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Trading firms and trading costs in services: Firm-level analysis

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TRADING FIRMS AND TRADING COSTS IN SERVICES: FIRM-LEVEL ANALYSIS

Dorothée Rouzet, Sebastian Benz, Francesca Spinelli
OECD Trade and Agriculture Directorate

This report presents evidence on how services trade restrictions influence the decisions and performance of firms engaged in international markets, drawing on micro-data from Belgium, Finland, Germany, Italy, Japan, Sweden, the United Kingdom, and the United States. It first describes the patterns of services exports and affiliate sales at the firm level, uncovering a number of stylised facts about the firms engaged in international trade in services, their choices of modes of supply and the links between services trade and manufacturing activities. The report then relates these outcomes to services trade policy barriers in destination markets as measured by the OECD STRI. It demonstrates that complex and restrictive regulatory environments limit the volume of services that firms are able to trade as well as the number of firms that engage with those markets. Hence services trade restrictions reflect not only *ad valorem* trade costs, but also fixed and sunk costs. Such barriers do not affect all firms equally. Restrictive services trade regulations disproportionately discourage SMEs. Size, productivity and previous exporting experience appear to be decisive factors in dealing with at-the-border and behind-the-border trade barriers. Finally, the cost of regulatory compliance is lower for foreign-owned firms with headquarters located in the export destination country and for firms that trade bundles of services and manufacturing products, than it is for pure services exporters.

JEL codes: D22, F13, F14, F61, F68, L8, L9, L22, L25

Key words: Trade in services, trade costs, firm-level data, foreign affiliates, regulation, competition, productivity, trade liberalisation

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This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

The statistical analysis of firm-level US data on multinational companies and services exporters was conducted by the Bureau of Economic Analysis, US Department of Commerce under arrangements that maintain legal confidentiality requirements. The views expressed are those of the authors and do not reflect official positions of the US Department of Commerce.

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Executive Summary

This report draws on detailed micro-data from Belgium, Finland, Germany, Italy, Japan, Sweden, the United Kingdom and the United States, as well as case studies on Costa Rica and Brazil. It analyses firm-level trade and foreign investment performance in services, and assesses the costs of trade policy barriers in services.

A descriptive analysis of firm-level services exports and foreign affiliate sales reveals some stylised facts on how trading patterns differ across firms and modes:

- Services providers operating on a cross-border basis constitute the vast majority of firms selling services abroad and serve at least twice as many foreign markets as firms setting up local affiliates in host countries. Yet they generate only a fraction of the revenue that multinational firms realise through sales of their foreign services affiliates.
- Although the majority of services exporters sell to one single destination, the volume of services exports is highly concentrated among the few firms that serve a large number of partner countries. However, even firms trading with a geographically diversified set of countries exhibit strong dependence of their international performance on their top destination market.
- Manufacturing firms account for a significant share of services exports, especially in professional and computer services which are often exported as part of a bundle of goods and services exports.
- Only a minority of cross-border services providers manage to keep exporting to a given destination for a prolonged period of time.
- Foreign affiliates act to a notable extent as export platforms, supplying in particular financial, transport, computer and distribution services not only to their local host market but also to third countries.

Furthermore, the report explores how the decisions to export across the border or to establish a commercial presence abroad are influenced by policy conditions in the host market, drawing on the Services Trade Restrictiveness Indices for 42 partner countries. The analytical results point to the overall cost of regulatory impediments to services trade, and also reveal how this burden differs across firms engaged in international markets:

- Confirming existing evidence from sector-level studies, services providers export significantly less to countries with a higher STRI score – as a result of both lower export volumes and a lower number of firms. Hence, services trade restrictions do not only add to *ad valorem* trade costs, but also to one-off exporting costs.
- A novel contribution of this report is to analyse the role of services trade restrictions in shaping not only cross-border trade but also the establishment and activity of foreign affiliates. Countries with higher STRI scores are significantly less likely to attract foreign investment in services than countries with a more liberal regulatory framework. If multinational companies do set up establishments in those countries, the foreign affiliates tend to gain a weaker foothold than in more favourable host markets.

- Regulatory restrictions to services trade disproportionately discourage smaller firms and newer firms without export experience from competing in a market. These results suggest that barriers to trade in services entrench the market shares not only of domestic firms, but even of large incumbent exporters. Such impediments are likely to be particularly detrimental to small and young firms seeking foreign customers to grow and survive, raising the economic costs of existing restrictions for innovation and job creation.
- Foreign-owned firms are less affected by services trade restrictions in the home country of their multinational parent. This indicates that familiarity with the regulatory requirements of a market gives a decisive head start in dealing with restrictions, and that improving transparency would be a beneficial step to reduce the costs associated with burdensome services regulations.

Introduction

The internationalisation of services markets has proceeded at a fast pace in recent decades, fuelled by technological advances and a rapid decline in the cost of communication and travel. At the same time, the fragmentation of services regulations raises the cost of doing business across markets for services providers – as documented by the Services Trade Restrictiveness Index (STRI). This study provides firm-level evidence on how regulatory hurdles impact on the ability of services providers to expand into new markets and grow their international activity. Detailed firm-level data on trade in services and foreign affiliate sales in several OECD economies are analysed to assess the costs of trade policy barriers in services, and the channels through which they affect services exporters.

Regulatory restrictions may have a bearing on the decision to serve a foreign market, on the amount exported once present in a country, or on the choice of whether to supply a given market through cross-border exports or by setting up a local establishment. Small exporters are also likely to react in a very different fashion than large multinational groups when faced with the same regulatory obstacles, with consequences on how inclusive and job-creating the rising globalisation of services may be. A finer understanding of firm-level exporting behaviour helps get a better grasp of the policy levers through which services reforms have the most potential to boost trade, competitiveness, growth and employment.

This report complements previous studies assessing the costs of services trade restrictions using sector-level data and mark-ups.[1] The firm-level analysis of services trade is complementary to previous work along several dimensions:

- *Data quality*: Sector-level trade data covers a wide range of countries, but the data availability and quality is lacking in many instances (e.g. missing data, inconsistent flows reported by the exporter and importer). Firm-level data limits the geographical coverage of exporters, which can only be analysed one country at a time, but tends to have better reliability.
- *Modes of supply*: Aggregate statistics on foreign affiliate sales are scarce and are rarely available both by partner country and by sector. The use of micro-datasets allows for the estimation of trade costs both for the cross-border provision of services and for trade through commercial establishment in the host country, including linking cross-border exports and affiliate sales of the same firms.
- *Heterogeneous effects*: Firm-level datasets enable us to estimate the differential impact of trade restrictions on different types of exporters, such as according to their size, productivity, belonging to a multinational group or export experience.

Firm-level data on services trade became available for researchers only very recently. One of the first descriptive studies was published by Breinlich and Criscuolo (2011). They show that a number of stylised facts which shortly before had been identified for firms exporting goods do also hold for services exporters in the United Kingdom.[2] Only a small share of firms engage in international trade in services and services traders "are larger in terms of employment, turnover and gross value added, pay higher wages, and are more capital

1. See Benz (2017), Rouzet and Spinelli (2016) and Nordås (2016).

2. Bernard and Jensen (1995) provide first evidence that larger and more productive firms are more likely to export. The analysis of customs data shows that trade is dominated by few firms which export a high number of products to many countries (Bernard et al. 2007; Eaton et al. 2011).

intensive and more productive in terms of both labour productivity and total factor productivity (TFP). Service traders are also more likely to be foreign-owned or to be part of a UK MNE." Subsequently, similar patterns have been identified for other countries. Most notably, by Kelle and Kleinert (2010) for Germany, Gaulier et al. (2010) for France, Federico and Tosti (2012) for Italy, Ariu (2016a) for Belgium, Walter and Dell'mour (2010) for Austria, as well as a comparative study by Haller et al. (2014) for Finland, France, Ireland and Slovenia. Regarding trade via a commercial presence abroad, Tanaka (2015) analyses the role of heterogeneous firm productivity in shaping the activity of Japanese multinationals' foreign distribution affiliates.

Building on these firm-level datasets of services trade, several authors have shown that the negative effect of trade frictions in the services sectors can be identified from micro-data. Kelle et al. (2013) analyse the trade-off between cross-border exports of services and exports via the establishment of a foreign affiliate. They find that high wages in the importing country tend to foster cross-border trade rather than affiliate sales and bilateral distance is especially detrimental to cross-border sales. In a similar analysis for the United States, Christen and Francois (2015) confirm the negative effect of distance on the importance of cross-border sales relative to foreign affiliate sales. In both studies, a large foreign market has no consistent effect on the choice between cross-border exports and commercial establishment.

Crozet et al. (2013) show that restrictive domestic services regulations in an importing country, as measured by the OECD Product Market Regulation index, reduce the probability that French firms export to that market. In addition, such regulation also reduces the value of individual export sales of these firms to the country. Christen et al. (2013) find similar results for Austrian firms. Firm-level data from Belgium has also been used by Ariu (2016b) to study the "great trade collapse". He shows that services trade declined much less than goods trade during the 2008-09 crisis, with most of the effect being accounted for by business services.

This report draws on micro-data from several OECD economies to analyse firm-level trade and foreign investment performance in services. It is to our knowledge the first study to analyse comparable enterprise data on international services transactions for seven countries and for all modes of supply.

The data used in the analysis are extracted from confidential International Trade in Services surveys and Foreign Affiliate Trade Statistics (FATS), collected by national statistical offices or central banks for the compilation of international statistics. They contain information on annual exports and foreign affiliate sales by firm, partner country and service type. The data on enterprise-level trade outcomes are complemented with information from structural business surveys to gather further insights into firms' characteristics including size, productivity, industry classification and ownership structure. The datasets for all countries span an overlapping, although not fully identical, period of time (2008 to 2014).[3]

The current analysis is based on trade in services and foreign affiliate micro-data covering trading firms in Belgium, Brazil, Costa Rica, Finland, Germany, Italy, Japan, Sweden, the United Kingdom and the United States. While the country coverage has been primarily driven by the existence and availability of confidential enterprise-level datasets, generalising the results obtained requires a reasonably varied sample of countries. Efforts have been made to include both small and large economies and span different continents to reach sufficient representativeness of global services traders.

The study is structured in two parts. In the first part, *A panorama of services traders*, stylised facts on services traders are presented, highlighting heterogeneous export patterns across trading firms. A novel feature compared to the existing literature is that a descriptive analysis of the patterns of foreign affiliate sales in services at the enterprise level is also undertaken. Among the main patterns uncovered are:

3. For each country, a description of the data sources and key aspects of each survey is presented in Annex A, while Table B.1 reports the types of services covered and the sector correspondence with the original classifications. Datasets on cross-border trade include both intra-firm transactions and trade with unrelated parties and usually do not distinguish between them.

- Services providers operating on a cross-border basis constitute the vast majority of firms selling services abroad and serve, on average, twice as many foreign markets as firms setting up local affiliates in host countries. Yet they generate only a fraction of the revenue that multinational firms realise through sales of their foreign services affiliates.
- Although the majority of services exporters serve one single destination, the value of services exports are highly concentrated among the few firms that serve a large number of partner countries. However, even firms trading with a highly geographically diversified set of countries exhibit strong dependence of their international performance on their top destination market.
- Manufacturing firms account for a significant share of services exports, especially in professional and computer services.
- Only a minority of cross-border services providers manage to keep exporting to a given destination for a prolonged period of time.
- Foreign affiliates act to a notable extent as export platforms, supplying in particular financial, transport, computer and distribution services not only to their local host market but also to third countries.

In its second part, *Policy influences on services trade and affiliate activity at the firm level*, the report explores how the decisions to export across the border or to establish a commercial presence abroad are influenced by policy conditions in the host market, drawing on the Services Trade Restrictiveness Indices for 42 partner countries. The analytical results point to the overall cost of regulatory impediments to services trade but they also reveal how this burden differs across firms engaged in international markets. Some of the main findings are:

- Firms are less likely to export services via all modes of supply to countries that impose higher levels of restrictions as measured by the STRI indices: a lower number of firms choose to enter such markets, and the volume of cross-border exports as well as affiliate sales realised there is lower.
- Small and medium-sized firms incur the most significant costs when faced with services trade restrictions. They are less likely to export or establish in less open markets than larger firms, and less able to gain substantial market shares in challenging regulatory environments. Conversely, services trade liberalisation would particularly encourage the expansion of SMEs into foreign markets.
- An important share of the costs of dealing with restrictive regulations is borne upon initial market entry: new exporters are disproportionately affected by restrictive policies in their target export markets, while the activity of incumbent exporters appears more immune.
- Foreign networks help alleviate the costs of regulatory restrictions in export markets. Those costs are generally lower for foreign-owned firms when their headquarters or ultimate parents are located in the export destination. This may reflect easier regulatory compliance for intra-firm trade but also the benefits of local contact points to navigate a restrictive regulatory environment.

Part 1. A Panorama of Services Traders

The first part of this report explores who trades services, how and with whom. It exploits the highly detailed nature of the datasets to present descriptive evidence on the patterns of services trade and foreign affiliate activity at the firm level. Services trade entails a range of modes of supply which may be used in combination to one another or as alternative market entry strategies. It encompasses small and large traders, occasional exporters to nearby destinations and highly globalised firms, specialised services suppliers and manufacturers offering full-service solutions to their overseas clients. As a first step to inform the design of services trade policies for all, it is important to assess the diversity of services trading firms and to uncover their linkages with investment and the broader economy.

Drawing on enterprise-level surveys covering cross-border trade in services and foreign affiliate sales in seven countries (as described in Annex A), consistent patterns and trends can be identified. The methodologies and definitions used in the design of the surveys are broadly similar across countries, as the inquiries are designed in all cases to be used for the calculation of aggregated balance of payment statistics, outward foreign affiliate trade statistics and international investment positions following harmonised guidelines.[4] However it should be mentioned that a comparative analysis of the results across countries is inevitably subject to a few caveats.

- First, data availability varies across the countries analysed. For some countries data is available on the provision of a service through both cross-border or commercial presence. However, for some other countries, the picture is far less complete, when the only surveys available are either those collecting trade in services data (e.g. Belgium) or data on the activity of foreign affiliates abroad (e.g. Japan). In addition, sectoral coverage also differs considerably across countries.
- Second, each survey has a distinct sampling framework with different reporting thresholds: for instance, in Finland firms engaged in trade in services are sampled if they have a turnover which is at least EUR 1.5 million; in Italy, however, only firms with a turnover over EUR 70 million are included in the survey.
- Third, the legal framework under which these surveys are conducted might also play a role: in some countries these are statutory surveys, which typically have a very high response rate and large sample size.
- Finally, not all countries use harmonised industrial classifications or refer to a common classification for services trade, which introduces a certain margin of approximation.

With these motives for caution in mind, the descriptive analysis below is presented jointly for all countries with available information.

4. See the Fifth and Sixth editions of the IMF's Balance of Payments and International Investment Position Manual, and the Manual on Statistics of International Trade in Services 2002 and 2010.

1.1 An overview of international services firms

General patterns of trade and affiliate activity are depicted below for several OECD countries. This section focuses on how much internationalised firms export services or sell through affiliates, which markets they target first, and how their tendency to reach out to new markets and to export new products varies across countries and over the post-crisis period.

How much do firms export services or sell through foreign affiliates?

While the number of exporting firms has been growing since 2008, the number of export destinations and the number of export products have remained relatively stable.

Table 1 shows the aggregate figures per country and year, obtained by adding up services exports of each firm over all partner countries and sectors in a given year. On the one hand, this table highlights the intensive margin from services trade, indicated by total services exports to all partners and in all sectors and the average aggregate exports per firm (fourth and sixth columns, respectively). On the other hand, it reports information on two types of extensive margins, in terms of number of countries served and number of services exported (in the second and third columns).

Total exports have been increasing and the number of exporting firms has been growing substantially over time in all seven countries, in part reflecting the recovery of trade in the wake of the financial crisis. The number of export destinations of the average firm has been growing in Italy, Sweden and the United Kingdom, while it is relatively stable in Germany and Belgium, and fluctuating in Finland and the United States. Also the number of export products is relatively stable. Typically, most services sold abroad correspond to the exporter's core activity. Italy and Sweden are the only exceptions, where the majority of firms exporting services products are primarily engaged in non-services activities. Overall, US firms export on average considerably more than firms in other countries and serve a significantly higher number of destination markets than exporters from the remaining countries.[5]

Table 1. Number of exporters and services exports by firm, 2008-2014

	Number of exporters	Average number of partner countries by firm	Average number of products exported by firm	Total exports, million EUR	Average bilateral exports per firm, million EUR	Average worldwide exports per firm, million EUR	Share of exporters with main activity in services
Belgium							
2013	6,958	10.0	1.7	65,204	0.9	9.4	n.a.
2014	7,635	10.6	1.7	72,133	0.9	9.4	n.a.
Finland							
2008	992	8.9	1.5	15,704	1.8	15.8	67.9%
2009	1,010	8.8	1.5	15,218	1.7	15.1	67.4%
2010	1,000	9.1	1.5	14,881	1.6	14.9	65.4%
2011	1,224	8.4	1.5	15,134	1.5	12.4	69.9%
2012	1,447	7.9	1.5	15,879	1.4	11.0	71.7%
2013	1,432	8.4	1.5	20,473	1.7	14.3	72.8%
2014	1,473	9.3	1.5	18,754	1.4	12.7	72.8%

5. However, this may partly be explained by the small sample of firms in the United States in which large exporters seem to be overrepresented.

Table 1. Number of exporters and services exports by firm, 2008-2014 (*cont*.)

	Number of exporters	Average number of partner countries by firm	Average number of products exported by firm	Total exports, million EUR	Average bilateral exports per firm, million EUR	Average worldwide exports per firm, million EUR	Share of exporters with main activity in services
Germany							
2008	11,544	5.5	1.7	202,660	3.2	17.6	11,544
2009	11,801	5.6	1.7	187,653	2.9	15.9	11,801
2010	12,660	5.6	1.7	210,777	3.0	16.6	12,660
2011	13,897	5.6	1.6	222,872	2.9	16.0	13,897
2012	14,583	5.6	1.7	230,163	2.8	15.8	14,583
Italy							
2008	759	9.0	2.3	9,725	1.4	12.8	41.2%
2009	825	9.1	2.0	13,030	1.7	15.8	43.0%
2010	895	9.4	2.0	12,629	1.5	14.1	42.8%
2011	986	9.3	2.0	13,560	1.5	13.8	42.2%
2012	948	9.9	2.1	15,229	1.6	16.1	42.8%
2013	960	10.1	2.1	14,906	1.5	15.5	43.0%
Sweden							
2008	765	13.7	2.4	35,968	3.4	47.0	23.0%
2009	799	13.7	2.5	35,990	3.3	45.0	23.0%
2010	631	16.3	2.5	38,682	3.8	61.3	21.0%
2011	673	16.1	2.6	44,733	4.1	66.5	20.0%
2012	783	16.1	2.6	52,280	4.1	66.8	23.0%
United Kingdom							
2008	4,633	9.9	1.4	70,554	1.5	15.2	79.7%
2009	5,560	9.7	1.4	71,951	1.3	12.9	78.2%
2010	5,676	10.1	1.4	80,951	1.4	14.3	80.1%
2011	5,661	10.5	1.4	87,490	1.5	15.5	80.7%
2012	6,002	10.5	1.4	94,634	1.5	15.8	81.1%
2013	6,265	11.1	1.6	96,518	1.4	15.4	80.5%
2014	5,917	10.5	1.4	90,543	1.5	15.3	81.0%
United States							
2008	1,251	22.4	1.6	144,117	5.1	115.2	68.3%
2009	1,221	22.6	1.6	152,661	5.5	125.0	67.8%
2010	1,419	21.2	1.6	172,398	5.7	121.5	69.4%
2011	2,211	17.3	1.4	194,034	5.1	87.8	72.9%
2012	1,260	23.4	1.6	208,205	7.1	165.2	69.8%

Note: The statistics reported in this table refer to the sample analysed and do not cover the full universe of exporting firms.

Source: Own calculations based on National Bank of Belgium, International Trade in Services; Statistics Finland, International Trade in Services; Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services; Bank of Italy, International Trade in Services survey; Statistics Sweden, Survey of Foreign trade in services; UK Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons.

Table 2. Number of multinational firms and foreign affiliate services sales, 2008-2014

	Number of parent firms	Average number of affiliates per parent	Average number of countries per parent	Average number of sectors per parent	Average turnover per affiliate, million EUR	Average number of employees per affiliate	Average turnover of parent, million EUR	Average number of employees of parent	Share of parents in services
Finland									
2008	415	5.6	3.7	1.3	38.6	79	399	896	69%
2009	467	5.3	3.7	1.2	22.7	71	295	737	69%
2010	462	5.4	3.7	1.3	24.9	72	316	720	67%
2011	443	5.6	3.9	1.3	23.2	75	348	764	64%
2012	515	5.1	3.7	1.3	23.4	71	271	656	64%
2013	512	5.0	3.7	1.3	23.7	76	318	631	62%
2014	523	4.9	3.5	1.3	19.2	71	292	612	63%
Germany									
2008	4,525	4.0	2.8	1.4	58.2	153	498	1,076	21%
2009	4,589	4.0	2.8	1.4	56.3	155	479	1,029	22%
2010	4,759	4.1	2.9	1.4	60.9	152	514	1,021	21%
2011	4,888	4.0	2.9	1.4	65.8	151	534	1,019	21%
2012	4,997	4.1	2.9	1.4	65.2	149	561	1,023	21%
2013	4,972	4.1	2.9	1.4	65.0	153	583	1,036	21%
2014	5,135	4.1	2.9	1.4	68.4	153	555	931	21%
Italy									
2013	3,782	2.0	1.8	1.3	51.1	48	643	1,101	63%
Japan									
2008	2,011	3.9	2.9	1.3	91.4	119	1,135	1,606	56%
2009	2,189	3.8	2.8	1.3	82.0	113	983	1,507	56%
2010	2,226	3.7	2.8	1.3	97.2	124	1,087	1,527	55%
2011	2,274	3.7	2.8	1.3	98.4	123	1,150	1,538	55%
2012	3,013	3.3	2.5	1.2	98.7	112	974	1,210	57%
2013	3,148	3.3	2.5	1.2	94.1	107	781	1,191	57%
2014	3,069	3.4	2.7	1.2	96.7	114	752	1,156	57%
United Kingdom									
2009	2,494	3.6	2.8	1.1	n.a.	n.a.	n.a.	n.a.	91%
2010	3,469	3.2	2.4	1.1	n.a.	n.a.	n.a.	n.a.	91%
2011	3,669	3.2	2.4	1.1	n.a.	n.a.	n.a.	n.a.	92%
2012	3,640	3.3	2.7	1.1	n.a.	n.a.	n.a.	n.a.	91%
2013	4,903	3.5	2.5	1.1	n.a.	n.a.	n.a.	n.a.	91%
United States									
2008	2,184	12.7	6.8	2.1	68.5	243	2,728	9,590	63%
2009	2,900	12.0	6.5	1.9	51.0	205	2,121	7,385	69%
2010	2,868	12.1	6.5	2.0	56.5	219	2,394	7,437	69%
2011	2,849	12.3	6.6	2.0	60.3	219	2,487	7,570	69%
2012	2,826	12.5	6.6	2.0	66.6	226	2,800	7,667	69%

Note: The number of parent companies refers to the sample analysed and does not cover the full universe of multinational parents.

Source: Own calculations based on Statistics Finland, Foreign Affiliate Trade Statistics; Research Data and Service Centre of the Deutsche Bundesbank, Micro-database Direct Investment; Orbis sample of Italian foreign affiliates; Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; UK Office of National Statistics, Annual Foreign Direct Investment Inquiry; and US Bureau of Economic Analysis, Surveys of US Direct Investment Abroad.

Foreign affiliates' services sales are several times larger than services exports. In contrast, exporting firms tend to serve more markets than foreign affiliates

Table 2 reports, for each country, aggregate patterns of the activity of foreign affiliates and reveals significant differences across countries and over the time period observed.[6] The average sales of foreign affiliates of German enterprises increased significantly from 2008, while US and Finnish foreign affiliates saw a decline in both average sales and average employment over a similar period of time. The analysis highlights significant differences between the sector of activity of the parent and that of its affiliates. In Germany, for instance, only about one fifth of the enterprises with services affiliates are themselves primarily engaged in services provision, while such share is considerably larger in the other countries. This might partly reflect sales of manufactured goods through distribution affiliates, allocated to the services sector. Another factor may be the services aspects of global value chains, with parent companies offshoring services activities, such as R&D and design, on an intra-firm basis. Across countries, US parents tend to have a more widespread network of foreign affiliates – with affiliates located in more than six host markets on average, considerably more than parents from other countries. Also, the average number of foreign affiliates per parent, substantially higher in the United States, has remained relatively stable in most countries with the exception of Finland and Japan, where it has been declining – perhaps reflecting a tendency to consolidate after the recent global recession.

Comparing foreign affiliates' activities with the export performance of German, Finnish and US firms suggests that firms providing cross-border services serve, on average, twice as many foreign markets than foreign affiliates, although foreign affiliates' average services sales are at least ten to fifteen times larger than firms' average exports. Firms, therefore, appear to set up local establishments where they can sell large volumes, be it because of extensive local demand or because the exporter enjoys above-par capacity and efficiency; while more occasional, smaller exporters and sales to less promising destinations rely more heavily on cross-border transactions.

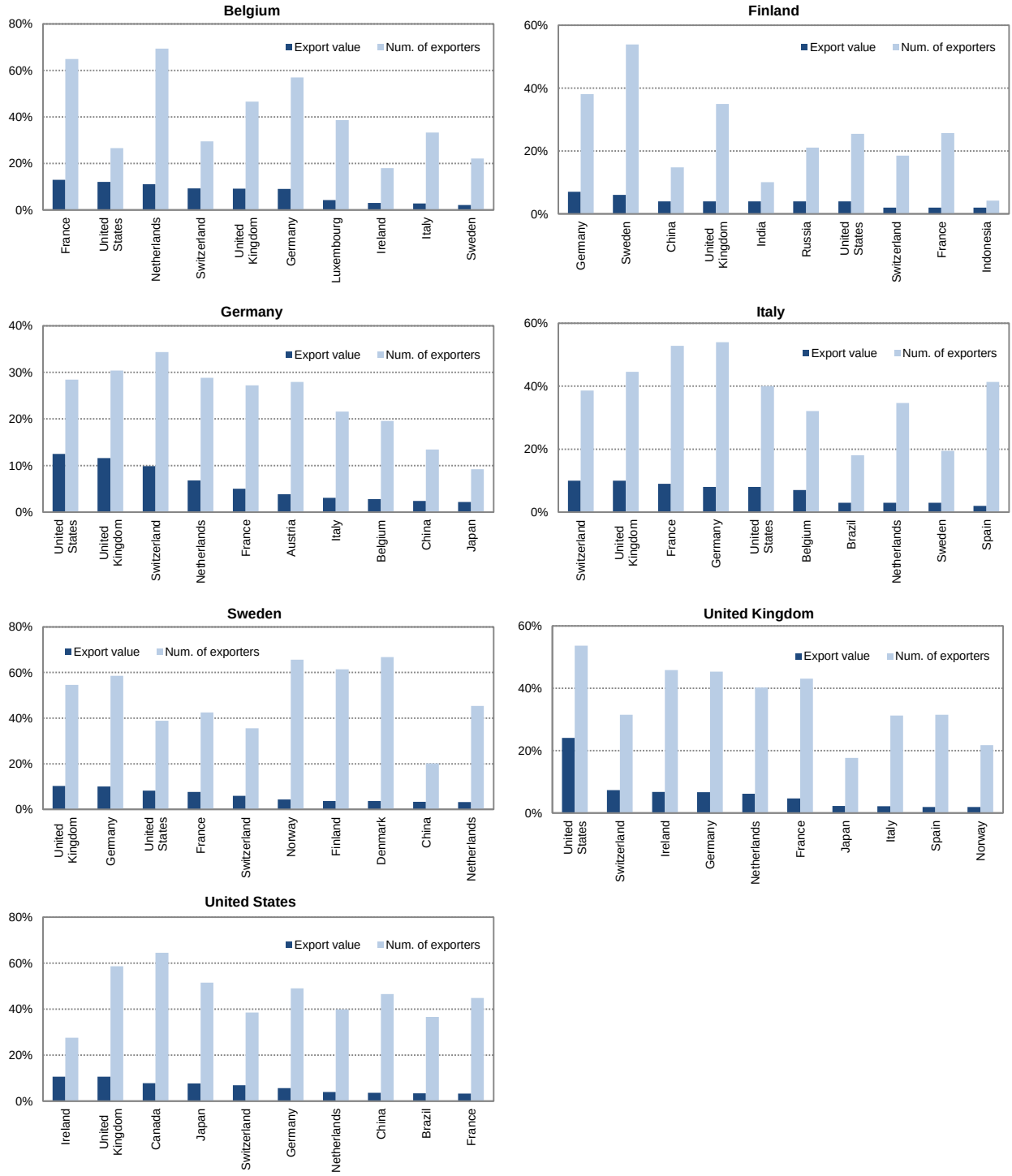
What are the main destination markets?

Figure 1 below shows, for each country, the ten most important destination markets according to their shares in total services exports and the share of firms exporting to such destinations among all active exporters included in the surveys over the period 2008-2014.[7] The top ten countries account for 39% (in Finland) to 75% (in Belgium) of firms' total services exports. Moreover, while in Germany, Italy and Belgium a large share of services exports stays, on average, within the European Economic Area (EEA) and Switzerland, Finnish, Swedish and UK firms tend to diversify their export markets and reach out to non-EEA countries. US firms' destination markets are quite widespread, but among the top ten trade partners, six are European countries.

