due to the region's premature deindustrialization (Castillo and Martins Neto, 2016).

The high share of services in aforementioned economic variables is not mirrored in the countries' gross exports of goods and services, being only between 20% and 25%, except for countries in the Caribbean and Panama. Gross exports refer to services sold directly by services firms to clients abroad. These exports can be divided into four categories: goods related services, transport, tourism and "other" services. The latter category is often referred to as "modern" services facilitated by information technologies (ITs), which include distribution, financial and insurance services, computer and IT services, a large range of business services, government services and personal services. The spread of IT and digital platforms boosted the growth of modern services exports worldwide, which in turn are at the heart of the proliferation of the geographical decomposition of production networks and global value chains (GVCs). According to balance of payments statistics, the expansion of modern services exports in LAC trails that of developing Asia and as a consequence the region has lost market share in one of the most dynamic segments of world trade (ECLAC, 2016).

Gross services trade statistics do not capture the true importance of services in international trade. This is because many services are traded indirectly, being incorporated as intermediate inputs in exports of other producers. When these intermediate exported services are also included, the share of services in the region's total exports almost doubles. Intermediate exports are services sold as inputs to other industries to produce goods and services for exports.

To measure both directly and indirectly exported and imported services, gross trade values need to be decomposed into value added components. These can only be measured since a few years using new types of statistics referred to as international input-output tables (IIOTs). A growing body of theoretical and empirical literature shows that the "servicification" of goods exports is a major determinant of their international competitiveness. Therefore, intermediate services exports do not only increase total services exports, but are also essential for increasing market shares of global trade in commodities and industrial products.

Two broad types of intermediate services can be distinguished: "cost services" and "value services" (Arbache, 2016). "Cost services" are important to improve production efficiency, increase productivity, smoothen international production networks and minimize costs associated to exports. Examples are transport and logistics, finance, information technology and communication (ICT), insurance, management, equipment and buildings, and financial and insurance. "Value services" are mostly business services used to differentiate goods and make them more attractive to customers in an often highly competitive environment. Value services help to produce premium products and increase customer loyalty.

Based on traditional balance of payments data and new statistics from IIOTs, this paper aims to re-assess the region's trade performance in direct and indirect services exports. The questions of this research are: What progress has been made over the past decade to measure direct and indirect services exports of LAC's main economies, and how do these developments compare to developing Asia? How do LAC and developing Asian countries perform in terms of direct services exports using traditional balance of payments statistics? How do LAC and Asian countries perform in terms of indirect services exports using data from new IIOTs? What is the contribution of intermediate services' forward linkages to goods exports? On the basis of the paper's results, what should ECLAC do to better assess and improve the performance of the member countries' direct and indirect services exports?

In addition to this introduction, this paper has four sections. The first reviews recent progress made in the measurement of both direct and indirect services exports. The second looks into the regional performance in trade in services, with a specific focus on modern services. Section four studies the region's trends with regard to indirect services exports through their incorporation as intermediates in manufacturing exports. In the final section, conclusions and recommendations on a future work agenda of ECLAC are presented.

A. Measurement of gross and value added services exports

Recently improvements have been made in the measurement of both gross and value added services trade around the world and Latin America and the Caribbean in particular. Services trade on a “gross” basis refers to the total value of the service traded. In the case of exports, it is the total value of a service sold by a resident service provider to a non-resident. In the case of imports, it is a total value of a purchase by a resident from a non-resident service provider.⁴ Gross services trade statistics are reported by the Extended Balance of Payments System (EBOPS) of each country since several decades. They are easy to find and understand, reflecting total services exports and imports between nations. However, until recently in many developing countries gross services trade statistics had only a very limited breakdown into different categories and often did not provide information of the partner countries.

The Latin American Integration Association (ALADI) (2016) provides a good overview on progress made in terms of gross service trade statistics by its 14 member countries: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela (Bolivarian State of) (See Table 1). This overview was facilitated by ALADI’s Service Trade Statistics Working Group, which annual meetings have greatly contributed to advancing the services trade statistics in these countries. In most countries, the Central Bank coordinates these statistics, except for Argentina, Colombia, Cuba and Panama where the statistical offices are also (co)responsible. Multiple other institutions also contribute to the data collection, including customs, ministries, supervisory bodies and sometimes private branch organizations.

Almost all countries have implemented the fifth Manual of the Balance of Payments, while some have fully implemented the sixth manual or are in the process of doing so. The sixth manual introduces several changes compared to the fifth manual. Most importantly, new services trade categories are introduced, such as manufacturing services on physical inputs owned by others, new types of business services and maintenance and repair services not included elsewhere. Also, financial services trade has been expanded to Financial Intermediation Services Indirectly Measured” (FISIM) using a specific method of reference interest rates. Moreover, some service categories are reclassified (Eurostat, 2016). About half of the countries are also following the guidelines of the 2010 Manual on Trade in Services Statistics. This manual recommends countries to follow the compilation guidelines and disaggregation of the services categories of the fifth and sixth Manuals of the Balance of Payments.

Most countries publish trade in services data on a quarterly basis, except for Brazil which releases monthly data. Cuba and Panama only publish data on an annual basis. Only four out of thirteen countries publish data by trading partner. For the estimation of trade in services data, several countries use business registers and special surveys.

⁴ This is the case for all modes of delivery of services trade except for mode 3 being services sales by foreign affiliates in a country’s territory.

Table 1
ALADI countries: Data availability on trade in services statistics, 2016

Country	Institution in charge	Implementation of manuals		Application of 2010 services manual?	Data frequency	By trading partner	By mode of delivery	Other services	
		Fifth	Sixth					Business registers	Special survey
Argentina	INDEC	Yes	Yes	Yes	Q	I.P.	No	Yes	Yes
Bolivia	CB	Yes	No	No	Q	No	No	Yes	Yes
Brazil	CB-Min	Yes	Yes	No	M	Yes	Yes	Yes	Yes
Chile	CB	Yes	Yes	No	Q	Yes	No	No	No
Colombia	BR-DANE	Yes	Yes	Yes	Q	Yes	Yes	Yes	Yes
Cuba	ONEI-CB	No	No	Yes	A	No	No	Yes	No
Ecuador	CB	Yes	No	No	Q	No	No	No	No
Mexico	CB	Yes	I.P.	No	Q	No	No	No	No
Panama	INEC	Yes	Yes	Yes	A	I.P.	No	Yes	Yes
Paraguay	CB	Yes	I.P.	n.d	Q	No	No	Yes	Yes
Peru	CB	Yes	2018	Yes	A	I.P.	No	Yes	Yes
Uruguay	CB	Yes	No	n.d.	Q	No	No	No	Yes
Venezuela	CB	Yes	I.P.	Yes	Q	No	No	Na	Yes

Notes: CB = Central Bank; Min = ministry; I.P. = in progress; A = annual, Q = quarterly and M = monthly.

Source: Author on the basis of Latin American Integration Association (ALADI) (2016), “Estadísticas del comercio internacional de servicios: Diagnóstico sobre la compilación y difusión en los países miembros de la ALADI”, Montevideo.

In most ALADI countries, the disaggregation of services trade has also improved (Table 2). When comparing 2014 and 2015 to 2000, nine out of fourteen countries provided more detail on trade in services, while only three countries reduced the level of disaggregation. Brazil is the country that most increased its services trade breakdown from 13 to 67 categories, following the introduction of its Integrated System of Foreign Trade in Services and Intangibles (SISCOSERV) in 2012 (see Box 1). In modern services trade, half of the countries further disaggregated their statistics, with Brazil being again the country that opened up most its data.

Table 2
ALADI countries: Number of categories of trade in total and modern services, 2000-2015

	Total					Modern services				
	2000	2005	2010	2014	2015	2000	2005	2010	2014	2015
Argentina	34	32	34	10	32	20	19	20	6	14
Bolivia	27	29	30	31	23	10	13	15	15	11
Brazil	13	13	31	37	67	10	10	26	37	35
Chile	19	12	12	12	16	11	5	5	5	5
Colombia	20	21	23	23	31	14	15	16	16	16
Costa Rica	24	26	28	21	24	13	15	17	11	8
Ecuador	10	10	9	10	15	3	3	2	3	4
Mexico	17	15	15	13	21	5	4	4	3	3
Panamá	23	25	29	22	25	12	14	18	13	12
Paraguay	24	23	25	15	16	11	9	12	7	5
Peru	16	16	20	15	19	5	5	7	7	7
Uruguay	21	21	21	21	30	10	9	10	9	11
Venezuela	23	23	24	24	34	11	11	12	12	13

Note: Modern services refer other services, which include all services categories except for transport, travel and goods related services.

Source: Author on the basis of Latin American Integration Association (ALADI) (2016), “Estadísticas del comercio internacional de servicios: Diagnóstico sobre la compilación y difusión en los países miembros de la ALADI”, Montevideo.

Box 1: Detailed trade in services statistics: The case of Brazil

In Brazil, the Central Bank and Ministry of Industry, Foreign Trade and Services compile trade in services statistics. The former does this to prepare Balance of payments data and follows the methodology of the sixth manual of the Balance of Payments. For the management of its trade support instruments, the latter collects data for all four modes of supply as defined by the General Agreement of Trade in Services (GATS), except for mode 3 (commercial presence). The former publishes monthly statistics since 2014 and annual data since 1947. The latter provides bi-annual data since 2014. The Central Bank relies on data from currency transactions and surveys for transactions taking place outside Brazil. In turn, the Ministry obtains its statistics from an online Integrated System of Foreign Trade in Services and Intangibles (SISCOSERV), to which all services exporting and importing firms are legally obliged to report.

SISCOSERV is one of the most detailed publicly available services trade databases, with about 850 different categories of services and intangibles based on version 2.0 of the Central Product Classification (CPC). This database not only specifies the category of service traded, date, mode of supply, value of the transaction and currency used, but also allows the identification of cases where Brazilian firms outsource the provision of specific services to foreign firms and to which country those services are ultimately provided.

The table below shows the main categories of modern services exports, which include all services except transport and travel, to the five main destination markets. These categories account for 39% to 84% of all modern exports in 2015

Brazil: Main types and total modern services exports to main destination markets, 2015

	United States	Netherlands	United Kingdom	Germany	Switzerland	World
Modern services exports (in million US\$)	2,383	1,862	517	251	199	8,511
Share of categories in other services (%)						
Management, management consulting, PR	12.3	36.0	18.6	8.9	17.1	14.5
Other professional services	12.8	13.1	15.3	11.6	22.2	12.5
Services auxiliary to financial services	9.2	1.6	24.0	2.2	2.1	10.0
Machinery maintenance services	6.0	9.8	2.3	10.4	4.3	7.9
Engineering services	1.2	23.6	3.4	6.3	0.5	5.8
TOTAL	41.5	84.2	63.6	39.4	46.2	50.6

Sources: Author on the basis of Latin American Integration Association (ALADI) (2016), *Estadísticas del comercio internacional de servicios: Diagnóstico sobre la compilación y difusión en los países miembros de la ALADI*, Montevideo; Arbache, Rouzet and Spinelli (2016), "The Role of Services for Economic Performance in Brazil", *OECD Trade Policy Papers*, No. 193, OECD Publishing, Paris; and Ministry of Industry, Foreign Trade and Services, Integrated System of Foreign Trade in Services and Intangibles (SISCOSERV) database.

Gross services trade statistics largely underestimate the true importance of services in international trade. This is because many services are traded indirectly, being incorporated as intermediate inputs in exports of other producers. For example, car production include transporting parts and components to the factory, car design, testing to meet quality standards, and branding and marketing for sale on foreign markets. All are part of the car exporting process. To measure both directly and indirectly exported and imported services, gross trade values need to be decomposed into value added components.

Another shortcoming of gross export data is that it reflects an outdated view of production in a context of the rising international fragmentation of production over the past two decades. During this period, exported goods require more and more foreign inputs, and as consequence the gross value of exports differs from the domestic value added contained in those exports. Gross export values include both domestic value-added components and imported components (foreign value

added) and therefore no longer reflect the true role of a nation in foreign trade. For these reasons, analyses based on gross trade data may result in inaccurate assessments of the impact of international trade, which in turn can produce misguided political decisions. In contrast, the measurement of trade in value-added terms gives a better estimation of the contribution of trade to an economy and employment, as it isolates the true contribution of domestic value added to goods and services exports.

Until recently no systematic data was readily available on how services value added contributes to gross exports across different sectors. From 2010 onwards, however, important progress has been made in the measurement of value added trade through the publication of different international input output tables (IOTs). These tables combine national accounts and bilateral trade statistics linking production processes within and across countries. They capture both direct and indirect linkages and exchanges between countries and industries, accounting for the international fragmentation of production. As such they avoid double-counting problems that affect gross value trade data (Ahmad et al., 2017).

The three most important IOTs that include Latin American countries are the World Input Output Database (WIOD), Trade in Value Added (TIVA) and the South American IO table (see Table 3). The WIOD is put together by a consortium of European institutions under the leadership of the University of Groningen. Its 2016 version covers 43 countries, including Brazil and Mexico, representing more than 85% of world GDP (Timmer et al., 2016). Its sector breakdown is the most detailed one of three databases with 56 sectors including 31 service sectors. WIOD includes both national and international IO tables, as well as detailed socio-economic and environmental satellite accounts (capital stock, investment, wages and employment by skill type, energy use, emissions, land use, materials use and water use).

