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OECD TRADE AND AGRICULTURE DIRECTORATE

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MULTINATIONAL PRODUCTION AND TRADE IN SERVICES

Andrea Andrenelli, Charles Cadestin, Koen De Backer,
Sébastien Miroudot, Davide Rigo and Ming Ye (OECD)

Using the OECD analytical AMNE database, this paper provides new evidence on the services activities of multinational enterprises (MNEs) and discusses the relationship between cross-border trade in services and the production of services through foreign affiliates ("mode 3" trade in services in the General Agreement on Trade in Services). An econometric analysis indicates that policies restricting trade in services (as captured in the OECD Services Trade Restrictiveness Index) are associated with a lower output of foreign affiliates not only in services industries but also in the manufacturing sector. Moreover, services trade restrictions also impact the choice of firms when it comes to engaging in exports or in foreign direct investment to serve foreign markets. Overall, the results in this paper demonstrate the intertwined nature of manufacturing and services activities in global value chains.

Key words: Multinational enterprises, multinational production, global input-output, global value chains, trade in value-added, trade in services, mode 3, FATS
JEL codes: F14, F23, F68, L16, L23

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Executive summary

The blurring of boundaries between manufacturing and services introduces increasing complexity to the challenge of industrial and trade policy design. Policies that focus exclusively on manufacturing risk overlooking the growing importance of services for value creation in manufacturing value chains. In this context, a policy focus on services industries represents an effective avenue through which to promote manufacturing industries. This paper seeks to demonstrate the potential benefits of an integrated view of manufacturing and services in policy discussions. It introduces new data and econometric analysis on multinational production and trade in services, using the analytical AMNE database.

The analytical AMNE database has been developed by OECD to better understand the Activities of Multinational Enterprises (AMNE) in global value chains (GVCs) and the interrelationships between trade and investment. This paper focuses on the role of services in multinational production, defined as the production carried out by firms abroad through their foreign affiliates. In the General Agreement on Trade in Services (GATS), multinational production in services is described as mode 3 trade in services.

Services have become increasingly important in all economies, illustrated in a rising share of services in GDP, employment, trade and investment. Services account for only 43% of the sales of foreign affiliates around the world but in value-added terms this share raises to 60%. As with trade in value-added (TiVA) statistics, the analytical AMNE database allows for the identification of the services inputs embodied in the output of manufacturing firms and highlights the true importance of services in multinational production.

The share of services in the output of foreign affiliates is higher when these affiliates are hosted in OECD economies. Emerging countries have lower shares as host economies, but as parent countries both OECD and emerging economies have similar shares of services for their foreign affiliates. Across industries, there are also differences, with ‘wholesale and retail trade’ and ‘finance and insurance’ being the two sectors where the output of foreign affiliates is the most important in absolute terms. In relative terms, ‘computer and information services’ is also a sector where foreign affiliates account for a large share of the sector output and value-added.

Tracing services value-added in global production highlights that while gross exports and the output of foreign affiliates are roughly equal at USD 20 trillion in 2014 (world estimate), the value-added content is not the same. Value-added in trade remains higher as a result of lower double counting in gross exports as opposed to gross output of foreign affiliates. The value-added in trade is estimated at USD 15 trillion (of which USD 7 are services) and the value-added in foreign affiliates output at USD 7.5 trillion (of which 4.4 are services).

While there is evidence of vertical strategies of MNEs creating foreign affiliates to produce inputs, the data suggest relatively modest shares of services value-added originating in foreign affiliates and being incorporated in exports. In line with the recent literature on multinational production, MNEs are also sourcing many inputs through arm’s length transactions with independent firms and are creating affiliates for a variety of purposes that also involve domestic sales in the host economy.

The second part of the paper focuses on mode 3 trade in services (i.e. trade through commercial presence) and how it compares with cross-border trade. For the first time, estimates of world trade according to mode 3 are provided, distinguishing the domestic sales of foreign affiliates from their exports. Both are covered by the definition of mode 3 in GATS but from a statistical point of view it is important to distinguish the exports of foreign affiliates as they are cross-border transactions under mode 1, 2 or 4 from the point of view of the exporting economy (where the foreign affiliate is established). Mode 3 trade in services has significantly increased between 2000 and 2014 and especially the exports of foreign affiliates, which is evidence of vertical strategies of MNEs.

The ratio of mode 3 to cross-border trade in services (in gross terms) is for most countries above 1, as services are mostly exported through mode 3. Only some emerging economies, such as the People's Republic of China (hereafter "China"), have higher exports of services than sales of foreign affiliates. The prevalence of modes of supply varies across industries and some industries are moving towards more cross-border trade, such as the 'finance and insurance' or 'computer and information services' sectors, maybe related to technological evolutions and the digital economy.

In the last part of the paper, some econometric analysis sheds light on the impact of services trade restrictions (including on mode 3), as captured by the Services Trade Restrictiveness Index (STRI), on the output of foreign affiliates. There are three interesting results. First, strong and significant coefficients are found for the STRI, indicating that services trade restrictions are associated with a lower output of foreign affiliates in services. Second, when using the ratio of mode 3 to cross-border trade as a dependent variable, there is also a negative and significant coefficient suggesting that services trade restrictions also impact the choice of firms when it comes to engaging in exports or in FDI to serve foreign markets.

Finally, the links between services trade and manufacturing output are confirmed by results demonstrating that, not only is the output of services affiliates lower when the STRI is higher (i.e. more restrictions to trade), but also that the output of the affiliates in the manufacturing sector is also negatively impacted by barriers to competition in services industries. Different robustness checks are conducted to confirm these results and address the potential endogeneity issue between the output of foreign affiliates and the policy regime.

Overall, the results in this paper demonstrate the intertwined nature of manufacturing and services activities, with implications for trade and investment policies aimed at promoting the manufacturing sector. Policy makers may actually need to focus more on services industries in order to support their manufacturing industries, suggesting the need for an integrated approach to manufacturing, services and investment in policy discussions.

Introduction

To better understand the role of Multinational Enterprises (MNEs) in global value chains (GVCs) and the links between trade and investment, the OECD has developed an analytical AMNE database (Box 1). The construction of the data is detailed in Cadestin et al. (2018[1]).

This paper focuses on the role of services in multinational production. It provides new evidence on the services activities of MNEs and discusses the relationship between trade in services on the one hand and the production of services through foreign affiliates on the other. The latter is described as "mode 3" trade in services in the General Agreement on Trade in Services (GATS). In addition, there are important questions related to the transformation of manufacturing industries and what has been described as their "servicification" (National Board of Trade, 2012[2]), i.e. the fact that they increasingly buy, produce and sell services.[1]

Part 1 of this paper provides some stylised facts on the prevalence of services in multinational production based on the analytical AMNE database. Part 2 further discusses the definition of mode 3 trade in services and analyses patterns of cross-border exports and domestic sales of foreign affiliates. Part 3 presents new econometric work on the role of services trade barriers in explaining multinational production of services. Part 4 concludes with some policy implications.

1. The prevalence of services in multinational production[2]

Services have become increasingly important in all economies, as illustrated by the rising share of services in GDP, employment, trade and investment. A number of factors at the demand side (income elasticity of services, demographic changes, growing demand for services inputs due to outsourcing/offshoring and servicification) as well as at the supply side (differences in productivity and prices of manufacturing and services) are important drivers behind this growing tertiarisation at all levels of development.

Recent OECD work on GVCs and TiVA has shown that services are also an important part of manufacturing trade. Since trade statistics are expressed in gross terms, services inputs and their value added embodied in manufactured goods are included in the exports/imports of manufactures. Because of the growing servicification with manufacturing companies producing services and bundling them with goods, the lines between manufacturing and service sectors are becoming increasingly blurred.

This growing integration between manufacturing and services activities is also prominent within multinational enterprises (MNEs). These companies often set up affiliates abroad to carry out services support functions (such as distribution, logistics or insurance) for their manufacturing operations. One can assume then that statistics on multinational production, i.e. the production by foreign affiliates in host countries, suffers from a similar bias and underestimates the importance of services. Just like trade statistics are expressed in gross terms, production statistics include the value of intermediate services inputs.

[1] Early work on services activities in manufacturing firms includes Pilat and Wölfl (2005[49]) and Pilat et al. (2008[50]). For more recent analysis, see Nordås and Kim (2013[51]), De Backer et al. (2015[52]) and Miroudot and Cadestin (2017[29]).

[2] Multinational production is defined as the production that is carried out by firms outside of their country of origin (Ramondo, Rodríguez-Clare and Tintelnot, 2015[15]). Multinational production in services (industries) relates to mode 3 trade in services in the GATS, i.e. the provision of services through a commercial presence abroad.

Box 1. The analytical AMNE database

The OECD database on the Activities of Multinational Enterprises (AMNE) contains the official data collected and published by National Statistical Offices and Central Banks on activities of MNEs. The database includes data for 32 OECD countries plus Costa Rica and Lithuania, and covers more than 50 industries with reporting beginning in 1985. While the coverage has improved over time, information is not equally available across countries and years, particularly at more disaggregated levels (e.g. bilateral at industry level).

STI and TAD have therefore created an analytical AMNE database that extends the data to additional countries and includes estimates for missing years and industries in order to obtain a full matrix of sales of foreign affiliates around the world. In addition, the data are used to split Inter-Country Input-Output (ICIO) tables to distinguish domestic-owned and foreign-owned firms. For the most recent years (starting in 2011), the split tables also distinguish domestic MNEs from other domestic companies not involved in international investment.

These data allow the construction of new indicators in value-added terms to characterise activities of MNEs, conceptually similar to those created in the context of the Trade in Value-Added (TiVA) project. The dataset covers 43 countries (plus the 'rest of the world') and 43 industries over the period 2000-2014. The original ICIO comes from the World Input-Output Database (WIOD) but in the future the work will be based on the updated OECD ICIO.

The methodology used to create the analytical AMNE database is described in Cadestin et al. (2018[1]).

However, UNCTAD suggests in a recent report that both FDI statistics and foreign affiliate sales tend to overstate the importance of services (UNCTAD, 2017[3]). In particular, the affiliates of manufacturing firms are often counted as services (for example when they provide wholesale and retail trade services). Some parent companies are also financial holding companies and are classified as services from the perspective of the 'ultimate owner', while most of their activities may be in the manufacturing sector (and only headquarter activities are 'services').

Measuring the contribution of services to multinational production is thus more difficult than it sounds. The analytical AMNE database offers a number of conceptual tools that allow for a more complete assessment of the contribution of services to multinational production. In particular, it can look into the contribution of services to the output of foreign affiliates in value-added terms.[3] The same way we have learned more on trade in services through TiVA statistics, the analytical AMNE database provides a value-added perspective on the services activities of foreign affiliates.

Some stylised facts on the share of services in multinational production in gross and value-added terms

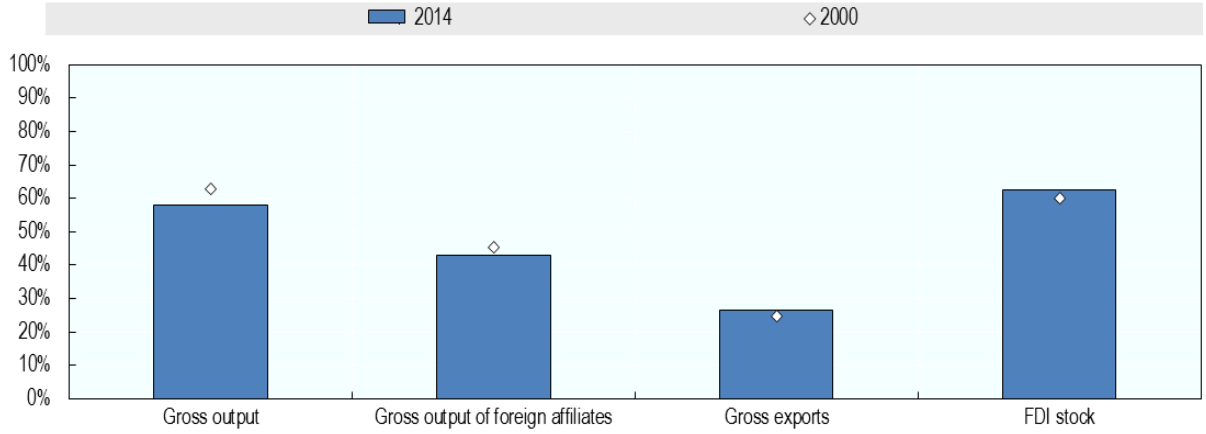
Figures 1 and 2 present respectively the importance of services in gross and value added terms for a number of global economic measures. Both the gross and value added perspective are needed to get a correct picture of the importance of services. The share of the services sector in GDP is typically above 70% in developed countries and somewhat lower in emerging and developing countries (with values between 50% and 70%). As shown in Figure 1, the share of services in gross output is significantly lower (58%)[4] due to the fact that services inputs go into the output of the manufacturing sector. This services value added is counted only once in GDP figures but double counted in output figures (in manufacturing and services).

[3] In addition, it creates some consistency between sales of foreign affiliates and gross output as measured in national accounts.

[4] Figure 1 provides an estimate for the world as the analytical AMNE database has a 'rest of the world' accounting for all the countries not covered.

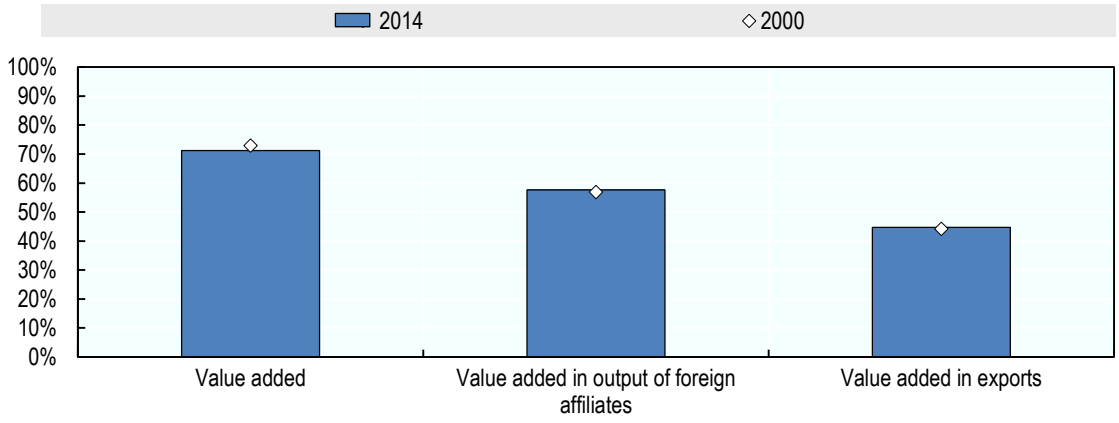
Foreign affiliates' sales account for 12% of global output (Cadestin et al., 2018[4]). Less than half (43%) of these sales by foreign affiliates are categorised as services, suggesting that, in comparison to domestic-owned firms, foreign-owned firms are relatively more involved in the production of goods. Remarkably maybe, the share of services in foreign affiliates' production share has decreased over time.

Figure 1. Share of services in gross terms (2014)



Source: Analytical AMNE database for gross output, gross output of foreign affiliates and gross exports; UNCTAD FDI/MNE database for the stock of FDI.

Figure 2. Share of services in value-added terms (2014)



Source: Analytical AMNE database.

This difference between domestic-owned and foreign-owned firms could be related to higher costs for establishing foreign operations in the service sector, due to both the policy environment and the specific characteristics of services. Section 3 of this paper provides some evidence that services trade restrictiveness (including investment or 'mode 3' trade restrictiveness) has a negative impact on the output of foreign affiliates producing services.

In addition to policies that may create a less favourable regime for foreign investors in services industries, there are also specificities related to the provision of services. Horizontal FDI in services is more impacted by differences in language or culture, as face-to-face contacts with customers and trust in the contractual relationships play a more important role in the case of services. For vertical FDI, some support services involving knowledge are also less prone to be offshored because of potential

breaches of intellectual property but also because they need to be co-located with the headquarters of the firm.