6. Time coverage is not identical in all countries. Outwards FATS data are not available for Belgium, while for Italy, where foreign affiliates data are extracted from the Orbis database, the whole set of aggregate statistics are only computable for 2013. In the United Kingdom, only some variables can be derived as no information on the value of foreign affiliate sales is available.

7. Discrepancies with the official Balance of Payments and FATS statistics can arise due to the incomplete sector coverage of the surveys used in this study.

Figure 1. Top ten export markets by country



Note: Only the top ten destination markets are reported in the figure. The destination markets are ranked by the share of export value in total exports over the period considered. The data covers the period 2008-2013 for Italy and Germany, 2008-2014 for Finland and the United Kingdom, 2013-2014 for Belgium, and 2008-2012 for the US and Sweden.

Source: Own calculations based on National Bank of Belgium, International Trade in Services; Statistics Finland, International Trade in Services; Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services; Bank of Italy, International Trade in Services survey; Statistics Sweden, Survey of Foreign trade in services; UK Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons. The statistics reported in this table refer to the sample analysed and do not cover the full universe of exporting firms.

The share of exporting firms is also heterogeneously distributed across the top destination markets, with some destinations being served by few large firms, while others by many small firms. In the United States, for instance, there are more firms exporting to France than to Ireland, although these are likely to be smaller firms as they jointly export five times less than those selling to Ireland, likely to be related to large MNEs. In Belgium, services exporters appear to follow a "pecking order" of destinations whereby they first serve the most immediate neighbours with whom they share an official language (about two-thirds of exporting firms sell to France and the Netherlands), then Germany and the United Kingdom, before reaching out to further destinations. Similarly, in Sweden there are many more, possibly smaller, exporting firms selling to other Nordic countries than to the United Kingdom or the United States – Sweden's top two destination markets in terms of export value. In contrast, the destination choices of German services exporters are more evenly spread, with no market served by more than a third of firms.

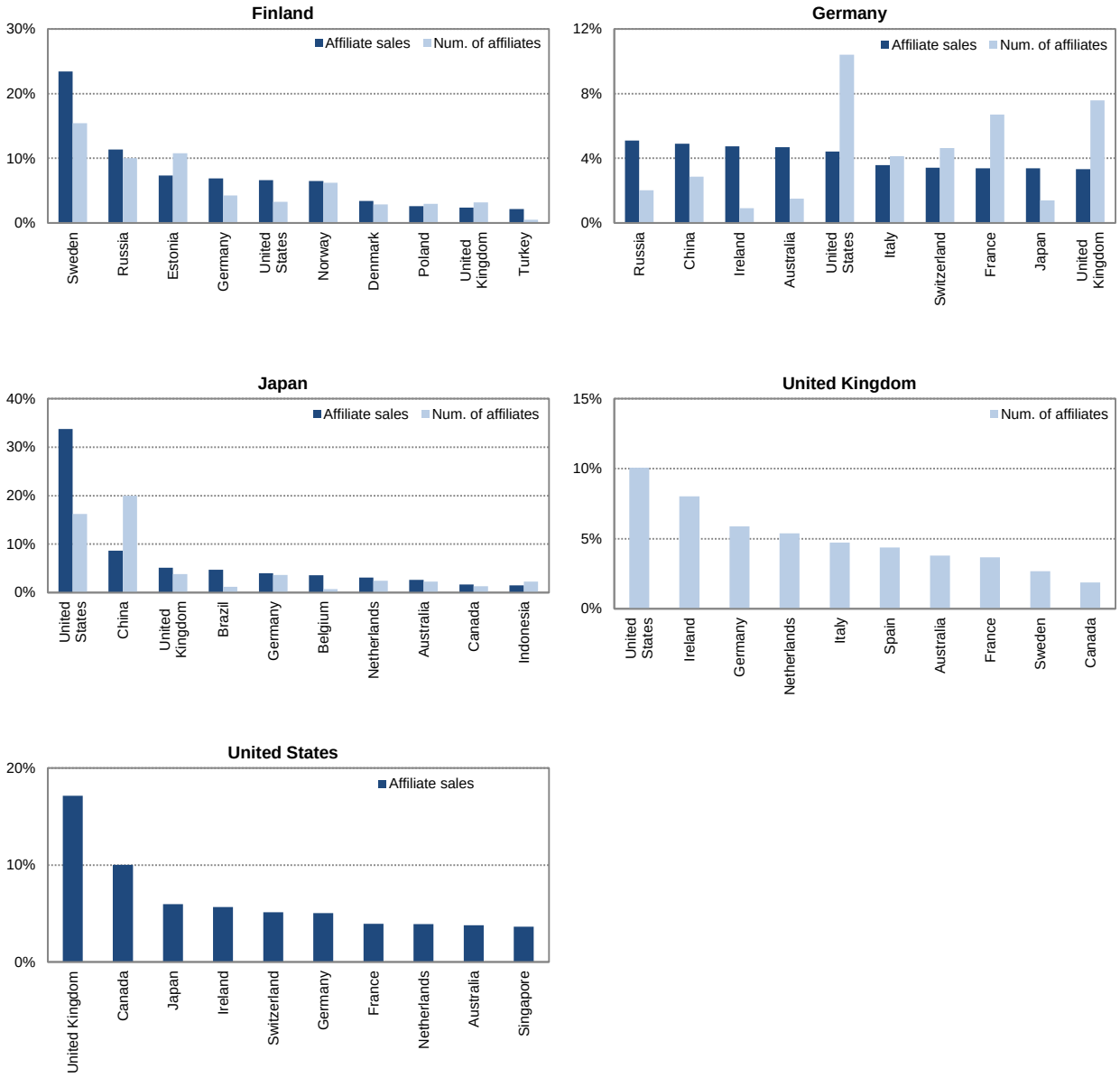
Figure 2 highlights, for each country, the top ten host economies of foreign affiliates over a time period that spans from 2008 to 2014. All together, these countries host from 42% (in the case of Germany) to 60% (for Finland) of all foreign affiliates, and realise between 41% (in Germany) to over 70% (in Finland) of all foreign affiliates sales. There are several possible explanations behind the observed investment patterns. A relatively favourable and harmonised regulatory environment could explain why firms established in the European Union tend to locate most of their affiliates in neighbouring countries. Language and relatively similar legal frameworks could explain the United Kingdom's commercial presence in Australia, Canada, Ireland, and the United States. Regional value chains are also likely to play a role in shaping investment decisions. For instance, over the period 2008-2014, about 20 % of Japanese affiliates located in the People's Republic of China generated just 9% of total affiliates sales, while Japanese subsidiaries in the United States – representing 16% of all Japanese affiliates abroad – were responsible for one third of total affiliates sales.

What are the main services sold abroad?

Figure C.1 in the Annex presents the sectoral decomposition of the trade in services sample over the period 2008-2014.[8] The sectoral distribution is quite heterogeneous across countries, and reflects in part the inclusion of some sectors such as transport and finance in only a subset of countries. On average, computer services, telecommunications and professional services (such as architecture and engineering) are the most important categories in most countries. For FATS data, the sample is dominated by affiliates in the distribution sector (Figure C.2).

8. Given the different level of aggregation of services categories and the different sectoral coverage of each country's trade in services data, sector categories are aggregated where possible to facilitate cross-country comparison. The data reported in Figure C.1 refer only to those services sectors matched with the OECD STRI.

Figure 2. Foreign affiliate sales by hosting economy



Note: Only the top ten hosting economies are reported in the figure. The data covers the period 2008-2014 for Italy, Finland, Germany and Japan, 2009-2013 for the UK, and 2008-2012 for the US. No foreign affiliate sales data are available for the United Kingdom. The number of firms for the United States was not disclosed for confidentiality reasons.

Source: Own calculations based on Statistics Finland, Foreign Affiliate Trade Statistics; Research Data and Service Centre of the Deutsche Bundesbank, Micro-database Direct Investment; Orbis sample of Italian foreign affiliates; Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; UK Office of National Statistics, Annual Foreign Direct Investment Inquiry; and US Bureau of Economic Analysis, Services Supplied to Foreign Persons by US MNEs through their MOFAs.

1.2. Mode choice and trade-FDI linkages

Services firms can use a variety of modes to serve foreign customers. The General Agreement on Trade in Services (GATS) distinguishes between cross-border supply (Mode 1), consumption abroad (Mode 2), commercial presence (Mode 3) and the presence of natural persons (Mode 4). While a detailed breakdown of services provision into the four modes is not available for most countries, linking trade and foreign affiliate information yields insights as to the prevalent choices, or combination of choices, in each sector. It also highlights that trade and investment are intrinsically intertwined where a substantive share of cross-border transactions occur within firm boundaries.

Export channels: Setting up shops locally or selling from afar

Export relationships through foreign affiliates are less frequent but transactions are of higher value than cross-border exports

Exporting on a cross-border basis and setting up an affiliate to sell services to the local market represent different means to serve a given country. In some cases, firms trade off the two alternatives against each other and decide to go for the more cost-effective one. Other firms prefer to supply their services via a combination of different modes.[9] The choice of mode or the decision to combine different modes is likely to be driven by factors such as technical and regulatory constraints, market size, and the expected duration of the supplier-customer relationship. Figure 3 compares the relative prevalence of these choices among German, Finnish and US firms by service sector, as well as their relative importance in overall international sales.[10,11]

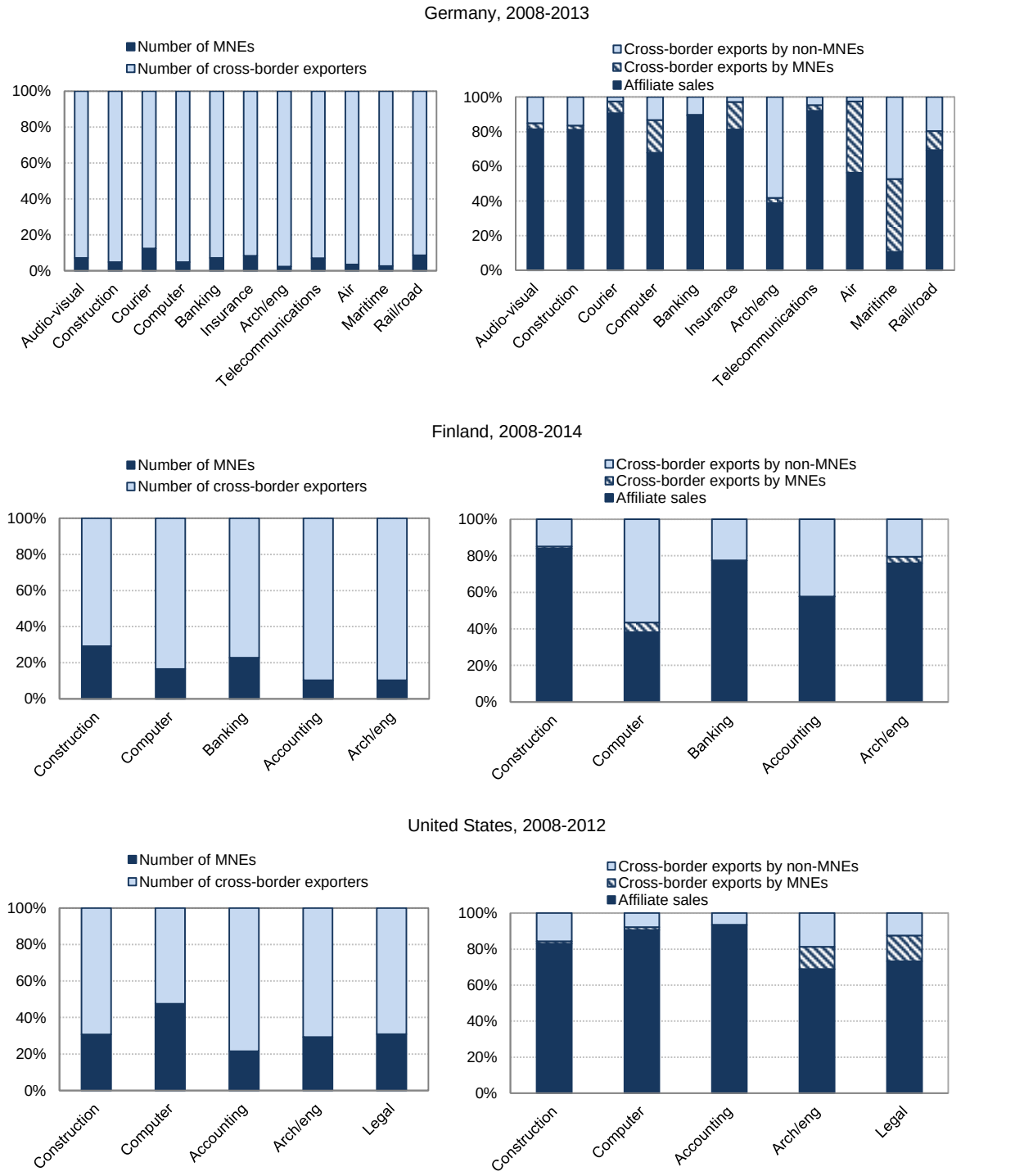
It emerges first, that cross-border exports are by far the most common means of market entry in all services sectors in the three countries, though less so in the United States. German firms serve foreign markets on a cross-border basis in 88% of cases in courier services, and even more in other sectors; Finnish firms in 70% of cases in construction services, and more commonly in other sectors; US firms in 52% of the cases in computer services, and more so in other business services. Only a small number of European firms active in foreign markets do so through local establishments. However, the size of transactions is considerably larger when conducted by foreign affiliates relative to cross-border sales. In Germany, this small minority of MNEs accounts for over 80% of total foreign sales in almost all sectors, most of which are sales by their affiliates. The only exceptions are architecture and engineering services and maritime transport. In air and maritime transport, global firms diversify their export channels: the sales of overseas affiliates of German companies account for respectively 56% and 11% of total foreign sales, but cross-border exports by those same MNEs contribute another 41% and 42% respectively. In international transport where the majority of transactions are cross-border by nature, MNEs thus also dominate the global market for large-value contracts.

9. A few studies have analysed whether trade and FDI are complements or substitutes in services, and find evidence that the different modes tend to facilitate each other (Fillat-Castejón et al., 2009; Lennon, 2009; Buch and Lipponer, 2004). In addition modes are natural complements where multinationals and their affiliates trade services with each other, as is for instance often the case in financial services.

10. These statistics cannot be calculated for other countries, where data is only available for either cross-border exports or foreign affiliate sales but not both.

11. Total international sales by sector add up the cross-border exports by EBOPS service type and the turnover of foreign affiliates by main industry classification of the foreign establishment. While the two are not fully comparable – assuming for instance that the entirety of foreign affiliate sales occur in their sector of primary activity – they provide the best available match for service trade by modes.

Figure 3. Sales of services abroad by export channel and by sector



Note: Figures on the left-hand side report the shares of firm-destination pairs where the foreign market is served through cross-border exports or through the establishment of a foreign affiliate, while figures on the right-hand side show the share of cross-border exports and foreign affiliate sales in the total value of international sales. Cross-border exports by MNEs aggregate the export transactions conducted on cross-border basis by firms that also own an affiliate active in the same service sector in the same destination market.

Source: Own calculations based on Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services and Micro-database Direct Investment; Statistics Finland, International Trade in Services and Foreign Affiliate Trade Statistics; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons and Surveys of US Direct Investment Abroad.

In Finland as well, the largest transactions are realised by foreign affiliates that account for about 80% of total foreign sales in most sectors, with the exception of accounting and computer services, where the share of cross-border exports by MNEs is higher than in other sectors. In computer services, sales by foreign affiliates account for only slightly over half of Finnish total foreign sales, while in Germany foreign affiliates are responsible for the vast majority of total sales. Furthermore, there is little diversification of export channels in Finland, with computer services and architecture and engineering services being the only sectors where Finnish MNEs also serve foreign markets through cross-border sales – although much less than through their affiliates abroad.

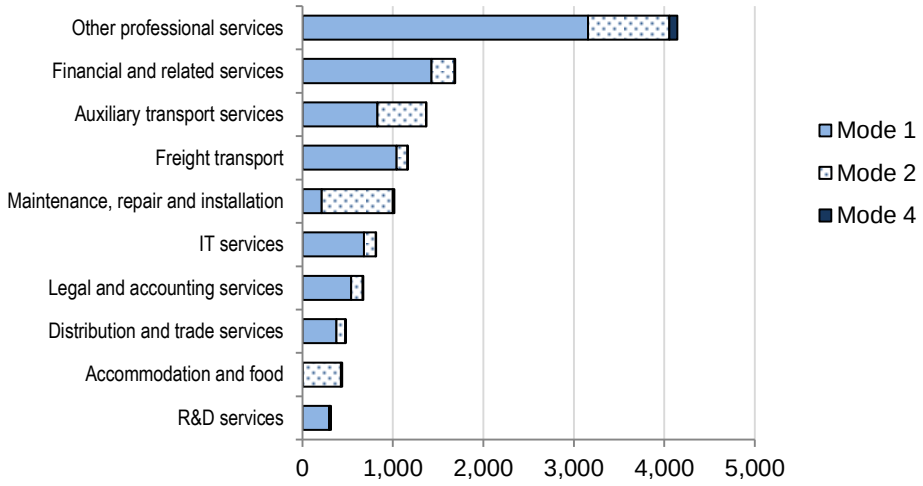
In the United States, MNEs also dominate foreign services sales in all five sectors with available data. Extensive networks of foreign affiliates even exceed 90% of total international sales by US firms in computer and accounting services. Compared to Finland and Germany, US professional services MNEs have a more global reach and more often serve foreign clients from their US headquarters. In architecture, engineering and legal services, those cross-border services provided by MNEs, either by digital means or through temporary stays of professionals abroad, account for 12 to 14% of total foreign sales.

Box 1. Untangling the four modes of supply: The case of Brazil

Since 2012, the Brazilian Ministry of Industry, Foreign Trade and Services has been collecting detailed data on transactions between residents and non-residents in services and intangibles. Brazilian companies are legally required to report in the Integrated System of Foreign Trade (SISCOSERV) each transaction's value, partner country, service type according to the Brazilian Services Nomenclature (NBS), and whether the acquisition of sales involved mode 1, 2 or 4. SISCOSERV was designed to improve the Balance of Payments statistics and to better inform policy-makers and trade negotiations in services. It is one of relatively few instances in which cross-border services exports are broken down into individual modes of supply in the reported data.

Figure 4 depicts the composition of Brazilian exports reported in SISCOSERV by mode of supply, for the ten 2-digit NBS service categories where Brazil's exports are largest. Cross-border supply is the main component in most sectors, while the contribution of the temporary presence of natural persons abroad tends to be marginal. Brazil also realises a significant share of its exports through mode 2 (foreign residents purchasing services on Brazilian soil) not only in the hospitality industry but also in professional services as well as logistics, maintenance and repair services.

Figure 4. Brazil's services exports by mode of supply and service type, in million USD (2014)

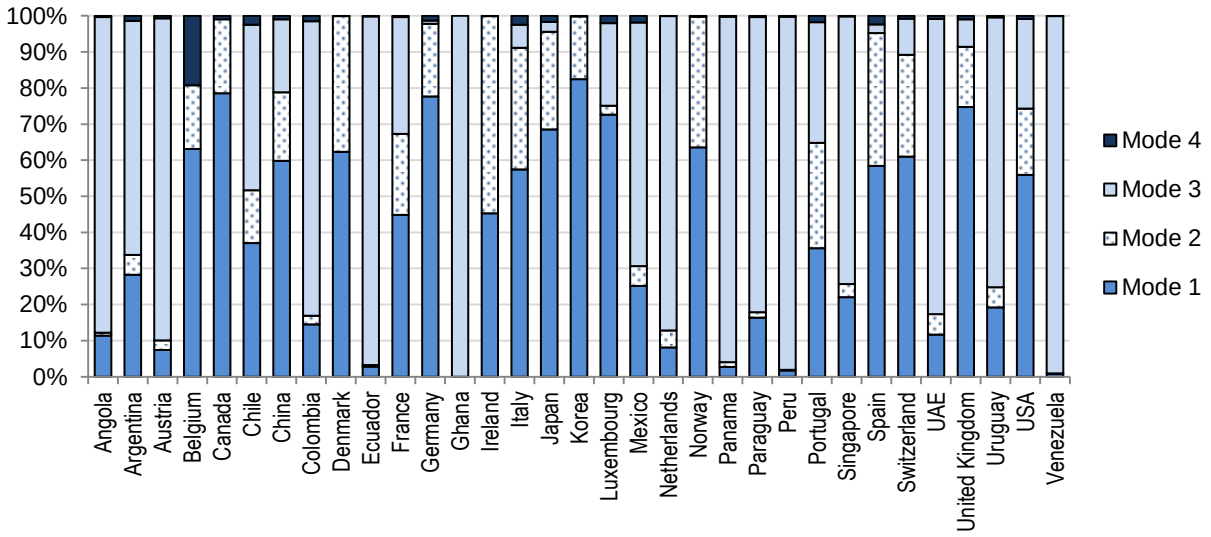


Note: "Other professional services" include management and management consulting services, architecture, engineering, scientific and other technical services, advertising, market research, photographic services and professional services not elsewhere classified.
Source: Own calculations based on data from SISCOSERV, Ministry of Industry, Foreign Trade and Services.

In addition, the Ministry of Industry, Foreign Trade and Services publishes aggregated statistics on the sales of foreign services affiliates of Brazilian companies by country. This information enables a full comparison of trade in services with various partners via the four modes of supply. As shown in Figure 5, the channel through which Brazilian companies supply services abroad varies considerably depending on the target market. Establishing locally is by far the most prevalent choice for Latin American and African host markets, while cross-border supply dominates as a means to serve the Unites States and most European markets.

Mode 4 only accounts for a substantive share of total services exports destined to Belgium, where this mode of supply is concentrated in low-skill support services. In contrast, exports to Latin American partners through the movement of natural persons primarily occur in engineering services, reflecting the dynamism of the engineering sector in Brazil and its strong regional performance. More broadly, while quantitatively small, mode 4 services support and facilitate other channels. The international movement of intra-corporate transferees is often a pre-requisite to the establishment of a foreign affiliate; and there is also evidence that temporary expats help boost firms' cross-border export activities (Graneli and Lodefalk, 2014).

Figure 5. Brazil's services exports by mode of supply and destination



Note: The shares are calculated from 2014 USD values for modes 1, 2 and 4, and 2015 USD values for mode 3.
Source: Own calculations based on data from SISCOSERV, Ministry of Industry, Foreign Trade and Services.

Affiliates as local market players and export platforms

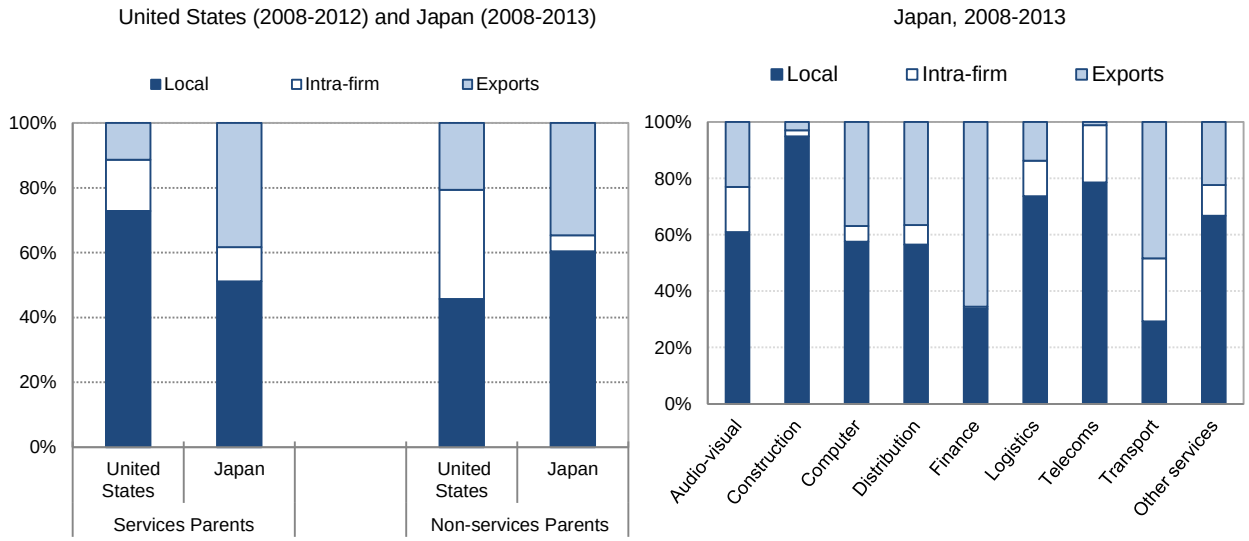
The business models behind internationalisation are complex in many sectors and foreign affiliates play a range of roles: supplying their services to local customers, but also serving as a regional export platform or as a specialised service centre for their corporate group. Data for Japanese and US affiliates, where the foreign affiliate data includes a breakdown of affiliate sales by destination, allow disentangling the respective importance of these three roles.

Figure 6 displays the decomposition of foreign affiliate activity by sector and final destination for Japan, and the breakdown of foreign affiliate sales by final destination and by main activity of the parent company for the United States. In the case of the United States, the foreign affiliates of services MNEs largely sell in their host countries, and only 16% of total foreign affiliate sales are addressed to parent companies. The picture is quite different for foreign affiliates of US companies whose main activity is not in services. A much bigger share of their activity is intra-firm trade, accounting for one third of total affiliate sales. This suggests that foreign services subsidiaries of manufacturing MNEs are mainly established to support the production of the parent company and to reach out to further markets in particular as distribution hubs. In fact, affiliate sales to third countries are also twice as important in the case of affiliates of US non-services MNEs: together with intra-firm trade they make up for more than half of total foreign affiliate sales, while sales serving local demand account for less than half of their activity. Transactions between parents and affiliates also amount to a large share of the services traded internationally on a cross-border basis: intra-firm trade accounted for 37% of US services exports in 2012 in the service categories covered by the BEA BE-120 survey, and the majority (62%) of services imports.

In the case of Japan, considerable differences emerge across sectors as to the purpose of foreign services establishments. Construction, logistics and telecommunication affiliates of Japanese parents are destined first

and foremost to achieve better market penetration in their host markets. This function is the closest to the conception of mode 3 services trade as selling services to a market through a local commercial establishment.

Figure 6. Decomposition of total foreign affiliate sales, by final destination



Note: The shares show respectively the percentage of sales of foreign affiliates that are destined to the local markets (local), to the parent firm (intra-firm) and to third countries or to unrelated parties in the home country (exports). The breakdown of foreign affiliate sales by sector was not disclosed for the United States.

Source: Own calculations based on Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; and US Bureau of Economic Analysis, Surveys of US Direct Investment Abroad.

In the other services sectors, the picture is more nuanced. Japanese parents establish affiliates abroad selling not only locally but also to a large extent to third countries. This export platform phenomenon, already documented in the manufacturing sector (e.g. Ekholm et al., 2007; Ito, 2013), is particularly sizeable in financial services where exports to third countries account for two thirds of the sales of foreign affiliates. Moreover, financial services affiliates of non-manufacturing firms have almost as much of a strong tendency to serve clients outside of their host markets as affiliates of financial institutions. Export platform sales are also prevalent in transport (48% of total sales), distribution (37%) and computer services (37%). In all of these sectors, multinational parents appear to follow a strategy of establishing regional bridgeheads selling more broadly than in their host market. In other words, developing a network of local establishments supplying clients both locally and in neighbouring countries seems to be a common strategy to efficiently serve a wide range of destinations.

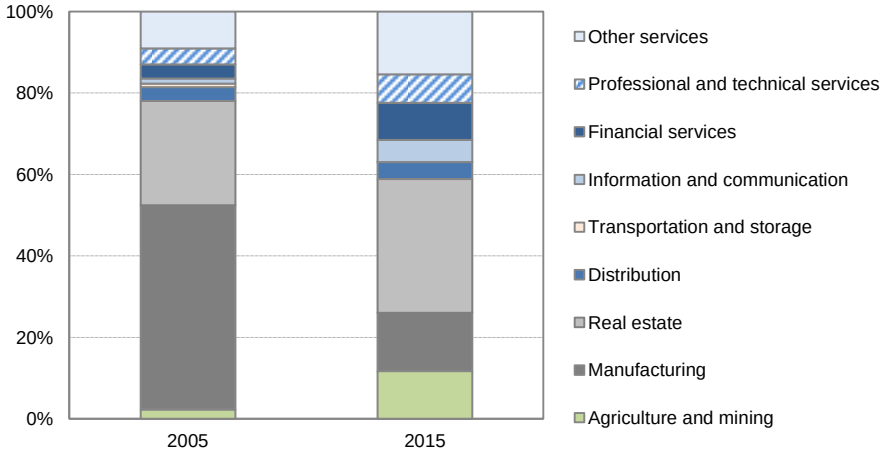
Exports back to the parent company account for over a fifth of total services sold by transport and telecoms affiliates. In those services, firms establish foreign subsidiaries in part as service centres to support the activity of the headquarter company. Looking at the main activity of the parent company, in computer services, intra-firm trade commands a substantive share of sales to services parents, possibly reflecting R&D centres in countries that can offer a talented pool of software engineers, but intra-firm exports of computer services are marginal for foreign affiliates whose parents are primarily engaged in manufacturing.