The TIVA database is prepared by the the Organisation for Economic Cooperation and Development (OECD) and World Trade Organisation (WTO). It includes both national and inter-country IOTs, together with a number of indicators based on trade in value-added terms. Its 2016 version covers 63 economies, including all 34 OECD countries and 29 non-member countries. The incorporated Latin American countries are Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico and Peru. It provides a 34 industries breakdown, including 13 service sectors, and annual observations from 1995 to 2011. One of the strengths of this database is the statistical network within which this database is constructed and maintained (OECD and WTO, 2013).

The 2016 South American Input Output table has been constructed by a consortium of researchers in 10 countries coordinated by the Institute of Applied Economic Research (IPEA) of Brazil and the United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC). It covers all economies of South America except Guyana and Suriname. The national and intercountry IOTs are only for 2005, although an update is under way. This dataset has a breakdown of 40 sectors, including seven service sectors.

Table 3
Selected International Input-Output Tables, 2017

Name	Authors	Latest release	Number of countries	Latin American countries	Years covered	Number of total (and services) sectors
World Input Output database	University of Groningen	2016	43	2	2000-2014	56 (31)
Trade in value added database	OECD-WTO	2016	63	7	1995 to 2011	34 (13)
South American Input Output table	ECLAC/IPEA	2016	10	10	1995	40 (7)

Sources: Author on the basis of WIOD: Timmer, M. P., Los, B., Stehrer, R. and de Vries, G. J. (2016), "An Anatomy of the Global Trade Slowdown based on the WIOD 2016 Release", GGDC Research Memorandum number 162, University of Groningen; TIVA: OECD and WTO (2012), Trade in value-added: concepts, methodologies and challenges and <http://www.oecd.org/industry/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm> [accessed on 28 May 2017]; South American Input Output Table: ECLAC (2016), The South American Input-Output Table: Key assumptions and methodological considerations, Santiago.

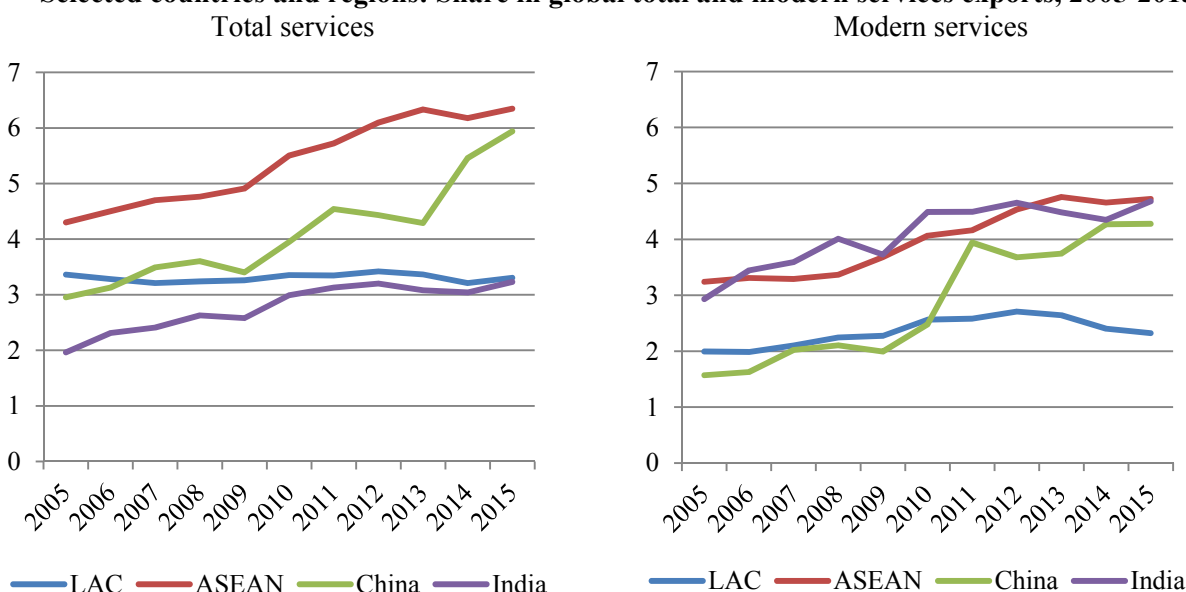
In sum, Latin America and the Caribbean has made some progress over the past decade in terms of improving its gross and value added trade in services statistics. Most countries have implemented the guidelines of the Fifth Manual of the Balance of Payments and some have completed the implantation of the Sixth manual. Most countries have increased the sectoral breakdown of their statistics and some have opened up their exports and imports data by trading partner and mode of delivery. Moreover, several intercountry input-output databases allow for the measurement of value added services trade for some countries in the region, including one developed by a regional organization.

Nevertheless, important challenges remain to further improve these data. Except for Brazil, all countries in the region continue to have a very limited breakdown of services trade statistics. Moreover, the further disaggregation of the data between 2005 and 2015 is concentrated in transport and travel services, whereas the number of categories in other services and in particular business services remains few. Also, most should invest resources in the breakdown by partner countries and mode of delivery. Certainly these improvements require resources, but much can also be gained from a more intensive use of existing business and tax registers. Also, efforts should be stepped up to exchange best practices among countries through ALADI's working group on trade in services statistics and other venues for North-South and South-South cooperation (ALADI, 2016).

B. Direct services export performance

The region's trade performance, as measured in gross values listed in the Balance of Payments, has been stagnant since 2005. According to the most recent version of the Trade in Services Database of the World Trade Organization covering the period 2005 to 2015, the region's market share in global exports fluctuated between 3.0% and 3.5% (Panel A of Figure 1). This performance is disappointing compared to its competitors in Asia: China increased its global market share by 3 percentage points, the group of ten countries belonging to the Association of South East Nations (ASEAN) by 2 points, and India by 1 point.

Figure 1
Selected countries and regions: Share in global total and modern services exports, 2005-2015



Note: Modern services refer other services, which include all services categories except for transport, travel and goods related services. LAC refers to Latin America and the Caribbean.

Source: Author based on World Trade Organization, Trade in Services Statistics.

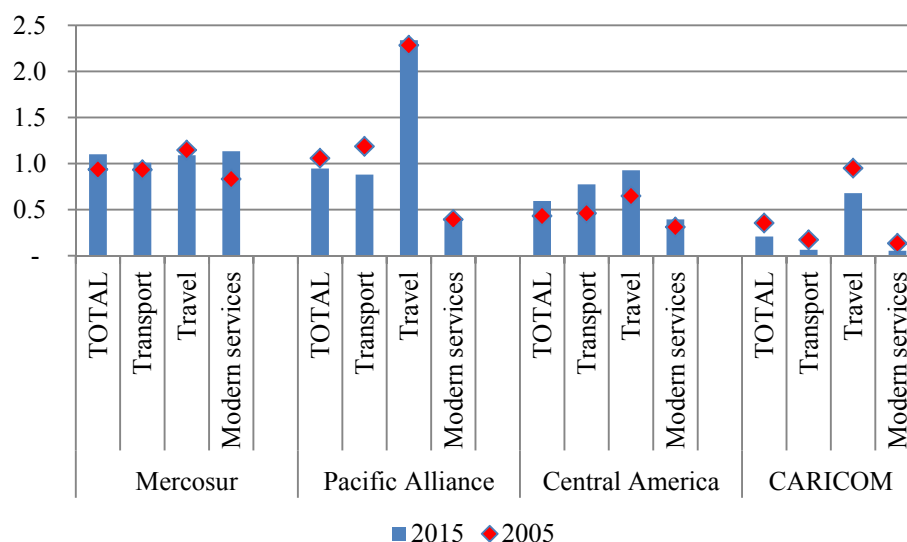
Latin America and the Caribbean performed a little better in modern services, as its global market share increased by 0.8 percentage points from 2005 to 2012, but fell slightly afterwards (Panel B of Figure 1). Modern services refer to the category of “Other services” in the Extended Balance of Payments (EBOPs). These are intensive users of information technologies (ITs). This group includes distribution, financial and insurance services, computer and IT services, a large range of business services, government services and personal services. Modern services are also the category that grew fastest, increasing its share in global services exports from 52% to 57% between 2005 and 2015.

Similar to total services, however, the region underperformed compared to Asia: China increased its market share by 2.5 percentage points, while ASEAN and India by about 1.5 points. China's better performance compared to other countries and groupings may be explained in part by its higher participation in regional and global manufacturing production networks, which are highly intensive in business services (see section C). The region's global exports share in travel and transport services is higher (6.0% and 2.9%, respectively, in 2015) than that in the subcategory of modern services (2.0%). This explains why the region's share in total global services exports is also higher.

The region's overall stagnant performance hides some variations across the four main subregional integration schemes (Figure 2). Mercosur is the regional scheme with the highest global market share in

2015 (1.1%), followed by closely by the Pacific Alliance (1.0%), and at a larger distance the Central American Common Market (0.6%) and CARICOM (0.2%). These market shares increased in the cases of Mercosur and Central America, but fell in the cases of the Pacific Alliance and CARICOM. Mercosur and the Pacific Alliance have different trade specializations. Mercosur is specialized in modern services with a market share that is triple that the Pacific Alliance. In turn, the Pacific Alliance is specialized in tourism and travel with a global market share that is double that of Mercosur. Central America and CARICOM have a similar trade specialization, but lost significant market shares between 2005 and 2015.

Figure 2
Subregional integration schemes: Shares in global exports of selected services, 2005-15
(Percentage)

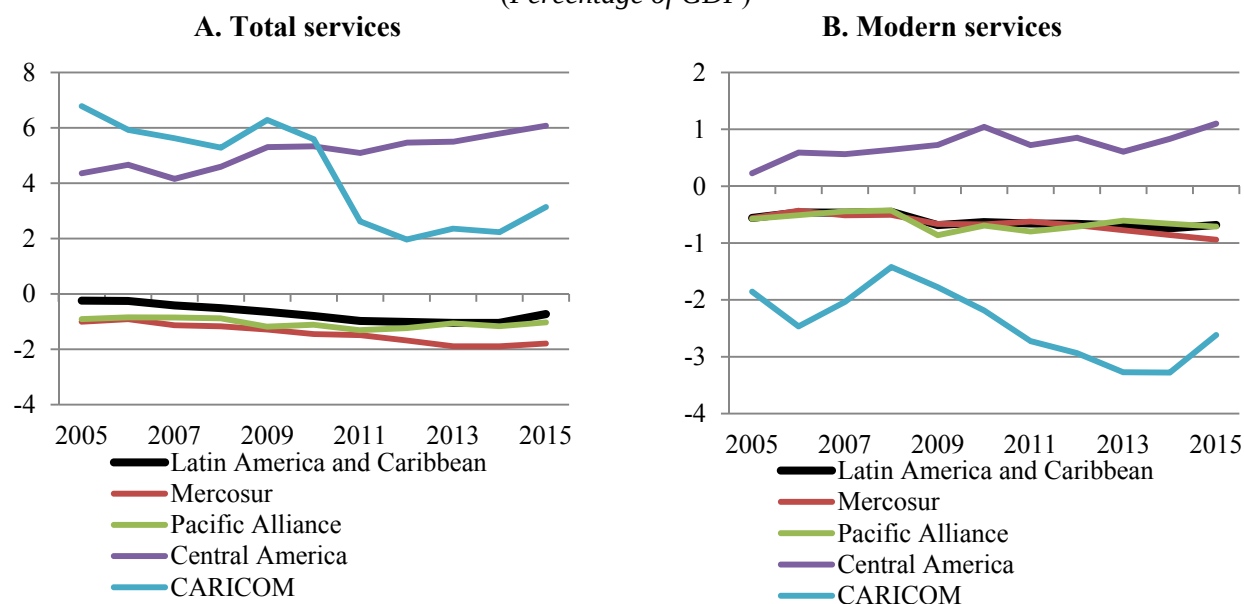


Note: Modern services refer other services, which include all services categories except for transport, travel and goods related services.

Source: Economic Commission for Latin America and the Caribbean (ECLAC), based on World Trade Organization, Trade in Services Statistics.

The region as a whole and all subregional agreements, except for Central America, experienced worsening trade balances in both total services and modern services from 2005 to 2015. Overall, CARICOM and Central America have trade surpluses, while Mercosur and the Pacific Alliance have trade deficits throughout this period. In modern services, the relative positions of the subregional integration schemes are similar except for CARICOM, which registers a trade deficit. It should be kept in mind that the sign of a trade balance does not necessarily reflect the competitive position of a country or region, as imports of in particular modern intermediate services may strengthen the export sector to the extent these services are not available in the home market.

Figure 3
Latin American countries: Trade balance in total and modern services in exports, 2015
(Percentage of GDP)



Note: Modern services refer other services, which include all services categories except for transport, travel and goods related services.

Source: Economic Commission for Latin America and the Caribbean (ECLAC), based on World Trade Organization, Trade in Services Statistics.

In Mercosur and Central America, one or two countries accounted for most of the increase in exports from 2005 to 2015 (Table 4). In Mercosur, Brazil is the dominant provider in all service categories, except for telecom, computer and information services, where Argentina comes first. Brazil also explains most of the increases in Mercosur's participation in different categories of Latin American and Caribbean services exports by more than 5 percentage points in this period (cells marked in green). The increase of Central America's market shares in transport and financial services is driven mostly by the increase of Panama, while its increase in telecom, computer and information services is accounted for mostly by Costa Rica. The results for goods related and construction services should be interpreted with care, as only few countries report data on these activities.