When comparing the share of services in foreign affiliates' sales with (cross-border) exports of services, it becomes clear that gross measures are even more biased towards the manufacturing sector in the case of trade. The share of services in gross exports rose to 27% in 2014, but is significantly lower than the 43% share of services in sales by foreign affiliates. Section 2 of this paper provides more detailed analysis on the prevalence of mode 3 in trade in services. Cross-border trade costs and the specificities of services activities mentioned above have an even bigger impact on the share of services in exports.

Interestingly, the share of services in the stock of Foreign Direct Investment (FDI) is higher than the share of services in foreign affiliate output. First, this confirms that while there is a correlation between FDI and the output of foreign affiliates, the size of the FDI stock is not a good proxy for the sales of foreign affiliates. FDI statistics capture only part of the equity of foreign-owned firms (those can also rely on capital coming from the host economy) and the output of foreign-owned firms also depends on other factors of production (labour, intermediate inputs, etc.). Second, it suggests that services are more capital-intensive and some services (e.g. financial services) involve more movement of capital than some labour-intensive manufacturing activities. There are also some statistical differences that can explain the discrepancy.[5]

The distinction between services and other activities (manufacturing, agriculture and mining) in the AMNE data is based on the industry of the foreign affiliate and not its parent company. While the data do not provide similar estimates in terms of the industry of the parent company, the value-added analysis reveals more about the services content of the output of foreign affiliates and can identify the source industry (whether value was first added in the manufacturing sector or in the service sector).

Looking at the value added originating in services industries in these global measures highlights the large(r) role of services in today's economies (Figure 2). The share of services in world value-added (i.e. world GDP) is 71%. A smaller share is found for the share of services in the value-added by foreign affiliates (58%), in line with their smaller output share. But this share is above the gross output share as the value-added approach includes all the services value-added in the output of manufacturing foreign affiliates.

For exports, the value-added calculation confirms earlier TiVA results; there is a higher service content when taking into account services exports embodied in manufacturing goods (OECD, 2013[4]).

In addition, the services share of foreign affiliate output varies across countries. Figure 3 demonstrates that services make up 49% of output of foreign firms established in OECD countries. The share is 22% for emerging economies. Affiliates established in emerging economies focus more on manufacturing activities.

Differences also arise when comparing the foreign affiliate share of services according to the location of the activity on the one hand (host) and country of the ultimate owner of the foreign affiliate on the other hand (parent). While the share of services is slightly higher in OECD countries for affiliates hosted as opposed to their own affiliates abroad, the reverse is observed for emerging economies. Their outward investment is more in services activities, with at the end a share similar to the one observed for OECD parents. This implies that location (the host country) matters more for the activities of the affiliates than the country to which the parent company belongs.

Interestingly, both as host and as parent, the affiliates of emerging economies have lower shares of services in 2014 as compared to 2000. But it is mostly related to the rise of China where both inward and outward activities of foreign affiliates are predominantly in the manufacturing sector. When removing China from the group of emerging economies, the decrease is much smaller.[6] The 'rest of the

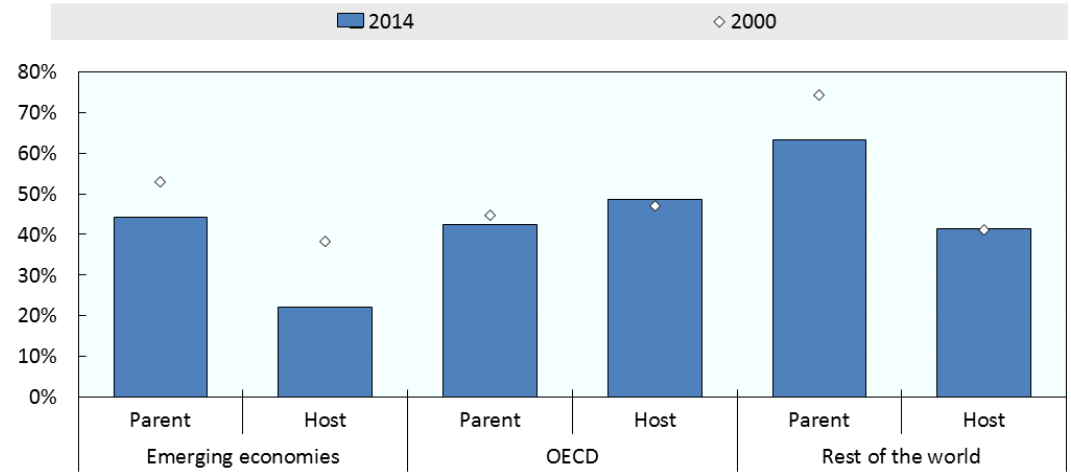
[5] See UNCTAD (2017[3]).

[6] See Figure A.1 in Annex A for more results by region.

world' category sits somewhere in between the two former groups for affiliates hosted, with a share of 42%, but has an even higher share of services in affiliates abroad (63%). This category is however an heterogeneous group for which data are less reliable (as they include estimates for all countries not covered).

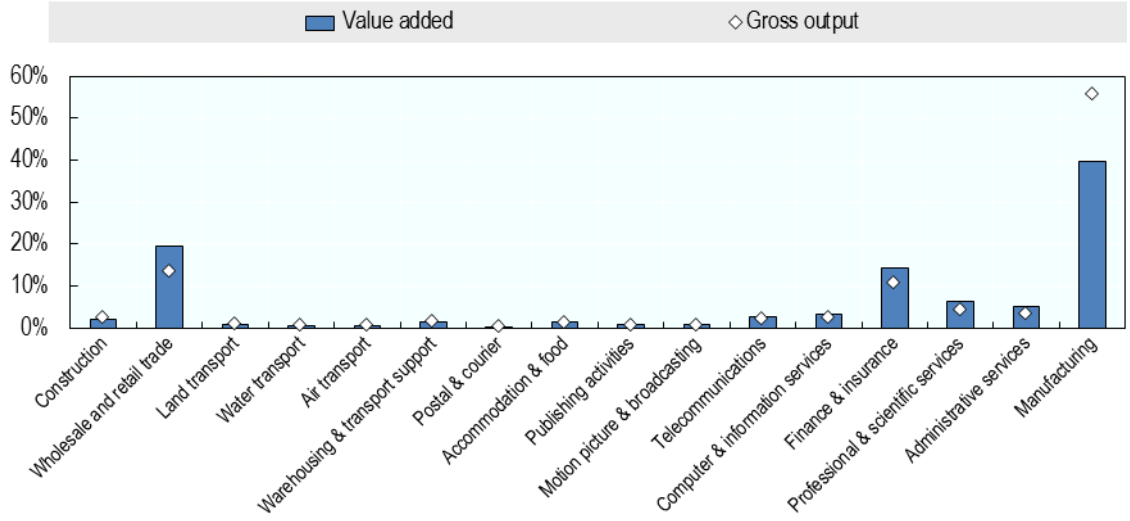
Across industries, Figure 4 shows how much each service industry weights into affiliates' value added and gross output. The values presented in the graph are the share of each industry so that the categories displayed sum to 100%. Manufacturing value added and output have been included for comparison purposes.

Figure 3. Share of services in the output of foreign affiliates, parent and host, 2000 and 2014



Source: Analytical AMNE database.

Figure 4. Distribution of VA and output of foreign affiliates across industries, 2014



Source: Analytical AMNE database.

The 'wholesale and retail' industry registers the highest share in services both in value added and gross terms, roughly equal to 19% and 13% respectively. While some horizontal FDI can occur in the distribution sector, this also reflects vertical FDI by firms from other industries. As suggested in the literature, such firms set up affiliates downstream in the distribution sector to build capacity in the host market, such as local marketing capabilities, brand capital or salesforce system (Caves, 1996[5]; Anand and Delios, 2002[6]).

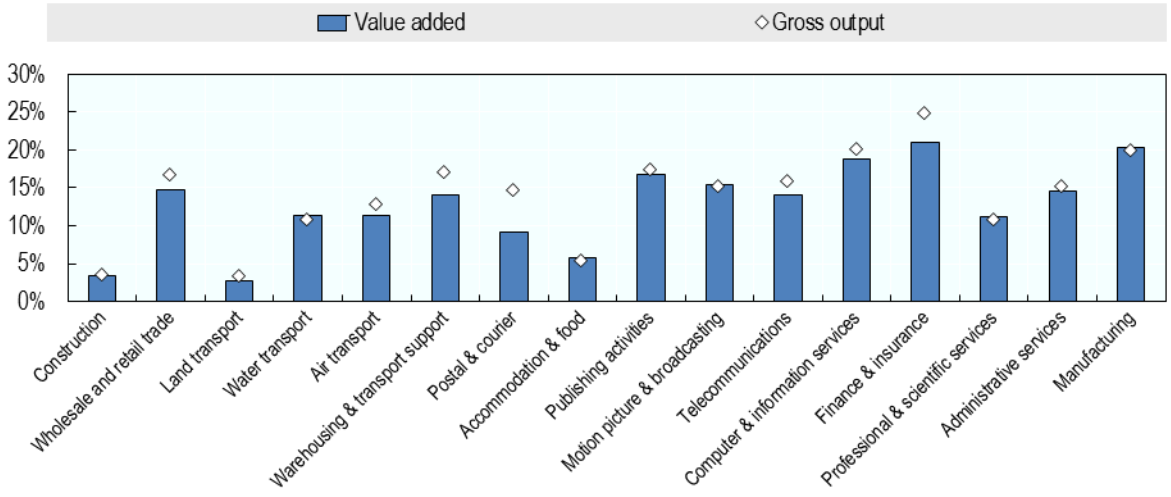
Other important categories in value added terms include 'finance and insurance' (14%), 'professional and scientific services' (6%) and 'administrative services' (5%). As with the distribution sector, financial services are also traded mostly through 'mode 3' not only because the proximity with consumers is essential but also because prudential regulations are also sometimes making it compulsory for firms to be established and to have some assets in the host economy. Some financial services, and particularly insurance services, are also part of the service activities needed by manufacturing firms and together with business services ('professional and scientific services' and 'administrative services'), these categories are typical support services.

It was previously highlighted that the co-location of activities could explain the lower share of services in foreign affiliates output with services support functions located near the headquarters of the firm. But the co-location of activities can also explain offshoring of services when it accompanies the offshoring of manufacturing production. For example, R&D activities tend to be located near production activities and firms also co-locate activities in countries where they set up foreign affiliates (Defever, 2006[7]; Belderbos et al., 2016[8]).

Figure 4 also confirms that the share of services in value added is always higher than in output and that the opposite is observed for the manufacturing sector. The manufacturing sector relies on many services inputs that contribute to its output while services are mostly produced with other services inputs and fewer material inputs.

Within each service industry, Figure 5 indicates the share of output by foreign affiliates (the rest being the output of domestic-owned firms). 'Finance and insurance' is the sector where value-added is the most international with 21% generated by foreign-owned firms. It is even higher than in the case of the manufacturing sector (20%). While being smaller sectors in terms of their overall share in GDP, 'computer and information services', 'publishing activities' and 'motion pictures and broadcasting' are also industries where there is a high share of output and value added by foreign-owned firms.

Figure 5. Share of VA and output by foreign-owned firms in each service industry, 2014

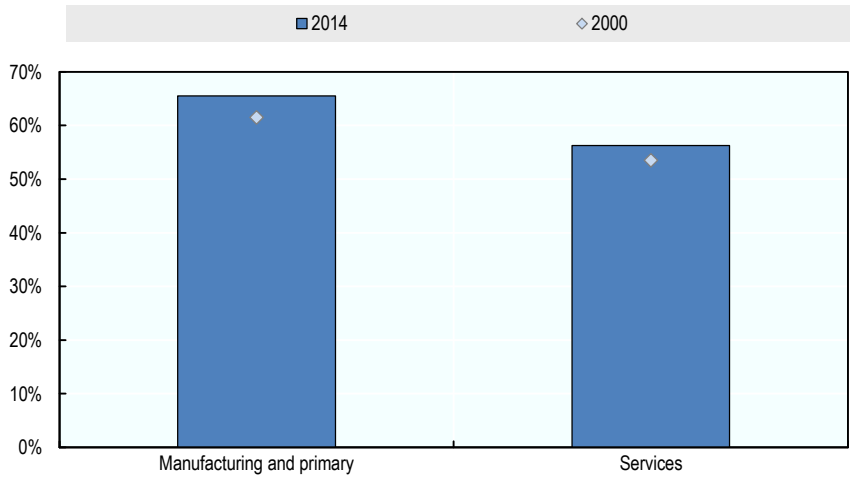


Source: Analytical AMNE database.

'Land transport', 'construction' and 'accommodation and food' are the industries where the output or value-added of foreign affiliates accounts for the smallest share of total output or value-added. These industries are in some countries subject to regulations that limit the entry of foreign firms but this outcome is also explained by their structural characteristics. For example, land transport services can be easily provided cross-border without creating an affiliate. Construction services are also often provided without establishment.[7]

Lastly, Figure 6 highlights that foreign affiliates produce mainly intermediate inputs and not goods or services for final consumption. In the case of affiliates in the manufacturing sector, two-thirds of the value of output consists in intermediate inputs. In this case, affiliates produce for GVCs or for domestic value chains in the host economy. For services affiliates, the share of production in intermediates is a bit lower, suggesting that there is more horizontal FDI in services, i.e. affiliates created to serve final consumers in the host economy. The share of intermediates in output has however increased both for manufacturing and services affiliates, another piece of evidence of the increasing vertical fragmentation of production.

Figure 6. Share of intermediate inputs in the production of foreign affiliates, 2000 and 2014



Source: Analytical AMNE database.

The decomposition of services value-added in world GDP

The previous sub-section has already introduced some value-added measures of the contribution of services to multinational production. In a more systematic way, we can try to account for all the value-added generated by firms in services industries and trace its journey until the consumption of the products where it is embodied. Such decomposition is provided on Figure 7.

The starting point on top of the figure is all the value-added in the world economy originating in services industries. As already indicated on Figure 2, this amounts to 71% of world GDP. This value-added is either generated by domestic-owned firms or by foreign-owned firms. Domestic-owned firms account for most of services value-added with only 6% contributed by foreign-owned firms in services sectors. Some of the value which is added by domestic-owned firms may end up in multinational production as it is absorbed abroad. 'Absorbed abroad' means that it was exported (directly as a service or embodied in a good manufactured in the domestic economy) and finally consumed in a different

[7] It is one of the cases where some 'mode 3' trade in services can cover transactions not involving a foreign affiliate (see Section 2).

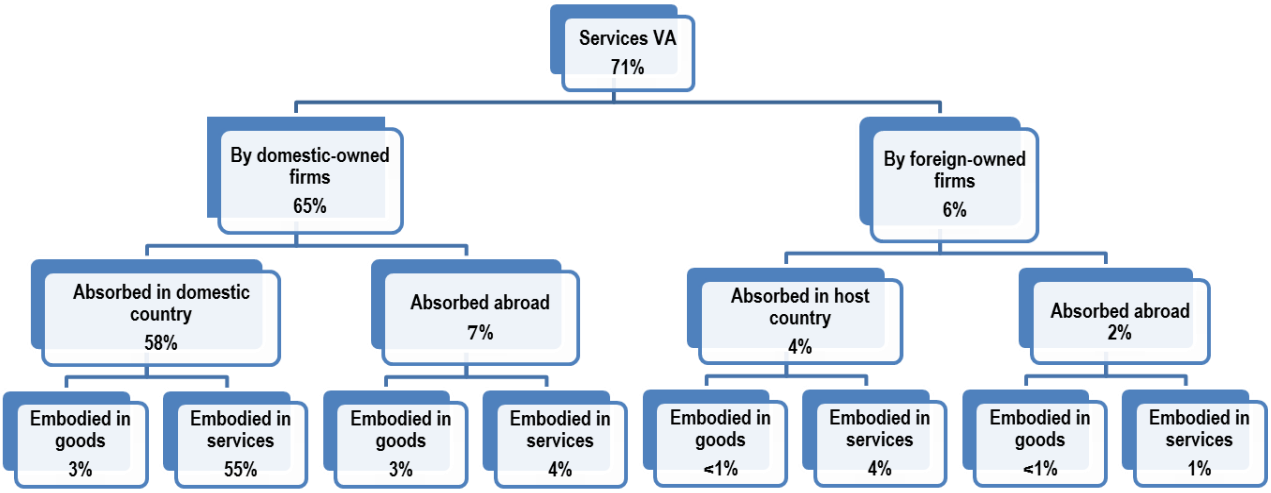
country. When the export is an input used by a foreign affiliate, the value-added becomes part of multinational production.