Box 2. Services trade linked to incoming FDI: The case of Costa Rica

Costa Rica is a small economy very well integrated in global value chains, partly on account of its active strategy of Foreign Direct Investment (FDI) attractiveness. FDI net inflows reached USD 3 billion in 2015, up from USD 1.8 billion in 2010. In relative terms, FDI net inflows to Costa Rica accounted for 3% of GDP in 2015, a share that is significantly higher than for most other countries in Latin America and the Caribbean. The United States is by far the most prominent investor, accounting for half of total FDI inflows in 2015; nevertheless, over the last few years, Costa Rica has also been able to attract a growing share of FDI from other Latin American countries.

Costa Rica has adopted successful investment promotion policies to attract FDI in high value-added and technology-intensive sectors. Over the past twenty years, Costa Rica has strived to bring in foreign MNEs in services, starting with entry-level activities such as call centres and gradually building up a reputation as an attractive centre for more knowledge-intensive services including offshore business services. FDI inflows in services have increased by an average 22% per annum over the last decade to be valued at USD 2.1 billion in 2015, absorbing nearly three quarters of total incoming FDI flows. The composition of FDI inflows has also changed over time, with services such as Information and communications, financial intermediation and other business services accounting for an increasing share of total FDI inflows. This trend highlights a successful strategy in attracting inward investment in high-quality services sectors essential to upgrade Costa Rica's position in regional value chains (Figure 7).

Figure 7. Composition of Costa Rican FDI inward flows, 2005 and 2015 (share of total FDI flows)



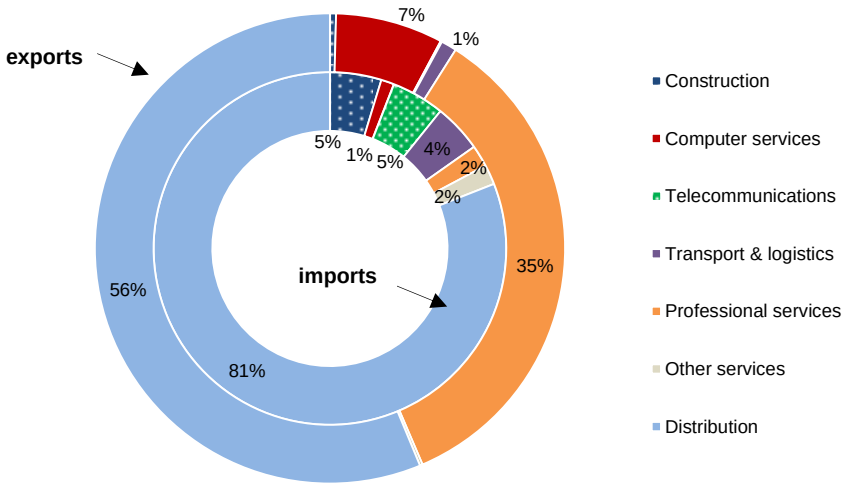
Note: The category *'Other services'* includes: construction, utilities, real estate, tourism, education, health and social work activities, and other services activities.
Source: International group of Foreign direct investment sourced from the Central Bank.

Foreign investment, be it in the form of greenfield establishment of foreign affiliates, joint ventures with domestic companies or acquisitions, brings along multifaceted benefits for the host country in terms of job opportunities, skill and technology transfers. By increasing competition in the domestic market, FDI helps offer a wider choice of products at lower prices. Foreign companies also contribute significantly to the host country's export performance by selling beyond the country of establishment. Over the last few decades, the Costa Rican government has supported export-oriented investment by encouraging greater openness through trade and investment agreements, but also by setting up a number of free trade zones and industrial parks. These areas, equally accessible to domestic and foreign firms, are governed by special trade regimes that offer even greater investment and trade opportunities to foreign companies, which might be attracted not only by the cost-effective fiscal incentives, smooth-running business environments and simplified customs procedures, but also by a more favourable legal framework.

Evidence from foreign companies operating within these special schemes of trade shows that FDI inflows contribute significantly to Costa Rica's services trade performance. Besides distribution services, which account for more than half of total services exports, foreign firms tend to specialise in high-tech and innovative industries and export high-quality services such as architecture and engineering or computer services (Figure 8). On the import side, these firms tend to source in large part distribution services from outside the country, along with telecommunications and logistics, which are essential services to coordinate production and move goods along the value chain.

continued

Figure 8. Contribution to Costa Rica's trade performance by firms in special trade regimes



Note: Data refer to trade flows by foreign firms operating in services industries and established in areas governed by special schemes of trade. Averages over the period 2013-2014. Percentages for the inner circle refer to sectoral import shares in total services imports, while those in the outer circle indicate sectoral export shares in total services exports. Non-allocated services of firms in wholesale and retail trade are assumed to be in distribution services. The category "Other services" includes audio-visual services, finance and courier/postal services.

Source: Own calculations based on data provided by the Central Bank of Costa Rica (BCCR), and derived from administrative records and surveys carried out by the Directorate General of Customs, Foreign Trade Promoter (PROCOMER), and Ministry of Finance.

These foreign-affiliated firms tend to serve not only the domestic economy but also reach out to other markets located outside the country, in particular within the region, with a large share of services exports destined to Costa Rica's immediate neighbours (Table 3). In fact, nearly a third of their services exports are addressed to other countries in Central America. Another important destination market is North America which represents nearly one quarter of foreign-owned firms' total services exports. The average foreign firm engaged in these markets is typically larger, exports more and to a larger number of countries, focusing mostly on new digital solutions, design and engineering or wholesale and retail trade.

Table 3. Regional distribution of selected Costa Rican services exporters

Region of destination	Number of trading firms	Average number of countries per firm	Total trade, million USD	Average trade per firm, million USD	Average turnover per firm, million USD
Asia	15	2.5	77.9	5.2	46.1
Caribbean Islands	32	2.8	138.8	4.3	68.7
Central America	86	3.0	338.6	3.9	75.5
Europe	33	2.5	157.9	4.8	61.5
North America	78	1.1	257.5	3.3	78.1
South America	35	2.4	101.7	2.9	50.7
Other regions	15	1.4	45.4	3.0	62.9

Note: Central America includes: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama. Estimates in Table 3 are based on data referring to trade flows by foreign firms operating in services industries and established in areas governed by special schemes of trade.

Source: Own calculations based on data provided by the Central Bank of Costa Rica (BCCR) and derived from administrative records and surveys carried out by the Directorate General of Customs, Foreign Trade Promoter (PROCOMER), and Ministry of Finance.

Continued

A closer look at the foreign ownership patterns reveals that North American and European parent companies own more than half of these firms and are responsible for over 90% of the total services exports in our sample (Table 4). However, while firms owned by North American multinationals are more likely to export back to their home country (16%), European parents tend to establish their affiliates in Costa Rica first and foremost to serve the region (13%), but also other Latin American countries. Regardless of the country of ownership, more than half of total services exports by foreign firms located in special schemes of trade in Costa Rica are cross-border transactions with other Latin American countries – an indication of how the country has successfully capitalised on its geographical location and more favourable investment conditions to better integrate into regional value chains and become a hub for multinationals intending to serve neighbouring markets.

Table 4. Foreign ownership and regional distribution markets

Ownership \ Exports	Asia	Central America	Caribbean Islands	Europe	North America	South America	Rest of the world	Total by ownership
Asia	0%	0%	0%	0%	0%	0%	0%	1%
Central America	0%	1%	0%	0%	2%	0%	0%	4%
Caribbean Islands	0%	0%	0%	0%	0%	0%	0%	0%
Europe	3%	13%	9%	8%	5%	6%	3%	47%
North America	3%	14%	2%	5%	16%	2%	1%	44%
South America	0%	0%	0%	0%	0%	0%	0%	1%
Other regions	0%	2%	1%	0%	0%	0%	0%	4%
Total by destination	7%	30%	12%	14%	23%	9%	4%	100%

Note: Estimates in Table 4 are based on data referring to trade flows by foreign firms operating in services industries and established in areas governed by special schemes of trade. Inner percentages refer to shares of total services exports, by region of ownership (rows) and region of destination (columns). Average values over the period 2013-2014.

Source: Own calculations on data provided by the Central Bank of Costa Rica (BCCR) and derived from administrative records and surveys carried out by the Directorate General of Customs, Foreign Trade Promoter (PROCOMER), and Ministry of Finance.

1.3. Diversification and duration of services trade

This section analyses the degree of concentration of services trade among firms according to their geographic and product scope, and further explores how long export relationships tend to last. A contrast emerges between a large number of small exporters targeting a single foreign market, potentially exiting after few years; and a relatively small number of firms accounting for the bulk of exports and affiliate sales as they reach many destinations, succeed in several sectors, and penetrate foreign markets more durably.

Concentration of exports and affiliate activity

The concentration analysis exploits the heterogeneity across firms to highlight the importance of new destination markets and new products, the so-called extensive margins of trade. It reveals that international performance relies on relatively few global players and very few markets per firm.

Services exports and foreign affiliate sales are highly concentrated among the few firms that export to a highly diversified set of partners

In line with existing evidence, the few firms that export to more than 25 countries account for the lion's share of total services exports (Figure 9, left side). In most countries, a small share of firms, representing 6% to 29% of all exporting firms, engage with more than 25 countries and account for between a little more than half and nearly 90% of total trade. Exports are even more concentrated in Germany, where just 6% of all firms are responsible for 70% of total exports. At the other end of the distribution, between 17% and 43% of all exporting firms serve only one foreign market, contributing to no more than 1% to 8% of total exports.

The activities of foreign affiliates display even higher levels of concentration (Figure 9, right side). Except in the United States, where 7% of MNEs have foreign affiliates in more than 25 countries, in all other countries barely 1% of MNEs have such widespread coverage; nonetheless, these affiliates account for a large share of total affiliate sales, ranging from one-third (Finland) to 73% (US) of total affiliate sales. In Japan, for instance, there is only a handful of parent firms with services affiliates geographically spread across several countries, and although they represent just 1% of all Japanese multinational parents, they make up for more than half of all foreign affiliates sales. Conversely, nearly 60% of Japanese multinationals are present in only one host country, contributing to just 2% of total affiliate sales.

Mixed results emerge from the concentration analysis on products for cross-border trade data (Figure 10, left side). Concentration is high in Finland and Germany, where firms exporting five or more different types of services represent a little over 10% of all exporters but are responsible for two thirds of total exports. The market is less polarised in Belgium, Italy, the United Kingdom and the United States, where firms with five or more export products account for at most 40% of total exports. With respect to foreign affiliate sales, Figure 10 (right side) shows a high degree of concentration in Germany, Italy, Japan and the United States, where multi-product foreign affiliates represent at most between 3% to 15% of all foreign affiliates in services sectors and account at least for 70% of total affiliates sales. In contrast, between 60% and 80% of all foreign affiliates in those countries export just a single product, although jointly they account for about 8% to 15% of all mode 3 exports in these countries. The sales of Finnish foreign affiliates are instead more equally distributed in terms of number of services provided.

Figure 9. Concentration of international activity by number of destinations

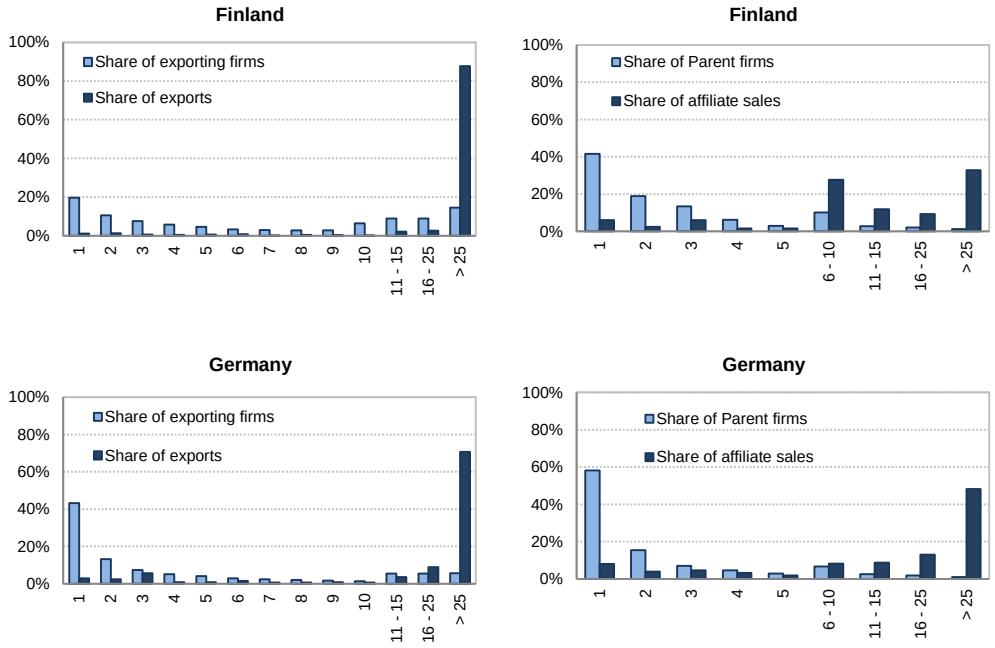
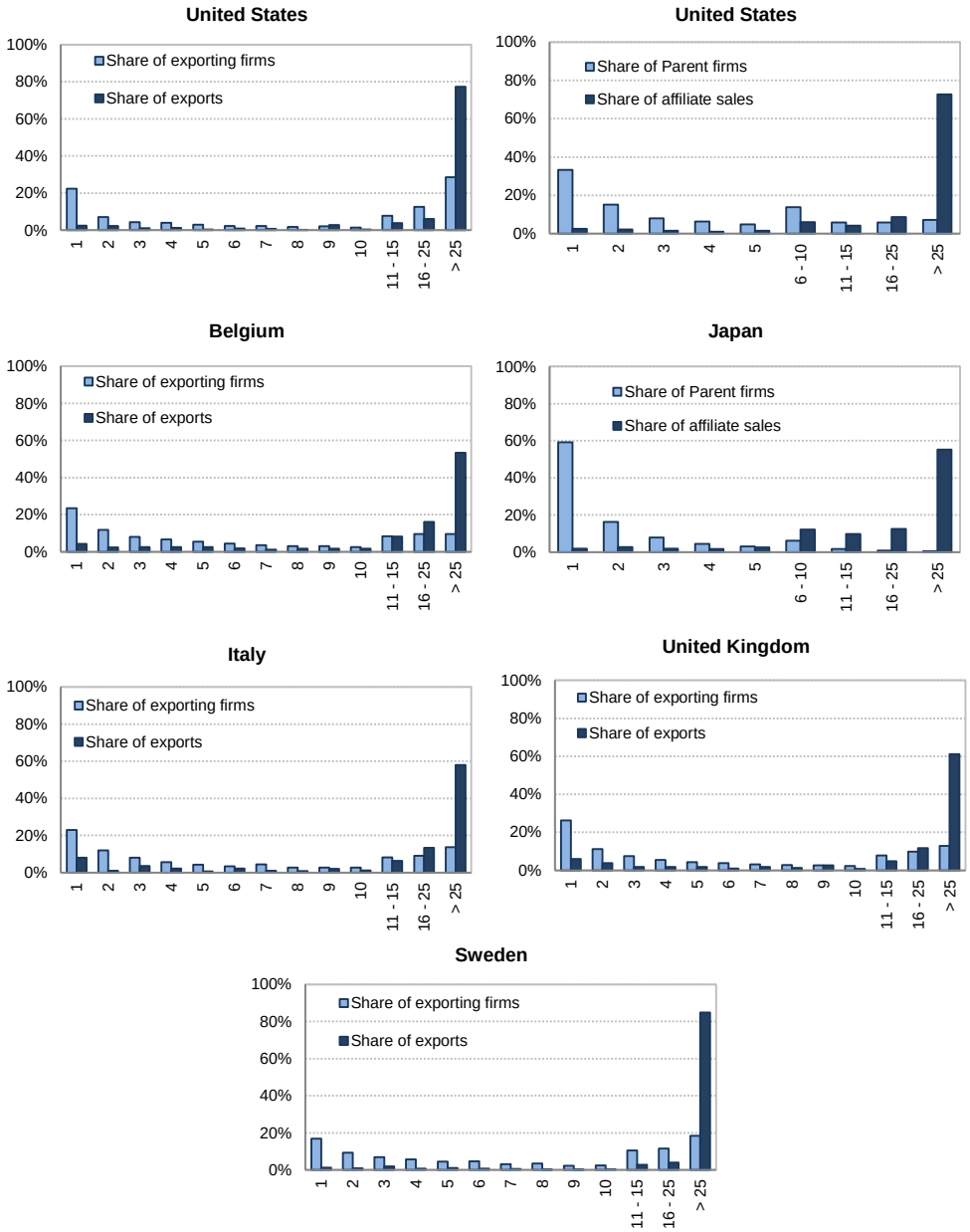


Figure 9. Concentration of international activity by number of destinations (*cont.*)



Source: Own calculations based on National Bank of Belgium, International Trade in Services; Statistics Finland, International Trade in Services and Foreign Affiliate Trade Statistics; Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services and Micro-database Direct Investment; Bank of Italy, International Trade in Services survey and Orbis database; Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; Statistics Sweden Survey of Foreign Trade in Services; UK Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons and Surveys of US Direct Investment Abroad. Shares calculated over each country's sample time period, as indicated in Table 1 and Table 2.

Figure 10. Concentration of international activity by number of services exported

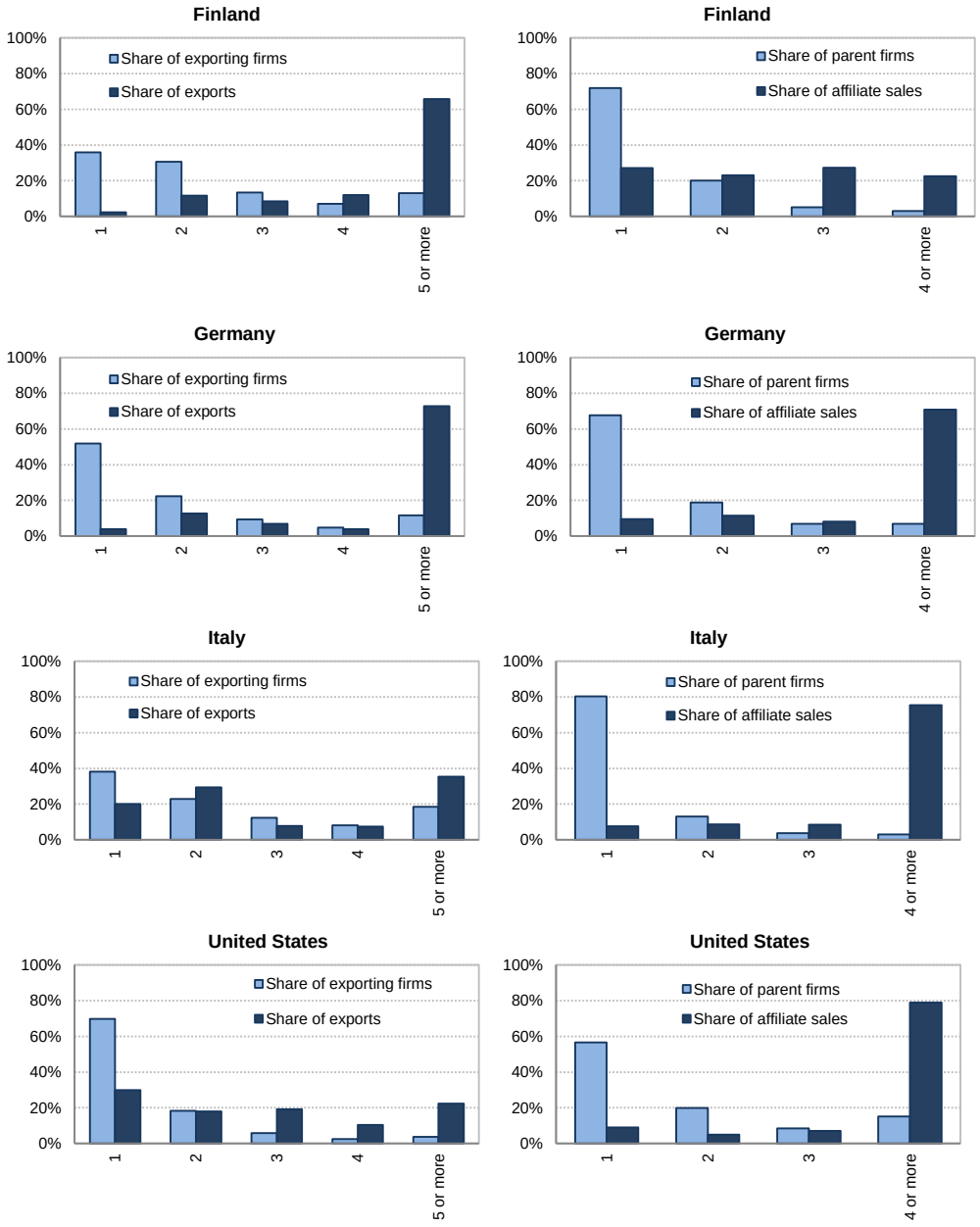
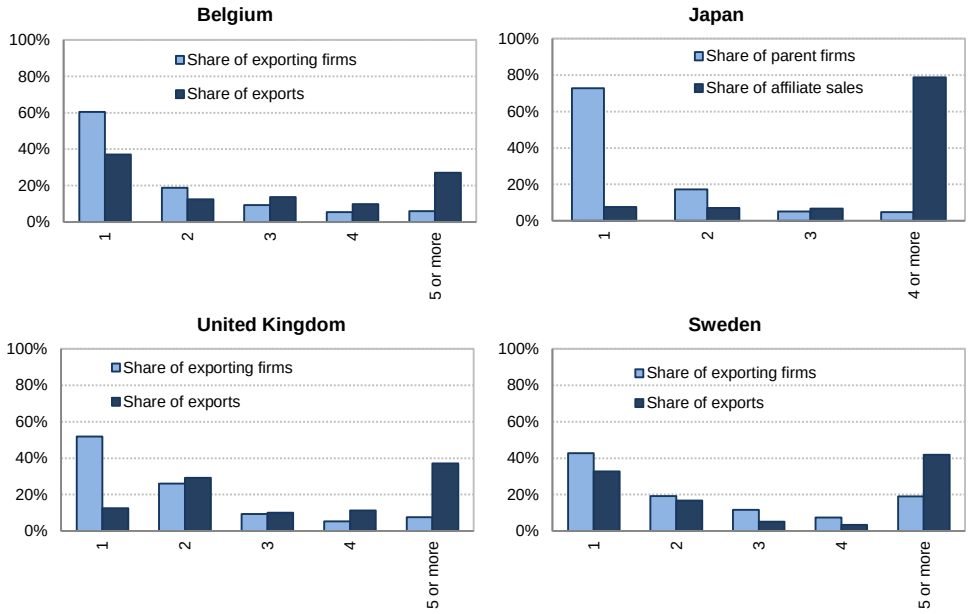


Figure 10. Concentration of international activity by number of services exported (*cont.*)



Source: Own calculations based on National Bank of Belgium, International Trade in Services; Statistics Finland, International Trade in Services and Foreign Affiliate Trade Statistics; Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services and Micro-database Direct Investment; Bank of Italy, International Trade in Services survey and Orbis database; Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; Statistics Sweden Survey of Foreign Trade in Services; Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons and Surveys of US Direct Investment Abroad. Shares calculated over each country's sample time period, as indicated in Table 1 and Table 2. Services classifications used for the shares of foreign affiliate sales are based on 4-digit level in all countries except Finland and Italy, for which services classifications are only available at a 2-digit level.

Services exporters and affiliate parents are highly dependent on their top destination market, which accounts for around half of total exports or total affiliates sales

Looking at the average export shares (across all firms) addressed to each firm's top five destination markets reveals that the very first market accounts from 37% (in Finland) to 57% (in Italy) of all firms' exports (Table 5, first column). Most firms export to one market only, therefore their main partner country will absorb 100% of their exports; the distribution of their exports across partner countries naturally gets more and more dispersed as they diversify their trading partners. Nevertheless, in line with the findings of the existing literature[12], in all countries an exporter's first exporting market is often at least twice as important as the second market, which, in turn, is often twice as large as the third market, and so on, with market shares cascading as one moves down the destination ranking – even for firms serving as many as twenty countries.

A similar picture emerges for foreign affiliates, whose sales are mostly concentrated in the parent's primary investment country. On average, about half of total sales across all foreign affiliates come from sales in the most important host country (Table 6). Also in this case, the top host country is always considerably more important than the runner-up, which tends to be twice as important as the third most important country and so on. These findings confirm that a firm's primary market, whether in terms of cross-border exports or commercial presence, remains a critical source of income, even when its exports and affiliates are highly geographically dispersed.

12. See Kelle and Kleinert (2010) for Germany and Breinlich and Criscuolo (2011) for the United Kingdom. The literature on manufacturing trade also emphasises a high degree of export concentration; e.g. Bernard et al. (2007).

Table 5. Concentration of services exports within firms

By main destination markets, 2008-2014

Export market ranking	Share of market (all firms)	Share of market (Number of destinations=1)	Share of market (Number of destinations=2)	Share of market (Number of destinations=5)	Share of market (Number of destinations=10)	Share of market (Number of destinations=20)
Belgium						
1	53%	100%	92.8%	77.6%	70.6%	51.3%
2	15%		7.2%	13.5%	15.2%	21.3%
3	8%			6.7%	6.9%	8.1%
4	5%			1.6%	3.6%	6.0%
5	4%			0.5%	1.9%	4.2%
Finland						
1	37%	100%	73.3%	71.5%	50.3%	40.0%
2	16%		26.7%	18.1%	20.5%	25.7%
3	10%			7.6%	12.8%	10.1%
4	8%			2.3%	6.2%	6.6%
5	7%			0.6%	3.4%	5.1%
Germany						
1	53%	100%	81.0%	71.8%	60.4%	55.9%
2	15%		19.0%	18.1%	17.4%	18.7%
3	9%			7.0%	9.5%	7.1%
4	6%			2.3%	5.5%	5.3%
5	5%			0.7%	3.5%	4.2%
Italy						
1	58%	100%	87.8%	80.6%	63.8%	83.1%
2	15%		12.2%	13.5%	15.5%	9.0%
3	8%			3.5%	10.6%	2.7%
4	5%			2.0%	4.7%	1.7%
5	4%			0.4%	3.6%	1.2%
Sweden						
1	43%	100%	86.7%	83.0%	56.5%	61.5%
2	17%		13.3%	10.7%	18.8%	15.3%
3	10%			4.8%	9.2%	8.8%
4	7%			1.1%	6.5%	6.8%
5	6%			0.4%	2.9%	2.8%
United Kingdom						
1	56%	100%	91.9%	72.1%	61.2%	46.5%
2	16%		8.1%	18.4%	20.1%	21.8%
3	8%			6.3%	8.4%	11.7%
4	5%			2.7%	4.5%	7.3%
5	4%			0.6%	2.7%	3.9%
United States						
1	44%	100%	86.6%	63.8%	64.9%	43.0%
2	14%		13.4%	25.5%	14.5%	18.2%
3	9%			6.4%	7.5%	13.2%
4	6%			2.9%	5.1%	8.1%
5	5%			1.4%	3.1%	4.2%

Source: Own calculations based on National Bank of Belgium, International Trade in Services; Statistics Finland, International Trade in Services; Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services; Bank of Italy, International Trade in Services survey; Statistics Sweden Survey of Foreign Trade in Services; UK Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons. The data covers the period 2008-2012 for Sweden and the United States, 2008-2013 for Germany and Italy, 2008-2014 for Finland and the UK, and 2013-2014 for Belgium.

Table 6. Concentration of foreign affiliate activity within firms

By main host countries, 2008-2014

Host country ranking	Share of market (all affiliates)	Share of market (Number of destinations=1)	Share of market (Number of destinations=2)	Share of market (Number of destinations=5)	Share of market (Number of destinations =10)
Finland					
1	49%	100%	89.7%	60.3%	48.6%
2	18%		10.3%	24.3%	24.7%
3	12%			9.6%	12.0%
4	7%			3.8%	6.7%
5	5%			2.0%	4.4%
Germany					
1	49%	100%	89.5%	63.6%	61.5%
2	17%		10.5%	20.8%	13.0%
3	10%			9.5%	8.4%
4	6%			4.5%	5.8%
5	5%			1.7%	3.7%
Japan					
1	45%	100%	86.8%	56.8%	52.2%
2	21%		13.2%	26.5%	21.3%
3	13%			11.6%	12.0%
4	7%			4.2%	6.9%
5	4%			0.9%	3.7%
United States					
1	44%	100%	90.4%	69.0%	53.0%
2	17%		9.6%	20.3%	19.0%
3	9%			6.9%	11.4%
4	6%			2.9%	6.8%
5	5%			0.9%	3.9%

Source: Own calculations based on Statistics Finland, Foreign Affiliate Trade Statistics; Research Data and Service Centre of the Deutsche Bundesbank, Micro-database Direct Investment; Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; and US Bureau of Economic Analysis, Surveys of US Direct Investment Abroad. The share of affiliate sales in total affiliates sales are calculated over the period 2008-2014 for Finland, Germany and Japan, and 2008-2012 for the United States.

Experimentation and survival in export markets

Only a fraction of firms manages to continuously export for a decade while others only export occasionally.

When entering a new market, potential exporters might "test the waters" to assess the local conditions before deciding whether to invest in durable buyer-supplier relationships. In many cases, such experimentations fail and new entrants promptly exit, while in others exporters are able to strengthen their presence and grow export sales. In the case of Germany, between 20% and 40% of all cross-border services exporters only export occasionally to a country (Figure 11).[13] This means that a year with a positive export volume is immediately followed by a year in which the firm does not again export the same service to the same country. This share of one-time exporters is highest in the construction sector, where 41% of all export relationships are terminated after one year. In contrast, in the courier services sector only 22% of all export relationships last for only a year.