Opposite trends occurred in the Pacific Alliance and CARICOM in terms of one or few countries explaining reductions of these groups' market shares in Latin American and Caribbean services exports. Chile drives most of the loss of market share of the Pacific Alliance in transport, while Mexico accounts for most of the drop of its market share in telecom, computer and information services. In CARICOM, the loss of market share in telecom, computer and information services is accounted for mostly by Jamaica and Barbados. Its loss in the market share of insurance and pension services is driven mostly by Trinidad and Tobago. The reduction of its market share in other business services is determined largely by the Bahamas, Barbados and Jamaica. CARICOM only succeeded to increase its regional market share in personal, cultural and recreational services mainly due to Jamaica's stellar performance.

Table 4
Latin American and Caribbean countries: Share in regional exports, 2015 and percentage points change from 2005
(Percentages)

	Goods-related services	Transport	Travel	Construction	Telecom, computer & information services	Financial services	Insurance and pension services	Charges for use of IPR	Other business services	Personal, cultural & recreational services	Government services	TOTAL services
Mercosur	14.5	35.2	18.3	64.3	47.0	31.3	19.1	56.3	73.8	55.8	46.2	35.1
Argentina	-	10.0	6.2	1.3	21.5	0.4	0.6	12.8	15.0	25.6	7.4	9.2
Brazil	12.0	19.4	8.3	63.0	20.2	27.0	17.8	43.5	57.0	29.1	27.9	22.2
Paraguay	2.4	1.3	0.4	-	0.2	0.3	0.4	-	0.0	-	6.1	0.6
Uruguay	-	1.8	2.5	-	3.9	3.1	0.3	0.0	1.4	0.3	1.2	2.1
Venezuela, B.R. of	0.1	2.7	0.8	-	1.2	0.6	0.1	-	0.4	0.8	3.6	1.0
Pacific Alliance	0.6	30.7	39.2	-	14.1	11.4	74.1	35.2	12.6	21.1	8.8	30.2
Chile	-	13.5	3.4	-	5.8	6.3	5.3	6.6	8.2	2.8	-	6.2
Colombia	0.6	6.3	6.0	-	4.4	2.1	0.0	3.9	2.9	9.5	3.3	4.9
Mexico	-	5.6	25.1	-	2.0	-	57.3	23.0	-	8.0	-	15.1
Peru	-	5.4	4.7	-	1.8	3.1	11.5	1.6	1.6	0.8	5.5	4.1
Central America	80.5	27.0	15.6	32.3	31.2	49.7	5.1	3.9	10.6	4.8	16.4	19.0
Costa Rica	6.6	1.5	4.6	-	12.9	2.5	0.0	-	8.0	0.0	0.9	4.9
El Salvador	15.6	1.9	1.2	19.6	2.4	1.6	0.8	2.2	0.2	0.0	2.3	1.5
Guatemala	-	1.7	2.2	12.7	6.8	0.5	0.1	1.2	0.4	-	4.2	1.9
Honduras	42.1	0.4	0.9	-	3.1	0.1	-	0.1	0.2	0.7	1.5	1.8
Nicaragua	15.7	0.2	0.7	-	2.0	-	0.1	-	0.0	-	3.4	0.9
Panama	0.4	21.3	5.9	-	4.0	45.0	4.1	0.4	1.8	4.1	4.0	8.0
CARICOM	-	2.2	11.4	2.6	3.0	1.1	0.9	2.9	2.1	10.8	11.8	6.6
Other countries												
Bolivia	2.4	1.2	1.0	0.8	1.0	0.1	-	1.7	0.1	0.1	0.8	0.8
Cuba	-	-	3.7	-	-	-	-	-	-	-	-	1.7
Dom. Republic	1.8	2.1	8.7	-	2.5	2.8	0.8	-	0.7	0.5	11.3	5.0
Ecuador	0.2	1.6	2.2	-	1.1	3.6	-	-	-	6.8	4.8	1.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Share of LAC in global exports:												
2005	5.0	2.9	6.0	0.2	1.7	0.5	3.6	0.2	2.2	3.1	4.1	3.2
2015	2.3	2.9	6.0	0.1	1.7	0.6	4.6	0.4	2.9	2.4	3.9	3.1

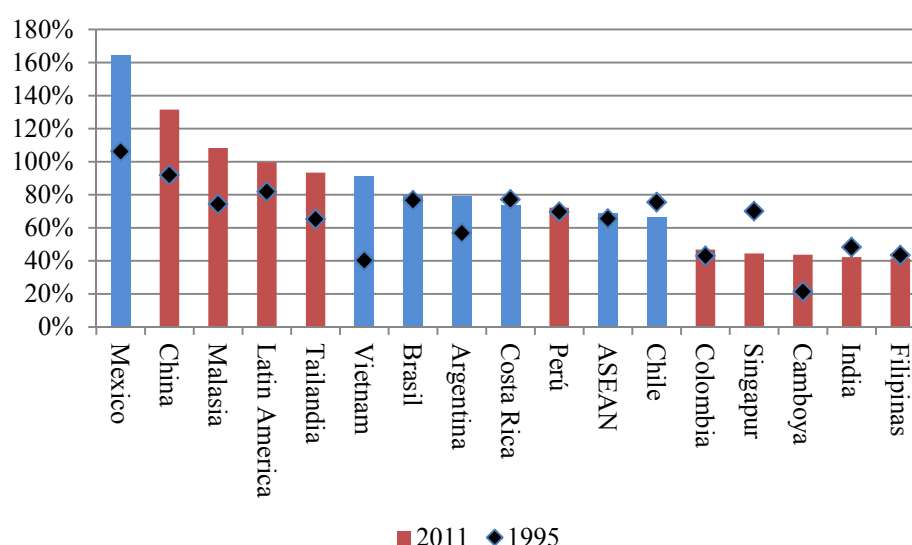
Note: Cells in green mean a market share gain above 5 percentage points, whereas cells in orange mean a market share loss of above 5 points.

Source: Economic Commission for Latin and the Caribbean (ECLAC) based on World Trade Organization (WTO), Trade in Services Statistics.

C. Contribution of indirect services exports to manufacturing competitiveness

The analysis of the countries' services sectors international competitiveness in the previous section using gross services export statistics is incomplete. This is because many services are traded indirectly through their incorporation as intermediate inputs in exports of goods producers. To measure indirectly exported services, the gross export values of these goods need to be decomposed into i) the value added generated within the specific sector, ii) value added of intermediate goods from other sectors and imported, and iii) value added of intermediate services from other sectors and imported. This decomposition of gross values into value added components can only be done since a few years using inter-country input-output tables (IIOTs) such as OECD's 2016 TiVA database. This dataset covers seven countries in the region (Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico and Peru) together with 56 countries in the rest of the world with annual data between 1995 and 2011. Data for Asian and Latin American countries show that the value of indirect services exports were between 0.4 (in the case of the Philippines) and 1.6 times (in the case of Mexico) the value of direct services exports in 2011 (Figure 4).

Figure 4
Selected countries: Indirect services exports as share of direct services exports, 1995 and 2011
(Percentage)



Source: Author based on calculations using the OECD-WTO 2016 version of the TiVA database.

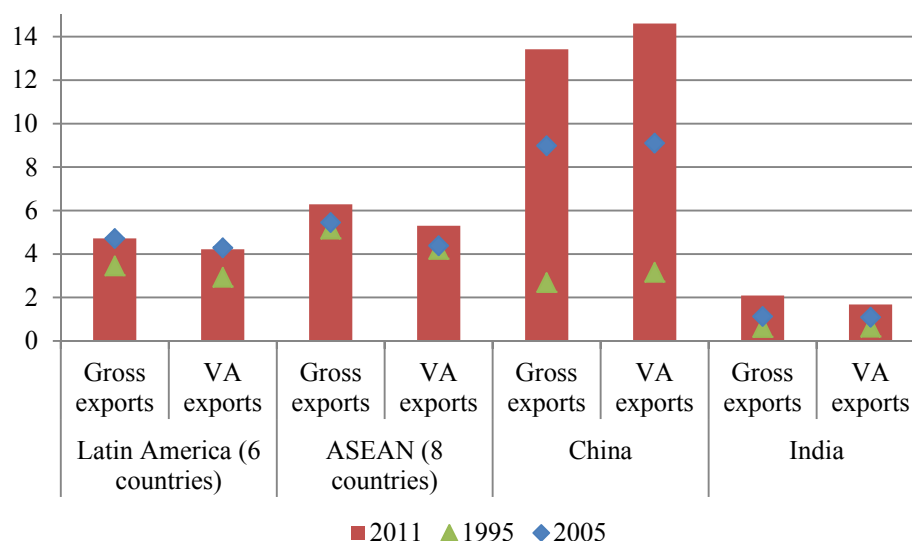
Intermediate services exports do not only increase total services exports, but are also an important determinant of the international competitiveness of goods exports. Multiple theoretical and empirical studies show that the “servicification” of manufacturing goods is a key driver of their export performance and diversification for two reasons. First, “cost services” play a key role in the coordination of manufacturing dominated global value chains (GVCs). Services such as distribution, logistics, and information technology improve the productivity of firms and facilitate the movement of goods and information between production segments and drive down production costs. Second, “value services” such as R&D, innovation and other business services are vital for the differentiation of products and overcome domestic market barriers (Arbache et al., 2016). Several studies confirm this growing services value added share in manufacturing production and

exports in the cases of OECD countries using IOTs, micro firm-level data and case studies. However, few studies have been conducted in this area on Latin America.

This section's goal is to explore the contribution of different types of intermediate services to Latin America's manufacturing export performance using OECD's 2016 TiVA database and econometric analysis. After looking at broad measures of Latin America's export manufacturing performance, the paper reviews motivations of manufacturing firms to incorporate different types of services within their products, as well as available evidence on the role of services in manufacturing exports. A comparison is made of different types of domestic and imported intermediate services value added contents of exports of manufactures between seven Latin American countries and eight ASEAN countries (Brunei Darussalam, Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam), China and India between 1995 and 2011. Moreover, panel regressions are carried out to test whether intermediate services intensities of manufacturing sectors help to explain their export performance in terms of global export market shares.

A major motivation for this study is the stagnating performance of Latin American manufacturing exporters. This stagnation can be illustrated with two different output measures estimated using the TiVA database (Figure 5). A comparison is made with the performance of ten emerging economies from the Association of Southeast Asian Nations (ASEAN), China and India. A first measure is gross exports, which shows that Latin America's share in global manufacturing exports first increased between 1995 and 2005, but stagnated afterwards. ASEAN's market share increased little until 2005, but rose substantially afterwards. China and India's market shares rose continuously over this period. Alternative and more recent gross export statistics from UN COMTRADE until 2016 confirm the stagnation of Latin America's market share and continuous rise of that of ASEAN, China and India.

Figure 5
Latin America, ASEAN, China and India: Participation in world manufacturing exports, 1995-2011
(Percentage)



Source: Author based on calculations using the OECD-WTO 2016 version of the TiVA database.

A second and more accurate measure of the “true” participation of a country in global exports is its share in global value added exports, which equals gross exports minus imported intermediate inputs. This measure shows slightly lower shares in world manufacturing exports for Latin America, ASEAN and India, which reflects the fact that their manufacturing sectors have a higher imported content of intermediate inputs than the rest of the world. The trends over time are similar.

Latin America’s overall underperformance in trade in manufactures is often explained by its growing specialization in natural resources, which has been exacerbated by the fast rising demand for these products by China and the rest of Asia since the early 2000s. The region’s growing overdependence on natural resources led to a stronger concentration of export in the terms of goods and export firms. Also, it contributed to an appreciation of several of its currencies, which in turn increased the international prices of its manufacturing goods and dampened these exports, also referred to as Dutch Disease. This section explores another potential explanation of the region’s stagnant performance in global manufacturing exports in terms of global market share: the insufficient incorporation of domestic and foreign intermediate services.

C.1 Literature review on servicification of manufacturing exports

A recent growing body of literature has shown the increasing role of services as a source of value added into exports of manufactures. Increasing evidence has become available of this “servicification” as a condition of successful manufacturing export performance and diversification by developed countries.

Manufacturing firms increasingly use different types of services at each stage of their value chains. This servicification has different origins (Lodefalk, 2017). First, several “cost” services are important to reduce expenditures, improve production efficiency and increase productivity (Arbache et al., 2016). Examples are transport and logistics, finance, information technology and communication (ICT) services, insurance, management, renting and leasing of machinery, equipment and buildings, and financial and insurance. These services improve the coordination of the production process and save time and materials (Nordas, 2010; USITC, 2013). As many manufacturing firms do not consider these services as part of their core competencies, these are outsourced to specialized providers. The importance of cost services increases with the lengths of supply chains.

Second, services are essential to establish and operate international production networks and global value chains (USITC, 2013). From the 1980s until recently, countries increasingly specialized in different types of manufacturing and business services segments of the value chain.⁵ These business-to-business (B2B) and business-to-customer (B2C) services include accounting, customer relations, headquarters functions, IT services and logistics. These trends were facilitated by technological developments in these areas, including containerization and the spread of high-quality ICT infrastructure. These services greatly reduced coordination costs, levels of inventory and delivery times of intermediate and final products.