Even some of the value-added 'absorbed in the domestic country' can first transit through other countries (and MNEs) before coming back to the domestic economy and can be part of multinational production. The shares involved are however very small (below 1%).

Whether services value-added is absorbed in the domestic economy (i.e. the economy where it was first generated) or abroad, it can either be embodied in goods or in services. The last row in Figure 7 provides this information. Most of services value-added ends up in other services[8] but services inputs are also embodied in goods. Summing all the value-added embodied in final goods, it accounts for 7% of world GDP which can be interpreted as one indicator for the servification of global manufacturing.

Figure 7 also highlights different paths through which services reach final consumers abroad. The main transmission mechanism is through the exports of domestic-owned firms (7% of world GDP). These exports are direct exports of services or services inputs that are then embodied in goods or in other services. This path already involves MNEs when they export from the country where the parent company is established (i.e. domestic MNEs)[9].

Figure 7. Tracing services value-added in multinational production, as a share of world GDP, 2014



Source: Authors' calculations based on the analytical AMNE database.

The services value-added in the output of foreign affiliates (6%) -the second branch of Figure 7- is lower than the services value-added in exports of domestic-owned firms (7%). This value-added is either absorbed in the host economy or exported (absorbed abroad). What is absorbed in the host economy can be regarded as a proxy for horizontal FDI, the purpose being to serve the local market. It is important to note that the value-added approach gets us closer to this horizontal FDI because it can

[8] In some cases, the service initially produced is directly consumed in the domestic economy. The shortest journey on Figure 7 is for final services produced by domestic firms (with no intermediate inputs) and directly consumed in the domestic economy.

[9] See Figure A.2 in Annex A for a decomposition based on fewer countries with domestic MNEs distinguished from other domestic firms.

identify the country of absorption. A foreign affiliate can produce an input sold in the host economy but used by another affiliate (particularly in the case of co-location) and then exported. This case is ruled out by the above calculation that takes into account the country of final consumption.

The last path involves the services value-added generated by foreign-owned firms but absorbed abroad. While this path appears to most closely resemble the concept of a global value chain that involves foreign ownership, it is also quantitatively the smallest. Value-added exports of foreign-owned firms (in services) account for only 2% of world GDP. But still it is an interesting path as it confirms that, next to strategies relying on arm's length trade, some GVCs rely on vertical FDI and export-platform FDI where affiliates are specialised in inputs that are exported, either back to the parent economy or to third countries.

Two final remarks with respect to Figure 7. First, we always observe a significantly higher share of services value-added embodied in services as compared to goods. But there is an important exception which is for services value-added exported by domestic-owned firms. In this case, the share in goods comes close to the share in services. This result –together with the relatively small share of value-added exports of services by foreign affiliates- is in line with the recent literature that indicates that MNEs tend to rely more on arm's length suppliers for their inputs (Atalay, Hortaçsu and Syverson, 2014[9]; Ramondo, Rappoport and Ruhl, 2016[10]). It suggests that it is also the case for their services inputs.

Second, there are further decompositions that could be done to identify flows of intermediate versus final services and the location of production in addition to the source country and the country of 'absorption' of value-added. But there is no need to further complicate the landscape as Figure 7 already provides the main results which are the following:

- Manufacturing and services activities are intertwined in GVCs and starting to think in terms of value-added flows of services makes the distinction between manufacturing and services even less relevant.
- There is significant heterogeneity in the organisation of multinational production. There is no single statistical category that allows us to measure what would be multinational production in services (or in any other sector). And we find MNEs in all the 'branches' of Figure 7.
- The analytical AMNE database permits the quantification of some of the strategies and a more detailed country-by-country analysis.

2. Multinational production and mode 3 trade in services

This section further explores the role of services in multinational production by referring to the GATS and the concept of mode 3 trade in services. The analytical AMNE database is the first set of data that allows not only to estimate trade "through commercial presence" (mode 3) but also to identify its overlap with cross-border trade (modes 1, 2 and 4) and to provide meaningful comparisons in terms of the value-added embodied in each type of trade. This section first discusses the definition of mode 3 and then provides descriptive statistics on its prevalence and how it compares with cross-border trade in services.

The definition and measurement of mode 3 trade in services

In GATS, mode 3 is defined as the supply of a service "by a service supplier of one [WTO] Member, through commercial presence in the territory of any other Member". The commercial presence means "any type of business or professional establishment, including through (i) the constitution, acquisition or maintenance of a juridical person, or (ii) the creation or maintenance of a branch or a representative office, within the territory of a Member for the purpose of supplying a service".

Mode 3 trade in services is not measured in balance of payments statistics as it involves mostly transactions between residents. However, the consumer can be in some cases a non-resident, either because she is located abroad (the case of exports through commercial presence, see below) or simply a foreign person living temporarily in the country where the commercial presence takes place.[10]

The GATS does not exclude from mode 3 the case where the consumer is abroad.[11] It would also be quite impractical to implement GATS commitments differently for the transactions with residents and non-residents. However, from the point of view of trade statistics and also analytical work on activities of MNEs, it seems important to distinguish the domestic sales of foreign established firms from their exports.

When foreign-owned firms export, there is an overlap between cross-border trade (mode 1, 2 and 4) and mode 3. On the one hand, the sales of foreign-owned firms are mode 3 trade in services in the host economy (and the parent economy can expect in this case mode 3 GATS commitments to apply). On the other hand, the exports of affiliates are cross-border trade in services (mode 1, 2 or 4) between the host economy and third countries where consumers are located. These transactions are subject to mode 1, 2 and 4 GATS commitments but between the parties involved, i.e. the country where the foreign affiliate is located and the partner country of the exports. The commitments made with respect to the parent country of the affiliate are no longer relevant.

This overlap between cross-border trade and mode 3 trade in the services also has implications for measurement. When measuring trade in services according to the mode of supply, it is likely that some double counting is involved: the same transaction, i.e. the services exports of foreign affiliates will be recorded both as mode 3 and cross-border trade, but from the point of view of different reporters and partners. Maybe this is why the Manual on Statistics of International Trade in Services 2010 (United Nations et al., 2010[11]) suggests that "only the local sales represent the delivery of output within host economies, and thus relate directly to the commitments made under the GATS Mode 3 by those economies". But as explained above, there is no reason to believe that mode 3 commitments in GATS are limited to the local sales of foreign affiliates.

The suggestion made in the Manual is also to measure mode 3 through the foreign affiliate statistics (FAS), which is the main source used for the construction of the analytical AMNE database. The problem however is that AMNE statistics typically do not make a distinction between domestic and international when measuring sales as exports/imports figures are not collected. But the split ICIO used in the analytical AMNE database allows distinguishing domestic sales from exports. Hence we are in a position to provide more accurate measures of mode 3 trade in services and say something on the double counting with cross-border trade.

There are however two important conceptual differences between sales of foreign affiliates and mode 3 trade in services that remain. First, AMNE data only include information for juridical persons established in the host economy while the commercial presence also covers entities such as branches or representative offices that are not juridical persons. Mode 3 trade involving branches and representative offices is not taken into account in the AMNE data.

[10] There are also specific cases where balance of payments statistics can include some mode 3 trade transactions because the service supplier is a non-resident. It is the case for construction services when the supplier establishes for less than one year or remains based in the home country and operates through a local office that does not qualify as a branch.

[11] Article I of GATS defines mode 3 on the basis of the commercial presence of the service supplier. It says nothing about the location of the consumer. It is only for mode 2 (consumption abroad) that the location of the service consumer matters.

Second, the sales of foreign affiliates are by industry and not by product. For example, services produced by manufacturing firms are part of the exports of the manufacturing sector. Trade statistics are generally by product and they classify exports of services by manufacturing firms as services exports. It becomes an issue when comparing AMNE data with balance of payment statistics or when relating services commitments in trade agreements (made for the supply of a specific service) with industry data.

Patterns of mode 3 and cross-border trade in services

The importance of mode 3 trade in services in gross terms is highlighted in Figure 8. As the data are in current prices, the increase over the years reflects changes in volume as well as in prices. Also, as with all the data coming from the analytical AMNE database, the figures are estimates based on the construction of a full matrix of the output of foreign affiliates where the missing information has been estimated.

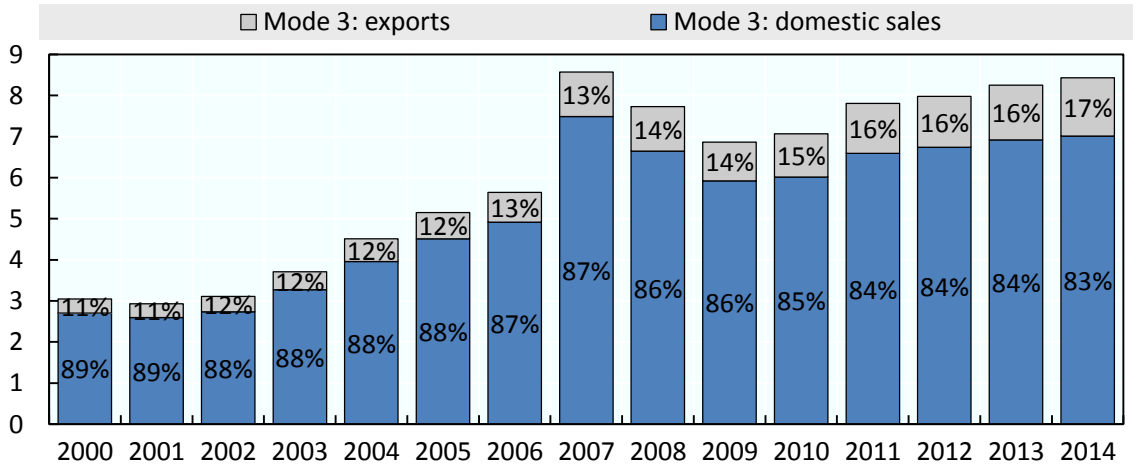
In 2014, mode 3 trade in services (measured as the output of foreign affiliates in services industries) is about 8 trillion USD. It is higher than world (cross-border) exports of services, which are 6 trillion USD in the WIOD data on which the analytical AMNE database is calibrated.

Mode 3 trade in services concerns predominantly the domestic sales of foreign affiliates (83%), while only 17% are their exports. Over time, the share of exports of foreign affiliates has increased. It was only 11% in 2000. This suggests an increase in the vertical activities of MNEs and can be seen as some evidence of vertical FDI.

The evolution of mode 3 trade in services over time is not different from world cross-border trade with a decrease during the 2008-2009 financial crisis. But while for cross-border trade (not shown on the Figure) the decrease occurred in 2009, the output of services foreign affiliates was already decreasing in 2008 as compared to 2007. After 2010, mode 3 trade in services increased further but still it is below its 2007 level in 2014.

In Figure 8, mode 3 trade is in gross terms, using the output of foreign affiliates. Because foreign affiliates producing services rely on domestic inputs or imported inputs, their value-added is lower than suggested by their gross output. It is 4.4 trillion USD in 2014 (Table 1). There is also a difference in terms of the share of exports, which is 13% in 2014, as compared to 17% in gross terms. It is consistent with the vertical FDI scenario where the affiliate is processing inputs in the value-chain.

Figure 8. World trade in services according to mode 3 (output), USD trillion, 2000-2014



Source: Analytical AMNE database.

Table 1. Trade in services in gross and value-added terms, in USD trillion

	2000	2005	2010	2014
Mode 3 trade in services				
Gross output	3.1	5.2	7.1	8.4
Domestic sales	2.7	4.5	6.0	7.0
Exports	0.3	0.6	1.1	1.4
Value-added	1.6	2.7	3.6	4.4
Domestic sales	1.3	2.1	2.7	3.2
Exports	0.3	0.6	0.9	1.2
Cross-border trade in services				
Gross exports	1.8	2.8	4.5	5.5
Value-added	2.4	3.9	5.6	6.9

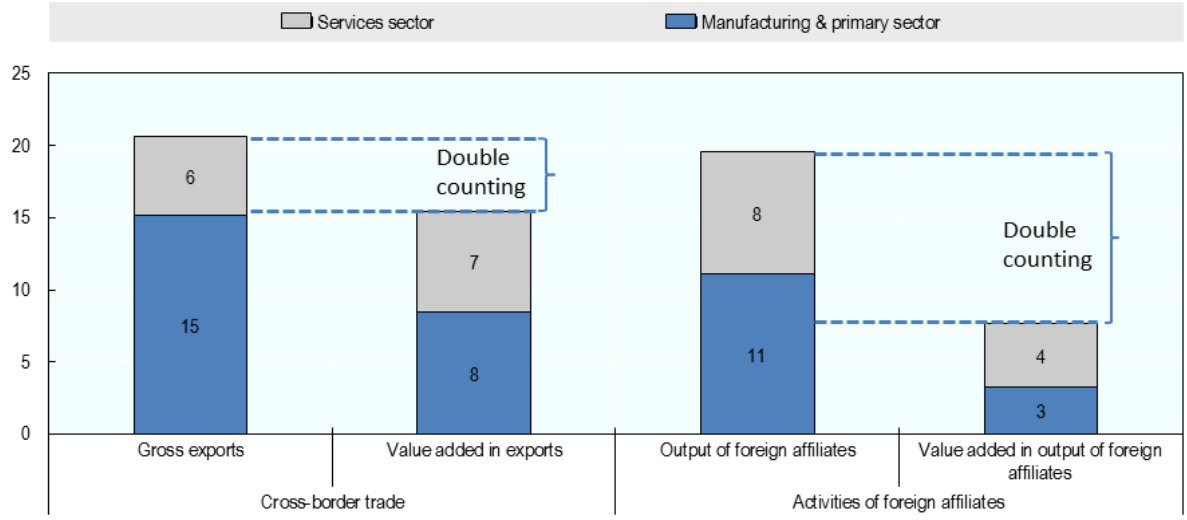
Source: Analytical AMNE database.

Generally speaking, what we describe as double counting in the case of trade is lower than the double counting in the output of foreign affiliates (Figure 9). In the case of trade, the double counting in gross exports is about 30% at the world level (looking at total trade, including goods). This double counting is the difference between gross exports and the value-added in exports. It comes from the use of intermediate inputs that are counted several times in gross trade figures when these intermediate inputs cross borders several times (as inputs and embodied in more processed goods or services).

There is a higher level of double counting in the output of foreign affiliates. This result is not surprising as foreign affiliates rely on domestic inputs from domestic-owned firms whose value is removed from their gross output. In the case of trade, the domestic inputs used by exporters are still contributing to the domestic value-added exported. Only foreign inputs (or the foreign value-added in domestic inputs) is removed in the value-added calculation. As it is costly to trade inputs internationally but less costly to buy domestic inputs, the value-added content of the output of foreign affiliates has to be lower, as it is observed on Figure 9.

Figure 9. VA and double counting in gross exports and output of foreign affiliates, 2014

Values in USD trillion



Source: Authors' calculations based on the analytical AMNE database.