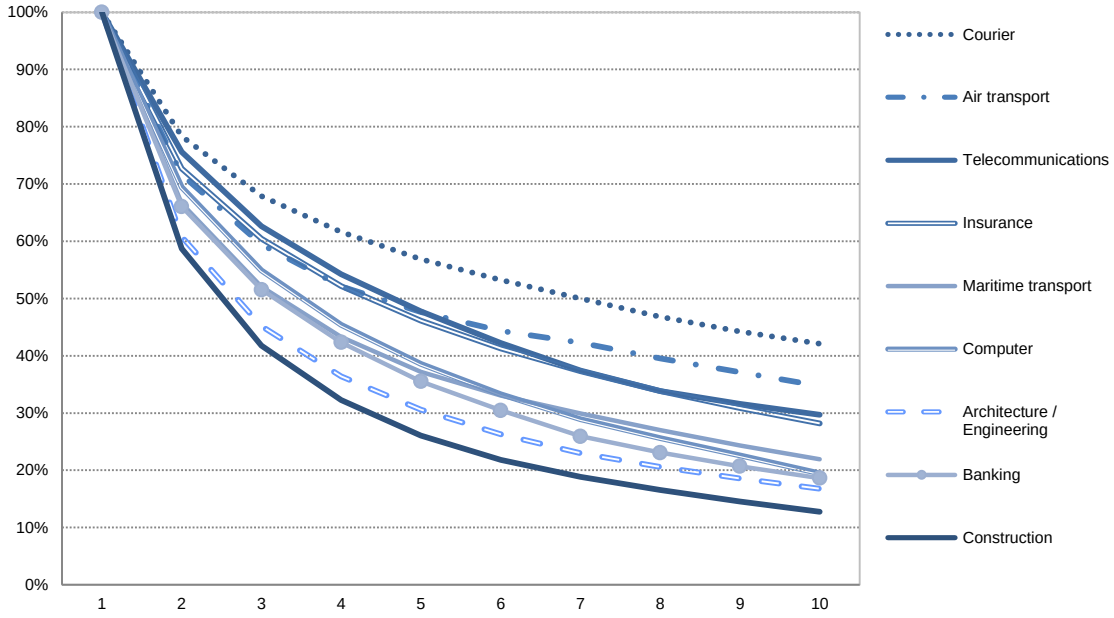
13. Because of the sampling methods, those statistics cannot be reliably calculated for other countries.

Courier services also are the sector in which export relationships hold the longest. The median firm exports continuously for seven years to a particular country and 42% of all export relationships last for ten years or more. In contrast, in the construction services sector only 42% of exporters supply their services for three continuous years to a country and only 13% of them do so for ten continuous years. Other sectors where only a small share of export relationships holds for ten years or more are architecture and engineering services with 17% and banking with 19%.[14]

A broad lesson of the descriptive analysis conducted in this section is that services traders come in various shapes and forms. It will be important to account for this firm heterogeneity in the empirical analysis of the consequences of policy decisions. The expansion of global firms with a highly geographically diversified client base might yield the largest boost to overall exports; but the more pressing policy priority may rather be to reduce the cost of market entry. Lowering barriers to entry would benefit smaller firms and newcomers disproportionately and as such, would enhance not only the volume but also the inclusiveness of services trade.

Figure 11. Survival rates in an export market by services sector

Germany, average 2001-2013



Source: Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services. Mode 3 services trade exports are not covered.

14. One possibility may be that some firms exit by graduating from exports to FDI, following a sequential internationalisation process where firms facing uncertainty about local conditions first test a foreign market via exports before deciding to invest there (Conconi et al., 2016). The data presented does not distinguish between firms that stop serving a market and those that switch to mode 3; however the latter is expected to represent a small share of overall exit patterns. No distinction can be made either between exit from export, firm dissolution, and firms that may continue serving a market but become different legal entities as they are absorbed through M&A. Again, true exit from foreign markets is likely to overwhelmingly drive the observed exit patterns compared to changes in firms' legal statuses.

1.4. Manufacturing firms in services trade

This section delves into the interdependencies between trade in services and trade in goods. Manufacturers are involved in services trade in several manners. One route is cross-border trade in knowledge services and support functions between manufacturing parents and their foreign affiliates. Another is the bundling of goods and services such as repair and maintenance, software, data analytics, design and feature customisation, insurance, training or consumer support sold to clients as integrated solutions. Multinational goods producers also strengthen their presence abroad by establishing specialised distribution and credit affiliates to complement the offering of their manufacturing establishments.

Which services do industrial firms trade?

Manufacturing firms account for a large share of exports in professional and computer services

Some services are an essential part of the value chain of manufactured products, and are traded as such. Figure 12 distinguishes between exports made by firms whose core activity is in services or in goods sectors.

Figure 12. Distribution of exports between services and non-services firms, by sector

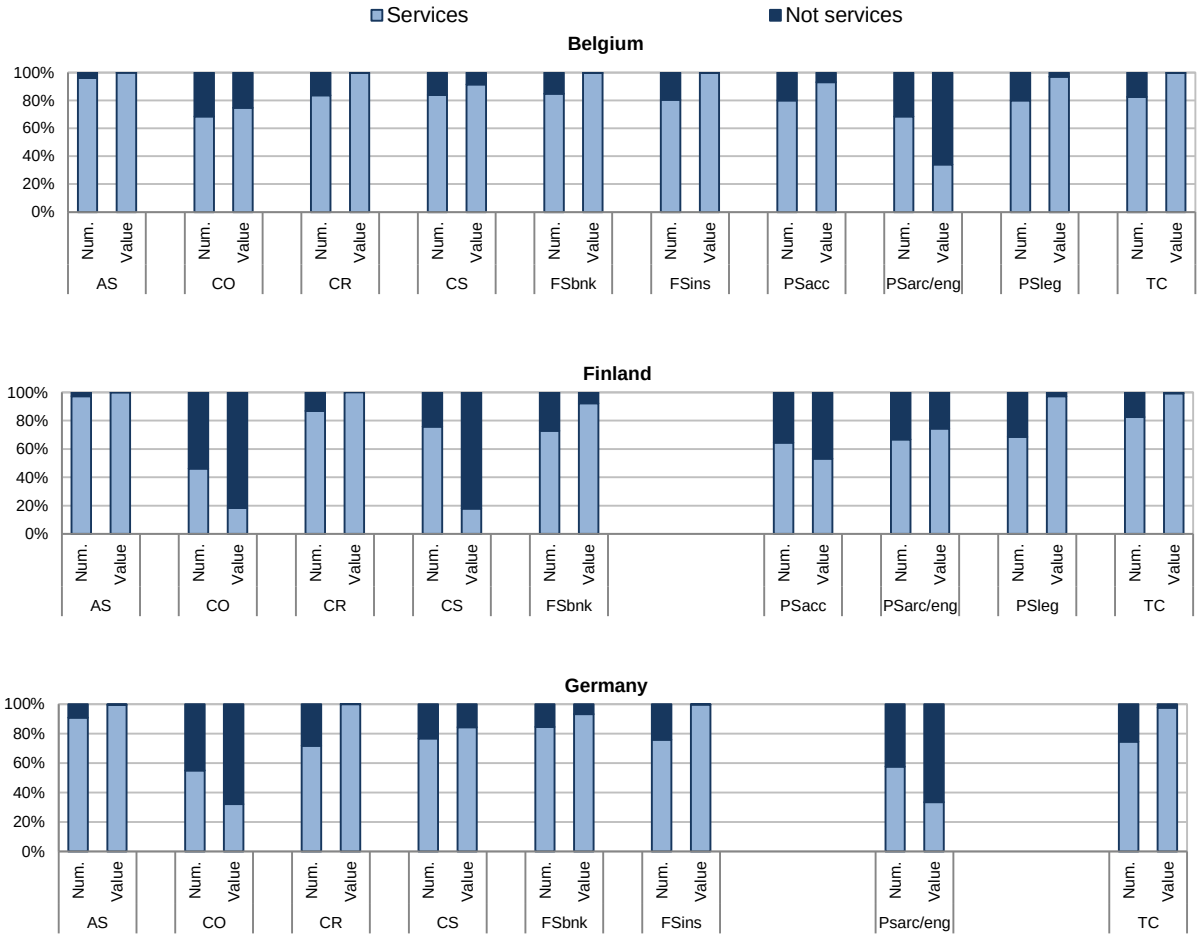
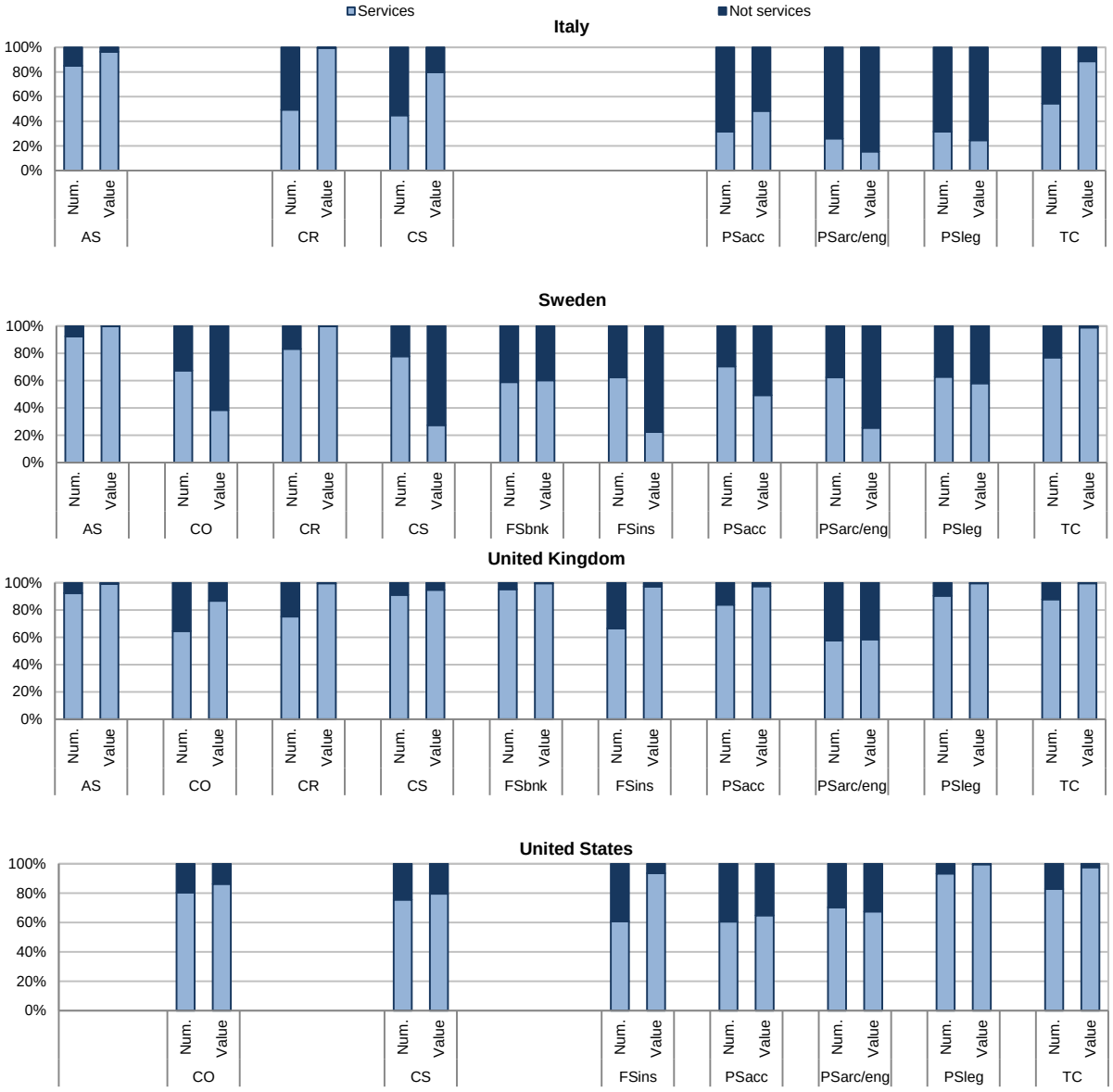
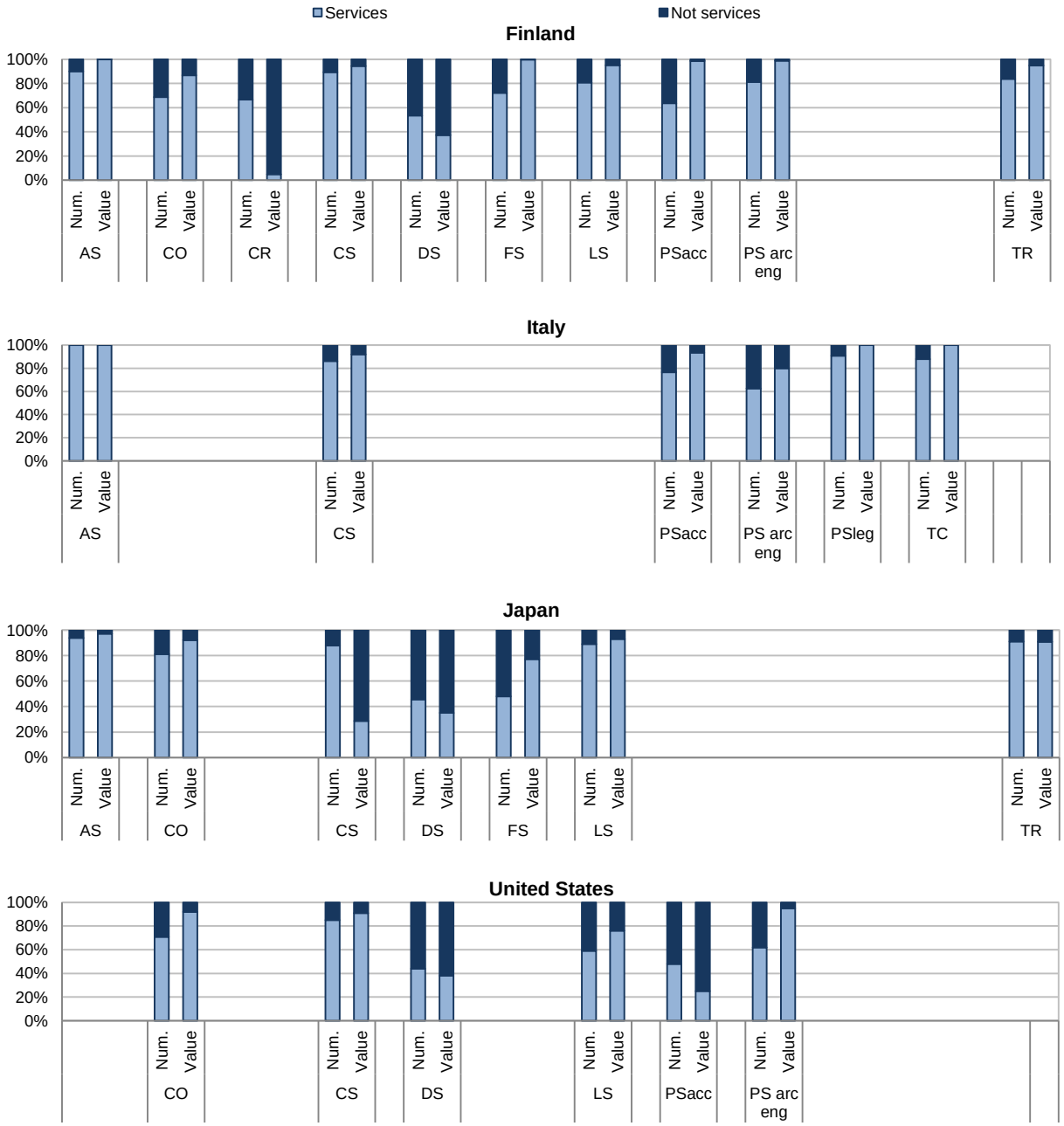


Figure 12. Distribution of exports between services and non-services firms, by sector (*cont.*)



Source: Own calculations based on Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services; Statistics Finland, International Trade in Services; Bank of Italy, International Trade in Services survey; Statistics Sweden Survey of Foreign Trade in Services; UK Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons. The data covers the period 2008-2013 for Germany and Italy, 2008-2014 for Finland and the United Kingdom, 2013-2014 for Belgium, and 2008-2012 for Sweden and the United States.

Figure 13. Distribution of foreign affiliate sales between services and non-services MNEs, by sector



Source: Own calculations based on Statistics Finland, Foreign Affiliate Trade Statistics; Bank of Italy and Orbis database; and Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; and US Bureau of Economic Analysis, Surveys of US Direct Investment Abroad. The data covers the period 2008-2014 for Finland, Italy and Japan, and 2008-2012 for the United States.

The share of non-services firms engaging in cross-border exports is particularly high for exports of engineering and architecture services in several countries. Presumably these firms accompany the international shipping of goods with services related to the design, production process management and quality control of their products or of customised intermediate inputs from overseas suppliers. In some countries, exports of architecture and engineering services by manufacturing firms are also larger on average than exports of firms that have those services as their core activity. For instance, in Germany non-services firms account for 43% of the number of exporters in the sector, but two thirds of the value exported; in Italy they represent 74% of all exporters and are responsible for 85% of the total export value.[15]

Other professional services and computer services are also traded by manufacturing firms in Finland, Italy and the United States. High-tech manufacturing firms account for the lion's share of computer services exports in Finland and Sweden, most likely reflecting exports of software embedded in or bundled with sophisticated equipment goods. While in most countries legal and accounting services are mostly traded by services firms, in Italy, Finland and Sweden such services are provided to a large extent also by manufacturing firms and in the case of Italy with relatively large export shares. This might in part reflect intra-firm trade, where large non-services MNEs could turn to their legal and accounting departments to offer legal advice and consulting activities to their subsidiaries abroad, or a relatively small number of specialised law firms providing specific legal services and litigation abroad. In Sweden, manufacturing firms are also largely engaged in the provision of financial services across the border and in particular for insurance services where non-services firms account for nearly 80% of total exports. Insurance services are typically included in the delivery of products across the border and therefore it is not unusual for manufacturing companies to provide a range of financial services to complement and support their sales abroad.

Figure 13 shows the shares of foreign affiliates and their sales across sectors depending on whether the main activity of their parent is in services or non-services sectors. Non-services MNEs establish abroad mostly to provide distribution and financial services. In Finland, Japan and the United States, for instance, nearly or more than half of foreign affiliates providing distribution services are owned by non-service parents and they are responsible for more than 60% of total affiliate sales in the sector. Courier services also tend to be provided by affiliates of parents mostly engaged in non-services activities in Finland. These are presumably affiliates of large manufacturing firms that maintain knowledge intensive assets at home and locate non-core activities abroad to better serve and support their foreign customer basis. Manufacturing MNEs also contribute high shares of foreign affiliate activity in knowledge-intensive sectors such as computer services for Japanese parents and accounting for US parents.

Does trade in services follow trade in goods?

Manufacturing firms are engaged in services trade primarily because services add value to goods sold, enabling them to charge higher prices and export larger product volumes (see Ariu et al., 2016). Switching from providing goods to providing more and more services has also been a channel of adjustment by firms to more intense competition in the manufacturing sector (Breinlich et al, 2014). To assess the magnitude of this trend, the importance of services exported is considered jointly with goods rather than on a stand-alone basis. The description below focuses on Belgium, the only country for which matched information on goods and services exports by firm and destination has been made available for this study.

15. The findings for Germany confirm and update those of Kelle (2013) according to which the highest shares of German manufacturing firms in services exports in 2005 were found in R&D services, engineering and construction services. Kelle found that headquarter services provided to foreign affiliates (data processing, R&D, management or advertising services) were quantitatively small, while installation, maintenance and technical support services supplied by machinery firms accounted for a sizeable share of total service exports.

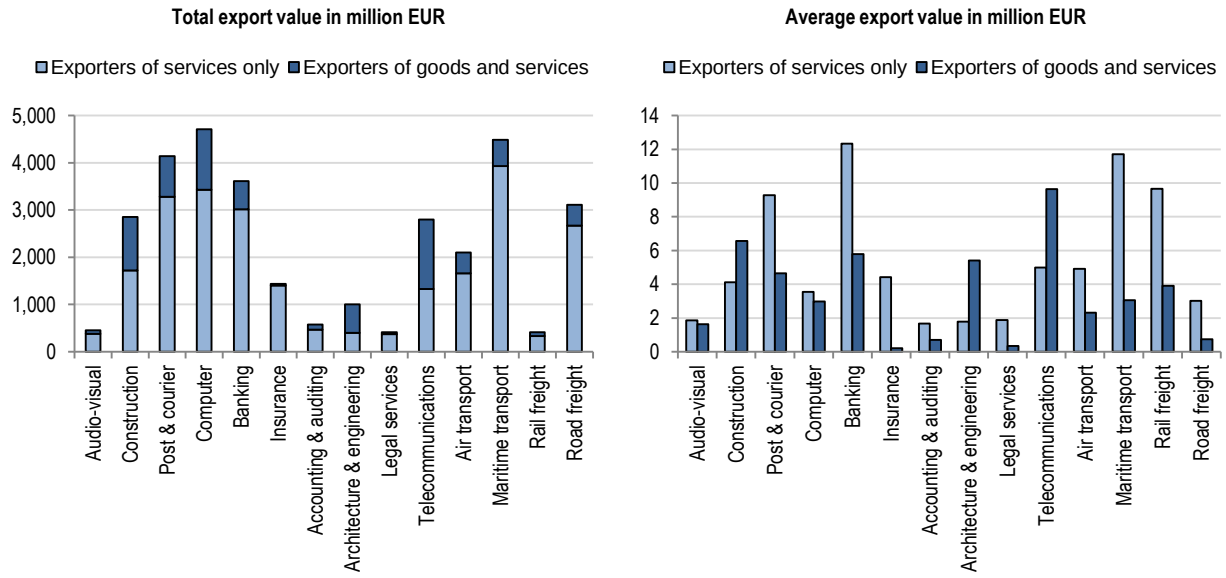
"Bi-exporters" (exporting both goods and services to the same market) account for 29% of the number of services firms in our sample of Belgian services traders as of 2014, and realise 36% of the services export sales. On average, services sold abroad represent 17% of the total exports of bi-exporters. A typical firm exporting both goods and services to its partners exports 40% more services overall than a firm exporting services only.

The contribution of bi-exporters to Belgium's services exports is shown in Figure 14 for selected sectors. The highest relative contribution relates to architecture and engineering services, where 60% of the total foreign sales accompany goods exports by the same firm to the same destination. More than half of telecommunication services are also exported jointly with manufacturing, and 27% of computer services exports, highlighting strong complementarities between sales of hardware and software. It is also noteworthy that in telecommunications as well as in architecture and engineering, the most successful exporters are those that combine their services with goods exports: the average bi-exporter sells three times more engineering services abroad than the average provider of unbundled engineering, and twice as much for telecommunications. In the construction sector, merchandise exporters account for more than 40% of the value of services exports, presumably reflecting construction materials exported jointly with the service.

Bi-exporters also command a larger size premium than services only exporters. In all sectors, Belgian firms that export simultaneously goods and services to the same markets are several times larger, both in terms of size and employment, than firms that only supply services abroad (Figure 15). The only exceptions are banking and courier services, where specialised providers fall in the same size range as diversified bi-exporters. While this evidence is silent on the direction of the causality link, it suggests that the potential of bundled goods and services to boost income and employment generation deserves further investigation.

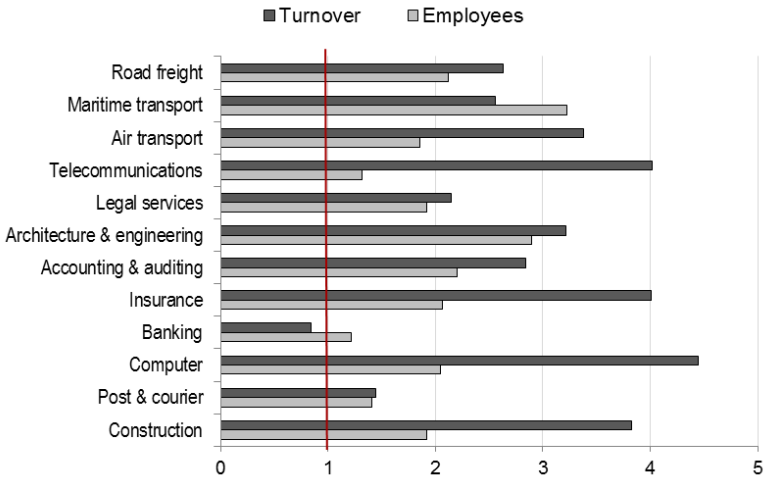
Not only do manufacturing exporters stimulate trade in services by combining services with their core product exports; they are also active on the services import side. Selling products to a market involves a range of services going from market research and contract design at the start of the process, to transport, logistics and distribution at the end of the chain. Some of those services are best sourced locally where knowledge of local conditions and proximity to the market can be decisive assets.

Figure 14. Contribution of goods exporters to Belgian services exports



Source: Own calculations based on data from the National Bank of Belgium. The values are averaged between 2013 and 2014. The left hand shows total exports by Belgian services and non-services firms. The right side shows average export values by firm over all destinations served.

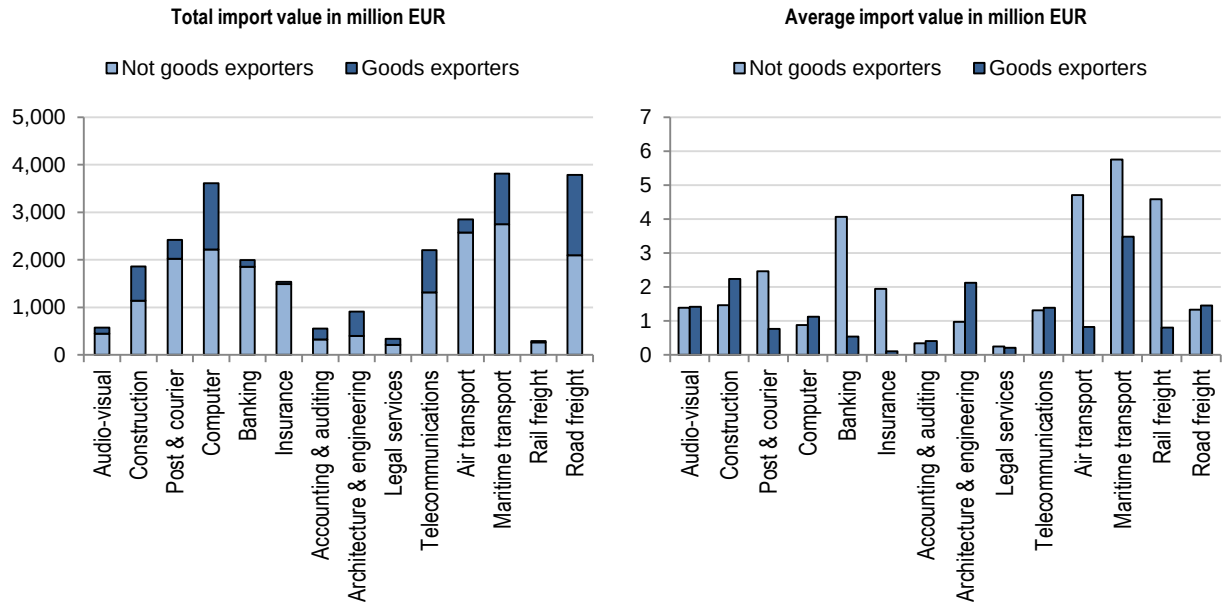
Figure 15. Size premium of bi-exporters over services-only exporters in Belgium



Note: Ratio of average turnover or employment of goods and services exporters compared to services only exporters. 1 corresponds to equal average turnover or employees among the two categories.
Source: Own calculations based on data from the National Bank of Belgium.

Figure 16 depicts services imports by firms that do and do not sell goods to the same market from which they source those services. It indicates that the complementarities between services inputs and merchandise exports are naturally strong for maritime and road transport and for telecoms; these are key enabling services supporting the smooth shipment and traceability of products across borders. Perhaps more surprisingly, over two fifths of professional and computer services imports are purchased by firms that export goods to those same markets. In other words, legal advice and representation, accounting tasks, engineering and IT support appear to be often outsourced to markets where manufacturers have strong export interests. The prevalence of value chains linking imported services to exported goods highlights the role of open regime for business services in supporting manufacturing export competitiveness.

Figure 16. Contribution of goods exporters to Belgian services imports



Note: The values are averaged between 2013 and 2014. The right hand side panel shows average export values over all destinations served by a given firm.
Source: Own calculations based on data from the National Bank of Belgium.

Part 2. Policy Influences on Services Trade and Affiliate Activity at the Firm Level

The second part of this report presents the main determinants of services trade costs at the firm level, with a focus on policy factors. These determinants are extracted from a regression analysis of the patterns of cross-border services trade and the patterns of foreign affiliate sales. This approach enables us to provide a detailed impression on the costs faced by services firms when going international; to show how the burden of services trade costs is distributed across firms; and to discuss the most important strategies used by firms in order to overcome services trade barriers.