Third, manufacturers add services to differentiate their goods and make them more attractive to customers in an often highly competitive environment. Firms also combine services with goods to adapt to changes in consumer demand. Using wireless networks and digital technologies, manufacturers build in sensors and microchips in their goods that allow communication with each other (internet of things) to provide additional services and collect information on consumer behavior. Also, services can help to limit the environmental and social impacts of their goods production and consumption through repurchasing and

⁵ Lewis and Monarch (2016) conclude that the fragmentation of supply chains has slowed or stalled between 2011 and 2015.

recycling. In short, services help to produce premium product and increase customer loyalty. This category can be referred to as “value” services, and generally require a higher content of human capital and other capabilities. Value services play are more important for sophisticated and differentiated products (Arbache et al., 2016).

Fourth, firms use services to overcome barriers to foreign market entry in the form of exports or foreign direct investment (FDI) and to sustain foreign market sales (Lodefalk, 2017). Through the establishment of affiliates abroad, multinational companies provide different types of services including distribution, maintenance, marketing, matchmaking, monitoring reparation and translation. These establishments and their local workers can help firms to improve their knowledge about local markets and networks.

Various authors have empirically confirmed the growing use of services in manufacturing production and exports. Miroudot and Cadestin (2017) show multiple stylized facts on the servicification of manufacturing on the basis of the 2015 version of the OECD international input-output table called Trade in Value Added (TiVA). In 2011, the share of services value added in the world gross value of exports was above 30% for all sixteen different manufacturing industries, except for coke and petroleum. Distribution services account for about one third, whereas business services (including telecoms, computer services, R&D and other business services) account for another third. The rest is split between transport, finance and other services. From 1995 to 2011, the domestic services value added share of world gross value of manufacturing exports fell one percentage points, whereas the foreign services value added share slightly increased two percentage points. In many countries, except for China and the United States, manufacturing exports have increased their share of services value-added during this period. These results confirm those of De Backer et al. (2015), who analyzed trends between 1995 and 2009 with the same database.

From the late 2000s, there is also a growing body of meso and firm-level literature on the importance of intermediate services for the export and productivity performance of manufacturing firms. The ESCIP consortium (2014) analyzed the contribution of the domestic and imported services contents of manufacturing in the European Union to another competitiveness variable being labor productivity growth. In the EU, services represented about 25% of total costs in manufacturing in 2011, which is only slightly higher than the level in 1995. The main categories are distribution (12%) and business services (9%). Within business services, the key items are legal and accounting activities, architectural and engineering activities, advertising and market research, other professional and scientific activities, computer programming and scientific research and development. Regression show that only imported business services inputs in manufacturing impact significantly labor productivity in manufacturing for all EU-27 countries. When splitting the sample by country size results are slightly different: in larger economies only domestic backward linkages affect positively labor productivity growth, whereas in smaller nations only foreign backward linkages play a role. Another outcome is that only in medium-high- and high-tech industries there is a positive effect of business services inputs on labor productivity.

On the basis cross-country statistics on production and trade in goods and services for 78 countries for the period 1994 to 2004, Francois and Woerz (2008) find a growing importance of services in production as the level of development increases, as well inverted U-pattern in pattern with respect to density of intermediate linkages. Using panel regressions, they show that an increased import intensity by business services between 1994 and 2004 contributed positively skilled and technology intensive manufacturing exports. Also, they confirm that the protection of intermediate services has a negative impact on export performance of technology intensive industries.

Wolfmayr (2008) looks into the determinants of export market shares of 18 manufacturing industries for 16 OECD countries from 1995 to 2000. She shows that services value added as a share of gross output increased in most countries over this period and reached over 20% in Ireland, Sweden and the UK. The author also shows that manufacturing in these countries purchased most services at home and imported

little from abroad. Using regression analysis and controlling for unit labor cost, R&D intensity and patent performance at the industry level, the author shows that total and domestic services value added does not significantly contribute to export market shares, whereas imported services do. Separate regressions for technology-driven industries show that total services inputs and imported services significantly affect market shares, whereas domestic services have no impact. Another set of regressions for the non-technology industries show that total, domestic and imported services do all not affect market shares of these industries. Another set of regressions focus exclusively on links between export market shares and purchases of a subset of services: computer and related activities, research and development and business services. These knowledge intensive business services (KIBS) are more crucial for shaping international competitiveness. These regressions show that total and imported KIBS significantly affect market shares, but not domestic ones.

Nordas and Kim (2013) show that the production of manufacturing industries in both developed and emerging economies became more services intensive between 1995 and 2005. This rising intensity is mostly linked to the growing importance of imported services, in particular in low-tech sectors where geographical fragmentation is largest requiring transport, logistics and other supply chain management services. Other evidence points to a positive link between business services intensity of production and export prices obtained in high-income markets. These authors also provide econometric evidence on the importance of service performance for manufacturing competitiveness across countries and industries. They show that indicators like telecommunications density, interest spread between banks' deposit and lending rates, transport costs, time for exports and imports, etc. impact significantly manufacturing performance dependent on the income of the country and the technological character of the industry.

Evangelista *et al.* (2015) looked into the role of three types of business services (post and communication, computer services and other business services) to explain changes in export market shares between 2000 and 2007 of five European countries (France, Germany, Italy, Spain and the United Kingdom). They confirm all three types of business services contribute significantly to each country's industrial competitiveness, controlling for unit labor cost and different types of innovation expenditure. Separate regressions for medium high tech sectors and medium low tech sectors show that communication and computer related services affect significantly market shares of both types of sectors, whereas other business services contribute to medium high-tech manufacturing industries only.

C.2 Methodology and data sources

The estimations of the services content in manufacturing exports in this paper is based on the OECD TIVA Inter-Country Input-Output (ICIO) tables. Below a summary is given of how different variables are calculated:

- i. *Gross output* is the sum of intermediate and final demand for each country c and sector i in any given year. The combination of sector and country is also referred to as geo-sector.
- ii. *Gross exports* are computed adding the exports of intermediate and final goods. This means excluding the $i \times i$ diagonal block matrix from the intermediate demand matrix and a $i \times f$ diagonal block matrix from the final demand matrix. The vector f refers to the final demand items: household consumption, non-profit institutions serving households, general government final consumption, gross fixed capital formation, changes in inventories (which are excluded from our calculations to avoid negative values, and direct purchases abroad by residents (exports to non residents).
- iii. *Value added* in output is computed as:

$$VA_{ci} = V B F$$

where V is a $ni \times ni$ diagonalised vector with value added (computed as output minus input) as a share of output, B is the traditional $ni \times ni$ Leontieff inverse $(I-A)^{-1}$ and F is a $ni \times 1$ vector with final demand excluding changes in inventories to avoid that F and value added could be negative. The domestic homologue of this measure is computed in the same way using however B_d which is the $i \times i$ diagonal block matrix extracted from B, including only domestic inter-sectoral relationships.

iv. GDP is computed at the country level by using the value added (computed as output minus input) already provided by the ICIO tables for the intermediate production and taxes and subsidies on final demand, also extracted from ICIO tables. This is a slightly different measure to value added as it does include changes in inventories.

v. Value added exports are computed by:

$$EXGR_{VA_{ci}} = V B EXGR$$

where is EXGR a $nix1$ vector with gross value of export.

vi. Domestic and foreign services value added content in export and domestic and foreign value added content of export is estimated as follows:

$$EXGR_{VA_{ii}} = V B \text{diag}(F_{exp})$$

$\text{Diag}(F_{exp})$ is the $ni \times ni$ diagonalised F_{exp} vector with export satisfying foreign final demand – this is the only difference with the formula used to compute value added in export. This formula above yields a $ni \times ni$ matrix (rather than a $ni \times 1$ vector) where each inter-sectoral contribution can be isolated; so, each element tells us how much the geo-sector corresponding to the row contributes, in value added terms, to the export of the geo-sector corresponding to the column – note that the subscript has changed from ci to ii, to indicate that contribution of each geo-sector to every other geo-sector is captured.

From this matrix the domestic diagonal block matrix (the block is as usual a $i \times i$ matrix) is extracted and the foreign off-diagonal block matrix to isolate domestic and foreign value added inter-sectoral contributions, respectively. In order to look exclusively at the service content in manufacturing export only the elements corresponding to services on the rows and manufacturing on the column from both matrices are isolated.

Below is an example on how these variables are computed using a basic example with two sectors (1 and 2) and two countries (a and b). In this case, the domestic value added in export would be:

$$V B \text{diag}(F_{exp}) = \begin{bmatrix} v_1^A & 0 & 0 & 0 \\ 0 & v_2^A & 0 & 0 \\ 0 & 0 & v_1^B & 0 \\ 0 & 0 & 0 & v_2^B \end{bmatrix} \begin{bmatrix} b_{11}^{AA} & b_{12}^{AA} & b_{11}^{AB} & b_{12}^{AB} \\ b_{21}^{AA} & b_{22}^{AA} & b_{21}^{AB} & b_{22}^{AB} \\ b_{11}^{BA} & b_{12}^{BA} & b_{11}^{BB} & b_{12}^{BB} \\ b_{21}^{BA} & b_{22}^{BA} & b_{21}^{BB} & b_{22}^{BB} \end{bmatrix} \begin{bmatrix} f_{exp_1}^A & 0 & 0 & 0 \\ 0 & f_{exp_2}^A & 0 & 0 \\ 0 & 0 & f_{exp_1}^B & 0 \\ 0 & 0 & 0 & f_{exp_2}^B \end{bmatrix}$$

Which yields:

$$V B \text{diag}(F_{exp}) = \begin{bmatrix} v_1^A b_{11}^{AA} f_{exp_1}^A & v_1^A b_{12}^{AA} f_{exp_1}^A & v_1^A b_{11}^{AB} f_{exp_1}^A & v_1^A b_{12}^{AB} f_{exp_1}^A \\ v_2^A b_{21}^{AA} f_{exp_2}^A & v_2^A b_{22}^{AA} f_{exp_2}^A & v_2^A b_{21}^{AB} f_{exp_2}^A & v_2^A b_{22}^{AB} f_{exp_2}^A \\ v_1^B b_{11}^{BA} f_{exp_1}^B & v_1^B b_{12}^{BA} f_{exp_1}^B & v_1^B b_{11}^{BB} f_{exp_1}^B & v_1^B b_{12}^{BB} f_{exp_1}^B \\ v_2^B b_{21}^{BA} f_{exp_2}^B & v_2^B b_{22}^{BA} f_{exp_2}^B & v_2^B b_{21}^{BB} f_{exp_2}^B & v_2^B b_{22}^{BB} f_{exp_2}^B \end{bmatrix}$$

In bold the diagonal blocks identifying domestic value added in export for country A and B, the off-diagonal block matrix captures foreign value added in export. This matrix is used to compute various variables:

- Summing the **rows** the value added exported by each geo-sector is obtained either **directly** (i.e. the values lying on the diagonal of the matrix) or **indirectly** through other sectors and other countries' exports. When the diagonal-block matrix are used, the domestic value added exported by each geo-sector is obtained either **directly** or through other sectors within the same home country. These two measures correspond to "Value added in export" and "Domestic value added in export" respectively.
- In contrast, summing the **columns** gives each geo-sector requirements for export, or the content of its export. This includes each geo-sector's own contribution (lying on the diagonal) as well as other sectors' and countries' contributions, lying in the same column but off diagonal. The diagonal block matrix shows the domestic value added content of export. These two measures are called "Value added content of export" and "Domestic value added content of export" respectively.

From the square matrix presented above, the entries corresponding to service rows and manufacturing columns are extracted. Each column indicates how much of the value added of services is embodied (or contained) in the export of each manufacturing geo-sectors.

The Inter-Country Input-Output (ICIO) table used in this study is drawn from the trade in value added (TiVA) database of the Organization of Economic Cooperation and Development (OECD) and World Trade Organization (WTO). This database covers 63 countries and 34 sectors, including 16 in manufacturing and 15 in services. Annual data are available from 1995 to 2011. The TiVA database distinguishes 16 manufacturing industries, which can be divided into three groups following Francois and Woerz (2008): natural resource intensive ones, labor intensive ones and technology intensive ones (see table 5).

Table 5: Manufacturing industries in TiVA and their intensity

ISIC Rev.3	Category	Intensity
15, 16	Food products, beverages and tobacco	Resource
17, 18, 19	Textiles, textile products, leather and footwear	Labor
20	Wood and products of wood and cork	Resource
21,22	Pulp, paper, paper products, printing and publishing	Resource
23	Coke, refined petroleum products and nuclear fuel	Resource
24	Chemicals and chemical products	Technology
25	Rubber and plastics products	Resource
26	Other non-metallic mineral products	Resource
27	Basic metals	Resource
28	Fabricated metal products except machinery and equipment	Resource
29	Machinery and equipment n.e.c	Technology
30, 32, 33	Computer, electronic and optical products	Technology
31	Electrical machinery and apparatus n.e.c	Technology
34	Motor vehicles, trailers and semi-trailers	Technology
35	Other transport equipment	Labor
36,37	Manufacturing n.e.c; recycling	Labor

Source: Author based on OECD TiVA database and Francois, J. and J. Woerz (2008), "Producer Services, Manufacturing Linkages, and Trade," *Journal of Industry, Competition and Trade*, 8:3, 199-229.