In order to assess the importance of mode 3 trade in services in comparison with cross-border trade, the ratio of the output of services of foreign affiliates to gross exports of services (from the perspective of the same country exporting or selling through foreign affiliates abroad) can be calculated. The higher this ratio above 1, the higher the prevalence of mode 3 trade in services over mode 1, 2 and 4. Conversely, when the ratio is below 1, there are more cross-border exports than sales through foreign affiliates. At the firm level, this ratio is related to strategies of firms and their decision to export or to sell through foreign affiliates (Box 2).

The ratio of mode 3 to cross-border trade in services (in gross and value-added terms) is calculated for OECD countries and key partners in Figure 10. The horizontal axis crosses the vertical axis at the value of one in order to more easily identify the countries where cross-border exports are more important than the output of their foreign affiliates.

Box 2. Exports and foreign affiliate sales: substitutes or complements?

The relationship between exports and FDI, meaning also the link between cross-border trade and sales of foreign affiliates, has been studied extensively in the economic literature, and its understanding has considerably evolved in the last thirty years.

To begin with, theories of the 'proximity-concentration trade-off' (Brainard, 1993[12]) traditionally understand foreign affiliates sales as an alternative strategy to exports when trade costs are high. In this vein, placing production abroad to eschew trade and transport costs implies forsaking economies of scale, and thus firms have to take a decision between proximity to foreign markets on the one hand and gains from concentration on the other. FDI is thus mainly considered as horizontal, meaning investment in the same industry and stage of production of the parent firm.

Yet, the advent of GVCs and trade in intermediates has challenged this classical understanding: firms also engage in vertical FDI, meaning FDI in industries connected in the supply chain and providing inputs into the production process. According to a second understanding (Helpman, 1984[13]; Antràs and Yeaple, 2014[14]), FDI indeed occurs when countries differ in relative endowments and factor prices, and firms thus fragment production across borders to realise productivity gains. Thus, trade and transport costs need to be low enough to allow cross-border trade in intermediates.

Hence, while the former theories emphasise the substitutability between exports and FDI as strategies to serve foreign markets, the latter readings highlight their complementarities.

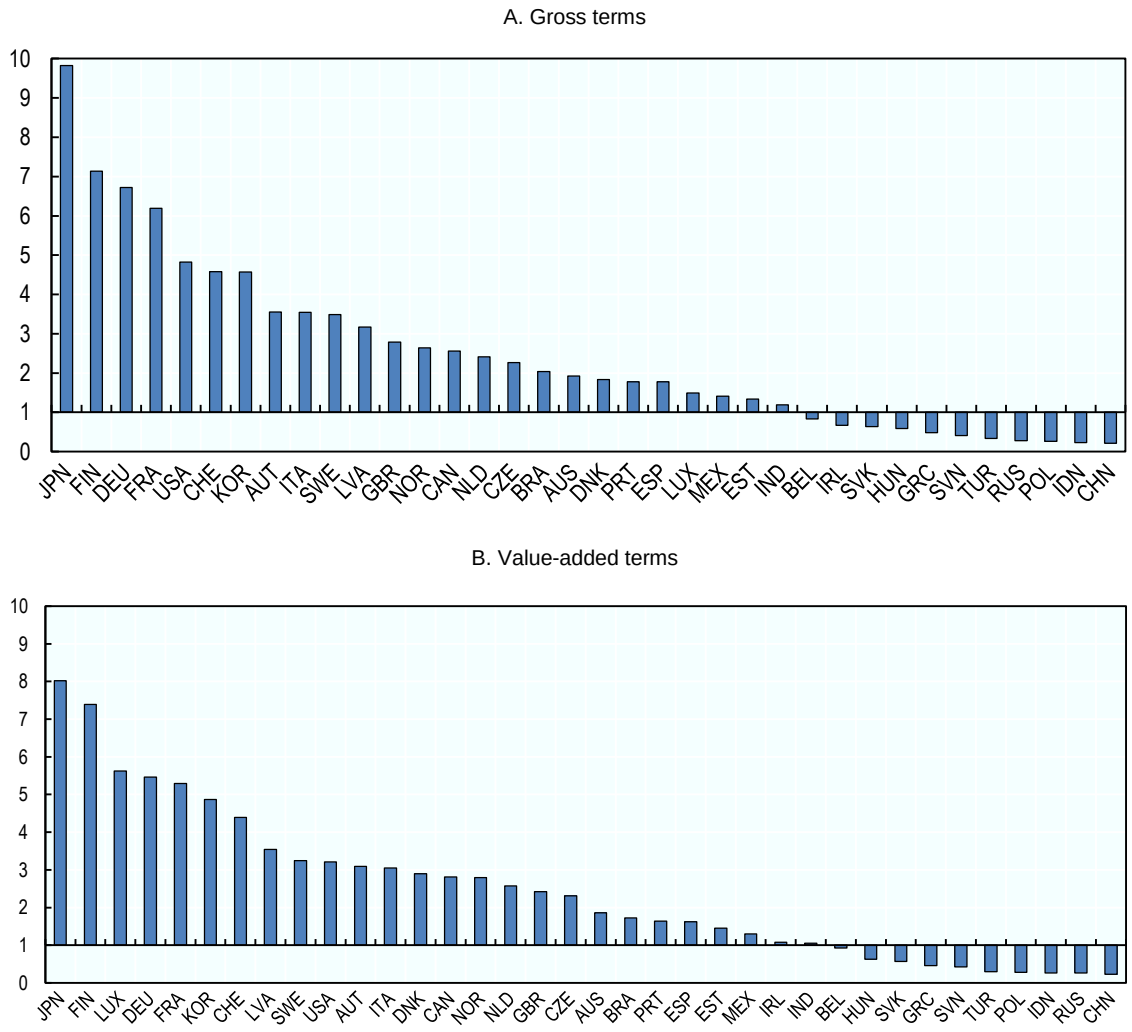
However, things seem to be even more complex than suggested: a growing body of literature shows that international trade and multinational production function as both substitutes and complements (Ramondo, Rodríguez-Clare and Tintelnot, 2015[15]). With regards to FDI, MNEs realise both vertical and horizontal investment (Alfaro and Charlton, 2009[16]), and FDI is mostly neither horizontal nor vertical, but rather 'conglomerate' (Herger and McCorriston, 2016[17]). Also, the very understanding of vertical integration is challenged, as intra-firm shipment of physical inputs represents only a minor share of affiliates' trade. Foreign affiliates are rather set up for the transfer of intangible inputs (Atalay, Hortaçsu and Syverson, 2014[9]).

In light of these observations, authors attempted to grasp and model the complexity of the trade-FDI relationship. For example, Fontagné (1999[18]) proposes that the relationship between the two depends on the level of analysis: they are substitutes at the microeconomic or firm level, while they are complements at the macroeconomic level, and their relationship at the industry level ultimately depends on host country characteristics. In a different vein, Liu et al. (2016[19]) propose a 'pendulum model' which posits that the trade-FDI relationship evolves with outward FDI growing gradually, following stages of development. At zero outward FDI, there is a relationship of complementarity between the two, but when FDI grows beyond the equilibrium point, exports and foreign affiliates sales become substitutes. Also, Antràs and Helpman (2004[20]) suggest that only the most productive firms engage in both trade and FDI, while less productive firms only export or serve the domestic market.

Although these attempts shed light on the relationship between exports and outward FDI, meaning also on cross-border vs. mode 3 trade in services in our framework, the very complexity and evolving nature of the issue at stake calls for further theoretical and empirical effort in the research agenda.

Since emerging economies have lower shares of services in the output of their foreign affiliates and account for a smaller share of world production through foreign affiliates, they tend to be on the right of the chart with countries the most specialised in manufacturing or primary industries having a ratio below one. It is the case for China but also the Russian Federation and Indonesia (both in gross and value-added terms). OECD countries that are strong manufacturing exporters, such as Mexico and Turkey, also have lower shares. But the share is above one in the case of Mexico. At the other end, on the left of the chart are developed countries more specialised in services but also more involved in international investment with more headquarters of MNEs, thus explaining high ratio of mode 3 compared to cross-border exports of services. Higher shares of mode 3 trade in services are generally observed for EU countries because of the economic integration in the EU where movement of factors of production are facilitated.

Figure 10. Ratio of mode 3 to cross-border trade in services, by country, 2014



Note: Exports of foreign affiliates have been removed from cross-border exports.
Source: Analytical AMNE database.

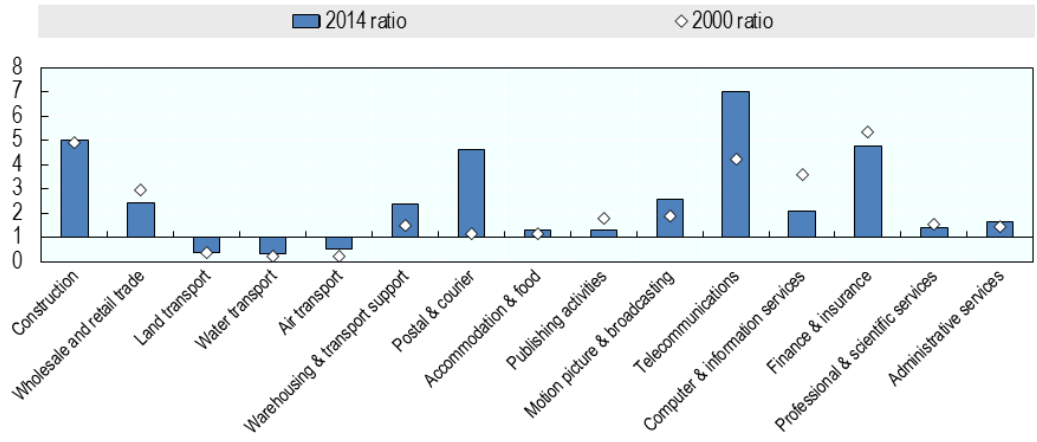
Because the value-added content of sales of foreign affiliates is lower than the value-added content of exports, the ratios are lower in panel B as compared to panel A. But generally it does not change the ranking of countries. There are however exceptions, such as Luxembourg which, in value-added terms, has a much higher ratio of mode 3. It can be explained by the fact that smaller economies also have a lower domestic value-added in exports (because they rely more on foreign inputs), thus making the value-added content more comparable between exports and sales of foreign affiliates.

Figure 11 provides the same ratio by industry and indicates that industry characteristics play an important role in the mode of supply of services.[12] Telecommunications, for example, is an industry where the supply of services through mode 3 is much more important than cross-border and the ratio has significantly increased over time with paid international telecommunications progressively becoming marginal. Construction is also an industry where cross-border trade is technically less feasible (but still exists as it includes mode 4 and the movement of professionals).

The sectors where cross-border gross exports are more important than the output of foreign affiliates are land transport, water transport and air transport. It is also not surprising to see three transport sectors there as moving people or goods from one country to another is by definition a cross-border activity and is less based on the creation of foreign affiliates in the country where the service is provided.

For 'computer and information services', and to a lesser extent 'finance and insurance' and 'wholesale and retail trade', it is interesting to see that over time the sectors are moving towards cross-border trade. It can be related to technical changes offering new digital services or the on-line sales in the case of the distribution sector.

Figure 11. Ratio of mode 3 to cross-border trade in services, by industry, 2000 and 2014



Note: Exports of foreign affiliates have been removed from cross-border exports.
Source: Analytical AMNE database.

[12] Across industries, the ratios are similar in gross and value-added terms. The Figure only shows the gross ratios.

3. Multinational production and services trade restrictiveness

This section presents an analysis of the impact of services trade restrictiveness, as measured by the OECD Services Trade Restrictiveness Index (STRI), on multinational production. Many of the barriers to foreign investment and foreign affiliate activity, such as foreign equity limits, discriminatory licensing conditions applying to foreign investors or the non-recognition of qualifications earned abroad, are found in services sectors. These restrictions impose additional costs to the entry of foreign suppliers and make the services sector less efficient (OECD, 2017[21]).

The benefits of services liberalisation extend beyond the services industries themselves. The empirical literature has shown a strong complementarity between manufacturing firm activities and services inputs, with the access to foreign services inputs as an important determinant in explaining manufacturing firms' competitiveness and performance.[13]

Restrictions to foreign investment prevent local companies from accessing more and higher-quality foreign inputs and to benefit from linkages with foreign companies. Foreign inputs have been associated with firm productivity improvements (Pavcnik, 2002[22]; Topalova and Khandelwal, 2011[23]) and with an increase in the number of varieties of goods produced and exported by domestic firms (Goldberg et al., 2010[24]; Bas and Strauss-Kahn, 2014[25]). Spillovers with foreign companies can materialise in terms of technology and quality transfers, knowledge spillovers through labour mobility (Poole, 2013[26]; Balsvik, 2011[27]) and export upgrading (Harding and Javorcik, 2012[28]). Foreign suppliers of services are also important in providing supporting activities to the functioning of GVCs (Miroudot and Cadestin, 2017[29]).

The impact of barriers to trade in services on cross-border trade flows has been studied in previous OECD work (Nordås and Rouzet, 2015[30]; Benz, 2017[31]); however, little is known about their impact on multinational production. The main limitation to such an analysis has been the lack of comprehensive data on foreign affiliate activity. Using the analytical AMNE database in a gravity framework, this section presents evidence of the detrimental effect of services trade restrictions on foreign affiliate activity, both in services and manufacturing sectors.

Although the gravity model was developed to study trade in goods and only recently applied to trade in services (Kimura and Lee, 2006[32]) and FDI (Bénassy-Quéré, Coupet and Mayer, 2007[33]), recent literature has extended its range of applications to multinational production (Alviarez, 2013[34]; Ramondo, Rodríguez-Clare and Tintelnot, 2015[15]).

To measure barriers to trade in services, the empirical analysis relies on the OECD STRI (Box 3). The STRI indices measure the prevalence of regulatory impediments to international trade and foreign direct investment in services sectors. It is straightforward to expect that policy measures targeting mode 3 to be associated with lower foreign affiliate activity in services. In general, services trade restrictiveness is expected to be especially detrimental in those services sectors where the proximity burden and coordination costs between provider and buyer are more important (Christen and Francois, 2017[35]). In addition, given the substitutability between cross-border trade and foreign affiliate domestic sales, barriers targeting cross-border trade (i.e. mode 1) should have a positive impact on foreign affiliate activity.

These predictions are coherent with the theoretical literature on the export versus FDI decision, which is dominated by models of the proximity-concentration trade-off. In these models, the firm decision to produce in its home country to export or in the destination market through a foreign affiliate is based on

[13] As shown in many firm-level studies. See among others: Fernandes and Paunov (2012[53]), Forlani (2012[54]), Arnold et al. (2016[57]) and Hoekman and Shepherd (2017[55]). The macro-level empirical literature also highlights that services regulation increases value-added, productivity and export growth in downstream service-intensive industries: see Barone and Cingano (2011[58]) and Bourlès et al. (2013[56]).

the trade-off between the gains from concentrating production at the firm's headquarters and the benefits to produce near the final consumers to avoid transport costs. These models predict that services liberalisation that lower the fixed cost of setting up a foreign supplier would lead to an increase in multinational production relative to exports.

The rest of the section introduces the main econometric results with respect to the impact of restrictions to trade in services on activities of foreign affiliates. A technical annex provides additional econometric results and robustness checks, as well as more information on the model and data sources (Annex B).