The analysis builds on two key contributions from the economic literature. Chaney (2008) lays out a theoretical framework for gravity analysis at the firm level.[16] Differences in the size of firms can have a potentially large impact on trade flows in a gravity regression. In order to shed light on such firm heterogeneity, it is important to distinguish between the intensive margin and the extensive margin of trade. The intensive margin refers to the trade volume of firms currently exporting. A growth of exports at the intensive margin occurs if on aggregate these firms manage to increase their total export volume from one period to the next. In turn, trade growth at the extensive margin is determined by firms which enter new export markets. Trade growth at the extensive margin is small when few firms start exporting or when new exporters sell substantially less than firms with well-established export relationships. The distinction between the intensive margin and the extensive margin of trade is crucial in order to estimate the magnitude of trade costs from firm-level trade data.

The two margins of trade growth are not only an outcome of given firm characteristics or of consumer preferences, but also of the composition of trade costs. A main distinction can be made between variable trade costs and fixed trade costs. Fixed trade costs may either be recurring each period or they may take the form of a one-time payment; such one-time payments are also called sunk export costs.[17] Once a firm has paid all fixed export costs, the volume of exports is only determined by variable trade costs. However, the initial decision to start exporting is affected by all types of trade costs collectively. In the presence of sunk export costs, this decision is not only driven by the market potential in the current period. Sunk export costs are more likely to be paid if a pleasant market condition will also pertain in the future.[18]

The distinction between variable and fixed costs does not only determine whether firms start and stop exporting or how much each individual firm exports. It also plays an important role for the choice between different modes of exporting. Services trade through setting up a commercial presence in a foreign country usually involves very high fixed costs, and a substantial share of these fixed costs will be sunk at the time of

16. The gravity regression is a well-established tool to identify geographical and political barriers to aggregate trade flows. The concept had been pioneered by Tinbergen (1962) and was already widely accepted in the literature when Anderson and van Wincoop (2003) provided a theoretical foundation for the gravity equation. Their contribution introduced multilateral resistance to trade and showed how to identify unbiased trade cost estimates in a standard gravity regression.

17. For instance, recurring fixed costs might be related to data localisation requirements in the importing country, while sunk export costs can result from initial market research or from the need to obtain a license in order to be present in a foreign market.

18. Similarly, firms may continue exporting even though profits from foreign sales do not cover recurring fixed export costs in a period in order to prevent additional payment of sunk export costs when market conditions improve, the so called hysteresis effect. See Campa (2004) and Das, Roberts and Tybout (2007) for quantifications of this mechanism.

establishment. In contrast, variable trade costs are more likely to dominate for the other three modes (cross-border trade, consumption abroad and presence of natural persons).

The literature on mode choice with heterogeneous firms was pioneered by Helpman et al. (2004) for trade in goods. They show that where foreign markets can be served through either trade or FDI, more productive firms are more likely to establish a local commercial presence, which entails higher fixed costs but lower variable costs than exporting cross-border. More productive firms will be able to leverage their efficiency to sell higher volumes in each market once they enter. As a result, fixed costs play a smaller role for highly productive firms' total costs of doing business abroad than they do for less productive firms with lower sales volumes, tilting the decision of the most efficient suppliers in favour of establishing affiliates abroad.[19]

The descriptive statistics in the first part of this report provide evidence for this mechanism: the average sales of foreign affiliates in a foreign market are more than ten times larger than the average volume of cross-border exports to a market (Tables 1 and 2). The number of parent companies is small relative to the number of cross-border exporters, and multinational parents only own foreign affiliates in very few countries compared to the number of destinations for firms which operate cross-border exports. These consistent patterns indicate that only the most productive firms establish a commercial presence, and only the most attractive markets are served via foreign direct investment.

Our approach combines insights from both Chaney (2008) and Helpman et al. (2004) by considering the full spectrum of modes of supply, and by exploring the influence of policy restrictions and other determinants jointly on the intensive and extensive margins of services trade.

2.1. Empirical methodology

This section outlines the methodological approach relating services trade restrictions to firm-level trade outcomes.

Empirical specifications

The empirical approach analyses the impact of services trade restrictions on cross-border trade and foreign affiliate sales separately for each exporter country.[20] It relies on a firm-level counterpart to the gravity equation taking into account insights from existing literature on the determinants of import demand addressed to a specific firm.[21] The regression equations are detailed in Annex B.

The analysis takes into account both the total value of international sales made by each firm in a given country and sector, and the probability that such sales are observed. To this end zero trade flows (respectively, zero affiliate sales) are imputed to countries which are not served in a given year and sector, provided that the firm reports exporting the same service (respectively, having an affiliate in the same sector) to at least one country in the same year. In other words, this takes into account the extensive margin in terms of destination

19. However Bhattacharya et al. (2012) argue that this model is not fully transferrable to services such as software where distance from the producer heightens the risk of poor service quality for the consumer. In that setting, there can be a reversal of the "pecking order", such that low productivity firms may have more incentives to establish abroad.

20. For confidentiality reasons, the datasets from different countries cannot be merged for analysis.

21. While the gravity framework has been developed in the context of trade in goods, it has been shown to be a good fit to aggregate data for trade in services as well (e.g. Kimura and Lee, 2006; Kox and Lejour, 2005; Nordås and Rouzet, 2016; Benz, 2017). In the case of services, the effect of distance does not capture costs of physically transferring products to foreign destinations, but is more likely to proxy for informational frictions between firms and their network of potential suppliers (Chaney, 2013). Several theories of multinational firms also predict that gravity relationships should hold for foreign affiliate sales (Kleinert and Toubal, 2010).

countries.[22] This approach at the firm level results in a large share of observations with zero trade – as indicated in the first part of this report, most firms only trade with one or very few partner countries. To obtain non-biased estimates in this setting, a Poisson Pseudo Maximum Likelihood (PPML) estimator is used for export or affiliate sale values. For the probability of international activity, Probit regressions are used.[23]

The specifications are estimated sector by sector, for each service sector with available data, and separately for each exporting country on a panel covering 2008 to 2014 or a slightly shorter period where data is not available for all years. The sector coverage and aggregation differs between countries for reasons of data availability.

Determinants of firm-level exports and affiliate activity

The analysis focuses on the role of services trade and investment restrictions, measured by the Services Trade Restrictiveness Indices by partner country and sector. The regression sample therefore only comprises the 42 countries included in the STRI database. The indices for 2014 are applied to the whole time period, considering that the STRI data is not available for earlier years and regulation is to a large extent persistent over a period of a few years.[24]

Besides services trade policies, the firm-level gravity equation takes into account several factors that contribute to explain aggregate demand by the importing country for services produced by the exporting country. Such factors include market size, measured by the importer's GDP; the distance between the two countries and whether they share a common border; whether both partners belong to the EEA or EFTA agreements (for Belgium, Finland, Germany, Italy, Sweden and the United Kingdom) or to a preferential trade agreement covering services (for Japan and the United States); as well as common language and common legal origin where relevant. For Germany and Italy additional specifications are used where the distance and contiguity variables are defined at the level of the state or region where the firm's primary establishment is located to better capture intra-European distances. Similarly for the United States, the distance variables are defined between the capital of the headquarter state and the foreign capital.

A number of determinants of international orientation and export performance at the firm level are also included both in their own right and interacted with STRI indices, reflecting the insights of the literature on firm heterogeneity and trade. The interaction terms estimate the differential impact of regulatory barriers on various types of firms, such as SMEs versus large firms or new versus experienced exporters. The firm-level variables considered are:

22. It is not possible to effectively assess other types of extensive margins due to the fact that only a subset of firms active in an economy is surveyed each year. Hence, in most surveys it is impossible to distinguish from year to year whether a firm starts or stops exporting, whether it enters or exits the survey sample, or whether the firm is born or liquidated. However when a firm reports exports or affiliate sales to at least one destination, it can be reliably inferred that it was sampled that year, answered the survey and thus would have been required to report exports to other destinations (or the existence of affiliates in other countries) had they occurred. The remaining margin of error concerns activity below reporting thresholds, which is indistinguishable from true zeroes.

23. Where data on cross-border trade and affiliate sales of the same firms can be linked, a bivariate Probit was also estimated in order to account for the correlation between the decisions to export and set up affiliates in the same country and sector. The results (not included in this report) are very similar to the univariate Probit.

24. A panel analysis was preferred over a cross-section analysis to maximise the firm coverage by sector and smooth out differences that may arise across years (for a given exporting country and service) due to sampling techniques such as rotating the set of firms being sampled year over year. For sensitivity analysis, regressions in several countries have been run for the post-crisis period only (2010 to 2013 or 2014) with consistent results also for the shorter period.

- Productivity, measured as either labour productivity or total factor productivity,[25] following the findings of Helpman et al (2004) that the most productive firms self-select into becoming exporters or multinational companies.
- Size, measured by total firm turnover and number of employees, capturing the benefits of scale for expanding internationally. Firm size is also expected to be correlated with productivity within a country unless allocative inefficiencies are high.
- International status, with dummy variables for the firm being foreign-owned (according to the location of the global ultimate owner), having a global ultimate owner in the destination country (i.e. exporting to its home country), and being a multinational parent (i.e. having at least one foreign affiliate in manufacturing or services).
- Primary activity in goods or services, as well as exports of goods, considering that services trade by manufacturing firms is often linked to trade in goods transactions and may follow different patterns than exports by firms which have their core activity in the same service sector.
- Previous export experience in the same country, reflecting initial costs of exporting. It should however be noted that over a relatively short time period, previous export decisions are likely to be correlated with other explanatory variables and could bias their estimated impact downwards. This is the case in particular with the STRI if a favourable regulatory environment encouraged market entry in the past and regulation is "sticky" over time.
- Imports of services from the same country, as a dummy variable for whether the firm imported any type of services from the destination country in the same year, taking into account complementarities between imports and exports in global value chains.
- Presence of foreign affiliates in the same country and service sector (in the cross-border export equations only), addressing the potential interdependence between modes of supply. A positive coefficient signals that cross-border exports and FDI tend to be complementary including through intra-firm trade, while a negative sign suggests that they constitute alternative means to serve a given market.

Interpreting the results in terms of trade costs

Going from a quantity-based impact assessment – the effect of services trade restrictions on firm-level trade flows – to an assessment of trade costs requires additional assumptions about the structure of the economy. Our descriptive analysis strongly suggests that the conditions of the host market affect both the decision to enter a market (the extensive margin) and the volume of exports conditional on entry (the intensive margin). To interpret the analytical results, it is useful to review the different types of trade costs potentially induced by regulatory restrictions.

First, discriminatory regulations affecting foreign firms' on-going operations in an overseas market may create *variable costs*, i.e. additional costs that are proportional to the amount of services sold. Higher taxes on sales or profits generated by foreign suppliers or local sourcing requirements could be of this nature. Variable costs have a similar effect as tariffs on goods, and are expected to discourage entry into foreign markets as well as to reduce the amount exported by firms that do enter. They can be estimated as ad valorem equivalents of non-tariff restrictions from the regression coefficients and additional knowledge of the sensitivity of import demand to prices.[26] Taking into account interactions with firm characteristics – for instance the differential

25. Labour productivity is calculated as either turnover per employee or value added per employee. Total factor productivity (TFP) could not be estimated for some countries due to lack of data on firms' capital stock. Therefore results using labour productivity are reported for better comparability among countries.

26. In mainstream trade models, the import demand elasticity ρ ("rho") is pinned down by the willingness of consumers to substitute between different varieties of traded services, and in particular between domestic and foreign ones, when faced with changes in relative prices. It is called the elasticity of substitution and

impact of the STRI depending on firm size – would yield different estimates of trade cost equivalents from different firms.

Second, market entry restrictions in services sectors can entail *fixed costs*, which must be incurred prior to selling the first unit and regardless of how much will be sold. For instance, discrimination in obtaining and renewing a licence to operate in a foreign market, data localisation requirements or economic needs tests for key personnel are likely to comprise a strong fixed cost component. High fixed costs will discourage foreign entry altogether but do not lower the amount exported once a firm has decided to serve a market.[27] The estimated reduction in export participation or foreign establishment attributable to STRI measures will therefore be informative about the magnitude of fixed costs. [28] Again, these costs might differ across firms of various sizes, productivity and FDI participation.

Third, for new exporters or at the time of setting up a foreign affiliate, some regulatory hurdles create *sunk costs*, that is, costs that are incurred once and for all the first time a firm penetrates a foreign market. Those costs are not recovered even if the firm stops exporting after the first period, but they are also not repeated for returning exporters. Regulation creating sunk costs for foreign firms includes, for instance, screening procedures for foreign investments, or demanding processes for the recognition of professional qualifications acquired abroad by foreign engineers, accountants or lawyers. At the firm level, high sunk costs have no impact on the export value if the firm does decide to go abroad, and do not impact either on the probability of remaining in the market for returning exporters. The importance of sunk costs can instead be inferred from differences in the probability of export between firms that have not previously sold in a given market and experienced exporters in the same market.

With these distinctions in mind, the results depicted in the next section confirm that the restrictions captured in the STRI database create a combination of fixed, variable and sunk costs. There is also evidence that not all firms are equally equipped when it comes to overcoming the burden of services trade regulations. Considering that the tariff equivalent methods are mostly well-suited to estimate variable trade costs, suitable caution must be exercised in the interpretation of estimates presented below.[29] The focus will be on

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denoted with σ. Micro-datasets containing financial data on both trading and non-trading firms can be used to derive theory-consistent estimates of σ by service sector (see Annex B for details). The elasticity of the intensive margin of exports at the firm level to variable trade costs is ρ=1-σ. The *ad valorem* equivalent of services trade restrictions derived from the PPML regressions, is a hypothetical tariff that would generate a similar decrease in firm-level trade flows as the STRI restrictions. For the STRI score of a given service sector *s*, the estimated trade cost equivalent relative to a benchmark (zero score or lowest score in the sector) would be $\tau_c^s = exp\left[\frac{1}{1-\sigma}\beta(STRI_c^s - STRI_{benchmark}^s)\right] - 1$.

27. While variable costs affect both the intensive and extensive margin of trade, fixed costs only reduce the extensive margin. More precisely according to Chaney (2008), the probability of a firm entering a market *c* is proportional to $f_c^{-\frac{\gamma}{\sigma-1}} t_c^{-\gamma}$ where f_c and t_c are respectively the fixed and variable costs of exporting to country *c* and γ is an inverse measure of the degree of firm heterogeneity in the model. Everything else equal and conditional on entry, the average exporter would actually have higher export volumes where fixed costs are high, because only those firms that can sell enough to recoup the fixed cost investment would enter in the first place.

28. Few attempts have been made in the literature to quantify in monetary terms the fixed costs of trade and FDI, and robust methods for their estimation remain to be developed. One interesting contribution is Tintelnot (2017) who devised an estimation procedure for the fixed costs of setting up foreign affiliates, in the case of German multinationals. Irarrazabal et al. (2013) estimate jointly the fixed costs of exports and affiliates by destination for Norwegian manufacturing firms. The few existing estimates of sunk costs also focus on the manufacturing sector (Das et al., 2007; Moxnes, 2010).

29. Note that in estimations of tariff equivalents from more aggregated data, the *ad valorem* equivalents of trade barriers can be thought of as an approximation of the overall burden combining the extensive and intensive margin effects, in other words a weighted average of variable and fixed costs.

identifying the nature of trade costs and which firms are most put at a competitive disadvantage by regulatory barriers to services trade.

2.2 The costs of services trade restrictions for cross-border exporters

Analytical results on cross-border exports of services are available from seven countries: Belgium, Finland, Germany, Italy, Sweden, the United Kingdom and the United States. Most results are reported based on the median estimate among specifications from all seven countries. This guarantees that results are not based on particular country characteristics, but are more likely to reflect the inherent technological structure of services trade in any given sector. Firm-level data allow us to analyse both the intensive margin and the extensive margin of services exports. The intensive margin refers to changes in the volume of trade for a fixed number of trading firms. The extensive margin means an increase in the number of firms that serve a foreign market. The PPML specification outlined above captures changes in both margins together. The Probit specification, for which export volumes are not used in the regression analysis beyond whether they take positive or zero values, only captures the extensive margin of services exports.[30]

Services trade restrictions measured by the STRI represent fixed as well as variable costs of exporting

Where an importing country imposes services trade restrictions, as measured by the aggregate STRI score, the probability that firms establish trade relationships and the volume of services imports are lower in most sectors. Figure 17 represents the relative change in the number of export destinations per firm which would be induced by a comprehensive reduction of the STRI score of 0.01 in all partner countries – a modest reduction of scores that range from 0 to 1. The resulting effect is largest in the insurance sector. In this sector, firms will expand their global activity so that the propensity score, which indicates the likelihood that a firm exports to a certain country, increases by around 2.4%. This expansion measures the extensive margin of trade growth. A strong positive effect of the STRI on the export propensity indicates that a substantial component of services trade restrictions represents fixed export costs.

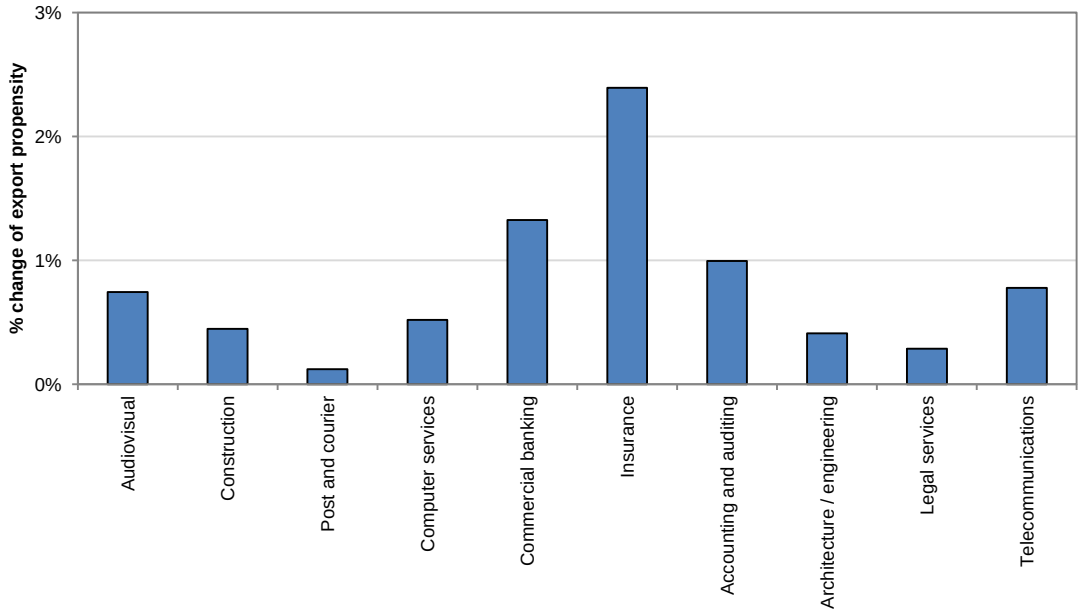
In most other sectors, this effect is slightly smaller. In several sectors, the propensity to export increases by around 0.5%. With a sufficiently large number of potential exporters in the sector, this could be interpreted as attracting 0.5% more firms exporting those services when a country reduces its STRI score by 0.01.

Adopting more liberal trade policies is expected not only to spur the initiation of new trade relationships, but also to enable those exporters already active in the country to further intensify their market penetration. Taking into account all margins of services trade reveals that services trade restrictions have the strongest effect on the volume of trade in the commercial banking sector (Figure 18). Based on the median of results from the seven countries, exports of banking services to a given destination will increase by 9% if this country reduces its STRI score by 0.01.

A liberalisation of services trade restrictions also leads to a strong growth of trade in insurance services. In this sector, the contribution of the extensive margin is somewhat larger than in the commercial banking sector (Figure 17). In most other sectors, a reduction of the STRI score in a country can be associated with a growing volume of services trade, including a small positive contribution from firms which are new exporters to this country. No significant growth effect can be identified for construction and computer services.

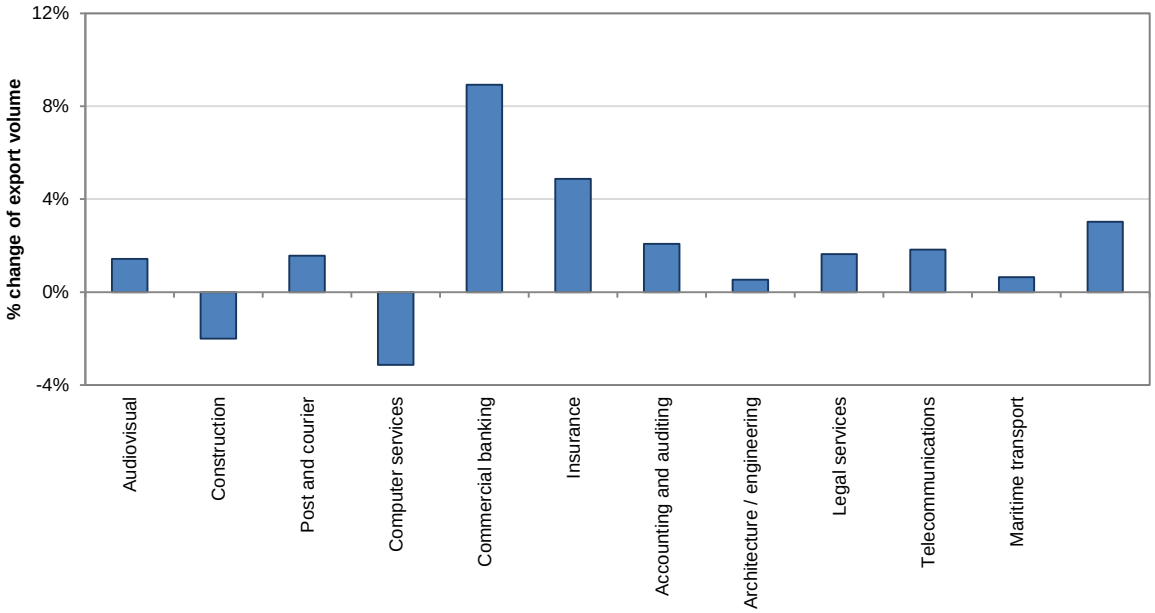
30. Tables C.1. and C.2. report the estimation results for cross-border exports from the baseline regressions in each country and pooling across sectors, to give a sense of the coefficients on non-STRI control variables. Regression tables by sector and for the specifications with interactions are not reported for conciseness, but are available from the authors upon request.

Figure 17. Estimated % change in export propensity from a global 0.01 reduction in STRI



Note: The number indicates the % change in the export propensity of a given sector when reducing the STRI score by 0.01. It is based on a weighted average of coefficients from probit regressions, where the weights are the squared ratios of point estimate to standard error.
Source: Own elaborations on firm-level data from Belgium, Finland, Italy, Germany, the United Kingdom and the United States.

Figure 18. Estimated % change in export volumes from a 0.01 reduction in STRI



Note: The number indicates the % change in the export volume of a given sector when reducing the STRI score by 0.01. It is based on a weighted average of coefficients from PPML regressions, where the weights are the squared ratios of point estimate to standard error.
Source: Own elaborations on firm-level data from Belgium, Finland, Italy, Germany, Sweden, the United Kingdom and the United States.

In a nutshell, the restrictions measured in a country's STRI represent barriers to both market entry and expansion. A liberalisation can lead to a growing volume of services trade and a growing number of services

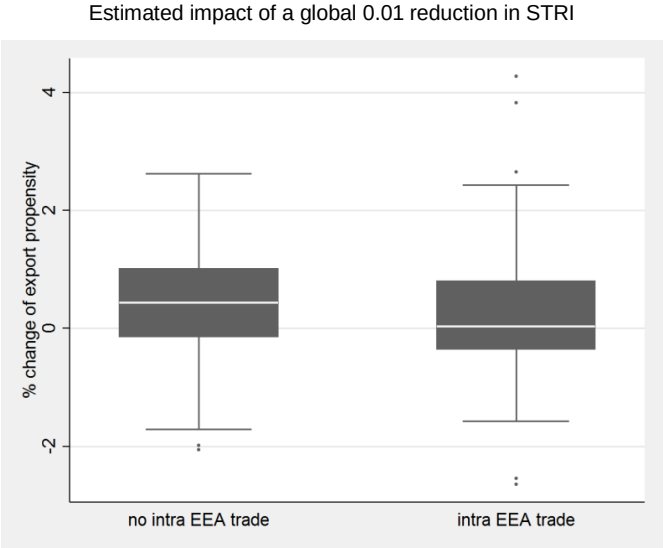
exporters in most sectors. This suggests that the aggregate STRI represents fixed export costs as well as variable export costs. The importance of services trade restrictions as fixed costs of exporting will be further emphasised in the following section, which delves into the differential impact of services trade barriers on firms of different size.

Services trade barriers are less of a deterrent to intra-EEA trade

While the STRI measures trade barriers on a Most Favoured Nation basis, the liberalisation conducted within the European Union and the European Economic Area should result in an easier regulatory environment for services traders. For EU members, the restrictions captured in the STRI appear to be less harmful for trade flows happening inside the EEA compared to those with extra-EEA partners, although with a considerable degree of heterogeneity across sectors and countries (Figure 19).

Based on the median estimate on the export propensity, a higher STRI does not have a visible impact on the decision to export inside the EEA, while it does discourage EEA firms from entering extra-EEA markets. Taking into account all margins of trade suggests that the effect of a given STRI on the volume of cross-border exports outside the EEA is about twice as high as its effect on intra-EEA trade (based on the median from the PPML regression, not reported). In other words, the services trade barriers captured in the STRI have an impact on the volume of intra-EU trade, but smaller than their impact on trade with or between third countries, most likely because the STRI does not take into account intra-EU preferences.

Figure 19. Estimated % change in export propensity, intra- and extra-EEA



Note: The numbers indicate the percentage change in the propensity to export of a given firm when reducing the STRI score by 0.01. Results are based on sector-level probit regressions. The horizontal white line indicates the median of the marginal effects from all regressions. The black box represents the interquartile range (IQR), which corresponds to the intermediate 50% of the distribution of marginal effects. In other words, 25% of all estimated marginal effects are smaller than the lower end of the dark box, while 25% of all estimated marginal effects are larger than the upper end of this box. The whiskers include all values that are at most 1.5 times the length of the IQR away from the upper or lower limit of the IQR.
Source: Own elaborations on firm-level data from Belgium, Finland, Italy, Germany and the United Kingdom.

High services trade barriers represent lower costs for large firms than for small firms

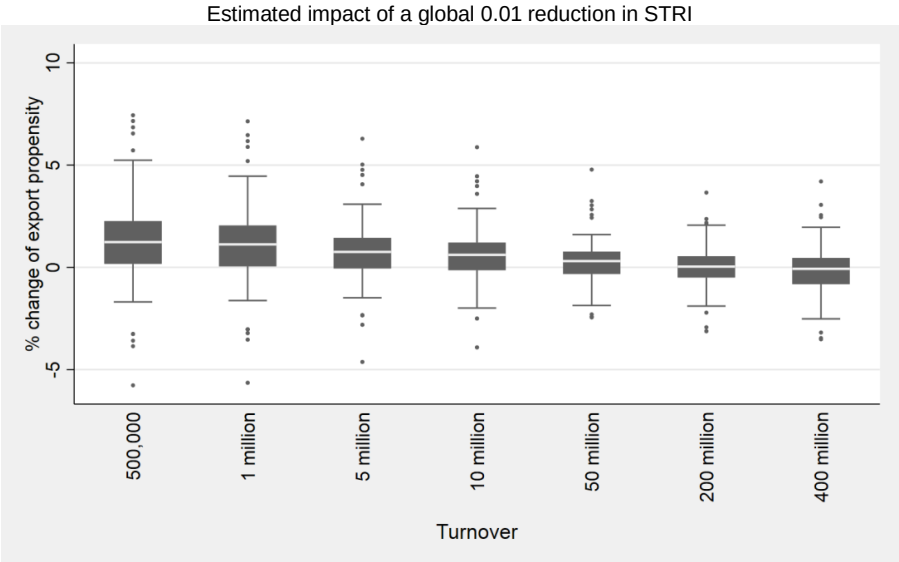
Differences in observable firm characteristics can be important drivers of services trade costs. Some firms might have acquired particular skills that help them to cope with services trade restrictions so that their exports are less affected by high STRI scores. In contrast, other firms might not have developed these skills, so that exporting to countries with stringent services regulation poses significant challenges. While the existence of such skills in firms is not observable, it is reasonable to assume that it should be correlated with other observable firm characteristics, such as a firm's size, productivity, previous export experience and

whether a firm has a foreign establishment in the target country or is an affiliate of a foreign multinational enterprise itself.

An important channel is the volume of potential or actual exports. Firms which stand to export more to all of their export destinations will be less affected by services trade restrictions if these restrictions entail, at least partly, additional fixed costs of exporting. Insofar as larger firms or more productive firms export higher volumes, they should be better able to offset the initial costs of dealing with a challenging regulatory environment than smaller providers.

Figure 20 confirms that as firms grow bigger, their export decisions are less and less affected by policy conditions in the host markets. The figure shows the relative change in the number of export destinations from a reduction of the STRI score by 0.01 for firms of different size classes, measured by their turnover. The graph represents the entire distribution of regression coefficients from all sectors and countries. The boxplots show the median value of the distribution as a white line. For example, based on the median coefficient small firms with a turnover of around EUR 500,000 are expected to increase the number of their export destinations by 1.2%, but larger firms with turnover of around EUR 50 million by only 0.3%.