The TIVA sector classification distinguishes 15 services sectors (Table 6). In this paper, these sectors are split into four groups. First, distribution services contain three industries that are crucial for the sale and movement of goods from the manufacturer to the consumer. Second, financial services, insurance and real estate are important for payments, loans, insurance and non-residential investments. Third, business services include three industries that are more crucial for international competitiveness as confirmed by prior studies: Renting of machinery and equipment, Computer and related activities; and Research and development and Other Business Activities (Arbache et al., 2016; Evangelista et al., 2015; Wolfmayr, 2008).

Table 6: Service industries in TIVA and groupings

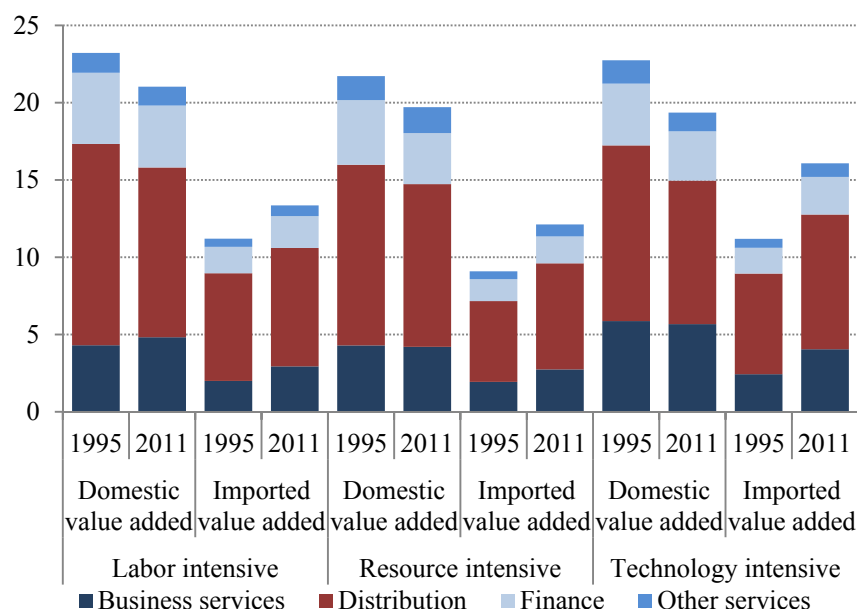
ISIC rev3	Name	Category
50, 51, 52	Wholesale and retail trade; repairs	Distribution
60, 61, 62, 63	Transport and storage	Distribution
64	Post and telecommunications	Distribution
65, 66, 67	Finance and insurance	Finance
70	Real estate activities	Finance
71	Renting of machinery and equipment	Business services
72	Computer and related activities	Business services
73, 74	Research and development, Other Business Activities	Business services
55	Hotels and restaurants	Other
75	Public admin. and defense; compulsory social security	Other
80	Education	Other
85	Health and social work	Other
90, 91, 92, 93	Other community, social and personal services	Other
95	Private households with employed persons	Other

Source: Author based on OECD TIVA database and Wolfmayr, Y. (2008), Producer Services and Competitiveness of Manufacturing Exports, FIW Research Report, N° 009, WIFO, Vienna.

C.3 Stylized facts on servicification of manufacturing exports

A first set of results shows trends at the global level between 1995 and 2011. During this period the total domestic services value added share of global manufacturing exports fell, whereas the total foreign (imported) value added share increased for all three types of manufacturing industries: labor intensive, resource intensive and technology intensive (Figure 6). In 2011, the domestic value added intensity is highest in the labor intensive industries, while the imported intensity is highest in technology intensive industries. Both types of industries are highly competitive and geographically fragmented industries, in which both domestic and imported outsourced services are essential to differentiate products and coordinate different actors in the value chain. The lower domestic services content in technology intensive industries does not necessarily mean they use less domestic services. This is because services may be produced within the firm (such as R&D services), which are not accounted for in the input-output statistics. In particular imported intermediate business services increased their share from 1995 to 2011 across all three types of industries, even though the absolute share of domestic ones are higher than the import shares across the board. Business services include renting of machinery and equipment, computer and related services and R&D and other business services. These are considered most crucial for international competitiveness of manufacturing products.

Figure 6
World: Value added content of services in manufacturing exports, 1995 and 2011
(Percentage)



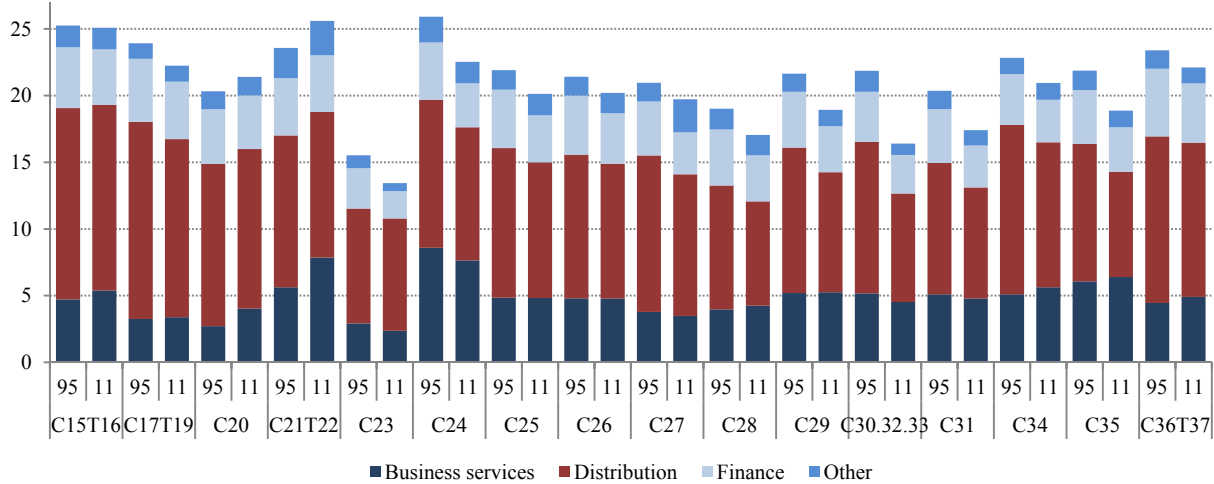
Source: Author based on calculations using the OECD-WTO TIVA database.

Previous findings are confirmed at the level of individual manufacturing industries (see Figure 7). The highest domestic services content is in Pulp and paper, together with Food and beverages in 2011. The lowest domestic share is in Petroleum and fuels. The domestic services value added share in manufacturing exports between 1995 and 2011 fell in all but two industries. The largest percentage points drop was in Computer, electronic and optical products. The highest imported services content is in Computer, electronic and optical products, together with Electrical machinery and apparatus and Motor vehicles, trailers and semi-trailers industries in 2011. The share of imported services value added share in manufacturing exports between 1995 and 2011 increased in all industries, and most in terms of percentage points in Computer, electronic and optical products and least in Textiles and clothing.

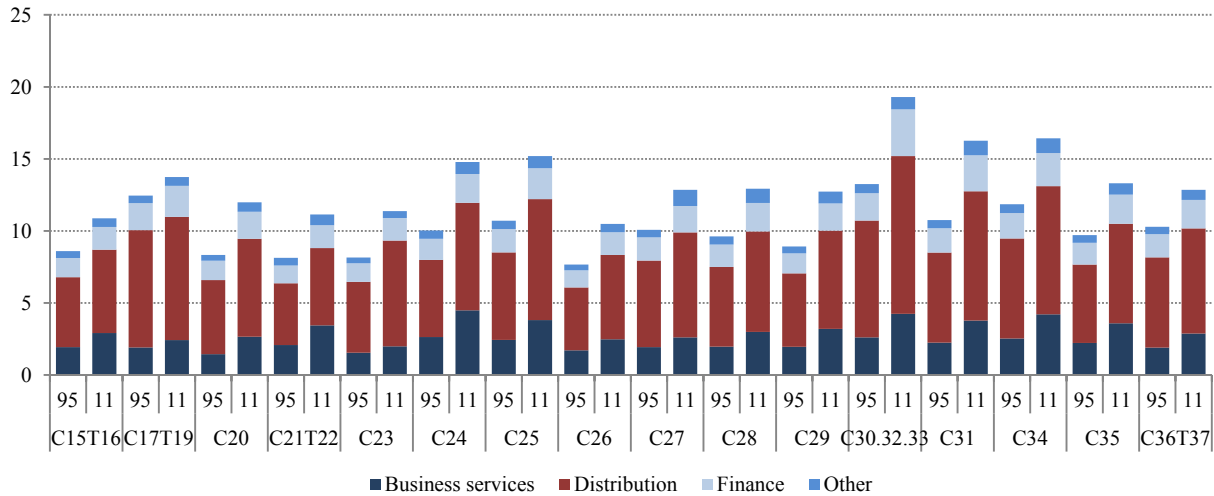
When focusing on business services value added incorporated in manufacturing exports only, the results change as the domestic content increased over time in 11 out of 16 industries. Moreover, the imported contents increased in all industries. The highest domestic content of business services in 2011 was in Pulp and paper and Other transport equipment, while the highest imported content of business services was in Chemicals and chemical products and Motor vehicles. The lowest domestic and imported content of this category was in Petroleum and fuels.

Figure 7
World: Value added content of services in manufacturing exports by industry, 1995 and 2011
 (Percentage)

A. Domestic services value added



B. Imported services value added

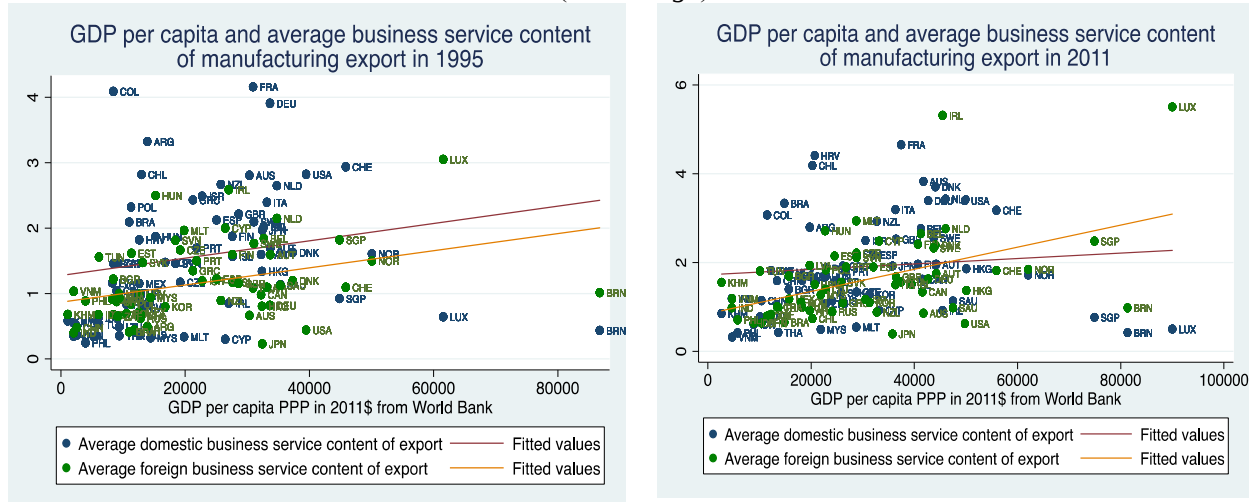


Notes: 15, 16 = Food products, beverages and tobacco; 17, 18, 19 = Textiles, textile products, leather and footwear; 20 = Wood and products of wood and cork; 21,22 = Pulp, paper, paper products, printing and publishing; 23 = Coke, refined petroleum products and nuclear fuel; 24 = Chemicals and chemical products; 25 = Rubber and plastics products; 26 = Other non-metallic mineral products; 27 = Basic metals; 28 = Fabricated metal products except machinery and equipment; 29 = Machinery and equipment n.e.c; 30, 32, 33 = Computer, electronic and optical products; 31 = Electrical machinery and apparatus n.e.c; 34 = Motor vehicles, trailers and semi-trailers; 35 = Other transport equipment; and 36,37 =Manufacturing n.e.c; recycling.

Source: Author based on calculations using the December 2016 release of the OECD TiVA database.

From 1995 and 2011, the relationship between the level of economic development and incorporation of imported business services in manufacturing exports grew stronger (Figure 8). This figure suggests the growing strategic importance in particular of imported business services in manufacturing exports when economies develop. This is in part because the share of skilled and technology intensive manufacturing sectors increases when countries become richer. In contrast, there is a much weaker relationship between level of development and incorporation of domestic business services in manufacturing exports.