Box 3. The OECD Services Trade Restrictiveness Index

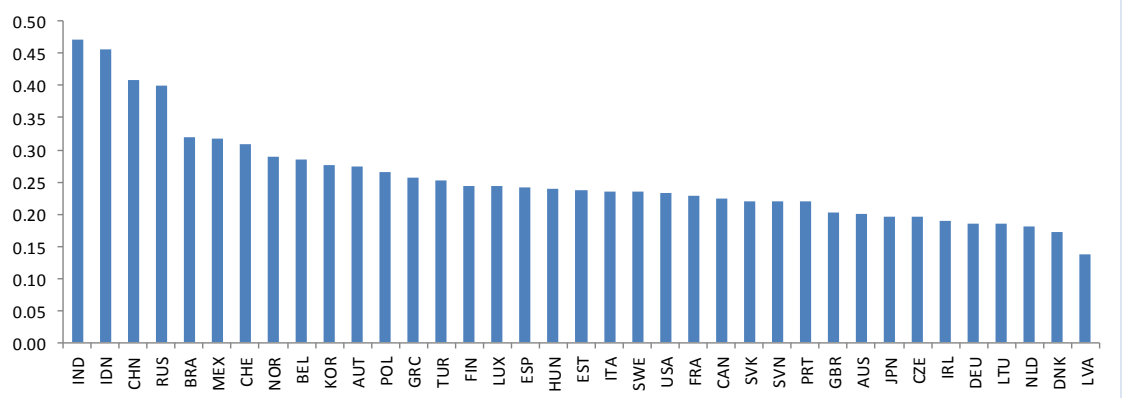
The STRI database provides information on trade restrictive measures in 22 services sectors and 44 countries. The STRI currently captures information for three consecutive years (2014-2016).[14] In the empirical analysis, the STRI score is averaged across sectors to assess the overall effect of restrictions to trade in services on foreign affiliate activity. A simple average is used.

In each sector, the indices take a value from 0 to 1 where 0 means completely open and 1 completely closed. As illustrated in Figure 12, the average over sectors varies substantially across countries.

The econometric analysis presents results using several decompositions of the STRI overall score. To start, it is decomposed into the five policy areas included in the database: restrictions on foreign entry, restrictions to the movement of people, other discriminatory measures, barriers to competition and regulatory transparency. The first three cover measures related to market access and national treatment, the fourth entails information on pro-competitive regulation, while the fifth category provides information on transparency and administrative procedures. The restrictions on foreign entry account for the largest share of the index in all sectors and countries, making up for about 40% of the overall score. However, the impact of these categories may be ambiguous, since each sub-index may include restrictions to both mode 1 and mode 3, which have opposite impacts on MNE investment decisions and foreign affiliate activity.

The second set of indices distinguishes between restrictions affecting different modes of supply, with barriers to mode 3 accounting for about 40% of the overall score. A third group of indices includes restrictions affecting the business environment transparency and competition, and the ones about market access and national treatment. The fourth class draws a distinction between barriers increasing the costs to set up an establishment and barriers affecting foreign affiliate ongoing operations. The final set distinguishes between restrictions that discriminate against foreign suppliers and non-discriminatory measures. All these break-downs come from the original STRI database and scores have been averaged across sectors.

Figure 12. Average STRI score, by country (2014)



Note: The average STRI score is the simple average of STRI indices across the 22 sectors in the database.
Source: Authors' calculations using the OECD STRI database.

[14] For the empirical analysis in this section, the last year available in the analytical AMNE database is used (2014).

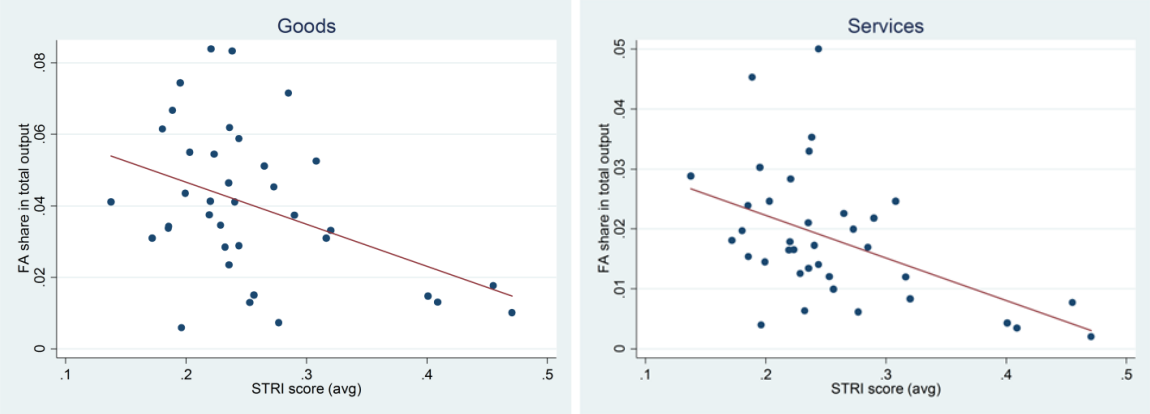
The impact of services trade restrictiveness on mode 3 trade in services

As shown in Figure 13, foreign affiliate activity (measured as the ratio of foreign affiliates output in total output) seems to be positively associated with services trade openness (a lower STRI), in both manufacturing and services sectors.

To confirm this result, we use a gravity model based on the theoretical framework developed by Bergstrand and Egger (2007[36]). We then augment the gravity specification by adding the STRI, several host-country specific variables and partner-country fixed effects. This gravity model is estimated using the PPML estimator proposed by Silva and Tenreyro (2006[37]), which allows to account for potential heteroscedasticity in the foreign affiliate activity. Another advantage of the PPML estimator is that it allows dealing with sample selection, since all zero observations are dropped from the OLS model when taking the logarithm of the dependent variable.[15]

Table 2 presents the results on the relationship between the STRI and mode 3 trade in services, measured by foreign affiliates output in services sectors. Table 2 extends this analysis by decomposing foreign affiliates output into domestic sales and exports. While the former measure is a proxy for horizontal FDI, the latter is a mix of both vertical and export-platform FDI.

Figure 13. Foreign affiliates output and services trade restrictiveness



Source: Analytical AMNE database and STRI.

Overall, the results in Table 2 point to the presence of a strong negative relationship between restrictions to trade in services and mode 3 trade in services. If interpreted causally the coefficients would imply that a relatively modest liberalisation bringing about a reduction in the STRI index by 5 basis points (e.g. from the mean index of 0.25 to 0.20) would boost foreign affiliate sales of services by 11.5%. Restrictions on mode 3 are especially detrimental; the same reduction in the STRI score is associated with an increase of multinational production of services by 22.5%.

Columns 2 to 6 show several decompositions of the STRI score. In Column 2, the restrictions on trade in services are grouped by policy area and their coefficients are not significant, except for barriers to competition. A possible explanation is that these indices include barriers to different modes of supply, with restrictions on mode 1 and 4 which may incentivise MNEs to set up a foreign affiliate instead of supply in arm's length relationship. For instance, barriers to foreign entry, in addition to restrictions

[15] However, the presence of zeroes in our analysis is minor, since the share of country-pairs without foreign affiliate activity is always lower than 10% of the sample. But the PPML estimator allows estimating the dependent variable in levels and it has the advantage that the coefficients of the independent variables entered in logarithm can still be interpreted as elasticities.

targeting specifically foreign investment, include barriers to mode 1 trade in services, such as non-equity restrictions. Moreover, restrictions to the movement of people should be specific to mode 4 services trade but this measure also includes quotas and limitations to intra-corporate transferees which may impact the MNE decision to set up a foreign subsidiary.

In Column 3, restrictions are classified based on the mode of supply (all modes, mode 1, mode 3 and mode 4). As expected, while barriers targeting the entry of foreign suppliers are negatively associated with mode 3 trade in services, restrictions to cross-border trade are in a positive relationship. This finding confirms that the STRI effectively captures the type of regulations it is meant to capture and that *de jure* restrictive regulations seem to be enforced. In particular, restrictions in the logistics, telecommunications and transport industries are the ones explaining this negative relationship (see Table B.4 in Annex B for the results by STRI sector). Columns 4 to 6 show the results with further decomposition of the STRI overall score. All the coefficients point to the beneficial impact of services liberalisation on foreign affiliate activity in services.

Table 2. Econometric results: STRI and foreign affiliates output

PPML estimation (see Annex B for more details on the methodology)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES			**FA sales of services**			
STRI	-2.172**					
	(0.877)					
Foreign entry		0.313				
		(2.114)				
Movement of people		-0.0555				
		(3.118)				
Other discriminatory measures		-1.053				
		(3.660)				
Barriers to competition		-19.01**				
		(7.941)				
Regulatory transparency		-0.119				
		(3.156)				
All modes			-3.125			
			(2.638)			
Mode 1			16.54*			
			(9.777)			
Mode 3			-4.059***			
			(1.384)			
Mode 4			0.966			
			(2.504)			
Transparency and competition				-5.137**		
				(2.077)		
Market access and national treatment				-0.575		
				(1.332)		
Establishment					-3.403*	
					(1.862)	
Ongoing operations					-1.384	
					(1.377)	
Discriminatory						-1.512
						(1.092)
Non-discriminatory						-4.928**
						(2.462)
Observations	1,554	1,554	1,554	1,554	1,554	1,554
R-squared	0.863	0.865	0.877	0.865	0.863	0.859

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

While the dependent variable in Table 2 was the output of foreign affiliates in services sectors, Table 3 distinguishes the domestic sales of these foreign affiliates (the output sold domestically) from their exports. The granularity of the data allows us to see that the STRI is negatively associated with both foreign affiliate domestic sales and exports. In particular, "behind the border" non-discriminatory restrictions are shown to be especially detrimental for foreign affiliates serving the domestic market. Foreign affiliates serving foreign markets are also negatively impacted by the lack of a pro-business environment in the host-country.

By looking at the coefficients of the gravity variables (Table B.1 in Annex B), several interesting patterns emerge. First, foreign affiliate activity increases with host-country GDP, with the coefficient being close to one for domestic sales and lower for exports. This is straightforward since host-country market access is less of a motive for vertical or export-platform FDI.

Table 3. Econometric results: Domestic sales vs. exports of foreign affiliates

PPML estimation (see Annex B for more details on the methodology)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	FA domestic sales of services						FA exports of services					
STRI	-2.484***						-4.983***					
	(0.896)						(1.364)					
Foreign entry		-1.707						4.348				
		(2.121)						(2.728)				
Movement of people		-0.921						0.0535				
		(3.111)						(3.973)				
Other discriminatory measures		-0.425						-4.251				
		(3.644)						(4.215)				
Barriers to competition		-11.44						-56.49***				
		(9.184)						(9.275)				
Regulatory transparency		-2.816						2.254				
		(2.698)						(5.175)				
All modes			-4.804*						1.968			
			(2.578)						(3.822)			
Mode 1			21.74**						1.917			
			(10.02)						(13.92)			
Mode 3			-4.168***						-10.20***			
			(1.398)						(1.913)			
Mode 4			0.996						-2.793			
			(2.547)						(3.657)			
Transparency and competition				-5.549***						-3.462		
				(1.814)						(4.014)		
Market access and national treatment				-0.948						-5.778***		
				(1.367)						(2.116)		
Establishment					-3.952**						-6.567**	
					(1.645)						(3.009)	
Ongoing operations					-1.571						-3.917*	
					(1.517)						(2.109)	
Discriminatory						-1.517						-5.261***
						(1.158)						(1.485)
Non-discriminatory						-6.937***						-3.163
						(2.404)						(3.921)
Observations	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554
R-squared	0.874	0.873	0.886	0.875	0.873	0.866	0.744	0.775	0.759	0.740	0.748	0.741

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Second, contrary to conventional wisdom, the geographical distance between the host and partner country is not a factor determining foreign affiliate domestic sales. Instead, the coefficient of the 'time zone diff' variable, which indicates the time difference between the host and partner country, is negatively associated with affiliates' domestic sales. These findings suggest that, on the one hand, the cost of transmitting information, as measured by 'time zone diff', matters in determining multinational

production in services sectors. On the other hand, physical transport costs, as measured by the distance variable, matter less.[16]

Third, the coefficient of 'host country instit' indicates that the higher the quality of host-country's institutions, the lower the foreign affiliates' domestic sales of services. The most likely explanation is that MNEs prefer to engage in cross-border trade rather than FDI for countries with good contract enforceability.[17] Fourth, as expected having a common culture or legal system is positively associated with foreign affiliate horizontal and vertical operations. Finally, the coefficient of the difference in corporate income tax rates between the host and partner country is positive and significant for domestic sales, indicating that in services sectors, low corporate tax rates are a motive for horizontal FDI.

The impact of services trade restrictiveness on the choice between exports and sales through foreign affiliates

The second part of the empirical analysis aims at testing the relationship between restrictions to trade in services and the substitutability between mode 3 and cross-border trade in services from the point of view of the parent country. This analysis addresses horizontal rather than vertical FDI, as cross-border trade and activities of foreign affiliates are regarded as substitutes. The dependent variable is the log of the ratio between foreign affiliate domestic sales (the output sold domestically) and exports from the parent country (excluding exports by foreign affiliates).

Table 4 shows the results of the OLS estimation of the baseline model.[18] In Column 1, the STRI coefficient is highly significant and negative. Because the dependent variable is the log of the ratio of domestic sales to exports, a negative coefficient implies lower foreign affiliate sales relative to exports. Columns 2 to 6 highlight that the negative relationship is mainly determined by discriminatory restrictions targeting the entry of foreign companies and movement of people. The latter is specific to mode 4 trade in services but this analysis suggests that the temporary movement of business persons is more important for foreign investment than for cross-border trade. Interestingly, the services sectors that appear to be the most important in determining foreign affiliate activity relative to exports are transport, distribution and computer services (see Table B.4 in Annex B for the results by STRI sector).

The results for standard gravity variables used to explain the FDI versus exports decisions are broadly not significant.[19] For instance, the coefficient on host-country GDP is not significant, suggesting that market access is equally important in driving cross-border trade or foreign affiliate activity. The coefficient on geographical distance and contiguity are positive and significant, coherent with the fact that physical distance is a measure of physical transport costs. The coefficient of 'GDP per capita diff' is positive and significant indicating that the higher the differences in countries' GDP per capita the higher is foreign affiliate activity relative to exports. Finally, tax difference is positively associated with the log of the domestic sales to export ratio. This is straightforward since low tax rates have shown to be a strong determinant of the location and activity of foreign affiliates.

[16] This evidence is consistent with the recent literature that has highlighted the importance of the costs associated with communicating complex information across borders in explaining firms' boundaries. See Oldenski (2012[42]) and Keller and Yeaple (2013[61]).

[17] As highlighted in the theoretical literature, the quality of contract enforcement is important because it allows firms to overcome the hold-up problem emphasised in the incomplete contracts literature (Williamson (1985[62]); Grossman and Hart (1986[63])).

[18] An OLS estimation is used instead of PPML because the dependent variable is a ratio.

[19] See Table B.3 in Annex B for the detail of gravity coefficients.

Table 4. Econometric results: Cross-border trade vs. sales through foreign affiliates

OLS estimation (see Annex B for more details on the methodology)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Ratio of FA domestic sales to exports of services					
STRI	-5.522***					
	(1.157)					
Foreign entry		-9.328***				
		(2.646)				
Movement of people		-9.327**				
		(3.688)				
Other discriminatory measures		11.21**				
		(5.614)				
Barriers to competition		8.665				
		(9.016)				
Regulatory transparency		-9.084**				
		(4.218)				
All modes			-6.512			
			(4.396)			
Mode 1			10.54			
			(17.71)			
Mode 3			-4.171**			
			(2.089)			
Mode 4			-8.914**			
			(3.660)			
Transparency and competition				-3.436		
				(3.041)		
Market access and national treatment				-6.780***		
				(1.882)		
Establishment					-2.119	
					(2.406)	
Ongoing operations					-8.603***	
					(2.345)	
Discriminatory						-2.127
						(1.635)
Non-discriminatory						-13.69***
						(3.330)
Observations	1,470	1,470	1,470	1,470	1,470	1,470
R-squared	0.354	0.360	0.355	0.355	0.355	0.357

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

The impact of services trade restrictiveness on the output of foreign affiliates producing goods

Section 1 has highlighted the fact that a large share of the output of foreign affiliates remains in the manufacturing sector. Services trade restrictiveness is also expected to have an impact on the output of foreign affiliates producing goods. The literature has emphasised that a competitive environment in manufacturing sectors leaves no room for error in the production of final goods. Within fragmented production processes, it is vital for manufacturing firms to have access to a wide variety of high-quality and reliable services inputs.