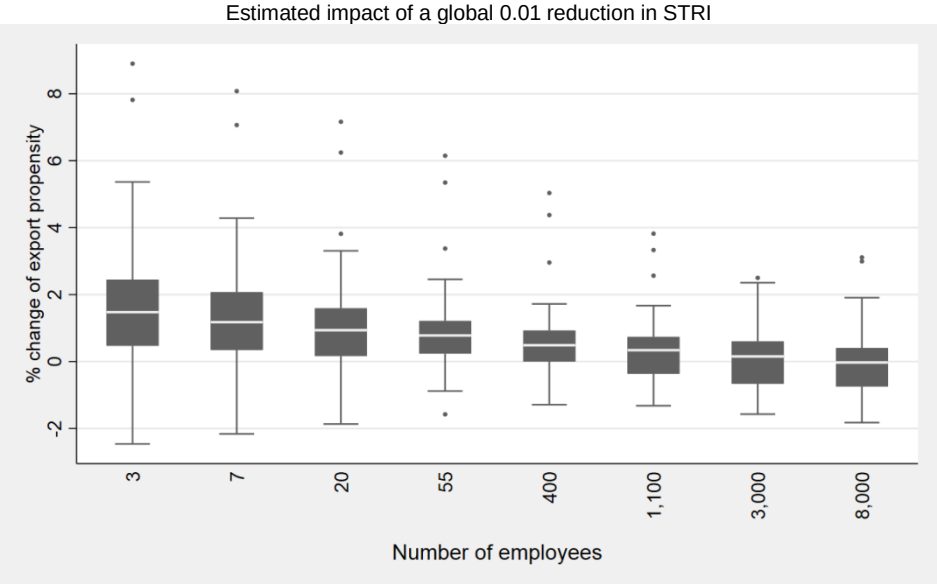
Figure 20. Effect of STRI on the number of destinations, by firm size (Turnover, in EUR)



Note: The numbers indicate the percentage change in the propensity to export of a given firm when reducing the STRI score by 0.01. Results are based on sector-level probit regressions. The horizontal white line indicates the median of the marginal effects from all regressions. The black box represents the interquartile range (IQR), which corresponds to the intermediate 50% of the distribution of marginal effects. In other words, 25% of all estimated marginal effects are smaller than the lower end of the dark box, while 25% of all estimated marginal effects are larger than the upper end of this box. The whiskers include all values that are at most 1.5 times the length of the IQR away from the upper or lower limit of the IQR.
Source: Own elaborations based on firm-level data from Belgium, Finland, Italy, Germany, the United Kingdom and the United States.

The same pattern results when firm size is measured by the number of employees instead of turnover, and the resulting coefficients are of similar magnitude. The number of small firms with as few as three employees exporting to a country may increase by around 1.5% if the importing country reduces its STRI score by 0.01 (Figure 21). For large firms with more than 8 000 employees the effect is very close to zero. The relationship between firm size and the extensive margin of export growth is strictly monotonic, based on the median values of the distribution. For firms with a very high turnover of more than EUR 4 billion or with more than 8 000 employees, the choice of an export destination does not depend on the STRI score of the country. In other words, the largest firms may still succeed in exporting to countries with a very restrictive services regulation; their size enables them to avail themselves of the necessary resources to bear the cost of complying with such regulation. In addition, large firms often have sufficient market power to pass the cost of regulation on to consumers. In contrast, small and medium sized firms often absorb the majority of the costs of regulatory hurdles by squeezing margins. A substantially lower share of these firms exports to countries with high services trade barriers.

Figure 21. Effect of STRI on the number of destinations, by firm size (Number of employees)



Note: The numbers indicate the percentage change in the propensity to export of a given firm when reducing the STRI score by 0.01. Results are based on sector-level probit regressions. The horizontal white line indicates the median of the marginal effects from all regressions. The black box represents the interquartile range (IQR), which corresponds to the intermediate 50% of the distribution of marginal effects. In other words, 25% of all estimated marginal effects are smaller than the lower end of the dark box, while 25% of all estimated marginal effects are larger than the upper end of this box. The whiskers include all values that are at most 1.5 times the length of the IQR away from the upper or lower limit of the IQR.
Source: Own elaborations on firm-level data from Belgium, Finland, Germany and the United Kingdom.

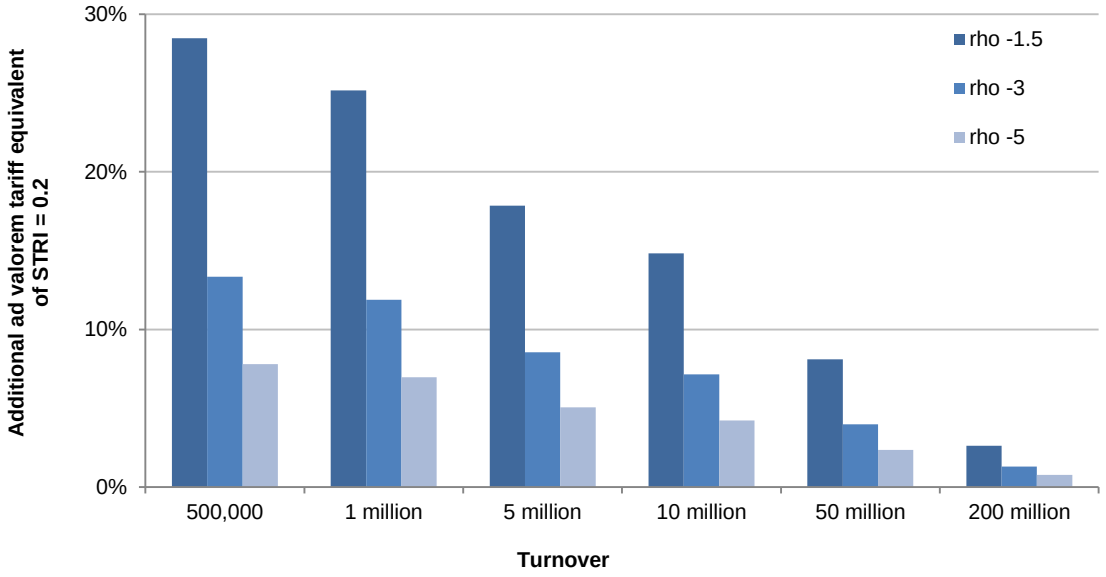
The effect of firm size on the number of export destinations is unambiguous across all sectors. However beyond the market entry decision, there exist some differences as to whether large firms are also more likely to export higher volumes to tougher destinations than small firms. This pattern can be identified in most sectors except in professional services. The following Figure 22 is based on regression results from five sectors: audio-visual services, commercial banking, insurance services, maritime transport and telecommunications. In these sectors larger firms find it significantly easier than small firms to export higher volumes to more restrictive countries. This type of analysis allows us to calculate a tariff equivalent of the additional costs borne by small firms when exporting to destinations with restrictive services policies, on top of what has to be paid by large firms exporting to the exact same destinations.

For this purpose firms are distinguished by their annual turnover. This additional tariff equivalent, which comes on top of cross-cutting trade costs of services restrictions, is normalised to zero for firms in the largest size class (with a turnover of EUR 400 million or more). The tariff equivalent is based on the median of estimates from all countries across a selected set of sectors and it corresponds to a STRI score of 0.2, which is within the range of observed values in almost all sectors and represents plausible levels of services trade restrictions in many countries. Hence, the estimate represents the additional tariff that small firms have to pay in addition to large firms when exporting to countries with an STRI score of 0.2.

Moreover, the calculation of the tariff equivalent requires information on the values of import demand elasticities. Based on firm-level data from Statistics Finland and the UK Office of National Statistics, these elasticities are estimated to lie between -0.6 and -4.4 (Annex Table B.2). These estimates are very similar to the elasticities of -1.5, -3 and -5 used in previous publications on ad valorem tariff equivalents of the OECD STRI, most notably Nordås (2016) and Benz (2017). In order to ensure comparability with the existing publications, the tariff equivalent is calculated based on these import demand elasticities between -1.5 and -5.

Figure 22. Tariff mark-up for small firms on cross-border exports

Estimated additional tariff equivalent of an STRI score of 0.2, by turnover in EUR



Note: The numbers indicate the additional ad valorem tariff equivalent of an STRI score of 0.2 for small and medium sized enterprises. Estimates are based on the median coefficient from sector-level PPML regressions, except professional services. Import demand elasticities used for the calculation of the ad valorem equivalent are indicated as 'rho'.
Source: Own elaborations based on firm-level data from Belgium, Finland, Italy, Germany, Sweden, the United Kingdom and the United States.

Services trade restrictions are particularly harmful to small and medium-sized firms. For example, when comparing large firms with a turnover of EUR 400 million to small firms with a turnover of around EUR 500 000, the small firms perceive an STRI score of 0.2 as an additional *ad valorem* tariff equivalent, compared to large firms, which ranges between 8% and 28%.

This result confirms the prior that regulatory barriers to trade in services create significant fixed export costs. When export costs do at least partly represent fixed costs, which do not depend on how much is exported, the perceived tariff equivalent must necessarily be higher for firms exporting modest volumes. Since total firm turnover is positively correlated with the volume of exports to a given market, this effect can be captured based on firm turnover. While the calculation of the tariff equivalent helps to illustrate the size of the effect, it is crucial to remember that fixed exports costs induced by services trade restrictions are the underlying economic phenomenon.

In contrast, this result does not hold in professional services, computer services, courier services and construction. In these sectors the analysis yields a similar number of coefficients being positive as being negative and only few of them are significantly different from zero. Hence, while large firms do export significantly more in those sectors and large firms do export to more restrictive markets more often than small firms, as shown above, the analysis does not suggest that large firms export particularly high volumes to more restrictive markets.

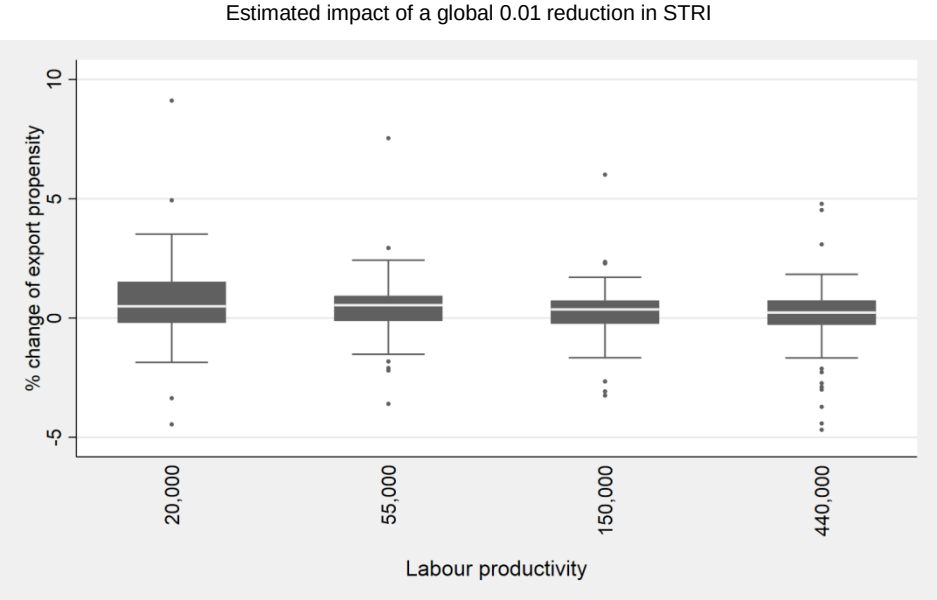
Highly productive firm are more likely to expand into more restrictive markets, while less productive firms tend to stick to more open markets

Similarly to differences in the size of firms, measured by their turnover or by the number of their employees, firms differ with respect to the efficiency of their production process. Naturally, productivity is one of the main determinants of firm turnover, since a more competitive production allows firms to capture

larger market shares.[31] It is therefore no surprise that the impact of services trade restrictions on firms of different productivity levels is very similar to its effect on firms of different sizes. Figure 23 shows that a reduction in a country's STRI score by 0.01 implies that more firms at all levels of productivity are likely to start exporting to this country. However, based on the median of coefficients from all exporting countries and all sectors, the effect is most pronounced for the least productive firms with a labour productivity of around EUR 20,000 per worker. The number of such firms exporting to a liberalising market will increase by around 0.5%, whereas the number of most productive firms can only increase by around 0.2%.

Nevertheless, it is worth pointing out that a trade liberalisation will still lead to an increase in the weighted average productivity of all firms present in a market.[32] The absolute number of new exporters with low productivity is still low, even though the relative change in the number of exporting firms is larger for less productive firms than for highly productive firms – because very few low-productivity firms managed to export in the first place.

Figure 23. Effect of STRI on the number of destinations, by firm productivity



Note: The numbers indicate the percentage change in the propensity to export of a given firm when reducing the STRI score by 0.01. Results are based on sector-level probit regressions. The horizontal white line indicates the median of the marginal effects from all regressions. The black box represents the interquartile range (IQR), which corresponds to the intermediate 50% of the distribution of marginal effects. In other words, 25% of all estimated marginal effects are smaller than the lower end of the dark box, while 25% of all estimated marginal effects are larger than the upper end of this box. The whiskers include all values that are at most 1.5 times the length of the IQR away from the upper or lower limit of the IQR.
Source: Own elaborations based on firm-level data from Belgium, Finland, Italy, Germany, the United Kingdom and the United States.

It is not only easier for more productive firms compared to less productive firms to start exporting to more restrictive countries. Looking at the same five sectors that already have been analysed in relation to size (audio-visual services, commercial banking, insurance services, maritime transport and telecommunications) plus the courier services sector, it is also significantly easier for more productive firms in those sectors to export higher volumes to more restrictive countries. Again, this effect is quantified by calculating the additional tariff equivalent that less productive firms have to pay relative to more productive firms when

31. Data availability is not sufficient to calculate total factor productivity in all countries (see note 25). Hence, this section is based on labour productivity as a measure of firm productivity.

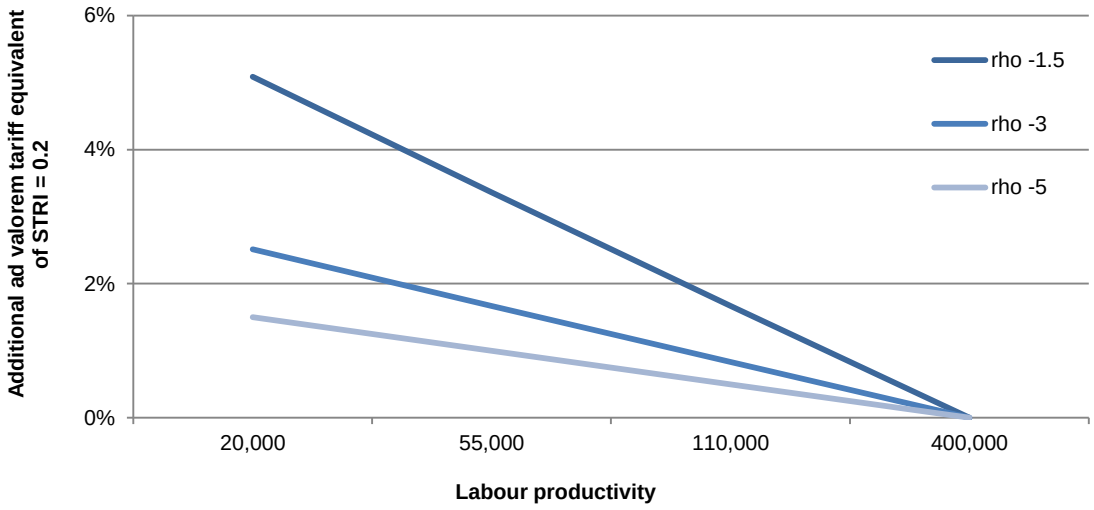
32. This effect is one of the key predictions from the workhorse model on trade with heterogeneous firms by Melitz (2003).

exporting to a country with an STRI score of 0.2 in Figure 24). As above, a range of tariff equivalents is calculated based on import demand elasticities of -1.5, -3 and -5.

In the six selected sectors, less productive firms, with an average labour productivity of around EUR 20,000 per worker, perceive services trade restrictions to represent trade costs that are between 2% and 5% higher than what is perceived by very productive firms with a labour productivity of around EUR 400,000 per worker. Similarly to the size effect, this productivity effect of services trade restrictions on trade costs cannot be identified in the professional services, computer services and construction.

Figure 24. Tariff mark-up for less productive firms on cross-border exports

Estimated additional tariff equivalent of an STRI score of 0.2, by labour productivity in EUR



Note: The numbers indicate the additional ad valorem tariff equivalent of an STRI score of 0.2 for less productive firms. Results are based on the median coefficient from sector-level PPML regressions. Import demand elasticities used for the calculation of the ad valorem equivalent are indicated as 'rho'.
Source: Own elaboration based on firm-level data from Belgium, Finland, Italy, Germany, Sweden, the United Kingdom and the United States.

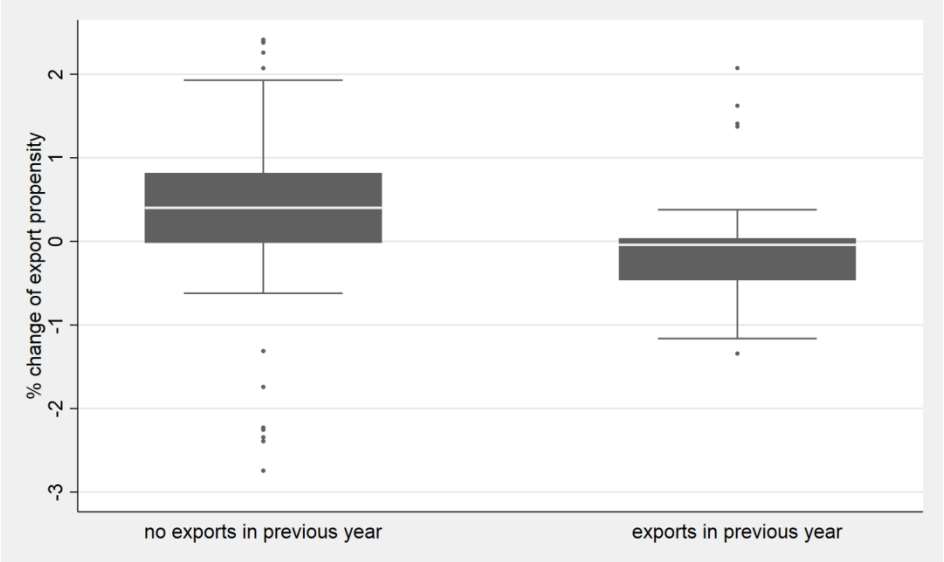
Firms export more to countries where they have previously exported

Just like larger or more productive firms, experienced exporters might be better able to deal with restrictive services trade regulation compared to newcomers. Previous export experience is particularly helpful when exporting to destinations with higher services trade barriers. There are several explanations for this pattern. For example, some restrictions might require adapting to the procedures of a specific country or even making adjustments in the way the services themselves are designed and supplied. Once these adjustments are made, the restrictions do not constitute barriers to exports anymore in all subsequent years. Alternatively, firms which have been present in a market in the past might learn from this experience in order to cope more easily with new regulation adopted by the importer, even though the regulation still creates barriers to these firms' activity. In other words, a significant share of export costs represents fixed costs to exporting which only have to be paid once a firm starts exporting to a particular country for the very first time. At this stage the costs are sunk, and do not have to be paid again as long as the firm continues exporting to this country. This gives experienced firms a competitive edge over newly created firms which cannot garner the benefits of previous export experience. Therefore, a reduction of services trade restrictions may create additional gains by exposing incumbent exporting firms to additional competition from firms which only start exporting, thereby creating a more dynamic economy.

Firms which have not previously exported to a given country are around 0.5% more likely to start doing so in the next period, if this country opens up slightly to services trade so that its STRI falls by 0.01. This effect is indicated by the white line inside the black box in Figure 25, which represents the median of marginal effects from all countries across all sectors. The interquartile range suggests an increase in the export probability of up to 0.9%. In contrast, the probability to export for firms which were already exporting to said country in the previous period seems to fall slightly. This might be due to growing competition from new exporters.

Ffigure 25. Effect of STRI on the number of destinations by export experience

Estimated impact of a global 0.01 reduction in STRI



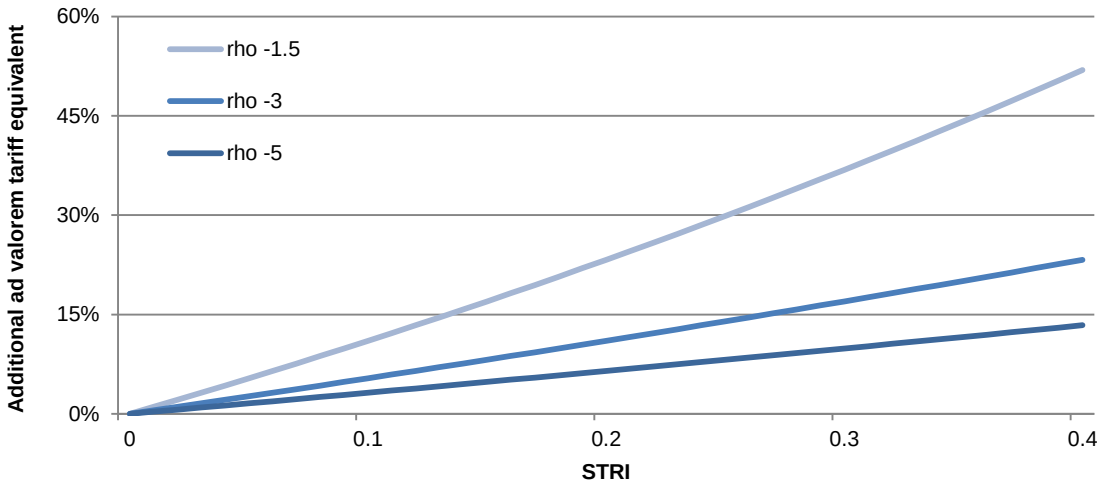
Note: The numbers indicate the percentage change in the propensity to export of a given firm when reducing the STRI score by 0.01. Results are based on sector-level probit regressions. The horizontal white line indicates the median of the marginal effects from all regressions. The black box represents the interquartile range (IQR), which corresponds to the intermediate 50% of the distribution of marginal effects. In other words, 25% of all estimated marginal effects are smaller than the lower end of the dark box, while 25% of all estimated marginal effects are larger than the upper end of this box. The whiskers include all values that are at most 1.5 times the length of the IQR away from the upper or lower limit of the IQR.
Source: Own elaborations on firm-level data from Belgium, Finland, Italy, Germany, the United Kingdom and the United States.

Previous export experience to a particular country is also all the more helpful to expand export sales the more restrictive a country is. The regressions on export volumes indicate that firms which have been exporting to a country in a given year tend to export substantially higher volumes to the same country also in the following year. This effect can be identified as a tariff equivalent of services trade restrictions which has to be paid by new exporters on top of what has to be paid by incumbent exporters.[33]

As above, the tariff equivalent is based on import demand elasticities of -1.5, -3 and -5. It indicates that it is substantially more difficult for new exporters to enter export markets with a high STRI score, since these services trade restrictions represent additional trade costs. For example, if markets are characterised by an STRI score of 0.4, new exporters have to incur costs amounting to an additional 13% to 51% *ad valorem* on top of the regulatory costs faced by incumbent exporters.

33. The tariff equivalent does not necessarily capture only the level of sunk export costs. It is a well-established fact that new exporters ship lower volumes to each destination than incumbent exporters (e.g. Eaton et al., 2007). Hence, this tariff equivalent might also indicate the presence of recurring fixed export costs which represent higher *ad valorem* equivalent for new exporters with low export volumes than for incumbent exporters with high export volumes.

Figure 26. Tariff mark-up for firms without export experience in the destination country



Note: The numbers indicate the additional ad valorem tariff equivalent for firms without export experience, where export experience is defined as having exported the same service to the same country in the previous year. Results are based on the median coefficient from sector-level PPML regressions. Import demand elasticities used for the calculation of the *ad valorem* equivalent are indicated as 'rho'.
Source: Own elaborations on firm-level data from Belgium, Finland, Italy, Germany, Sweden, the United Kingdom, and the United States.

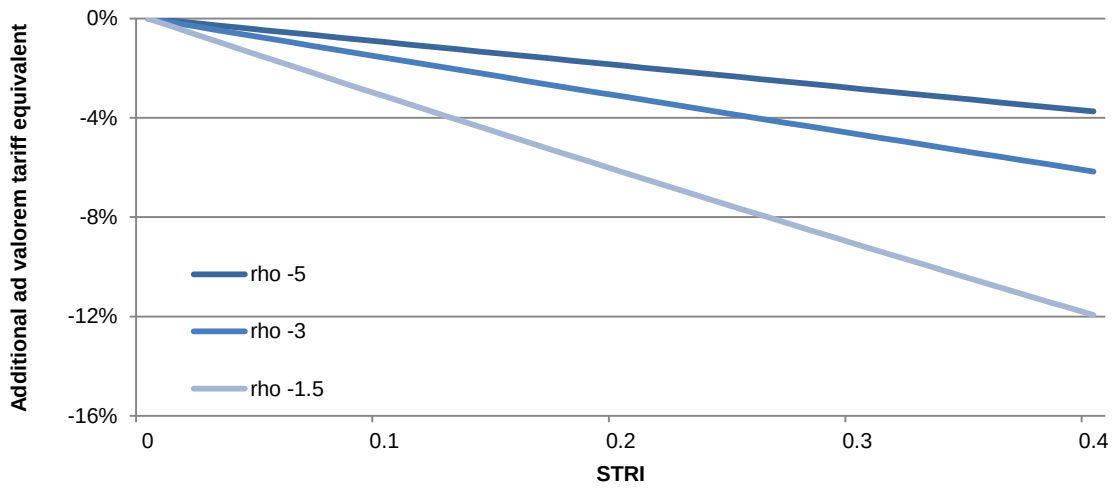
Exporting to tough markets is easier for foreign-owned firms only when those are their home countries.

Exporting to more restrictive markets seems to be similarly difficult for foreign-owned firms as for purely domestic firms. The exception is that firms that belong to a foreign MNE network have a particular advantage when exporting to their home markets. This result can be identified from the median of the PPML coefficients from all countries and sectors. The coefficients can be transformed in tariff equivalents reflecting various degrees of restrictiveness. Nevertheless, it has to be mentioned that there exists some heterogeneity across sectors. Figure 27 shows that when the home country of the parent company of a foreign-owned firm has an STRI score of 0.4, the *ad valorem* equivalent cost of services trade restrictions in that country is between 4% and 12% lower for foreign-owned firms than for firms with no ownership ties to the target market. When exporting to less restrictive markets, the tariff equivalent difference is proportionately lower.

There are two plausible mechanisms to explain this result. One very likely channel is that affiliates of foreign firms benefit from their parent's knowledge of how to navigate complex regulations in the headquarter country. However, it could also be that exports back to the home country may be dominated by services provided to the parent firm, and intra-firm transactions are less affected by regulatory hurdles than arm's length dealings.[34] Since most countries do not report services trade data separately for within-firm transactions, it is not possible to robustly test which of the two explanations dominates. Evidence from the United States (unreported) indicates that the home country effect is overall stronger for intra-firm exports than for unaffiliated trade, but nevertheless remains significant for the latter especially in computer and professional services.

34. Transfer pricing and tax optimisation considerations may also affect the value of reported intra-firm services trade. See Hebous and Johannesen (2015).

Figure 27. Tariff discount for foreign-owned firms exporting to their home countries



Note: The numbers indicate the discount on the ad valorem tariff equivalent for exports of foreign-owned firms to their home countries. Results are based on the median coefficient from sector-level PPML regressions. Import demand elasticities used for the calculation of the *ad valorem* equivalent are indicated as 'rho'.
Source: Own elaborations based on firm-level data from Belgium, Finland, Italy, Germany, the United Kingdom and the United States.

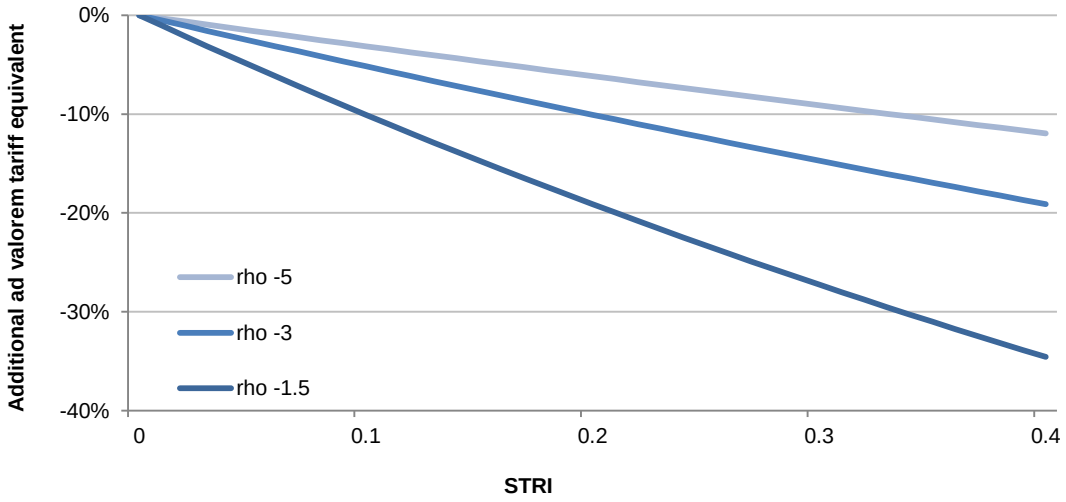
Firms exporting goods and services jointly are less affected by services trade restrictions than pure services exporters

While data on exports of goods is not readily available in all countries analysed, data from Belgium and from the United Kingdom allows us to identify the complementarity between exports of goods and services. Firms which export goods in addition to services tend to export to more restrictive destinations than exclusive services exporters. The reason for this pattern might be that goods exporters use services exports to accompany their exports of manufactured products. Hence, they do not necessarily choose – or exclude – an export destination for its services regulation, but rather the primary driver is demand for the particular products the firm is exporting. Consequently, manufacturing exporters may be more inclined to export complementary services to markets with high services barriers if demand for their product exists in that country, whereas exclusive services exporters might be deterred by regulatory impediments.[35]

In other words, goods exporters perceive the restrictions of the STRI to be less costly for their services packages than exclusive services exporters. For low import demand elasticity and a relatively high STRI score of 0.4, the ad valorem tariff equivalent of this discount can be as high as -35% (Figure 28). The only exceptions for which this mechanism does not appear to hold are audio-visual services and legal services. In these sectors, few firms are also goods exporters (see Figures 12 and 14) but these firms tend to confine their exports to a less restrictive set of countries than exclusive services exporters.