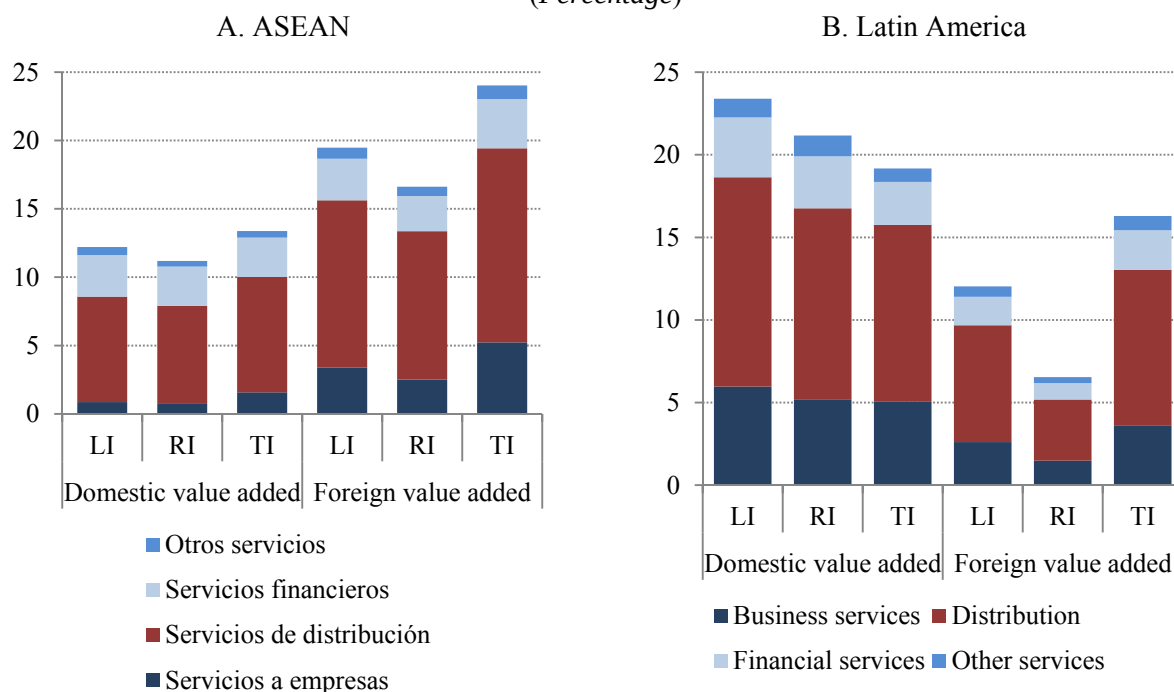
Figure 8
World: Total and business services value added share of manufacturing exports, 1995 and 2011
 (Percentage)



Source: Author based on calculations using the December 2016 release of the OECD TiVA database.

The ASEAN and Latin America differ in several respects with regard to the services content of manufacturing exports (Figure 9). In Latin America, the domestic services value added intensity of manufacturing exports is higher than in ASEAN for all three types of industries. In contrast, in ASEAN the imported services value added intensity of manufacturing exports is higher than in Latin America for all three types of industries. Multiple possible explanations can explain these results, which require further investigation. First, as ASEAN countries are more integrated in regional production networks and value chains, they import relatively more business services. The causality could also run the other way, as these countries may first have imported proportionally more business services, which helped it in turn to insert better into international production networks. Second, Latin America may have a more developed domestic services sector than ASEAN and therefore can more easily subcontract business services at home instead of importing these from abroad. Third, there may be a composition effect: Latin America may export proportionally more manufacturing goods which are more intensive in domestic business services compared to ASEAN. In similar vein, ASEAN may export relatively more manufactures that are intensive in imported business services.

Figure 9
ASEAN and Latin America: Services value added shares in manufacturing exports, 2011
 (Percentage)



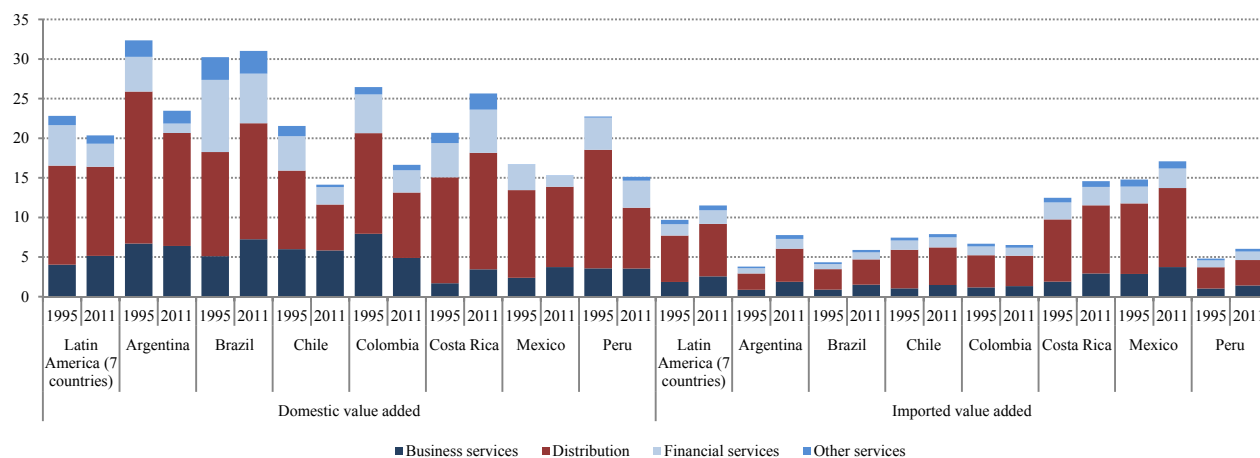
Notes: LI are labor intensive industries, RI are resource intensive industries and TI are technology intensive industries.

Source: Author based on calculations using the OECD-WTO TIVA database.

A comparison of seven Latin American countries included in the TIVA database shows that Brazil and Costa Rica are the countries with the highest domestic services content of manufacturing exports. Both countries have the highest share of distribution services of all seven, while Brazil also has the highest share of the other three types of services (Figure 10). Arbache (2014) argues that this high domestic services content in Brazil contributes little to the international competitiveness of the manufacturing sector, as it mostly reflects the high prices of key services such as finance, logistics and telecom. In turn, these high prices result from low productivity, little competition and reduced investment levels. In the case of Chile, a potential explanation may be the concentration of Chilean manufacturing in food products, which are highly business services intensive. Brazil and Costa Rica are the only countries in the region where the domestic services contents increased between 1995 and 2011. In the other five countries, this content fell up to 9 percentage points. This results in part from the increasing export specialization in natural resource based manufactures, which are least intensive in services.

Mexico is the first country and Costa Rica the second in terms of the foreign services value added contents of exports in 2011. This may result from the fact that the manufacturing sectors in these two economies are the most integrated in global and regional production networks with a concentration in both labor and technology intensive products, which are highly intensive in the use of services. Both countries have the highest share of both services aimed to reducing costs and adding value to manufacturing exports.

Figure 10
Selected Latin American countries: Services value added in manufacturing exports, 1995 and 2011
(Percentage)

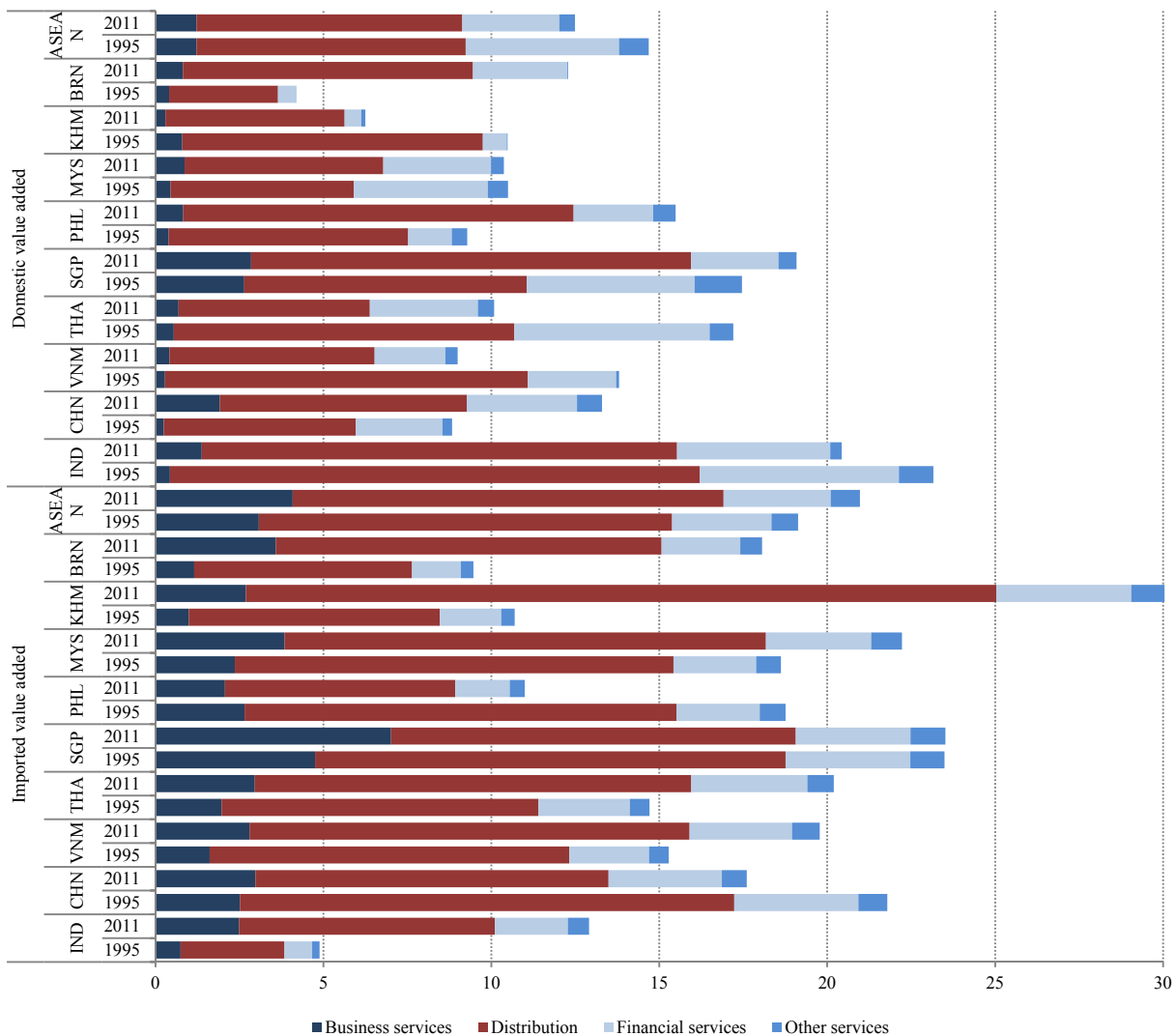


Source: Author based on calculations using the December 2016 release of the OECD TiVA database.

ASEAN countries, China and India also show interesting differences. India and Singapore are the countries with the highest domestic services value added contents (almost 20%) of manufacturing exports in 2011. While two thirds of this content is concentrated in distribution services, the business services content of these two countries is also the highest within this region. This result reflects the fact that both countries probably have the most developed domestic business services sector within the Asian sample. The business services content increased in the value of manufacturing exports in all countries between 1995 and 2011, except Brunei, as a result of the increasing depth of regional value chains which require proportionally more of these services. Financial services and real estate also are important services, in particular in India, Thailand and Malaysia.

The imported services content is higher than the domestic one in 2011 in all countries, except for India and the Philippines. This content is higher in particular in Cambodia (21 percentage points), Malaysia (9 points), Vietnam and Thailand (8 points). In these countries, the imported service content is especially high in distribution services, which may be explained by the underdeveloped nature of these services in the domestic market.

Figure 11
ASEAN, China and India: Services value added share of manufacturing exports, 1995 and 2011
 (Percentage)



Notes: the country codes are BRN = Brunei, KHM = Cambodia, MYS = Malaysia, PHL = Philippines, SGP = Singapore, THA = Thailand, VNM = Vietnam, CHN = China and IND = India.

Source: Author based on calculations using the TiVA database.

C4. Regressions on the effect of intermediate services on manufacturing export performance

Different types of domestic and imported services have different effects on manufacturing competitiveness

The previous section showed the heterogeneity both across industries and countries in terms of the intensity of manufacturing exports in different types of both domestic and imported services inputs. According to the reviewed theoretical and empirical studies, two types of services can be distinguished: “cost services” and “value services” (Arbache, 2016). “Cost services” improve production efficiency, increase productivity, smoothen international production networks and minimize costs associated to

exports. These are in particular distribution services (Wholesale and retail trade; Transport and storage, and Post and telecommunications) and financial services (Finance and insurance, and Real estate activities). Manufacturing firms certainly need to contract a certain amount of these intermediate services to achieve the above objectives. However, if these services are too expensive they may hinder export competitiveness instead of supporting it. Therefore their expected effect on global export market shares may be either positive or negative. “Value services” refer in particular to business services used to differentiate goods and add characteristics that support their competitiveness. These are in particular Renting of machinery and equipment, Computer and related activities, and Research and development and Other Business Activities. As these activities add value to the product, their effect on global export competitiveness is expected to be positive.

Another differentiation among the intermediate services is their origin: domestic or imported. In particular within the context of emerging countries, it is likely that imported services are of superior quality than those subcontracted domestically. In other words, the effects of domestic versus imported cost services may be different. This is what can be tested using regression analysis.