Table 5. Econometric results: STRI and output of foreign affiliates producing goods

PPML estimation (see Annex B for more details on the methodology)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES			**FA sales of goods**			
STRI	1.018					
	(0.991)					
Foreign entry		7.378***				
		(1.886)				
Movement of people		3.330				
		(2.971)				
Other discriminatory measures		9.649***				
		(3.614)				
Barriers to competition		-49.56***				
		(7.756)				
Regulatory transparency		4.402				
		(3.234)				
All modes			3.638			
			(2.640)			
Mode 1			0.0778			
			(11.82)			
Mode 3			-0.118			
			(1.680)			
Mode 4			-3.018			
			(2.773)			
Transparency and competition				-4.460**		
				(2.272)		
Market access and national treatment				2.501**		
				(1.215)		
Establishment					1.257	
					(2.056)	
Ongoing operations					0.878	
					(1.450)	
Discriminatory						1.734
						(1.065)
Non-discriminatory						-6.670***
						(2.510)
Observations	1,554	1,554	1,554	1,554	1,554	1,554
R-squared	0.844	0.846	0.841	0.846	0.844	0.845

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table 5 presents the results of the estimation of the gravity model using the PPML estimator, where the dependent variable is the foreign affiliate production of goods (including domestic sales and exports). Overall, the coefficients are mixed, with non-discriminatory restrictions on competition being negatively associated with foreign affiliate activity. This suggests that when services sectors are regulated in a pro-competitive manner foreign affiliates produce higher volumes of goods.

The gravity coefficients are consistent with previous studies (see Table B.4 in Annex B). The coefficient of host-country GDP is highly significant and larger than one, indicating that market access is an important driver of multinational production. Finally, cultural proximity, lower corporate income tax rates and cheaper factors of production are important drivers of foreign affiliate activity in the manufacturing sector.

4. Concluding remarks

This paper has assembled new evidence on multinational production and trade in services based on a dataset that includes detailed information on the activities of foreign affiliates of MNEs in a consistent framework accounting for world output and GDP. It has started to answer basic questions on the prevalence of services in multinational production, the importance of mode 3 trade in services and the choice between exports and FDI in the strategies of MNEs.

As these data are new and the value-added perspective in multinational production is also a new field, more research will be needed to refine the results and derive additional insights. This section offers preliminary thoughts on the policy implications.

The results in this paper have –again– demonstrated how intertwined manufacturing and services are in the global economy. Statistical classifications and indicators do not always sufficiently capture the changing characteristics of manufacturing and services, as manufacturing industries increasingly sell and buy services (servicification). Services are sold together with goods, embedded or embodied. As a result, it becomes increasingly difficult to identify services in multinational production. A value-added approach can help to trace services value-added across the international activities of firms.

In addition, a number of firms that are classified as services firms are in reality manufacturing firms that have re-organised their activities on an international scale within GVCs. Conversely, several affiliates of MNEs are undertaking services activities in support of their manufacturing operations. Indeed, the competitiveness of manufacturing is increasingly linked to 'intangible' services activities like design, R&D, sales and logistics.

The blurring boundaries between manufacturing and services mean that effective targeting through industrial and trade policies becomes increasingly difficult. Policies that focus exclusively on manufacturing ignore the growing importance of services for value creation in manufacturing GVCs. Instead, policy makers may actually need to focus more on services industries in order to support their manufacturing industries then. Above all, this paper demonstrates that an integrated approach to manufacturing and services in policy discussions is necessary, going beyond traditional product definitions and statistical classifications.

Government policies for services are less well-known and policy makers have sometimes less experience in designing effective services policies beyond sector-specific policies that aim at regulating industries with market imperfections. The broad and heterogeneous group of services has traditionally been looked upon as somewhat secondary to manufacturing. In recent years, however, some categories of services have undergone a thorough transformation making them more productive, more innovative and internationally tradable. These changes increasingly call for a more modern, progressive, approach to policy making that takes into account these new characteristics of services.

Secondly, looking at the results from a different perspective, this paper also provides new insights into the use of exports and affiliate production as internationalisation strategy for services. Establishing a local affiliate is the preferred choice for companies offering services in international markets, while the opposite holds true for manufacturing. However in value added terms, both strategies are roughly equally important, demonstrating the relatively higher value added content of services in exports.

The peculiar characteristics of services, where direct contact with the consumer is vital for certain categories of services, seem to some extent to explain this choice. In addition, government policies impact business behaviour and strategies. An interesting result from the econometric analysis is that services trade and investment restrictions are associated not only with lower output for foreign affiliates but also that these restrictions have an impact on the choice between exports and sales through foreign affiliates. It suggests the value of a diversified policy approach that focusses on both (i) the trade or investment hindering effect of restrictions, and (ii) the consequences of distortions impacting the strategic decisions of firms.

Such distortions may have an impact on the economic benefits of multinational production and further work could look at the way policy constraints have altered the modes of internationalisation and the productivity in host and parent economies.

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Annex A.

Data coverage and additional results

Data coverage

All the data from the analytical AMNE database in this paper are based on the August 2017 update that includes 43 countries (plus the rest of the world) and 43 industries (Table A.1). See Cadestin et al. (2018[1]) for more details on the analytical AMNE database and its construction..

The countries covered are: Australia, Austria, Belgium, Bulgaria, Brazil, Canada, Switzerland, the People's Republic of China, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Croatia, Hungary, Indonesia, India, Ireland, Italy, Japan, Korea, Lithuania, Luxembourg, Latvia, Mexico, Malta, Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, Slovak Republic, Slovenia, Sweden, Turkey, Chinese Taipei and United States. There is a 'rest of the world' which is an aggregate with all other countries so that total output in the database is equal to world output.

All the output, value-added and trade data match the World Input-Output Database, 2016 release (Timmer et al., 2015[38]).

Table A.1. List of industries in the analytical AMNE database

ISIC Rev. 4 code	Description
A	Agriculture, forestry and fishing
B	Mining and quarrying
C10T12	Manufacture of food products; beverages; tobacco products
C13T15	Manufacture of textiles; wearing apparel; leather and related products
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C17T18	Manufacture of paper and paper products; Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20T21	Manufacture of chemicals and chemical products; basic pharmaceutical products and pharmaceutical preparations
C22	Manufacture of rubber and plastics products
C23	Manufacture of other non-metallic mineral products
C24	Manufacture of basic metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29	Manufacture of motor vehicles, trailers and semi-trailers
C30	Manufacture of other transport equipment
C31T32	Manufacture of furniture; other manufacturing
C33	Repair and installation of machinery and equipment
D_E36	Electricity, gas, steam and air conditioning supply; water collection, treatment and supply
E37T39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities
I	Accommodation and food service activities
J58	Publishing activities
J59T60	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities
J61	Telecommunications
J62T63	Computer programming, consultancy and related activities; information service activities
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
RTS	Arts, entertainment and recreation; other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organizations and bodies

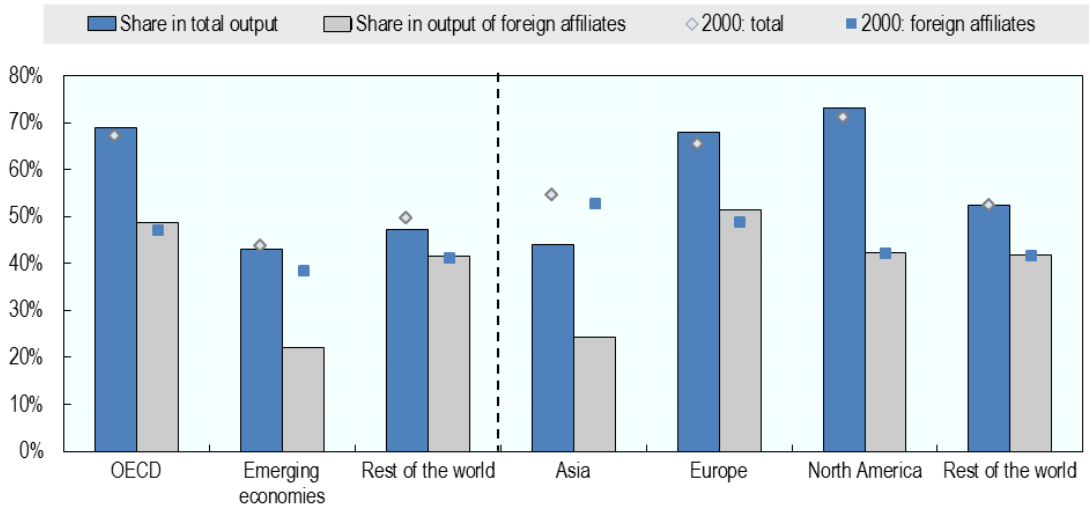
Additional figures

As highlighted in Figure 3, there are differences between OECD countries and emerging economies in the prevalence of services in the output of foreign affiliates. These differences are also observed across regions when comparing Asia, Europe and North America (Figure A.1, as host economies). With the rise of China, the average share of services in foreign affiliates established in Asia has for example decreased between 2000 and 2014.

Figure A.1 also provides the comparison with total output (i.e. the output of domestic-owned plus foreign-owned firms), highlighting that in all regions there are relatively less services in the activities of foreign affiliates.

Figure A.1. Share of services in total output and in the output of foreign affiliates

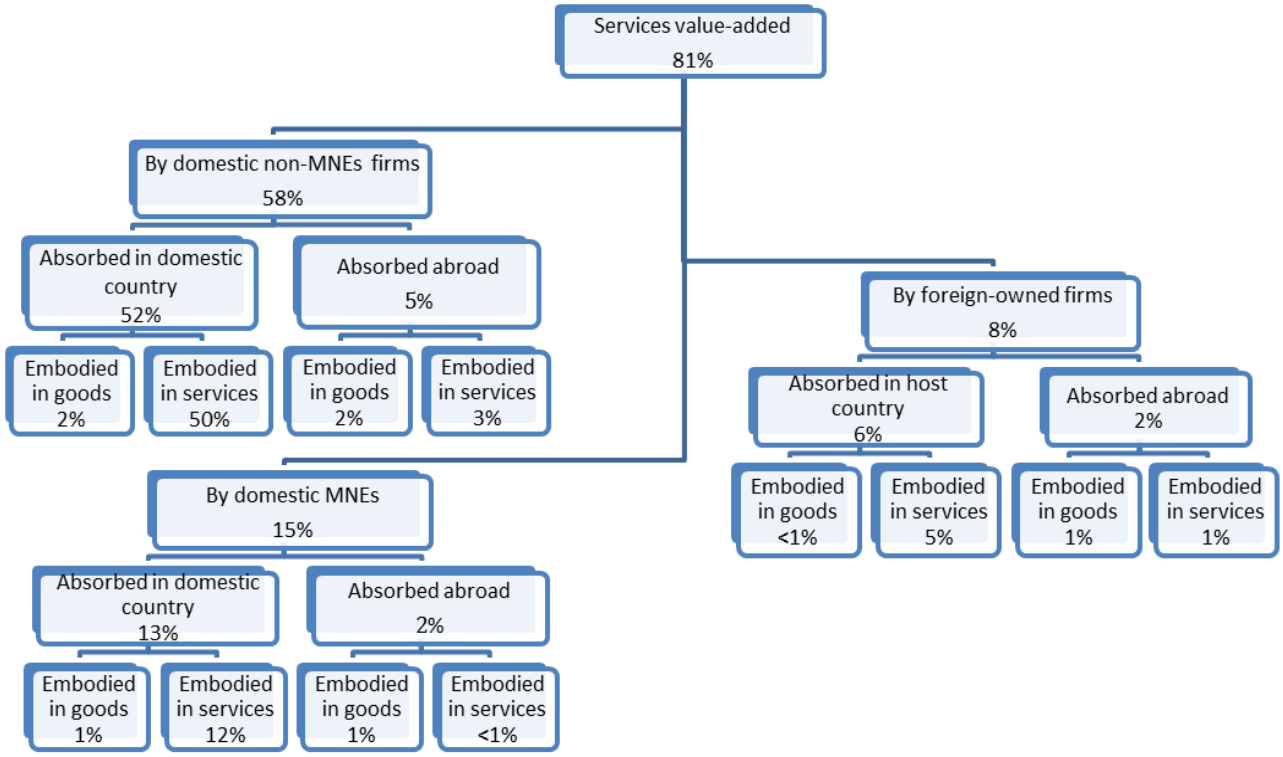
By group and by region, as host economy, 2000 and 2014



Source: Analytical AMNE database.

Figure 7 in the main text provides a decomposition of world value-added (i.e. world GDP) to trace services value-added in the output of domestic-owned and foreign-owned firms. For four years (2011 to 2014), the analytical AMNE database also has information on the output of domestic MNEs (as opposed to other domestic firms not engaged in multinational production). The data are however only available for 16 countries (Austria, Belgium, Germany, Finland, France, Hungary, Italy, Lithuania, Luxembourg, Latvia, the Netherlands, Poland, Portugal, Sweden, the United Kingdom and the United States). Figure A.2 below adds to the services value-added decomposition the distinction between domestic MNEs and 'non-MNEs'. Since it is based on 16 countries that are OECD economies more specialised in services activities, the total services value-added on top of the chart is 81% instead of 71% (expressed as a share of GDP) as compared to Figure 7.

Figure A.2. Tracing services value-added in multinational production, results for 16 OECD countries, 2014



Source: Authors' calculations based on the analytical AMNE database.

Annex B.

Econometric analysis: Data and methodology

Multinational production and services trade restrictiveness: gravity model

The empirical analysis on multinational production and services trade restrictiveness relies on the on the knowledge-capital model of MNEs (Markusen, 2002[39]; Bergstrand and Egger, 2007[40]). This framework predicts that MP is driven by market size, relative factor endowment, trade costs and set up costs. We then augment this framework by adding the STRI, several host-country specific variables and partner-country fixed effects. The estimated specification is the following:

$$
\begin{aligned}
MP_{ij} = \exp[\beta_0 & \\
& + \beta_1 STRI_i + \beta_2 \ln\left(GDPCap_j - GDPCap_i\right) \\
& + \beta_3 \ln\left(\left(GDPCap_j - GDPCap_i\right)^2\right) \\
& + \beta_4 \ln Distance_{ij} + \beta_5 Contigous_{ij} + \beta_6 Colony_{ij} \\
& + \beta_7 Common\ colony_{ij} + \beta_8\ Common\ language_{ij} \\
& + \beta_9\ Common\ religion_{ij} + \beta_{10}\ Common\ legal_{ij} + \beta_{11} RTA_{ij} \\
& + \beta_{12} Inst\ Govern_i + \beta_{13} Inst\ Enfor_i \\
& + \beta_{14} \ln GDP_i + \beta_{15}\left(CITR_j - CITR_i\right) + \delta_j] + \varepsilon_{ij}{}^{20}
\end{aligned}
$$

where *i* denotes the host country and *j* is the partner/source country. The dependent variable is the total output by foreign affiliates in country *i* controlled by country *j*, as a proxy of the level of foreign affiliate activity. The main variable of interest is the OECD Services Trade Restrictiveness Index (STRI) on a scale of 0 to 1, which is our proxy for the level of barriers restricting international trade and foreign investment in services sectors.

To account for countries' size and factor endowments, the specification includes host-country GDP as a measure of expenditure in the location country; $\ln\left(GDPCap_j - GDPCap_i\right)$ is the ratio between partner and host country GDP per capita (from World Bank) and it is meant to capture differences in countries' relative factor endowments; $ln\left(GDPCap_j - GDPCap_i\right)^2$ is its squared which is included since the relationship between countries' relative factor endowments and multinational production is expected to be non-linear.

[20] Other control variables related to the host country investment and business climate, such as the OECD product market regulation index and OECD FDI restrictiveness index, are not included as control variables because they overlap in many policy areas with the STRI. The results are robust to the inclusion of a variable measuring the host-country's intellectual property climate (from www.theglobalipcenter.com/ipindex2017). But since the coefficients of this index are not significant and the index is available for a small set of countries, this variable was not included in the estimation.