35. In previous literature, Christen et al. (2013) find evidence that more stringent economy-wide product market regulation deters services exports by services firms, but does not have a significant bearing on services exports by manufacturing firms.

Figure 28. Tariff discount for firms also exporting goods



Note: The numbers indicate the discount on the ad valorem tariff equivalent for firms exporting both goods and services. It is based on the median coefficient from sector-level PPML regressions with data from Belgium and the United Kingdom. Import demand elasticities used for the calculation of the ad valorem equivalent are indicated as 'rho'.
Source: Own elaborations based on firm-level data from Belgium and the United Kingdom.

2.3. The costs of services trade restrictions for trade through foreign affiliates

This section addresses the exports of services via mode 3 of services trade, the commercial presence of foreign suppliers. It provides first evidence on the importance of the services trade restrictions captured in the STRI for trade via foreign affiliate sales in a selection of services sectors. So far there exists only little evidence on firm-level patterns of mode 3 services exports across several countries, highlighting the importance of pioneer work in this area.

Data on foreign affiliate sales can currently be used for regression analysis in four countries: Germany, Finland, Japan and the United States. Due to the lower number of countries analysed so far, results from this section might be somewhat less robust than results from the previous section. Nevertheless, for all four countries, information on the volume of foreign affiliate sales in all host markets is available. Similarly to the analysis of cross-border exports above, this allows for the analysis of foreign affiliate sales at the intensive margin and the extensive margin, using Probit regressions as well as PPML regressions. [36]

A high level of services trade restrictions in a country reduces the volume of foreign affiliate sales

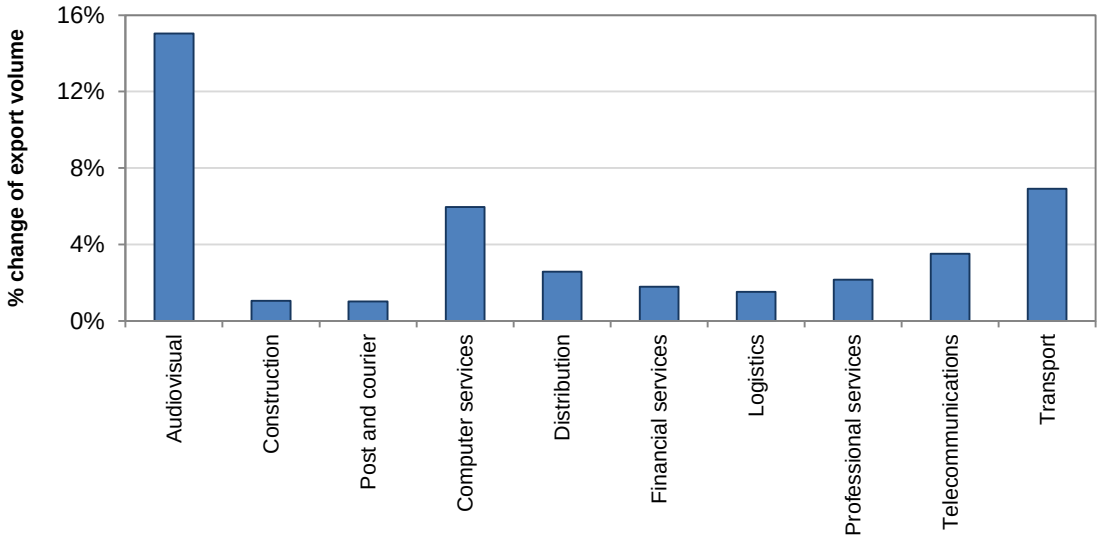
Services trade restrictions in almost all sectors are important determinants of the volume of foreign affiliate sales. Figure 29 relies on the results of the PPML regression. The values in the figure represent the median estimate based on different specifications from all four countries. The figure shows the estimated change in the volume of foreign affiliate sales that would result from a reduction in the STRI score by 0.01 in the respective sector. [37] Effects on the volume of foreign affiliate sales are most pronounced in audio-visual services, transport and computer services. For example, in the audio-visual services sector the reduction in the

36. Tables C.3. and C.4. report the estimation results for foreign affiliates sales derived from baseline regressions in each country and pooled across sectors, to give a sense of the coefficients on non-STRI control variables. Regression tables by sector and for the specifications with interactions are not reported for conciseness, but are available from the authors upon request.

37. Whenever a more detailed classification was available in at least one country, which is the case for financial services, professional services and transport services, the figure is based on the median coefficient from all regressions, including those on a more disaggregate level. Estimates for courier services are only based on German data.

STRI score could increase the volume of foreign affiliate sales in the respective country by up to 15%; the estimated effect would be 7% in the transport sector and around 6% for computer services. The impact on foreign affiliate sales in other sectors is somewhat smaller.

Figure 29. Estimated % change in the volume of affiliate sales from a 0.01 reduction in STRI



Note: The number indicates the % change in the volume of foreign affiliate sales in a given sector when reducing the STRI score by 0.01. It is based on a weighted average of coefficients from PPML regressions with data from Finland, Germany, Japan and the United States, where the weights are the squared ratios of point estimate to standard error.
Source: Own elaborations based on firm-level data from Finland, Germany, Japan and the United States.

Interestingly, a reduction of services trade restrictions is significantly related only to the volume of foreign affiliate sales in a country. In general, there does not seem to be a strongly significant effect on the number of foreign affiliates present. Furthermore, contrary to the case of cross-border exports, no discernible difference is found between the impact of services restrictions on intra-EEA affiliate sales and those of affiliates of EEA-based firms in non-European trade partners.

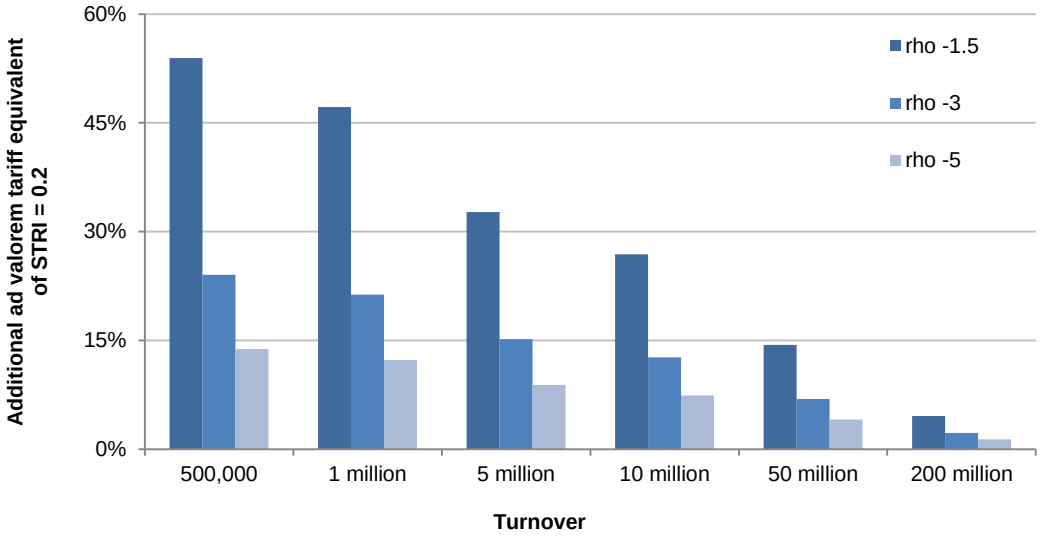
Affiliates of larger and more productive firms sell more in more restrictive markets than affiliates of smaller and less productive firms

Similarly to the patterns identified for the cross-border exports of services, the analysis shows that affiliates of larger and more productive firms sell more in more restrictive markets than affiliates of smaller and less productive firms. The additional trade costs created by services restrictions for small and medium-sized parent firms relative to large MNEs can be expressed as *ad valorem* equivalents. Figure 30 shows that this effect is indeed substantial: an STRI score of 0.2 can represent trade costs exceeding a 50% tariff for small firms with annual turnover of only EUR 500 000.This result shows that setting up foreign affiliates involves a substantial amount of non-recurring costs – even more so than for cross-border exports. More restrictive regulatory barriers further magnify these fixed costs and may end up constituting prohibitively high entry barriers for small and medium-sized firms.

This effect does not only hold when comparing firms of different sizes but also when comparing firms with different levels of labour productivity. For services trade conducted via mode 3, the additional *ad valorem* equivalent of the costs of policy barriers may be as high as 12% for less productive parents compared to highly productive firms (Figure 31). This result highlights the fact that services trade restrictions impose an extra burden on less productive firms, which may deter them from establishing abroad.

Figure 30. Tariff mark-up for small firms on foreign affiliate sales, by parent size

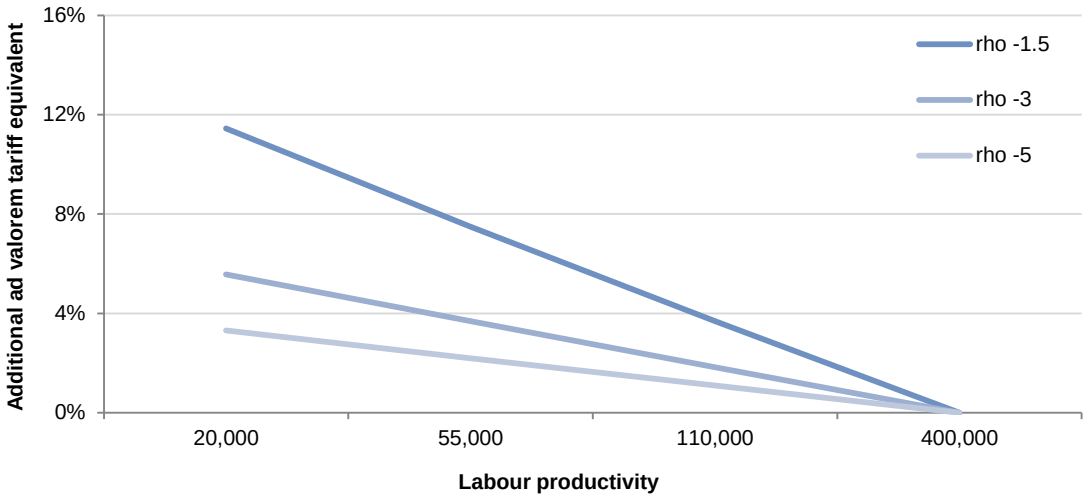
Estimated additional tariff equivalent of an STRI score of 0.2, by turnover in EUR



Note: The numbers indicate the additional *ad valorem* tariff equivalent of an STRI score of 0.2 for small and medium-sized enterprises. It is based on the median coefficient from sector-level PPML regressions, except professional services. Import demand elasticities used for the calculation of the *ad valorem* equivalent are indicated as 'rho'.
Source: Own elaborations based on firm-level data from Finland, Germany, Japan and the United States.

Figure 31. Tariff mark-up for less productive firms on foreign affiliate sales, by parent size

Estimated additional tariff equivalent of an STRI of 0.2, by labour productivity in EUR



Note: The numbers indicate the additional *ad valorem* tariff equivalent of an STRI score of 0.2 for less productive firms. It is based on the median coefficient from sector-level PPML regressions with data from Finland, Germany, Japan and the United States. Import demand elasticities used for the calculation of the *ad valorem* equivalent are indicated as 'rho'.
Source: Own elaborations based on firm-level data from Finland, Germany, Japan and the United States.

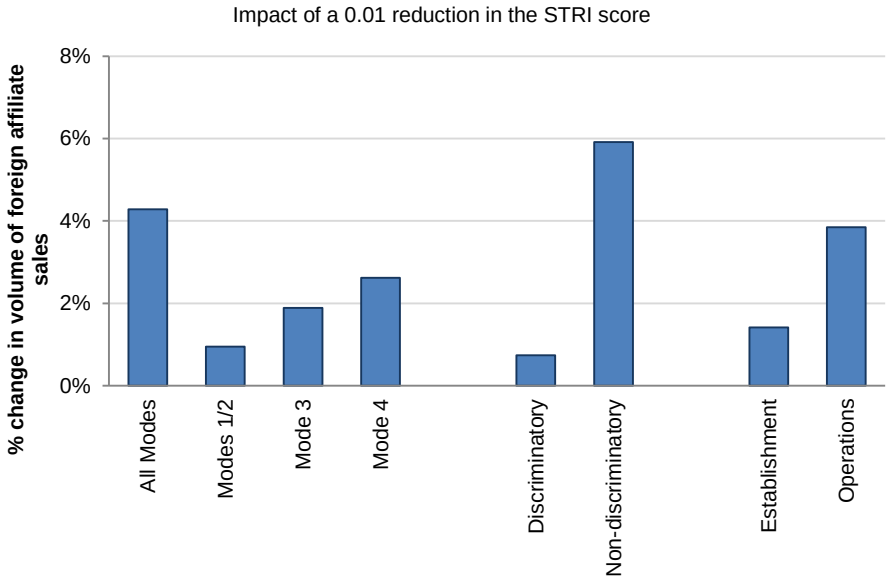
All types of services trade restrictions represent significant barriers to foreign affiliate sales

The decomposition of the STRI into different categories of restrictions shows that all of them represent significant barriers to foreign affiliate sales. Figure 32 shows the percentage change in the volume of foreign affiliate sales when reducing sub-components of the STRI score of a country by 0.01. With respect to the decomposition by modes of services trade, it turns out that the most pronounced effect does not result from barriers to Mode 3. In contrast, behind the border regulation, summarised as barriers to all modes of services

trade, and barriers to Mode 4 appear more important.[38] However, it is no surprise that restrictive behind the border regulations are significant impediments to the activity of foreign affiliates operating in a less pro-competitive regulatory environment. In addition, it seems intuitive that the establishment of a commercial presence abroad and the day-to-day operations of foreign affiliates often entail accompanying movement of intra-corporate transferees by Mode 4.

Interestingly, non-discriminatory impediments are substantially more of a deterrent for foreign MNEs than discriminatory investment barriers. This is clearly related to the high importance of restrictions behind the border, which mostly do not discriminate between domestic and foreign investors but affect the overall costs of doing business and the competition framework in the host economy. The impact of establishment barriers is of relatively lower magnitude compared to barriers to operations.

Figure 32. Estimated % change in the volume of affiliate sales by STRI sub-component



Note: The number indicates the % change in the volume of foreign affiliate sales in a given sector when reducing the STRI score by 0.01. It is based on the median of coefficients from PPML regressions with data from Finland, Germany, Japan and the United States. The "Modes 1/2" component is only available for financial services and some transport services.
Source: Own elaborations based on firm-level data from Finland, Germany, Japan and the United States.

2.4. Concluding remarks

This report draws on detailed firm-level data to analyse the importance of services trade restrictions for cross-border exports of services and foreign affiliate sales. It shows that firms from several OECD countries export significantly less to countries with a higher STRI score, confirming existing evidence from similar analysis based on sector-level data of cross-border exports. However, not only the volume of exports is lower, but also a lower number of firms export to these countries. Hence, services trade restrictions do not only add to *ad valorem* trade costs, but also to one-off exporting costs. Similarly, high STRI barriers significantly reduce the volume of foreign affiliate sales in the domestic economy, jeopardising the availability of high-quality services which can be crucial for countries in order to participate in global value chains and facilitate inclusive growth.

38. However, when considering the effect of a liberalisation from being completely closed to being completely open, barriers to Mode 3 and barriers to all Modes have a similar effect on the volume of foreign affiliate sales due to a higher contribution of Mode 3 barriers to the overall STRI score. The contribution of barriers to Mode 4 is substantially smaller in this respect. Hence, the potential for trade growth from a liberalisation in a given country strongly depends on the set of restrictions still in place in this country.

Size and efficiency appear decisive for firms to overcome services trade restrictions. The impact of regulatory hurdles on export entry and export volumes is significantly less detrimental for larger firms, indicating that some of these barriers represent fixed costs of exporting that deter SMEs from seeking markets abroad. Deeper pockets, in-house legal expertise, broader existing networks of business partners at home and abroad, and the benefits of scale to absorb overhead costs are many reasons why larger firms are better equipped to succeed in complex and challenging regulatory environments. For instance, an intermediate level of restrictiveness corresponding to an STRI score of 0.2 can represent additional *ad valorem* export costs of as much as 14% for SMEs relative to large firms. It therefore emerges that small and medium-sized exporters would be the chief beneficiaries of services trade liberalisation.

Previous export experience is also a key asset to succeed in less open countries. Existing exporters in a country are considerably more likely to keep exporting there than are other firms to enter the market. In addition, experienced exporters tend to sell higher volumes in more restrictive countries than newcomers. On average, trade restrictions does not significantly discourage firms that have previously been exporting to the same country from continuing to do so, indicating that the costs created by trade barriers are to a large extent incurred at the time of initial market entry.

Regulatory restrictions to services trade thus disproportionately discourage small firms and newer firms without export experience from competing in a market. These findings suggest that barriers to trade in services entrench the market shares not only of domestic firms, but even of large incumbent exporters. Such restrictions are likely to be particularly detrimental to small and young firms seeking foreign customers. Considering that digital services trade by small and newly-created firms is not fully captured in existing services export data, further investigation would be warranted to shed more light on constraints that trade restrictions place on the expansion of a vibrant digital economy. As the business models of start-ups increasingly rely on being "born global" and gaining scale rapidly to survive, the economic costs of existing restrictions for innovation and job creation may well be on the rise.

Inflows of foreign direct investment also feed into better export performance of firms that belong to multinational networks. The costs of services trade restrictions are generally lower for foreign-owned firms when exporting back to the home country of their multinational parent. This suggests that familiarity with the regulatory requirements of a market gives a decisive head start in dealing with restrictions, and that improving transparency would be a beneficial step to reduce the costs associated with burdensome services regulations.

Another novel contribution of this report is to analyse the role of services trade restrictions in shaping not only cross-border trade but also the presence and activity of foreign affiliates in a country. Countries with higher STRI scores are less likely to attract foreign investment in services than countries with a more liberal regulatory framework. If multinational companies do set up establishments in those countries, the foreign affiliates tend to realise lower sales than in more favourable host markets. Services restrictions are particularly costly for smaller and medium-sized parents, hampering their foreign affiliate activity to an even larger extent than cross-border exports. As countries strive to attract foreign investors to boost economic dynamism and knowledge transfer, reforming services to sustain an open regulatory environment and healthy competition emerges as a necessary part of the toolkit.

These findings represent the first in-depth evidence on how services trade restrictions influence the decisions and outcomes of firms engaged in international markets. Future work could proceed along several dimensions. First, robust methods remain to be developed to quantify the fixed costs of trade, which have been shown to constitute an important share of the overall cost burden for exporters dealing with regulations in their target markets. Second, one could further analyse whether, beyond levels of restrictiveness, regulatory differences are a determining factor for market entry decisions. Third, linking cross-border exports and foreign affiliate sales of the same firms for a larger set of countries could yield more insights into how firms choose between – or combine – modes of supply and how trade and investment interact. Fourth, how the mechanics of services trade bundled with trade in manufacturing products diverge from those of pure services exports could be further explored, with a view to help design policies that leverage the complementarities between goods and services and promote widely shared benefits of trade liberalisation.

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Annex A.

Micro-Datasets

Belgium

Data on Belgian trade in services are drawn from surveys conducted since 2007 by the National Bank of Belgium (NBB) for the compilation of the balance of payments. For the non-financial sector, a full survey of major enterprises is conducted on a monthly basis, and a set of specific monthly or quarterly surveys for other enterprises. For the financial sector, the surveys target the full population of financial institutions by sub-sectors. The sample used in our study covers around 9,800 exporting firms for 2013 and 2014. The 12 main Extended Balance of Payment Services (EBOPS) categories are included, as well as a specific breakdown by STRI sectors.[39]

The information on trade in services is matched with data from several other sources. The Business register, covering the population of firms, provides data on turnover, employment, operating profits, value added and intermediate inputs. The foreign ownership status of firms comes from the NBB Survey of Foreign Direct Investment. Exports of goods are taken from the Intrastat declarations (intra-EU transactions, covering 13 000 companies) collected by the NBB and Extrastat declarations (extra-EU transactions) collected by the customs offices.

Finland

Firm-level data for Finland are drawn from the International trade in services and Foreign affiliate statistics maintained by Statistics Finland. The sampling framework for both inquiries is based on the target population of enterprises and establishments in Statistics Finland's Business Register, which provides a comprehensive coverage of businesses in Finland and identifies those with affiliates abroad.

Statistics on international transactions in services are collected on an annual basis, but are complemented by quarterly inquiries. The questionnaires are sent to manufacturing firms with more than 20 employees and turnover above EUR 10 million and firms engaged in services with no less than 10 employees and annual turnover of at least EUR 1.5 million. The survey is addressed to enterprises that are known to have engaged in trade in services from previous responses and additional sources. The sample used in our study covers around 2 500 exporting firms over a period of seven years (2008-2014) and nine types of services, as defined in the EBOPS classification.[40] The initial sample is slightly reduced when matched with additional information on firms' characteristics drawn from the Business Register and other Structural Business Statistics.

Data on foreign affiliates that operate in Finland and the institutional unit controlling them (inward FATS), are included in the trade in services dataset to distinguish domestic from foreign-owned enterprises. Statistics Finland also collects data on enterprise groups located in Finland that have affiliates, branches or associated companies (outward FATS[41]). These data can be linked to financial variables through a common identifier present in the Enterprise Group Register. Both inward and outward FATS are based on the Finnish Standard Industry Classification (TOL 2008). The surveys are carried out annually and collect key

39. Data is available for 14 STRI service categories, only excluding logistics and distribution services.

40. The services considered in our analysis are listed in Table B.1. Statistics Finland's survey does not include Transport and Insurance services, which are addressed by other surveys.

41. Outward FATS includes foreign affiliates, branches or associated companies where the parent company located in Finland owns, directly or indirectly, at least 10% of the equity shares or voting rights.

information on each affiliate's turnover, number of employees, personnel costs, gross investment in tangible assets, etc. Our study focuses only on foreign affiliates whose main activity is in services, for which it is possible to match fourteen STRI services types, as outlined in Table B.1 in the annex. The sample is composed of approximately 3,000 Finnish affiliates abroad and 800 parent companies, over a time period covering 2008 to 2014.

Germany

Services trade data at the firm level are collected by the Deutsche Bundesbank and published in its Statistics on International Trade in Services (SITS). These data contain all international service transactions carried out by German residents above a reporting threshold of EUR 12,500 per transaction. Not only resident firms have to report their transactions, but also individuals and public authorities. Because of the statutory nature of the survey and the low reporting threshold, the coverage (in terms of number of firms) is by far the largest of the countries analysed. The data are available on a monthly basis in a panel since 2001 for a detailed list of services. However, only data from 2008 onwards, aggregated to represent annual services transactions for each firm, are used for this analysis.

Information on foreign affiliates, as well as foreign owners of German firms, is collected in the Microdatabase Direct Investment (MiDi). The data are available as a panel dataset from 1999 onwards. Since 2007 reporting is required if German companies and private individuals directly own at least 10% of the shares or voting rights in a foreign company that has a balance sheet total of more than EUR 3 million, if they own (indirectly or through a mixture of direct and indirect shares) a combined controlling share of more than 50% in such companies, or if they own a branch or permanent establishment on foreign territory with business assets of at least EUR 3 million. Equivalent reporting thresholds apply for inward foreign direct investment. The sector of the affiliate is identified by the NACE rev.2 sector.

Data from the SITS and MiDi can be merged and in addition they can be complemented with information from the corporate balance sheet data (Ustan).[42] Using information from Ustan in addition to SITS and MiDi reduces the sample size, since firm coverage in Ustan is significantly worse. Hence, it is only used when information on total factor productivity is required for the regression analysis.[43] In total, data is available for around 28,000 exporting firms and 6 600 German parent companies with 21,000 foreign affiliates for the years from 2008 to 2013.

Italy

Firm-level data for Italy are limited to international trade in services from the Bank of Italy. Trade in services data have been collected through quarterly surveys since 2008 for the compilation of the trade in services current account of the Italian Balance of Payments. The survey collects international transactions in services by firms resident in Italy with an annual turnover higher than EUR 70 million. The sample used in our study covers around 1,700 exporting firms over a period of seven years (2008-2013).[44] However, the initial sample is reduced to 1,000 exporting firms when matched to the STRI sectors as detailed in Table B.1.[45] This sample is subsequently matched with balance sheets and financial statements sourced from

42. Originally, the data in Ustan were collected to provide information for the refinancing business of the Deutsche Bundesbank. The data are biased towards large firms, representing the majority of firm turnover but only a small share of firms. In addition, there is a bias towards firms from West Germany.

43. However, all regressions were also performed on the larger sample of SITS and MiDi using labour productivity, which can be calculated from MiDi.

44. Data for 2008 are included in the descriptive statistics but, as in Federico and Tosti (2012), not considered in the analysis due to a slightly lower coverage during the first year of the survey.

45. The services sectors not included in the survey used in this study are: Construction, Transport and Logistic services, collected through separate surveys.

Centrale dei Bilanci and *Cerved*[46], to obtain additional information on firm's characteristics, and as a result the number of firms is reduced by about one quarter.

Further information on firms' global ultimate owners is sourced from the Bureau van Dijk Orbis database together with additional data on the Italian affiliates abroad. The sample is composed of firms that are directly owned by Italian companies (between 50% and 100%) and are mainly active in services sectors (from 45 to 96 according to the 2-digit NACE rev. 2 classification). Foreign subsidiaries that only report "consolidated" accounts are excluded from the sample. The sample is composed of approximately 7 500 Italian affiliates abroad and 3 800 parent companies, over a time period covering 2008 to 2014. However, Orbis coverage of services firms is not fully representative of global services industries; therefore this sample of firms is only partially representative of the universe of Italian firms' foreign affiliates in services sectors.[47]

Japan

For Japan, only outward FATS data, collected in the Basic Survey on Overseas Business Activities (BSOBA) by the Ministry of Economy, Trade and Industry (METI), are available for this study. The survey targets both parent companies, i.e. Japanese corporations which own overseas affiliates, and the foreign affiliates themselves, directly or indirectly owned by Japanese companies.[48] The survey covers a broad range of economic aspects with detailed questions on affiliates' sales, purchases, number of employees, personnel cost, gross investment in fixed assets, etc. The survey also differentiates between activities involving the host economy and those performed with the parent company (intra-firm trade) or with third countries. A specific industry classification based on the Japanese Standard Industry Classification (JSIC, Rev.13) is used to classify both the parent and the affiliate. From this classification affiliates engaged in services activities are extracted and matched to eight of the STRI services sectors, as detailed in Table B.1 in the annex. The final sample covers approximately 13 000 foreign affiliates and 4 500 parents, over a period of six years (2008-2013). All monetary variables were converted from yen to euro using Eurostat exchange rates.

Sweden

Firm-level data for Sweden are drawn from the survey of Foreign Trade in Services, compensation of employees and current transfers. This survey is conducted on a quarterly basis by Statistics Sweden, on behalf of Sweden's Riksbank, and based on a stratified sample of approximately 6000 enterprises, with about 1500 firms, corresponding to the largest firms in terms of turnover or trade, regularly included. The sample used in this study covers around 1400 exporting firms over a period of five years (2008-2012) and 102 types of services, as defined in the Swedish Standard Industrial Classification (SNI 2007) – see Table B.1 for the services matched with the STRI sectors. The initial sample is slightly reduced when matched with additional information on firms' characteristics from Structural Business Statistics. Data on firm affiliations and firm dynamics are from the Enterprise Group Register and the Firm and Plant Dynamics Register.

46. *Centrale dei Bilanci* is a commercial database maintained by Bank of Italy, ABI and other credit institutions, collecting financial statements of major listed companies resident in Italy for credit risk analysis. This database is integrated with the financial statements filed with the Italian Chambers of Commerce and collected by *Cerved*.

47. For instance, a comparison with aggregate foreign affiliates' statistics reported by Istat suggests that the Orbis sample includes about a quarter of foreign affiliates in the "professional, scientific and technical activities services" and around a third of foreign affiliates in the "information and communication services".

48. Overseas affiliates include foreign affiliates in which Japanese companies have a direct invested capital of at least 10% and, foreign affiliates indirectly controlled by majority-owned Japanese subsidiaries abroad that have an invested capital of more than 50%.