The model

Several regressions have been performed to test whether and how different domestic and foreign cost and value services contribute to manufacturing export performance. The latter is measured by the change in the share of a country’s manufacturing sector in world exports of that same industry.⁶ Following a literature review, several standard control variables were included (Basarac Sertić et al. 2015; Nordas and Kim, 2013; and Evangelista et al., 2015) (see Table 7). The contribution of multiple intermediate domestic and imported cost and value services to the competitiveness of manufacturing sectors is empirically tested as follows:

$$\Delta Q_{ijt} = \beta_0 + \beta_1 Q_{ijt-1} + \beta_2 ULC_{ijt-1} + \beta_3 PMR_{ijt-1} + \beta_4 Cost_{ijt-1} + \beta_5 Manuf_{ijt-1} + \beta_6 REER_{jt-1} + \beta_7 FDI_{jt-1} + \beta_8 DomS_{ijt-1} + \beta_9 ImS_{ijt-1} + \varepsilon_{ijt} \quad (1)$$

Where ΔQ_{ijt} is the change in global export market share of sector i in country j at year t , ULC is the unit labor costs, PMR is product market regulation, $Cost$ is the cost to export, $Manuf$ is the size of the manufacturing sector, $REER$ is the real effective exchange rate, FDI is foreign direct investment, $DomS$ is the domestic intensity of different types of (cost and value) services, and ImS is the imported intensity of different types of (cost and value) services.⁷

The control variables are measured as follows (see also Table 7):

- Unit labor cost (ULC) is measured by the ratio of *i*) labor cost as measured by wages and salaries (in USD) divided by number of employees, and *ii*) labor productivity as calculated by the division of value added and the number of employees;
- Product market regulation (PMR) is measured for 36 OECD countries and 11 non-OECD countries for the years 1998, 2003, 2008 and 2013 in three broad areas: state control, barriers to entrepreneurship and barriers to trade and investment;
- Cost to exports ($Cost$) refers to the cost of shipping a container abroad as estimated by World Bank’s Doing business data from 2004 onwards;

⁶ A more detailed bilateral gravity trade model would have been more precise. However, data quality of bilateral incorporated intermediate services was too poor, especially for emerging economies, to estimate such a model.

⁷ Another variable that affects the contribution of indirect services to manufacturing performance is the restrictiveness of service trade. However, data on this type of restrictiveness is available for one year only and could therefore not be included in the regressions.

- Real effective exchange rate (*REER*) is measured for 61 economies by the Bank of International Settlement (BIS). Nominal EERs are estimated as geometric weighted averages of bilateral exchange rates. The trade weights are based on manufacturing exports. In turn, Real EERs are the same weighted averages of bilateral exchange rates but are in turn adjusted by relative consumer prices. The following formula is used with $l = 1, 2 \dots N$ being the trading partners of country i :

$$REER_i = \sum_{l=1}^N \text{Trade weights}_l \times \text{Real exchange rate}_{il} \quad (2)$$

Table 7
Control variables, sources, period and expected signs for econometric regressions

Variables	Source	Period	Expected sign
Unit labor cost	UNIDO Industrial Statistics Database	1995 to 2010	-
Product market regulation	OECD Product Market Regulation Database	1998 to 2013	-
Real effective exchange rate	Bank of International Settlement Statistics	1995 to 2011	-
Cost to export	World Bank Doing Business	2004 to 2011	-
Size of manufacturing sector	OECD Trade in Value Added (TIVA) database	1995 to 2011	+
Foreign direct investment	UNCTAD Interactive database	1995 to 2011	+

Source: Authors on the basis of literature review and the data websites: UNIDO data on wages, value added and employment to calculate unit labor cost: www.unido.org/resources/statistics/statistical-databases.html; OECD data on Product Market Regulation: <http://www.oecd.org/eco/growth/indicatorsofproductmarketregulationhomepage.htm>; World Bank data on cost to export: www.doingbusiness.org; BIS Real effective exchange rates: www.bis.org/statistics/eer.htm; and UNCTAD Foreign direct investment: <http://unctadstat.unctad.org/EN/>.

The following variables are of specific interest for the effect of intermediate services on competitiveness. These

- Total domestic service value added contents as % gross exports;
- Specific domestic cost and value services value added contents as % gross exports;
- Total foreign service value added contents as % gross exports;
- Specific domestic cost and value services value added contents as % gross exports

The model was estimated using generalized methods of moments (GMM) with one time lag of the outcome variable. The GMM has several advantages. The GMM can be used when the distribution of the data may not be known. GMM does not require distributional assumptions for the variable of interest. A dynamic GMM estimation also circumvents the bias associated including a lagged dependent variable as a regressor (uncorrelated to error or fixed effects) and allows to calculate consistent and efficient estimates. The GMM estimation also allows dealing with omitted variable bias and simultaneity bias. Additionally, the panel data provides a richer set of information to exploit the relationship between the dependent and independent variables, reduces collinearity among the explanatory variables, increases the degrees of freedom, and gives more variability and efficiency.

The model was estimated for 61 countries and 16 manufacturing industries for the years 1995, 2000, 2005, 2008, 2009 and 2011. The countries include high-income ones and emerging economies, mainly from Asia and Latin America. All variables are normalized, so the coefficients can be interpreted as elasticities. The model was first tested including only control variables (Table 8). A model is estimated using a two-step GMM approach. Sargan/Hansen tests are applied for overidentifying restrictions for all specifications, as well as the Arellano Bond test for first and second order correlation. Moreover, a number of covariates are

endogenized (PMR, cost to exports, REER and manufacturing size). In addition, a fixed-effects model is tested for each specification to test the robustness of results.

The results suggest that changes in the global export market share of sector i in country j at year t are positively associated to last year's export market share. Product market regulation has an expected negative and significant sign only when regressed with the other control variables. The unit labour costs, defined as wages per employee over labour productivity, are found to be positively correlated to countries' export market share. This surprising result may be arising from the fact that that higher cost may be associated with higher quality products and market shares. Another possible explanation is that a lack of data on wages and labour productivity may distort this result. Cost to exports emerges as a highly significant (and negative) covariate of the global export market share. This result coincides with the literature, suggesting that increasing costs are detrimental for service-exporting countries.

The stock of FDI-to-GDP, a proxy measure of the presence of foreign technology within a country, suggests that FDI is surprisingly negatively linked to higher export shares. A high FDI intensity may reflect the fact that countries with a high intensity already have high global manufacturing export market shares, making it difficult to further increase these shares. Ideally a more disaggregated measure of FDI intensity, at the manufacturing level, could give more robust results. The Real Effective Exchange Rate (REER) is negatively related to the global export market share for countries in the sample as expected. Exchange rate fluctuations and the exchange rate misalignment are considered to have a significant effect on economic growth and export performance (Rodrik, 2008). Countries with undervalued exchange rates grow faster, as a result of production shifts towards tradables, which tend to have higher productivity growth rates. Results suggest that an appreciation of the REER (increase) could negatively impact on the global export market share. Finally, the manufacturing size is included to control for the size effect on global export market shares, but turns out not be significant.

Table 8
Control variables to explain changes in global manufacturing export market shares, 1995 to 2011

		Global market share change (ΔQ_{ijt})					
Previous period market share	Q_{ijt-1}	0.118*** (0.0175)	0.119*** (0.0186)	0.111*** (0.0156)	0.118*** (0.0186)	0.112*** (0.0186)	0.105*** (0.0187)
Product market regulation	PMR		-0.0730 (0.0634)		-0.0977 (0.0636)	-0.0873 (0.0633)	-0.130** (0.00630)
Cost to export	Cost				-0.422*** (0.102)	-0.421*** (0.101)	-0.308*** (0.115)
Unit labor cost	ULC			0.0432* (0.0255)		0.0571* (0.0310)	0.0806*** (0.0309)
FDI stock as share of GDP	FDI						-0.0984** (0.0429)
Real effective exchange rate	REER						-0.413*** (0.0750)
Manufacturing size	Manuf						-0.000163 (0.0342)
Constant		0.0411*** (0.0162)	0.00571*** (0.0228)	0.0352*** (0.0127)	0.0623*** (0.0228)	0.0607*** (0.0227)	0.118*** (0.0237)
Observations		2,352	2,064	3,040	2,064	2,064	2,016
Number of geosectors		640	560	816	560	560	560

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$

Source: Author on the basis of econometric regressions.

Table 9 presents results when including in the model's two main variables of interest, namely the domestic and foreign value added of total and business services in the export performance measure (global export market share): renting machinery and equipment, research and development and computing and related activities. The model includes all control variables considered in the baseline regressions. These results suggest that total domestic services content is negatively associated with global exports market shares and total imported services positively. However, when the focus is exclusively on business services the results change: the domestic value added of renting machinery and equipment and research and development are positively associated to a higher global export market share for the average country. In contrast, the effect of imported (foreign) business services in the equation seems less clear: imported renting and machinery services have a positive effect on the export performance measure, while imported computed and related services have a significant (and negative) effect. As a robustness check, regressions were performed with the differentiated global export market shares and differentiated explanatory variables. Results go in line with those from level-variables.

Table 9
Additional variables explaining changes in global manufacturing export market shares, 1995 to 2011

	Global market share change (ΔQ_{ijt})	Global market share change (ΔQ_{ijt})
Previous period market share	0.0982*** (0.0186)	0.115*** (0.0196)
Total domestic services contents	-0.355** (0.162)	
Total imported services contents	0.600*** (0.192)	
Domestic contents of renting of machinery and equipment		0.488*** (0.121)
Domestic contents of computing and related activities		-0.0901 (0.154)
Domestic contents of R&D and other business services		0.613*** (0.242)
Imported contents of renting of machinery and equipment		0.152*** (0.0776)
Imported contents of computing and related activities		-1.020 (0.290)
Imported contents of R&D and other business services		0.0550 (0.268)
Constant	0.214*** (0.0359)	0.0934*** (0.0334)
Observations	2,016	2,016
Number of geosectors	560	560

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Source: Author on the basis of econometric regressions.

To further explain the result of a negative contribution of the total domestic contents of manufacturing exports to changes in global export market shares, on the one hand, and a positive contribution of some individual types of domestic business services, on the other, separate regressions are performed using the control variables and specific types of domestic services (see Table 10).

Table 10
Additional variables explaining changes in global manufacturing export market shares, 1995 to 2011

Global market share change (ΔQ_{ijt})												
Hotels & restaurants	-0.137*											
	(0.0746)											
Transport & storage		0.0664										
		(0.0801)										
Post & telecom			0.0808									
			(0.0867)									
Finance				-0.292***								
				(0.0593)								
Real estate					-0.228***							
					(0.0672)							
Renting machinery-eq						0.410***						
						(0.0742)						
Computer-related ac							0.0852					
							(0.0878)					
R&D -other business								0.298***				
								(0.0958)				
Government									-0.875			
									(0.0660)			
Education										0.400***		
										(0.0954)		
Health & social work											-0.26***	
											(0.0498)	
Other services												0.0437
												(0.0846)
Constant	0.142***	0.101***	0.100***	0.174***	0.161***	0.0428***	0.0946***	0.0536*	0.134***	0.0421	0.164***	0.108***
	(0.0270)	(0.0308)	(0.0297)	(0.0258)	(0.0266)	(0.0269)	(0.0328)	(0.0310)	(0.0268)	(0.0297)	(0.0249)	(0.0313)
Observations	2,016	2,016	2,016	2,016	2,016	2,016	2,016	2,016	2,016	2,016	2,016	2,016
Number of geosectors	560	560	560	560	560	560	560	560	560	560	560	560

Notes: Standard errors in parentheses. *** p<0.01, **p<0.05, and *p<0.1.

Source: Author on the basis of econometric regressions.

These regressions illustrate that while some services (renting of machinery and equipment, R&D and business services, education) contribute positively, other services (hotels and restaurants, finance, real estate and health and social work) seem negatively associated with changes in global market shares. In sum, individual services seem to have different impacts on global market shares.

Whereas changes in the global export market shares have already been used in the literature as a measure of export performance, other export performance measures are also explored to capture the role of domestic and foreign services in exports. One of the alternative indicators is the EXPY indicator, which uses the methodology by Hausman et al. (2007) to estimate the level of technological sophistication embodied in a country's export portfolio. Regressions with the same control variables and service-related variables suggest that the effects are not as clear as when considering global export market shares.

D. Conclusions and suggestions for future research and technical assistance

This report has three main purposes: *i)* evaluate recent advances in both the region and globally with respect to the measurement of both direct services trade and indirect services trade as measured by the incorporation of services as intermediates in goods exports; *ii)* assess the competitiveness of the region, sub-regions and countries in global services exports and trade over the past decade and *iii)* look into the incorporation of both domestic and imported intermediate services into the exports of manufactures for seven economies in the region.

Several findings emerge from this report as well as recommendations for ECLAC's work program on trade in services. First, despite some advances in the measurement of trade in services statistics, major challenges continue to exist. More than half of the countries in the region have not yet adapted the guidelines of the 2010 Manual on Trade in Services Statistics, which provides indications on compilation methods and disaggregation of services categories following both the fifth and sixth Manuals of the Balance of Payments. Moreover, the large majority of countries do not publish data by trading partner, while almost none registers services trade by modes of delivery. In addition, information on the incorporation of services value added into the exports of goods sectors is available from 2010 onwards mainly from three inter-country input output tables (IIOTs) produced by a consortium led by the University of Groningen, the OECD-WTO and ECLAC.

On the basis of these results, ECLAC could step up its efforts to assist countries in their improvement in trade in services statistics. The most pressing needs are in the area of modern services, including the improvement in the estimation of trading volumes and further disaggregation of categories. Other necessary improvements include a breakdown by trading partners and four modes of services provision. The 2010 Manual on Trade in Services Statistics is the main basis for this assistance. The Commission could help countries in the design of specific surveys that capture better trade in modern services. Moreover, it could facilitate institutional cooperation frameworks between public and private institutions to share statistics, such as customs, tax authorities, supervisory bodies, chambers of commerce, and professional organizations. ECLAC could also organize, in collaboration with ALADI and the United Nations Statistics Division, workshops to promote the sharing of best practices of countries in the region.