To measure bilateral trade costs the following empirical proxies are used: *Distance* is the weighted geographical distance between country *i* and *j*; a dummy variable that equals one for countries that share a common land border (C*ontigous*); a dummy variable that equals one for country pairs that share a common official language (*Commmon language*); a dummy variable that equals one if countries *i* and *j* were once in a colonial relationship (*Colony*); a dummy variable that equals one for country pairs that were colonized by the same power (*Common colony*); a dummy variable that equals one for country pairs with common religion and legal system (*Common religion and Common legal*).

Finally, *RTA* is a dummy that equals one if host and partner country are in the same regional trade agreement (RTA); *Inst Govern* is the host country's level of rule of law from the World Bank Governance Database; *Institit Enfor* measures the quality of the host country's contracting institution. Several empirical studies document a robust negative effect of the corporate income tax rate on the location and activities of MNEs (de Mooij and Ederveen, 2003[41]), we thus include the difference in tax rate between the host and partner country $(CITR_j - CITR_i)$. The value of this variable is higher when tax rates in the destination market are lower, so it can be interpreted as a tax benefit in the foreign country.

Additional data sources

The dependent variables come from the analytical AMNE database that includes both the output of foreign affiliates and export data calibrated on the World Input-Output Database (WIOD). In addition, the split ICIO allows distinguishing the output that foreign affiliates sell domestically from their exports to third countries. For further details on the construction of the analytical AMNE database, see Cadestin et al. (2018[1]).

In the analytical AMNE database, about 20% of observations on bilateral output of foreign affiliates are imputed based on different statistical methods, including in some cases the use of gravity estimations. However, the data are further transformed when balancing the ICIO and the empirical analysis in this paper is based on a sub-set of countries for which imputed values play a minor role.

The industry of reference is taken looking at the industry supplying the intermediate and final goods and services (i.e. the industry of the exporting country), while for multinational production data the industry refers to the activity of the foreign affiliate in the host country. This allows to study the substitutability between trade and horizontal FDI, particularly when focusing on the domestic sales of foreign affiliates.

As a proxy for the level of institutional quality of the host country, we use an index based on the World Bank's Doing Business Database. This database includes rankings of countries based on their strength in nine policy areas: starting a business, protecting investors, dealing with construction permits, paying taxes, trading across borders, registering property, getting credit and enforcing contracts. Following Oldenski (2012[42]), we use the difference between the contracting institutions ranking and the overall ranking to isolate the role of contract enforcement apart from the overall business environment. We then construct a dummy variable which equals one if the country's contracting institutions is above the median and zero if it is not. Measures of geographical distance together with data on cultural similarities are taken from Mayer and Zignago (2011[43]). Finally, the corporate income tax rates are taken from KPMG's corporate tax rates table.[21]

[21] https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html.

Additional results

Table B.1. STRI and foreign affiliates output: gravity coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	FA sales of services					
Host country GDP (log)	0.920***	0.887***	0.921***	0.913***	0.931***	0.916***
	(0.0493)	(0.0483)	(0.0502)	(0.0496)	(0.0561)	(0.0502)
GDP per capita difference (log)	-0.170	-0.183	-0.163	-0.203*	-0.144	-0.167
	(0.118)	(0.140)	(0.136)	(0.120)	(0.132)	(0.120)
(GDP per capita diff)^2 (log)	-0.0219	-0.0167	-0.0154	-0.0182	-0.0206	-0.0143
	(0.0289)	(0.0286)	(0.0294)	(0.0285)	(0.0287)	(0.0281)
Distance (log)	-0.278***	-0.271***	-0.244**	-0.318***	-0.278***	-0.310***
	(0.0978)	(0.105)	(0.0991)	(0.103)	(0.0969)	(0.0978)
Contigous	0.0600	0.0752	0.119	0.0488	0.0676	0.0407
	(0.135)	(0.132)	(0.134)	(0.133)	(0.136)	(0.133)
Colony	0.150	0.145	0.108	0.154	0.148	0.138
	(0.135)	(0.136)	(0.130)	(0.131)	(0.134)	(0.139)
Common language	0.402***	0.347***	0.399***	0.400***	0.390***	0.380***
	(0.132)	(0.132)	(0.129)	(0.130)	(0.129)	(0.131)
Common colony	0.816	0.831	0.777	0.687	0.846	0.751
	(0.778)	(0.775)	(0.784)	(0.815)	(0.770)	(0.795)
Common religion	1.013***	0.852***	1.027***	1.014***	1.029***	0.981***
	(0.243)	(0.251)	(0.241)	(0.241)	(0.246)	(0.246)
Common legal system	0.198**	0.230***	0.196**	0.197**	0.199**	0.213**
	(0.0907)	(0.0885)	(0.0860)	(0.0888)	(0.0906)	(0.0925)
Time zone diff	-0.0249	-0.0280	-0.0341	-0.0201	-0.0249	-0.0224
	(0.0234)	(0.0232)	(0.0219)	(0.0230)	(0.0234)	(0.0233)
RTA	0.0128	-0.0156	-0.00612	0.00898	0.0136	-0.0164
	(0.120)	(0.116)	(0.116)	(0.117)	(0.120)	(0.119)
CITR difference	0.0229***	0.0221***	0.0229***	0.0249***	0.0244***	0.0259***
	(0.00820)	(0.00847)	(0.00821)	(0.00858)	(0.00890)	(0.00945)
Host country rule of law	0.0596	-0.0222	0.0328	0.0145	0.0530	0.0154
	(0.0815)	(0.108)	(0.0950)	(0.0876)	(0.0800)	(0.0816)
Host country institutions	-0.220***	-0.135*	-0.170**	-0.183**	-0.220***	-0.166**
	(0.0721)	(0.0729)	(0.0726)	(0.0733)	(0.0719)	(0.0719)
Observations	1,554	1,554	1,554	1,554	1,554	1,554
R-squared	0.863	0.865	0.877	0.865	0.863	0.859

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table B.2. STRI and foreign affiliates domestic sales vs. exports: Gravity coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	FA domestic sales of services						FA exports of services					
Host country GDP (log)	1.017***	1.000***	1.020***	1.008***	1.029***	1.012***	0.628***	0.569***	0.618***	0.619***	0.641***	0.617***
	(0.0429)	(0.0386)	(0.0422)	(0.0433)	(0.0470)	(0.0438)	(0.0879)	(0.0741)	(0.0884)	(0.0863)	(0.104)	(0.0884)
GDP per capita difference (log)	-0.0171	0.0129	-0.0295	-0.0429	0.0158	0.00387	-0.955***	-1.215***	-0.841***	-0.924***	-0.935***	-0.923***
	(0.108)	(0.118)	(0.121)	(0.110)	(0.113)	(0.110)	(0.289)	(0.311)	(0.302)	(0.278)	(0.314)	(0.263)
(GDP per capita diff)^2 (log)	-0.0453	-0.0426	-0.0391	-0.0415	-0.0440	-0.0358	0.189***	0.249***	0.208***	0.187***	0.194***	0.178***
	(0.0323)	(0.0319)	(0.0318)	(0.0319)	(0.0323)	(0.0319)	(0.0577)	(0.0589)	(0.0563)	(0.0566)	(0.0557)	(0.0539)
Distance (log)	-0.116	-0.103	-0.0971	-0.158	-0.117	-0.165	-1.019***	-1.018***	-0.916***	-1.015***	-1.020***	-1.013***
	(0.108)	(0.116)	(0.109)	(0.113)	(0.107)	(0.109)	(0.0913)	(0.0919)	(0.0924)	(0.0977)	(0.0918)	(0.0957)
Contigous	0.130	0.133	0.193	0.118	0.137	0.0991	-0.320**	-0.268*	-0.237	-0.327**	-0.305**	-0.323**
	(0.142)	(0.143)	(0.140)	(0.139)	(0.143)	(0.139)	(0.156)	(0.146)	(0.158)	(0.163)	(0.151)	(0.162)
Colony	0.250**	0.238**	0.205*	0.255**	0.248**	0.229*	-0.193	-0.191	-0.240	-0.186	-0.193	-0.176
	(0.120)	(0.119)	(0.115)	(0.120)	(0.120)	(0.125)	(0.229)	(0.211)	(0.228)	(0.233)	(0.225)	(0.237)
Common language	0.336**	0.314**	0.344***	0.332**	0.323**	0.300**	0.646***	0.452**	0.601***	0.637***	0.631***	0.643***
	(0.131)	(0.125)	(0.129)	(0.130)	(0.132)	(0.132)	(0.211)	(0.222)	(0.205)	(0.217)	(0.196)	(0.210)
Common colony	0.890	0.892	0.792	0.768	0.924	0.781	0.820	0.985	1.146	0.932	0.867	0.903
	(0.764)	(0.767)	(0.781)	(0.799)	(0.755)	(0.790)	(0.834)	(0.836)	(0.763)	(0.835)	(0.818)	(0.823)
Common religion	1.131***	1.047***	1.167***	1.130***	1.150***	1.090***	0.405	0.0501	0.287	0.356	0.413	0.369
	(0.251)	(0.255)	(0.255)	(0.250)	(0.252)	(0.258)	(0.376)	(0.353)	(0.376)	(0.376)	(0.384)	(0.361)
Common legal system	0.180*	0.201**	0.171*	0.181*	0.182*	0.203**	0.300***	0.355***	0.335***	0.317***	0.297***	0.309***
	(0.0940)	(0.0918)	(0.0889)	(0.0927)	(0.0941)	(0.0963)	(0.104)	(0.101)	(0.104)	(0.104)	(0.102)	(0.106)
Time zone diff	-0.0603**	-0.0648***	-0.0660***	-0.0549**	-0.0601**	-0.0570**	0.137***	0.128***	0.113***	0.140***	0.136***	0.140***
	(0.0245)	(0.0241)	(0.0227)	(0.0242)	(0.0244)	(0.0243)	(0.0284)	(0.0269)	(0.0284)	(0.0280)	(0.0286)	(0.0283)
RTA	0.128	0.110	0.111	0.124	0.128	0.0826	-0.398*	-0.519**	-0.448**	-0.403*	-0.399*	-0.383*
	(0.107)	(0.105)	(0.102)	(0.105)	(0.108)	(0.106)	(0.228)	(0.219)	(0.228)	(0.233)	(0.227)	(0.230)
CITR difference	0.0230***	0.0243***	0.0234***	0.0252***	0.0246***	0.0281***	0.0434***	0.0424***	0.0437***	0.0418***	0.0450***	0.0401**
	(0.00769)	(0.00782)	(0.00805)	(0.00797)	(0.00802)	(0.00923)	(0.0150)	(0.0126)	(0.0152)	(0.0156)	(0.0166)	(0.0173)
Host country rule of law	0.0888	0.0595	0.0329	0.0461	0.0806	0.0215	-0.153	-0.494**	-0.0300	-0.125	-0.163	-0.110
	(0.0756)	(0.102)	(0.0913)	(0.0816)	(0.0751)	(0.0840)	(0.178)	(0.207)	(0.185)	(0.187)	(0.173)	(0.173)
Host country institutions	-0.259***	-0.195**	-0.187**	-0.223***	-0.258***	-0.172**	0.0709	0.274**	0.0858	0.0572	0.0691	0.0395
	(0.0736)	(0.0763)	(0.0745)	(0.0759)	(0.0733)	(0.0755)	(0.0989)	(0.114)	(0.100)	(0.0999)	(0.0984)	(0.113)
Observations	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554
R-squared	0.874	0.873	0.886	0.875	0.873	0.866	0.744	0.775	0.759	0.740	0.748	0.741

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table B.3. Sales through foreign affiliates vs. cross-border trade: gravity coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Ratio of FA domestic sales to exports of services					
Host country GDP (log)	0.0430	0.0278	0.0223	0.0325	0.0282	0.0436
	(0.0554)	(0.0564)	(0.0558)	(0.0553)	(0.0571)	(0.0553)
GDP per capita difference (log)	0.499***	0.687***	0.399**	0.543***	0.412**	0.492***
	(0.147)	(0.167)	(0.173)	(0.150)	(0.161)	(0.143)
(GDP per capita diff)^2 (log)	-0.0927***	-0.0945***	-0.0915**	-0.0928***	-0.0902**	-0.0733**
	(0.0357)	(0.0359)	(0.0358)	(0.0360)	(0.0358)	(0.0357)
Distance (log)	0.365***	0.395***	0.323**	0.383***	0.368***	0.287**
	(0.138)	(0.138)	(0.146)	(0.141)	(0.138)	(0.139)
Contigous	0.564***	0.574***	0.538***	0.578***	0.550***	0.530***
	(0.205)	(0.205)	(0.205)	(0.205)	(0.204)	(0.204)
Colony	0.273	0.286	0.266	0.292	0.266	0.253
	(0.240)	(0.233)	(0.241)	(0.239)	(0.241)	(0.241)
Common language	0.170	0.185	0.194	0.169	0.205	0.147
	(0.261)	(0.262)	(0.261)	(0.261)	(0.262)	(0.256)
Common colony	0.512	0.538	0.482	0.553	0.552	0.449
	(0.364)	(0.373)	(0.385)	(0.359)	(0.380)	(0.389)
Common religion	-0.0880	0.0742	-0.0701	-0.118	-0.103	-0.144
	(0.256)	(0.259)	(0.255)	(0.255)	(0.257)	(0.256)
Common legal system	0.189	0.173	0.189	0.187	0.192	0.181
	(0.146)	(0.146)	(0.146)	(0.146)	(0.146)	(0.146)
Time zone diff	0.0136	0.00607	0.0142	0.0160	0.00948	0.00982
	(0.0357)	(0.0355)	(0.0363)	(0.0356)	(0.0357)	(0.0350)
RTA	-0.273	-0.282	-0.321	-0.276	-0.299	-0.330
	(0.214)	(0.214)	(0.216)	(0.214)	(0.216)	(0.214)
CITR difference	0.0278**	0.0330***	0.0292**	0.0270**	0.0266**	0.0307**
	(0.0126)	(0.0125)	(0.0128)	(0.0125)	(0.0124)	(0.0126)
Host country rule of law	-0.216	0.0646	-0.233	-0.182	-0.218	-0.321**
	(0.140)	(0.162)	(0.161)	(0.143)	(0.139)	(0.137)
Host country institutions	-0.130	-0.105	-0.101	-0.143	-0.104	0.00831
	(0.107)	(0.119)	(0.108)	(0.113)	(0.108)	(0.116)
Observations	1,470	1,470	1,470	1,470	1,470	1,470
R-squared	0.354	0.360	0.355	0.355	0.355	0.357

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4. STRI and foreign affiliate activity: results by STRI sector

	PPML RESULTS		OLS RESULTS	
	(1)	(2)	(3)	(4)
VARIABLES	FA sales of services		Ratio of FA domestic sales to exports of services	
STRI - Audiovisual	-0.722		0.400	
	(1.382)		(1.877)	
STRI - Banking	2.454		1.053	
	(2.053)		(3.041)	
STRI - Computer	-2.216		-7.748***	
	(1.477)		(2.234)	
STRI - Construction	0.167		10.86***	
	(1.577)		(2.356)	
STRI - Courier	0.157		-1.175	
	(0.567)		(0.894)	
STRI - Distribution	0.126		-4.687***	
	(1.317)		(1.726)	
STRI - Logistic	0.748		-2.615*	
	(1.144)		(1.512)	
STRI - Professional	0.540		0.169	
	(0.815)		(0.816)	
STRI - Telecom	-1.705*		3.463**	
	(0.878)		(1.377)	
STRI - Transport	-2.265**		-4.451***	
	(1.072)		(1.684)	
M3 - Banking		3.242*		-1.961
		(1.874)		(3.003)
M3 - Computer		-4.481**		-3.336
		(1.971)		(2.815)
M3 - Construction		4.708		22.73***
		(3.576)		(4.427)
M3 - Courier		0.210		-5.872***
		(0.941)		(1.815)
M3 - Distribution		-1.258		-8.214***
		(1.523)		(2.199)
M3 - Logistic		0.159		-2.384
		(1.802)		(2.842)
M3 - Professional		3.387*		4.834**
		(1.969)		(2.047)
M3 - Telecom		-1.644		6.951***
		(1.077)		(2.016)
M3 - Transport		-5.861***		-9.392***
		(1.863)		(2.662)
Observations	1,554	1,554	1,470	1,470
R-squared	0.871	0.877	0.372	0.370