A second main result that emerged from this report is that region's competitiveness in trade in services stagnated between 2005 and 2015. This performance is bleak compared to its competitors in Asia, like China, India and ASEAN, which all expanded substantially their market shares. Within the region, Mercosur and Central America improved their global market shares, whereas the Pacific Alliance and CARICOM lost. Moreover, all subregional agreements, except for Central America, experienced

worsening trade balances in both total services and modern services during this period. The most dynamic countries were Brazil, Panama and Costa Rica, whereas Chile and Mexico lost market shares.

On the basis of these results, ECLAC could carry out more detailed analyses of the competitiveness of the region, sub-regions and countries using different types of indicators. Its main focus should be on the most dynamic segments of international trade in services, since these are heavy users of digital platforms. Moreover, more analysis is needed to better understand differences in the performance of countries. These may stem in part from more or less active public and private initiatives to promote the production and exports of specific types of (modern) services exports. The Commission should also carry out in depth studies on strategies in the countries to develop specific human capital skills, build IT infrastructure to access high-speed broadband, attract and retain foreign direct investment in targeted sectors, establish favorable tax treatment for service exporters, build a regulatory environment to produce and import services that discriminates little against foreign providers with some possible exceptions, spread digital platforms, and promote services exports.

A third main result focuses on indirectly traded services through their incorporation in manufacturing exports. This paper shows that the region does not underperform in terms of the incorporation of intermediate services in their exports of manufacturing goods, when compared to developing countries and regions in Asia. This finding seems to reject a common thought that the region's stagnant export performance in goods trade over the past fifteen years could be due to the insufficient incorporation of intermediate services in exports. Comparing Latin America with ASEAN, it turns out that the domestic services value added intensity of manufacturing exports is higher in the former, whereas the imported services value added intensity is higher in the latter. This could be due to the fact that ASEAN countries are more integrated in global value chains, which are more intensive in imported services. Another possible explanation is different trade specializations: ASEAN countries export relatively more labor-intensive and technology-intensive manufactures that are more services intensive, compared to Latin America which is more specialized in natural resource-intensive industries. Regressions seems to suggest that total domestic services content of manufacturing exports are negatively associated to global exports market shares, whereas total imported services are positively associated. However, some types of domestic business services are positively associated to changes global export market shares, while domestic finance and real estate services may be negatively associated.

These results can be further developed by ECLAC to the extent more data become available, which cover more countries and recent years. The on-going Development Account project that builds an almost full regional input-output table for recent years is a good step in this direction. With better data, the Commission could also extent its econometric work to better understand differences between Latin American countries in terms of the intensity of different types of domestic and imported intermediate services. Factors that need to be studied more are types of specialization in natural resource, labor or technology intensive industries, forward and backward participation in global value chains, product and service markets restrictions, domestic presence of foreign firms in service sectors, and participation in free trade agreements. This work also opens up avenues for future research on the impact of different domestic and imported service intensities on manufacturing export performance. This requires linking these service intensities to performance measures of domestic service sectors. Moreover, this work could be extended to primary goods producing sectors. Finally, other definitions of export performance can be tested, as well as the differential contributions of different types of services.

The results of this work can be further developed into Manuals that could be used for training purposes of the Division. These ECLAC manuals would be particularly useful to explain different types of indicators and provide examples of their use, for example to analyse trade in services performance and measures of domestic and imported services contents of goods exports combined with yardsticks of domestic services performance and regulations.

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Annex 1: Comments on paper and suggestions for future cooperation

Work in progress was presented at the following places in February and March 2017: OECD (Paris, 1 March), World Trade Organization (Geneva, 8 March), United Nations University and Maastricht Economic Research Institute for Innovation and Technology (MERIT) (Maastricht, 13 March), University Computense (Madrid, 21 March), University of Granada (Granada, 23 March), Science Policy Research Unit (SPRU, University of Sussex), (Brighton, 29 March) and University of Groningen (Groningen, 30 March). The main comments on the presentations are summarized below and were included in the paper to the extent possible.

On the introduction of the paper:

- Emphasize more in the introduction that the contribution of the paper is the distinctive contribution of domestic and imported services to export competitiveness. What are plausible reasons to presume that the former is of lesser quality relative to the latter?
- Please introduce some caveats of the IIOTs in the introduction of the paper:
 - the low degree of disaggregation of sectors, in particular R&D and business services.
 - the impossibility to measure services provided within the firm both domestically and internationally.

On the survey of previous studies

- include recent papers by OECD on our topic (December 2016)

On the illustration of differences between Latin America and Developing Asia regarding the domestic and foreign contents of services in manufacturing exports:

- Focus on Latin America exclusively, which is different from other continents. So do not bring in the heterogeneity of the other continents in like that of ASEAN.
- When comparing Latin America and Asia, only look at ASEAN countries and take out China and India. The dynamics of ASEAN are different from those of China and India.
- The data do not allow to identify the level of outsourcing by industry, as in-house provided services are not registered within an IO framework. The results may be distorted by measurement problems, as the data do not capture in-house provided services by manufacturing firms.
- How does transfer pricing affect the estimates, which is predominant in a GVC world dominated by multinational companies?
- Maybe the higher intensity of domestic services in the case of Latin American exports compared to Asia and the lower intensity of imported services of the first group compared to the latter is due to a composition effect of different types of exported services.
- Maybe it is worth trying alternative classifications of industries. The author looked into different ones including the Pavitt categories (supplier dominated, science based, scale intensive and special suppliers), Lall categories (resource-based, low, medium and high tech) and OECD categories (low, medium-low, medium-high and high). The one used in our paper seems to classify best industries.
- The classification of industries in three groups: labor intensive (LI), technology intensive (TI) and resource intensive (RI) is artificial. In the GVC world, electronics can be LI in one country and TI in another. One should look at the skill intensity of the tasks involved. In a GVC world where countries concentrate in tasks, an industry classification based on final products does not make much sense. Therefore industries in specific countries should be ranked by their labour skill-intensity. However, in TIVA no data are available on this and it can be argued that classifications based on the final product still make some sense.

On the theoretical model behind the econometric regressions:

- The paper lacks a theoretical model of international trade and outsourcing decisions, which justifies the estimates and their interpretations of the paper. This theoretical model should take into account: the different resource endowments between countries, the productivity differences between them, and the location strategies of large multinational companies. Thus, one could truly isolate the causality between the incorporation of services in manufacturing exports and changes in competitiveness. The problem is that in order to incorporate business localization strategies into the model you would need to work with firm-level data, or find a way to combine that information with the most aggregated data the author is working with.

On the outcome variable in the regressions:

- Share in gross global manufacturing exports may not be a good outcome variable, because it is affected by movements in exchange rates and country and industry composition effects. Therefore it does not necessarily reflect changes in competitiveness. The following article provides a methodology to decompose changes in market shares yielding a residual that gives the true change in competitive position: H. Oldersma and P.A.G van Bergeijk (1993), "Not so constant! the constant-market-shares analysis and the exchange rate", *De Economist*, 141, nr. 3, 380-401. Our paper is based on gross trade values which are expressed in US\$. Still the issue of the numeraire is important and even if one does not want to deal with the numeraire/exchange rate issue, a decomposition would be useful regarding the first two stages of the constant market shares analysis that is regarding geographical and product composition.
- What exactly is the competitiveness indicator used? If it is change in the country-industry share in world gross exports, this is not correct in a GVC perspective. Instead the share in world value added manufacturing exports should be taken, or even better the country-industry share in total income generated in GVCs. See article Marcel P. Timmer, Bart Los, Robert Stehrer and Gaaitzen J. de Vries - Fragmentation, incomes and jobs: an analysis of European competitiveness
- Consider analyzing the vertically integrated trade balance rather than a particular good trade balance.
- An alternative outcome variable is EXPY: total or for the manufacturing sector only. This measure is based on final products trade and not suitable maybe in a GVC perspective.
- Another option could be the country - industry participation in global final demand, which includes

Additional explanatory variables for the regressions:

- Distance to manufacturing hubs: the closer a country is to a manufacturing hub, the more a country is potentially integrated in regional production network. The distances to United States, Germany and China or Japan could be taken.
- GDP per capita to account for i) the fact that the degree of services incorporation rises with the level of development, ii) the quality of domestic services increases with the level of GDP. These effects may already been captured by the country fixed effects.
- Supply of total domestic (business) services: the larger their availability, the easier the domestic subcontracting of these services.
- FDI stock in (business) services, which facilitates the domestic provision of services (mode 3). It is very difficult to obtain these data. The only available data is on the total domestic FDI stock.
- Is it possible to differentiate between directly imported or domestic services and indirectly imported or domestic services which are embodied in imported goods?
- Human capital as one of the main drivers of the quality of domestic services.
- Integration in regional or global value chains. Total and forward backward linkages by industry can be used as proxy variables, although these are correlated with the imported services contents variable

- Destination markets of the exported good. To the extent goods are exported to more sophisticated markets, probably more (sophisticated) services are needed.
- Fixed effects (time, country and industry fixed effects) may enable us to drop the non-essential explanatory variables and focus the presentation on the variables of interest. Are these already in the model?

On the specification of the regressions:

- Instead of using levels of all variables, use over time differences (deltas). Otherwise, an increase of services value added embodied in manufacturing exports always will increase manufacturing exports, as being an accounting exercise which is like an identity.
- Instead of explaining variations in global export shares, one could try to explain “bilateral” export shares using a gravity model framework in part to control for distance to the closest manufacturing hub. In this case, the unit labour costs should be relative to those of trading partners. Also, one should include other gravity variables. However, a gravity model for this paper is not recommended, as data on bilateral trade shares in intermediate services are of poor quality. Therefore it is preferable to maintain global export shares.
- Is it possible to cluster certain variables?

On the interpretation of the econometric results:

- Some signs of variables seem counterintuitive: unit labour cost (ULC) has a significant and positive coefficient, while the FDI inflows as a share of GDP has a significant and negative coefficient. One possible interpretation of these results is that developed countries have both relative high ULC and relatively high FDI inflows, and find it difficult to increase even more their market share.
- In the regressions, separate labour productivity from labour cost.
- On the quality of (imported) services: for developing countries, it is reasonable to assume that imported services are more efficient than domestic services? Indeed, some countries can be “forced” to use foreign services because they are more efficient. One could identify the source country of the imported services and domestic services. For example, domestic/imported services in/from the United States are different from domestic/imported services in/from Brazil. Marcel van den Berg (Utrecht University) has done something like this for importers of goods (requires interaction terms).
- Put this paper in a wider context of the accelerated pace of deindustrialization in Latin America. For this purpose, please see 2016 Trade and Development Report by UNCTAD.
- The authors suggest that the stagnation of Latin America in global manufacturing exports is due to the degree and types of domestic and foreign services contents of manufacturing export. However, this stagnation may be due to other variables. Therefore one should do a decomposition analysis, see the paper of Javier Lopez, to see what is the relative contribution of services contents
- The high content of financial services seems to be associated with a negative manufacturing export performance. Please check how financial services are measured in the context of national accounts and IO tables to check if it is a good proxy of performance. How can this be interpreted? One could use other research methods (qualitative) to investigate this further, looking for example at Arbache’s paper on the case of Brazil.
- An interesting story of the results of the paper would be financialisation versus real economy (domestic) service content which demonstrates the Hirschman Linder hypothesis – the low value added domestic ones come out with negative signs (real estate activities, education, health social work). Why would these services be relevant for manufacturing?
- Either one look at i) global export shares and total services content or ii) at manufacturing global export shares and business services and finance contents only. You can draw a quadrant with i) financial vs. “real” business services and ii) domestic vs. foreign origin of services provision. It

seems financial services contribute negatively to manufacturing export performance, whereas domestic business services positively!

- Is there a connection between the origin of imported services and destination of manufacturing exports?
- Is a lower imported value added are actually detrimental for manufacturing export competitiveness (domestic capability story)?
- The "use of intermediate (business) services" is difficult to interpret without considering the type of industry: labor-intensive or technology-intensive. For example, R&D services in high-tech industries are performed mostly in-house and are not outsourced. As a result it is difficult how to interpret a share of R&D and business services of gross exports: either producers do not use high-quality services for their products (which may impact negatively their competitiveness) or they produce these quality services internally.
- What does it if companies subcontract a low share of services domestically or abroad? If countries import services, is this because there is too little supply within the country? Are domestic services too expensive? Do exporting manufacturing companies not benefit from "quality upgrading" using imported services? To answer these questions, additional (case-study) research is needed.
- How to explain high-share of services in labour industries? It could be an effect from food industries. Example: marketing is the highest service in food.

Suggestions for future cooperation:

- With OECD: trade section in next Latin American Economic Outlook, based partly on result of this paper
- With Michiko Iizuka of UNU-MERIT Maastricht: on upgrading trajectories in natural resource industries in Latin America, with a specific interest in wine sector and possibly mining sector
- Suggestions for collaboration with University of Groningen:
 - Study on trade in tasks: check on decomposition of labor force by sector and type of job occupations by industry. See Gaaitzen de Vries' work with Sebastian Miroudot.
 - Study on competitiveness replacing gross exports by VA exports or income generated through GVCs.