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5. STRI and output of foreign affiliates producing goods: gravity coefficients

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES			FA sales of goods			
Host country GDP (log)	1.157***	1.015***	1.137***	1.169***	1.156***	1.166***
	(0.0603)	(0.0480)	(0.0557)	(0.0635)	(0.0629)	(0.0630)
GDP per capita difference (log)	0.381***	0.448***	0.379**	0.360**	0.374**	0.473***
	(0.147)	(0.167)	(0.157)	(0.144)	(0.146)	(0.152)
(GDP per capita diff)^2 (log)	-0.0827*	-0.0594	-0.0738*	-0.0664	-0.0828*	-0.0617
	(0.0433)	(0.0424)	(0.0446)	(0.0449)	(0.0435)	(0.0452)
Distance (log)	-0.302**	-0.328***	-0.289**	-0.355**	-0.303**	-0.360***
	(0.132)	(0.122)	(0.138)	(0.141)	(0.133)	(0.136)
Contigous	0.0619	0.0639	0.0671	0.0619	0.0605	0.0343
	(0.142)	(0.146)	(0.149)	(0.140)	(0.144)	(0.143)
Colony	0.0827	0.0645	0.0792	0.0669	0.0830	0.0223
	(0.188)	(0.192)	(0.192)	(0.187)	(0.188)	(0.191)
Common language	0.368*	0.247	0.389**	0.408**	0.371*	0.361*
	(0.188)	(0.193)	(0.188)	(0.190)	(0.191)	(0.190)
Common colony	-0.119	0.0220	-0.0487	-0.181	-0.121	-0.171
	(0.669)	(0.624)	(0.664)	(0.642)	(0.669)	(0.637)
Common religion	1.738***	1.237***	1.753***	1.812***	1.735***	1.738***
	(0.248)	(0.260)	(0.252)	(0.248)	(0.251)	(0.249)
Common legal system	-0.0535	0.0491	-0.0603	-0.0776	-0.0540	-0.0418
	(0.112)	(0.110)	(0.113)	(0.113)	(0.111)	(0.115)
Time zone diff	-0.0337	-0.0375	-0.0351	-0.0252	-0.0336	-0.0302
	(0.0357)	(0.0347)	(0.0369)	(0.0365)	(0.0358)	(0.0353)
RTA	-0.0308	-0.141	-0.0419	-0.0366	-0.0309	-0.0961
	(0.250)	(0.253)	(0.248)	(0.246)	(0.250)	(0.255)
CITR difference	0.0235**	0.0220**	0.0248**	0.0317***	0.0232**	0.0338***
	(0.0112)	(0.0102)	(0.0110)	(0.0116)	(0.0117)	(0.0120)
Host country rule of law	0.195**	-0.00336	0.230**	0.0952	0.196**	0.0856
	(0.0905)	(0.105)	(0.0944)	(0.0930)	(0.0911)	(0.0917)
Host country institutions	-0.0309	0.226**	-0.0456	0.0485	-0.0305	0.111
	(0.0895)	(0.108)	(0.0893)	(0.0867)	(0.0886)	(0.0996)
Observations	1,554	1,554	1,554	1,554	1,554	1,554
R-squared	0.844	0.846	0.841	0.846	0.844	0.845

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Robustness checks

The main limitation of the econometric analysis is the endogeneity of the STRI coefficients, with the baseline results suffering of both an omitted variable bias and reverse causality. We used several alternative methods to assess the severity of this issue and we find that the main qualitative results do not change.

The other concern is the omitted variable bias. In our baseline specification we could not include the host country fixed effects, since they would wipe away the STRI variable which is host country specific. As theorized by Anderson and van Wincoop (2003[44]), the most likely source of omitted variable bias are the multilateral resistances. In their framework they deliver the following structural gravity system of trade:

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{t_{ij}}{P_j \Pi_i}\right)^{1-\sigma}$$

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \frac{E_j}{Y} \quad \text{and} \quad P_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} \frac{Y_i}{Y}$$

Where Π_i is called outward multilateral resistance and captures the fact that exports from country *i* to *j* depend on trade costs across all possible export markets; P_j is the inward multilateral resistances and captures the fact that imports of country *j* from country *i* depend on trade costs across all possible suppliers; E_j is total expenditure in country *j*; Y_i is the size of country *i*; *Y* is world output; t_{ij} denotes bilateral frictions between partner and host country; σ is the elasticity of substitution among goods and services from different countries. We thus can think at multilateral resistances as the return to investment faced by a MNE in a partner country *i* and the costs of investment faced by country *j* across all possible partner countries. By borrowing from the literature on gravity trade, we propose several approaches to estimate a structural gravity model accounting for multilateral resistances.

To fully rule out the concern of omitted variable bias, we transform the STRI to allow for variation along the partner dimension. We interact the STRI with data from the DESTA database, which indicates whether a country has a trade agreement covering trade in services with another country. Our novel measure of services trade restrictiveness combines the STRI and the DESTA data in the following way:

$$STRI - RTA\ serv\ (inverse)_{ij} = STRI_i * RTA\ serv\ (inverse)_{ij}$$

where $RTA\ serv\ (inverse)_{ij}$ takes value one in the absence of a trade agreement between host-country *i* and partner-country *j* including a substantive provision liberalizing trade in services. We thus implement our baseline specification including host country and partner country fixed effects. The results in Table B.5 show that restrictions on trade in services are negatively associated with foreign affiliate activity in both manufacturing and services sectors. However, the interpretation of the interaction term is made more difficult by the fact that services provision may indicate the liberalization of mode 1 or 4 trade in services. We would thus interpret the results of the analysis as a lower bound when the dependent variable is the foreign affiliate output in services, given the substitutability between export and MP, and as an upper bound when looking at the foreign affiliate output in manufacturing, given the fact that liberalizations to mode 1 or 4 trade in services may reinforce foreign affiliate production of goods.

Table B.6 shows that with the inclusion of host-country fixed effects the relationship between STRI and MP becomes stronger. The coefficient of STRI is higher than the baseline results for the foreign affiliate domestic sales of services (column 2) and becomes negative and highly significant from being positive and not significant when looking at MP of goods (column 4). This suggests that the host-country's omitted variables were biasing the baseline coefficients toward zero, implying that our baseline conclusions were too conservative.

Table B.6. STRI and foreign affiliate activity: dealing with omitted variable bias

VARIABLES	(1) FA sales of services	(2) FA domestic sales of services	(3) FA exports of services	(4) FA sales of goods
STRI*RTA serv	-3.883***	-3.765***	-3.128**	-6.069***
	(1.117)	(1.071)	(1.538)	(1.703)
GDP per capita difference (log)	0.610***	0.644***	0.578***	0.908***
	(0.0796)	(0.0832)	(0.0763)	(0.0627)
(GDP per capita diff)^2 (log)	-0.0374	-0.0259	-0.0733**	-0.0393
	(0.0311)	(0.0324)	(0.0343)	(0.0392)
Distance (log)	-0.411***	-0.426***	-0.362***	-0.337***
	(0.106)	(0.115)	(0.116)	(0.122)
Contigous	0.209**	0.206*	0.281**	0.139
	(0.105)	(0.107)	(0.140)	(0.133)
Colony	-0.0313	0.0554	-0.333**	0.0511
	(0.117)	(0.109)	(0.158)	(0.119)
Common language	0.234*	0.259*	0.117	0.197
	(0.129)	(0.133)	(0.173)	(0.161)
Common colony	0.876	0.879	1.031	0.152
	(0.759)	(0.765)	(0.735)	(0.625)
Common religion	0.792***	0.978***	0.0949	0.689**
	(0.260)	(0.271)	(0.286)	(0.273)
Common legal system	0.289***	0.241**	0.434***	0.210**
	(0.0902)	(0.0997)	(0.0970)	(0.0994)
Time zone diff	-0.0190	-0.0163	-0.0157	-0.0722*
	(0.0204)	(0.0211)	(0.0286)	(0.0415)
RTA	0.258	0.331	-0.330*	0.267
	(0.209)	(0.219)	(0.178)	(0.211)
RTA serv	1.372***	1.343***	0.826**	2.053***
	(0.396)	(0.398)	(0.419)	(0.457)
CITR difference	0.0826***	0.0582**	0.129***	0.0194
	(0.0255)	(0.0258)	(0.0279)	(0.0299)
Observations	1,554	1,554	1,554	1,554
R-squared	0.902	0.900	0.875	0.908

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

An alternative approach for including host countries fixed effects consists in adjusting a methodology proposed by Heid et al. (2017[45]), used for the estimation of unilateral trade policy in the structural gravity model of trade. To do this I include intra-national production, i.e. production by domestic-owned firms, in my baseline framework. I thus estimate equation (1) augmented with $INTL_{ij}$, $INTL_{ij} * \ln STRI_i$ and a set of host and partner countries dummies as follow:

$$MP_{ij} = \exp\Big[\beta_0 + \beta_1 INTL_{ij} + \beta_2\, INTL_{ij} * \ln STRI_i + \beta_3 \ln\big(GDPCap_j - GDPCap_i\big) + \beta_4 \ln\Big(\big(GDPCap_j - GDPCap_i\big)^2\Big) + \beta_4 \ln Distance_{ij} + \beta_5 Contigous_{ij} + \beta_6 Colony_{ij} + \beta_7 Common\ colony_{ij} + \beta_8\, Common\ language_{ij} + \beta_9 RTA_{ij} + \beta_{10}\big(CITR_i - CITR_j\big) + \delta_i + \delta_j\Big] + \varepsilon_{ij}$$

The dependent variable, MP_{ij}, includes inter- and intra-national MP (i.e. host-country gross output excluding foreign affiliate production), $INTL_{ij}$ is a dummy variable taking value 1 for MP between country *i* and *j* and zero otherwise (when *i=j)*. Table B.7 shows that the coefficient of $INTL_{ij}$ is negative and significant, indicating that foreign affiliate production is lower than domestic-owned firms production (i.e. intra-national production) in both manufacturing and services. The effect of STRI on intra-national production is captured by the host-country fixed-effects. In column 1 and 3, the coefficient of the interaction term is negative and significant, suggesting that the STRI has a more detrimental impact on foreign affiliate production rather than domestic-owned sales. The main limitation of this analysis is that, contrary to unilateral trade policy, services restrictions negatively affect the operations of domestic-owned firms. It becomes thus important to look at restrictions that are

likely to affect only foreign affiliate activity, such as restrictions to mode 3 trade in services. Columns 2 and 4 replicate the analysis by interacting $INTL_{ij}$ and restrictions to each mode of supply, the coefficients of the interaction terms indicate that barriers to mode 3 and all modes are the ones driving this negative relationship.

Table B.7. STRI and foreign affiliate activity: Heid et al. (2015)'s approach

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES		Sales of services			Sales of goods	
intl	-0.646	-1.289***	-1.236***	0.466	-0.584	-0.735
	(0.423)	(0.429)	(0.451)	(0.448)	(0.572)	(0.541)
STRI*Intl	-13.14***			-13.98***		
	(1.271)			(1.283)		
Foreign entry*Intl		-8.295			-3.742	
		(5.396)			(4.408)	
Movement of people*Intl		17.69***			19.47**	
		(6.431)			(7.829)	
Other discriminatory measures*Intl		-9.442*			7.478	
		(5.061)			(6.617)	
Barriers to competition*Intl		-66.76***			-92.60***	
		(13.86)			(12.35)	
Regulatory transparency*Intl		-8.764*			-4.916	
		(5.285)			(7.156)	
All modes*Intl			-18.11***			-20.24***
			(3.183)			(4.184)
Mode 1*Intl			-2.559			39.69
			(22.00)			(29.04)
Mode 3*Intl			-15.41***			-19.80***
			(2.504)			(3.351)
Mode 4*Intl			7.276			14.11***
			(4.619)			(4.869)
Observations	1,591	1,591	1,591	1,591	1,591	1,591
R-squared	0.999	1.000	0.999	0.998	0.999	0.999

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

Finally, we try to deal with reverse causality. One of the biggest challenges in obtaining reliable estimates of the effects of trade policy within the gravity model is that the trade policy variables are endogenous. Reverse causality comes from the fact that more open economies have an incentive to implement less restrictive trade policies, creating a circular causal chain between foreign affiliate activity and trade policy. The best way to deal with endogeneity is to find an instrumental variable. By following Beverelli et al. (2017[46]), we use an instrument that exploits information on services trade policy adopted by other countries. The STRI is thus instrumented by using the weighted average of STRI in other countries, as follows:

$$STRI_i^{IV} = \sum_j STRI_j * SI_{ij}$$

Where $i \neq j$ and the weights are the similarity index in GDP per capita between host and partner country, as follow $SI_{ij} = 1 - \left(\frac{GDP\ pc_i}{GDP\ pc_i + GDP\ pc_j}\right)^2 - \left(\frac{GDP\ pc_j}{GDP\ pc_i + GDP\ pc_j}\right)^2$. In other words, the similarity index gives more weight to the policies adopted in countries with levels of economic development that are closer to that of the host country. The rationale behind this instrument is that countries with similar levels of per capita GDP will likely have similar level of multinational production and similar forces shaping the political economy of trade policy. The results of 2SLS estimation are presented in column 2 and 5 of Table B.7 for two dependent variables, the foreign affiliate sales of services and goods. The

2SLS results are quantitatively higher than the OLS results (in column 1 and 4) for foreign affiliate sales of services. This would suggest that our baseline results are biased towards zero, which implies a conservative assessment of the impact of STRI on foreign affiliate activity.

Table B.7. STRI and foreign affiliate activity: IV approach

	FA sales of services (log)			FA sales of goods (log)		
	OLS	IV	IV	OLS	IV	IV
STRI	-3.994***	-5.435**	-2.446	-3.283***	-2.357	-9.991***
	(0.960)	(2.429)	(2.979)	(0.905)	(2.282)	(2.470)
Observations	1,470	1,470	1,470	1,422	1,422	1,422
R-squared	0.663	0.663	0.663	0.728	0.727	0.718

Note: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

In order to satisfy the exclusion restriction, the instrument must be exogenous to foreign affiliate activity in country *i*. A first potential violation of this condition can arise again through a lobbying channel. If services trade policy in country *j* responds to that of country *i* because of reciprocity or other negotiation linkages in the context of a trade agreement, lobbying motives coming from foreign affiliates in *i* could affect the policy outcomes in *j*. To minimize the impact of such trade policy linkages between country *i* and other countries *j*, we select only *j* countries that: (i) are not member of any RTA that includes country *i*; and (ii) do not belong to the same geographical region as that of country *i*. The coefficients based on these adjustments are shown in column 3 and 6 and are qualitatively in line with the previous results. The first-stage regression indicates that the instruments are relevant. The Sanderson-Windmeijer (SW) tests confirm the relevance of the instrument across specifications. Analogous conclusions obtain from the values of the Cragg-Donald (CD) F statistic, which are always well above the corresponding critical values tabulated in Stock and Yogo ($2005_{[47]}$) (SY). The same is true, in the interaction models, for the heteroskedasticity robust F statistic introduced by Kleibergen and Paap ($2006_{[48]}$) (KP). The main weakness of this analysis is the lack of host-country fixed effects. Since foreign affiliate activity in country *i* depends on other countries services trade policy relative to country *i;* not controlling for host-country fixed-effects is likely to affect the exogeneity of the instrument.