United Kingdom

Firm-level data for the United Kingdom are drawn from the International Trade in Services (ITIS) Inquiry and the Annual inquiry into Foreign Direct Investment (AFDI), carried out by the Office for National Statistics (ONS) for the compilation of the UK Balance of Payments statistics. ITIS is a statutory inquiry conducted on a quarterly and annual basis, and addressed to private sector companies resident in the United Kingdom with ten or more employees.[49] Firms engaged in international services transactions are classified according to the UK's 2007 Standard Industrial Classification (SIC07). The type of services traded is defined according to a different classification, which can be matched to eleven STRI sectors.[50] The sample selected for our analysis comprises about 13,700 exporting firms over a period of seven years, from 2008 to 2014.[51] Trade in services data thus selected are combined with financial data from the Annual Business Survey (ABS).[52]

Data on subsidiaries/associates of foreign firms operating in the United Kingdom and on the investment made by UK firms in their overseas operations, as collected by inward and outward AFDI inquiries, are also examined.[53] The target population is the universe of businesses recorded in the IDBR, from which a stratified sample is drawn, based on previously reported net investment positions of foreign affiliates or the UK group. FDI data are classified according to the principal activity of the parent or subsidiary/branch following the UK's SIC07. From this industrial classification it is possible to match sixteen STRI services sectors, for a total of 5 000 UK parent companies with significant control in approximately 17 000 overseas companies, over the period 2009-2013. Although data on the activity of foreign affiliates are not available, further information on the UK parent activity is obtained by matching outward AFDI with ABS data. All monetary variables were converted from pound to euro using Eurostat exchange rates.

United States

Firm-level data on services trade for the United States come from the Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons (BE-120 and BE-125) over the period 2008-2012, as collected by the US Bureau of Economic Analysis (BEA). The quarterly survey comprises approximately 2 000 firms and the annual survey approximately 10 000 firms. Surveyed firms must report receipts and payments related to 36 categories of services and intellectual property rights with affiliated and unaffiliated foreign persons. Response to the annual survey is mandatory if the firm exported or imported any of the

49. The quarterly survey focuses on large companies with international transactions exceeding GBP 10 million, while the annual survey is addressed to smaller enterprises. The target population is the universe of UK businesses as collected by the Inter-Departmental Business Register (IDBR), from which stratified random samples are extracted based on industry and size. Firms are selected using filter questions from other business surveys in addition to direct sampling from "High intensity industries" and a selected number of "known traders" from responses given in previous inquiries.

50. The classification of service types used in ITIS is based on the Extended Balance of Payments Services classification and covers 39 different types of producer services, but excludes travel and transport, and some audio-visual services, covered by other surveys.

51. Data for 2008 are reported in the descriptive statistics but not included in the regression analysis to have a sample of data that is as harmonised across countries as possible.

52. The Annual Business Survey (ABS), formerly known as the Annual Business Inquiry - Part 2 (ABI/2), is an annual survey sent to around 62 000 firms every year collecting information on the financial statements and balance sheets of businesses resident in the UK. ABS is a "selected sample" extracted from IDBR, stratified by industry and employment bands, covering single- or multi-plant enterprises and enterprise groups.

53. The ONS considers as FDI those investments for which the investing firm acquires at least 10% of the capital of a foreign company, defined as *associate*. In the case of *subsidiaries*, the investing firm shall own at least 50% of the equity shares or voting rights. *Branches* are permanent plants as defined for UK corporation tax purposes.

covered services during the fiscal year. If the total transaction value exceeds USD 2 million in exports or USD 1 million in imports, a detailed breakdown by service and by country is required. Response to the quarterly survey is mandatory the total transaction value exceeds USD 6 million in exports or USD 4 million in imports for the previous or current fiscal year. Information on transactions with foreign parties in transport, financial services and travel is collected through other surveys and sources and was not available for this study.

Data on the foreign affiliates of US parents are drawn from the Surveys of US Direct Investment Abroad (BE-11, BE-10 and BE-577) conducted by the BEA. All US persons that own, directly or indirectly, 10% or more of the voting securities of an incorporated foreign business enterprise, or an equivalent interest in an unincorporated foreign business enterprise, are required to report the activities of their foreign affiliates for the Benchmark Survey conducted every five years. Entities contacted by the BEA and owning at least one affiliate with total assets, sales or net income of more than USD 60 million (positive or negative) are required to report for the annual survey. The threshold is USD 25 million in the case of newly established or acquired affiliates. For the purpose of the analysis, only majority-owned or foreign-owned services affiliates of US firms are retained. The sector of the affiliate is identified from 4-digit NAICS codes.

Firm-level financial information not available from the BEA International surveys is sourced from the S&P Global Compustat database.

Annex B.

Technical Annex

Service classifications

The coding for the STRI sectors is as follows:

ASbrd	Audio-visual services: Broadcasting
ASmot	Audio-visual services: Motion pictures
ASsou	Audio-visual services: Sound recording
CO	Construction
CR	Postal and courier services
CS	Computer services
DS	Distribution services
FSbnk	Commercial banking
FSins	Insurance
LS	Logistics
PSacc	Accounting and auditing
PSarc	Architecture
PSeng	Engineering
PSleg	Legal services
TC	Telecommunications
TRair	Air transport
TRmar	Maritime freight transport
TRrai	Rail freight transport
TRrof	Road freight transport

The correspondence tables between STRI sectors and national classifications for service categories and sectors are indicated in Table B.1.

Table B.1. Correspondence between STRI sectors and national classifications

	International trade in services	Foreign affiliate statistics
Belgium	**EBOPS 2010**	
AS	B111, B112	
CO	5100, 5200	
CR	3400	
CS	9211, 9212, 9220	
FSbnk	7100	
FSins	6110,61200,61300, 6200,6300	
PSacc	A212	
PSarc/eng	A311, A312	
PSleg	A211	
TC	9100	
TRair	322	
TRmar	312, 313	
TRrai	362, 363	
TRrof	372	
Germany	**BoP coding list based on EBOPS**	**NACE rev. 2**
ASbrd	510	602
ASmot		591
CO	570, 580	41, 42, 43
CR	591	53
CS	513	62, 631,582
DS	n.a.	46, 47
FSbnk	533	6419, 649
Germany	**BoP coding list based on EBOPS**	**NACE rev. 2**
FSins	400, 401, 410, 420, 440, 441, 442, 443, 444, 445, 450, 451, 460	651, 652, 6622
PSarc/eng	512	7111, 7112
PSleg/acc	n.a.	691, 692
TC	518	61
TRair	014, 015, 020, 082, 225, 244, 260, 270, 360, 361	511, 5121
TRmar	016, 081, 210, 220, 260	502
TRrai	013, 016, 080, 233, 234, 260, 271, 340	492
TRrof	080, 240, 250, 260, 271, 310, 320, 330, 362, 370	494
Finland	**EBOPS 2002 / 2010**	**TOL 2008**
AS	288 / B111, B112	59, 60
CO	250, 251 / 5100, 5200	41, 42, 43
CR	246 / 3400	53
CS	263 / 9211, 9212, 9220	62, 63
DS	n.a.	46, 47
FSbnk	260 / 7100	641, 643, 649
FSins	n.a.	65
LS	n.a.	52
PSacc	276 / A212	692
PSarc/eng	280 / A311, A312	71
PSleg	275 / A211	691
TC	247 / 9100	61
TRair	952	51
TRmar	n.a.	50
TRrai/rof	223, 953 / 332B	49
Italy	**EBOPS 2002**	**NACE rev. 2**
AS	288	602,591
CR	246	53
CS	263	62, 631,582
PSacc	276	692
PSarc/eng	280	7111, 7112
PSleg	275	691
TC	247	61

Table B.1. Correspondence between STRI sectors and national classifications (*cont.*)

Japan		**JSIC rev. 13**
AS		2102, 2105
CO		301
CS		2103, 2104
DS		2301, 2302
FS		2401, 2601
LS		2202
TC		2101
TR		2201
Sweden	**SNI2007**	
AS	460	
CO	412, 413	
CR	402	
CS	410	
DS	105, 122, 123, 473	
FSbnk	331	
FSins	302-03, 309-10, 315-19, 321	
LS	173, 174, 176	
PSacc	432	
PSarceng	442	
PSleg	430	
TC	403	
TRair	171, 141, 154, 201, 207, 408	
TRmar	140, 153, 172, 390	
TRrof/rai	142, 155, 409; 143, 151, 152, 156	
United Kingdom	**BoP coding list based on EBOPS**	**SIC 07**
ASbrd	39 (until 2012); 43 (2013)	602
ASmot/sou		591, 592
CO	25, 26 (until 2012); 27, 28 (2013)	41, 42, 43
CR	19 (until 2012); 21 (2013)	53
CS	21 (until 2012); 23 (2013)	62, 631
DS	n.a.	46, 47 except 47730, 47741, 47749
FSbnk	27 (until 2012); 29 (2013)	6419, 649
FSins	29 to 36 (until 2012); 30 to 35 (2013)	651, 652, 6622
LS	n.a.	52
PSacc	05 (until 2012); 06 (2013)	69201, 69202
PSarc	47 (until 2012); 48 (2013)	7111
PSeng	48 (until 2012); 49 (2013)	7112
PSleg	11	691
TC	20 (until 2012); 22 (2013)	61
TRair	n.a.	511, 5121
TRmar	n.a.	502
TRrof/rai	n.a.	492, 494
United States	**BE-120**	**NAICS 07**
ASbrd		5122
ASmot		5121
ASsou		515
CO	13	23
CR		491, 492
CS	12, 14	518, 5415
DS		42 (except 4231), 44 (except 441, 446, 447), 45 (except 4539)
FSbnk		522
FSins	11, 27, 28	524
LS		488, 493
PSacc	9	5412
PSarc/eng	16, 18	5413
PSleg	20	5411
TC	30	517
TRair		4811
TRmar		4831
TRrof/rai		4821, 484

Econometric specifications

PPML regression

The Poisson pseudo maximum likelihood regression was established as a standard tool for gravity analysis by Santos Silva and Tenreyro (2006). The regressions are run separately for each exporting country. The estimation equation can be written as

$$X_{ict}^{s} = \exp(\alpha + \beta STRI_{c}^{s} + \gamma Z_{it} + \delta S_{ct} + \theta_{t} + \varepsilon_{ict}^{s})$$

where the outcome variable X_{ict} represents the value of cross-border exports or the value of foreign affiliate sales by firm *i* in destination country *c* and year *t*. Z_{it} contains a vector of firm-level variables and S_{ct} contains a vector of country-level controls on the services importing country or affiliate host country. The STRI variables may include the aggregate STRI score by country and sector or interactions of the STRI with firm-level and country-level variables of interest. θ_t is a matrix of year dummy variable with the first year being omitted as base category and ε_{ict}^{s} is a normally distributed error term. The equation is estimated sector by sector, for each service *s* with available data.

Based on the coefficients from the PPML regression, *ad valorem* tariff equivalents of any STRI score can be calculated as

$$\tau = [\exp(-\beta * STRI_{c}^{s}/\rho) - 1] * 100,$$

where ρ is the import demand elasticity. When analysing interactions of the STRI score with firm-level variables, for example firm turnover, the product of the β vector and the *STRI* matrix from the estimation equation can be written as

$$\beta STRI_{c}^{s} = \beta_{1} stri_{c}^{s} + \beta_{2} stri_{c}^{s} turnover_{i}$$

and the additional tariff equivalent of a small firm *i* relative to large firms is given by

$$\tau_{i} = [\exp(-\beta_{2} * stri_{c}^{s}(\max(turnover) - turnover_{i})/\rho) - 1] * 100,$$

where $\max(turnover)$ indicates the turnover of large firms used as benchmark level of firm size. Only the coefficient β_2 is used for the calculation of the ad valorem tariff equivalent for heterogeneous firms due to higher confidence in the robustness of this coefficient.

Probit regression

The Probit regression is a standard tool for a binary outcome variable. The regressions are run separately for each exporting country. The estimation equation can be written as

$$P(X_{ict}^{s*} > 0) = \Phi(a + bSTRI_{c}^{s} + cZ_{it} + dS_{ct} + \varphi_{t} + \omega_{ict}^{s})$$

where the outcome variable is a binary variable which takes the value of one if positive cross-border exports or foreign affiliate sales by firm *i* exist in destination country *c* and year *t* and the value of zero otherwise. Φ is the cumulative distribution function of the normal distribution and all explanatory variables are identical to those in the PPML specification.

The semi-elasticity of an STRI reduction on the propensity of foreign exports, which is reported in the main test of this report, is given by

$$\frac{\partial \ln[\Phi(a + bSTRI_{c}^{s} + cZ_{it} + dS_{ct} + \varphi_{t} + \omega_{ict}^{s})]}{\partial STRI_{c}^{s}}$$

Technical notes

Where the dependent variable is the value of exports or foreign affiliate sales at the firm level by destination, sector and time, the sample inevitably includes a large share of zeroes in the left-hand side variable. The PPML estimator was used as a standard method to obtain consistent estimates in such cases with many zeroes. It may however be that the data-generating process for the zeroes differs from that of the strictly positive observations, creating concerns about overdispersion and selection. To test the robustness of our results to these concerns, zero-inflated Poisson models and Heckman selection models were also estimated. The results are qualitatively similar.

Another concern may be endogeneity of some of the regressors. Past literature has uncovered "learning by exporting" effects such that firm productivity and size may be positively influenced by being an exporter. Reverse causality may then be a source of bias in the coefficients on size and productivity variables and their interactions with the STRI indices. One way of dealing with this concern would be to include firm fixed effects controlling for unobservable firm characteristics. However given the relatively short time horizon of our panel datasets and the large number of firms, including such high dimensional fixed effects in all regressions would be highly computationally demanding. Specifications with firm fixed effects were tested in a number of instances and yielded very similar results to our baseline specifications.

Lastly, as the STRI is defined at the country-sector level and does not yet have a sufficiently long time series to allow robust inference from time variation in policies, the regressions do not include country fixed effects. This can introduce some bias in the coefficients on the aggregate STRI score as multilateral resistance effects are omitted (Anderson and van Wincoop, 2003). To test the severity of this concern for our main results, the specifications where the STRI indices are interacted with firm-level variables were run alternatively including also the base level of the STRIs or country fixed effects. The addition of country fixed effects did not affect the estimated coefficients on STRI interactions.

Estimation of σ

The estimation of the elasticity of substitution for each sector follows Breinlich (2010). This approach relies on the assumption of a Constant Elasticity of Substitution demand system, as is the case in mainstream trade models. Under this assumption and further assuming that fixed costs are capital expenditures and labour is the main variable input into production, firm profits before fixed costs are given by firm revenue divided by σ. In other words, an estimate of σ can be derived from differences across industries in profitability before investment in fixed capital.

The empirical implementation reported in Table B.2 uses data from the UK Annual Business Survey and the Finnish Financial Statements panel, which contain financial data on a large sample of firms – both engaged in international activities and purely domestic – spanning all sectors.

The estimated σ is the median ratio of turnover to operating profits among all firms primarily active in a given sector. The estimates obtained with the two datasets are then averaged to yield the final estimate.[54] The corporate balance sheet data from Germany is not used because of concerns with the small sample size and biases in the representativeness of the Ustan dataset. For other countries no such data on non-trading firms is available.

The estimates are greater than 1, which ensure that import demand falls as prices rise. They are also lower than usual estimates of σ for goods, which is likely to be the outcome both of a higher aggregation level and of the fact that most services are customised, differentiated products, therefore less easy to substitute for one another.

54. The correlation coefficient between the estimates obtained from the UK and Finland datasets is 0.8.

Table B.2. Estimated elasticities of substitution by sector

Sector	σ
Audio-visual services	1.9
Construction	2.7
Courier services	2.4
Computer services	2.1
Distribution services	5.4
Banking	1.6
Insurance	2.2
Logistics	3.5
Accounting and auditing	2.3
Architecture and engineering	2.2
Legal services	2.1
Telecommunications	2.7
Air transport	1.9
Maritime transport	2.8
Rail and road transport	3.1

Annex C.

Additional Tables and Figures

Table C.1. Pooled Probit regression results: Cross-border exports

	BEL	DEU	FIN	GBR	ITA	USA
STRI	0.045	-0.117	-0.163	-0.177*	0.128	-0.345**
	(0.114)	(0.163)	(0.117)	(0.100)	(0.112)	(0.156)
GDP (log)	0.118***	0.127***	0.121***	0.130***	0.118***	0.199***
	(0.012)	(0.0122)	(0.012)	(0.017)	(0.012)	(0.014)
Distance (log)	-0.138***	-0.0750***	-0.259***	-0.100**	-0.146***	-0.126***
	(0.033)	(0.0252)	(0.055)	(0.046)	(0.027)	(0.046)
Contiguity	0.299***	0.112***	0.106*		-0.030	0.038
	(0.074)	(0.0397)	(0.062)		(0.034)	(0.103)
RTA in services						0.076**
						(0.032)
EEA-EFTA	0.109	0.135**	0.006	0.228*	0.045	
	(0.070)	(0.0530)	(0.084)	(0.125)	(0.063)	
Common legal origin					0.309	
					(0.403)	
Official common language				0.353***		0.193***
				(0.058)		(0.041)
Labour productivity (log)	-0.069***	0.00123	-0.102***	-0.103***	0.052***	-0.024**
	(0.004)	(0.00312)	(0.008)	(0.008)	(0.009)	(0.012)
Turnover (log)	-0.041***	-0.0425***	0.031***	0.013**	-0.055***	0.115***
	(0.005)	(0.00477)	(0.010)	(0.005)	(0.008)	(0.007)
Main activity in goods	-0.459***	-0.252***	-0.215***	-0.316***	-0.231***	*not disclosed*
	(0.019)	(0.0172)	(0.021)	(0.015)	(0.024)	
Foreign-owned	-0.001	0.0237***	-0.108***	-0.236***	-0.186***	*not disclosed*
	(0.012)	(0.00723)	(0.017)	(0.014)	(0.021)	
Importer of services	1.164***	1.789***	1.715***	1.743***	2.028***	*not disclosed*
	(0.033)	(0.0194)	(0.050)	(0.058)	(0.033)	
Constant	-1.564***	-2.679***	-2.541***	-1.708***	-2.275***	-4.963***
	(0.391)	(0.298)	(0.583)	(0.586)	(0.370)	(0.438)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Sector Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	280,399	1,066,709	132,922	162,295	134,208	317,750
R-squared	0.259	0.321	0.288	0.298	0.411	0.215

Note: The regressions are run on a pooled sample of all sectors shown in Figure C.1. for each country, where the STRI index is country- and sector-specific. The dependent variable is an indicator that takes value 1 if the firm exports to a given country in a given sector and year, and 0 otherwise. Standards errors are clustered by importer. ***, ** and * mean statistical significance at 1%, 5% and 10% respectively.

Table C.2. Pooled PPML regression results: Cross-border exports

	BEL	DEU	FIN	GBR	ITA	SWE	USA
STRI	-0.508	-1.268	1.780*	-0.938	-0.821	-1.123	0.370
	(0.462)	(0.978)	(0.976)	(0.777)	(0.861)	(0.833)	(1.305)
GDP (log)	0.492***	0.604***	0.390***	0.649***	0.466***	0.760***	0.781***
	(0.108)	(0.091)	(0.078)	(0.071)	(0.116)	(0.037)	(0.090)
Distance (log)	-0.626***	-0.179	-0.116	-0.183	-0.241	-0.790***	-0.392
	(0.137)	(0.173)	(0.183)	(0.145)	(0.372)	(0.149)	(0.243)
Contiguity	-0.099	0.153	0.139		-0.324**	-0.112	-0.590
	(0.251)	(0.329)	(0.373)		(0.140)	(0.163)	(0.557)
RTA in services							0.307
							(0.348)
EEA-EFTA	-0.675	-0.056	0.182	0.755*	0.352	-0.145	
	(0.417)	(0.371)	(0.375)	(0.419)	(0.699)	(0.316)	
Official common language				0.982***		0.671***	0.797**
				(0.204)		(0.039)	(0.355)
Labour productivity (log)	-0.041	0.049***	0.017	0.083	0.036	0.332***	0.050
	(0.044)	(0.017)	(0.100)	(0.063)	(0.065)	(0.047)	(0.059)
Turnover (log)	0.355***	0.393***	0.607***	0.350***	0.260***	0.806***	0.352***
	(0.020)	(0.031)	(0.063)	(0.047)	(0.033)	(0.039)	(0.035)
Main activity in goods	-1.873***	-2.530***	0.038	-0.425*	-0.545	-0.791***	*not*
	(0.102)	(0.169)	(0.097)	(0.257)	(0.353)	(0.130)	*disclosed*
Foreign-owned	0.111	-0.431***	-1.123***	0.114	0.411*	-0.680***	*not*
	(0.169)	(0.151)	(0.096)	(0.130)	(0.248)	(0.145)	*disclosed*
Importer of services	2.720***	3.939***	3.340***	1.820***	3.783***	0.890***	*not*
	(0.131)	(0.181)	(0.178)	(0.334)	(0.253)	(0.115)	*disclosed*
Constant	-3.036	-9.320***	-15.793***	-7.840***	-8.596***	-27.805***	-6.893***
	(2.359)	(2.172)	(2.410)	(1.734)	(2.481)	(1.925)	(2.651)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Sector Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	280,399	1,066,709	132,348	162,295	113,503	353,798	317,748
R-squared	0.024	0.043	0.130	0.026	0.057	0.132	0.008

Note: The regressions are run on a pooled sample of all sectors shown in Figure C.1. for each country, where the STRI index is country- and sector-specific. The dependent variable is the value of exports by firm, destination, service and year. Standards errors are clustered by importer. ***, ** and * mean statistical significance at 1%, 5% and 10% respectively.

Table C.3. Pooled Probit regression results: Foreign affiliate sales

	DEU	FIN	JPN	USA
STRI	-0.525*	-0.163	-0.501	-1.232***
	(0.274)	(0.117)	(0.546)	(0.311)
GDP (log)	0.283***	0.121***	0.656***	0.364***
	(0.0182)	(0.012)	(0.039)	(0.022)
Distance (log)	-0.120**	-0.259***	-0.536***	-0.253***
	(0.0488)	(0.055)	(0.105)	(0.090)
Contiguity	0.208***	0.106*		0.064
	(0.0752)	(0.062)		(0.189)
RTA in services			0.199	0.056
			(0.152)	(0.088)
EEA-EFTA	0.208**	0.006		
	(0.0937)	(0.084)		
Common legal origin			-0.278	
			(0.202)	
Official common language				0.378***
				(0.084)
Parent labour productivity (log)	-0.0964***	-0.102***	-0.093***	-0.074***
	(0.00719)	(0.008)	(0.012)	(0.008)
Parent turnover (log)	0.118***	0.031***	0.210***	0.133***
	(0.00733)	(0.010)	(0.022)	(0.008)
Parent in goods	-0.403***	-0.215***	-0.033	*not disclosed*
	(0.0354)	(0.021)	(0.098)	
Parent foreign-owned	-0.211***	-0.108***		*not disclosed*
	(0.0264)	(0.017)		
Parent importer of services	0.400***	1.715***		*not disclosed*
	(0.0411)	(0.050)		
Constant	-10.443***	3.847	-9.890***	-9.890***
	(2.794)	(3.752)	(3.267)	(3.267)
Year Fixed Effects	YES	YES	YES	YES
Sector Fixed Effects	YES	YES	YES	YES
Observations	1,391,748	132,922	467,188	297,252
R-squared	0.262	0.288	0.384	0.175

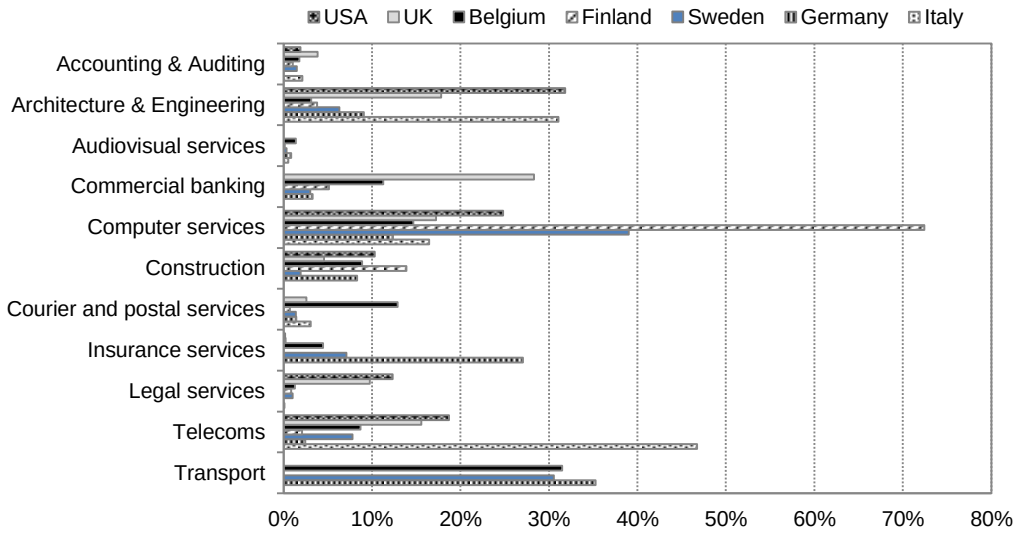
Note: The regressions are run on a pooled sample of all sectors shown in Figure C.2. for each country. The STRI index is country- and sector-specific. The dependent variable is an indicator that takes value 1 if the firm has strictly positive affiliate sales in a given country, sector and year, and 0 otherwise. Standards errors are clustered by importer. ***, ** and * mean statistical significance at 1%, 5% and 10% respectively.

Table C.4. Pooled PPML regression results: Foreign affiliate sales

	DEU	FIN	JPN	USA
STRI	-0.794	-3.448*	1.299	-3.185***
	(0.576)	(1.970)	(2.895)	(1.084)
GDP (log)	0.822***	0.746***	1.037***	0.704***
	(0.070)	(0.078)	(0.109)	(0.132)
Distance (log)	-0.382*	-1.871***	0.573	-0.226
	(0.212)	(0.192)	(0.449)	(0.334)
Contiguity	0.152	0.800***		0.930
	(0.248)	(0.227)		(0.834)
RTA in services			-0.171	-0.511**
			(0.517)	(0.239)
EEA-EFTA	0.219	-1.272***		
	(0.350)	(0.325)		
Common legal origin			0.309	
			(0.403)	
Official common language				0.902***
				(0.282)
Parent labour productivity (log)	-0.128***	-0.098	-0.446***	0.192***
	(0.027)	(0.161)	(0.053)	(0.059)
Parent turnover (log)	0.655***	0.703***	1.258***	0.643***
	(0.042)	(0.085)	(0.060)	(0.064)
Parent in goods	-1.274***	-0.369	0.241	*not disclosed*
	(0.091)	(0.427)	(0.193)	
Parent foreign-owned	-0.458***	0.042		*not disclosed*
	(0.153)	(0.133)		
Parent importer of services	1.452***			*not disclosed*
	(0.137)			
Constant	-12.181***	-6.062***	-31.415***	-15.445***
	(1.764)	(1.826)	(5.677)	(4.536)
Year Fixed Effects	YES	YES	YES	YES
Sector Fixed Effects	YES	YES	YES	YES
Observations	1,391,748	111,056	464,367	297,252
R-squared	0.0905	0.0500	0.174	0.104

Note: The regressions are run on a pooled sample of all sectors shown in Figure C.2. for each country. The STRI index is country- and sector-specific. The dependent variable is the value of foreign affiliate sales by firm, destination, sector and year. Standards errors are clustered by importer. ***, ** and * mean statistical significance at 1%, 5% and 10% respectively.

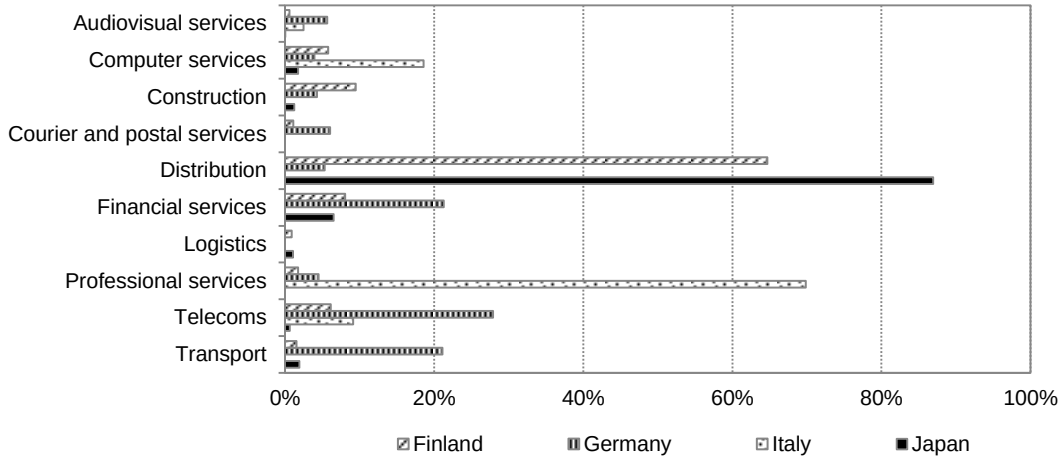
Figure C.1. Composition of the trade in services data by sector



Note: The data covers the period 2013-2014 for Belgium, 2008-2012 for Sweden, 2008-2013 for Germany and Italy, 2008-2014 for Finland and the United Kingdom, and 2009-2012 for the US. Sectors not included in the surveys are: audio-visual services for the UK and the US; accounting and legal services for Germany; insurance for Finland and Italy; transport for Finland, Italy and the UK; construction and commercial banking for Italy and the United States.

Source: Own calculations based on National Bank of Belgium, International Trade in Services; Statistics Finland, International Trade in Services; Research Data and Service Centre of the Deutsche Bundesbank, Statistics on International Trade in Services; Bank of Italy, International Trade in Services survey; Statistics Sweden, Survey of Foreign trade in services; UK Office of National Statistics, International Trade in Services Inquiry; and US Bureau of Economic Analysis, Survey of Transactions in Selected Services and Intellectual Property with Foreign Persons. The statistics reported in this figure refers to the sample analysed and do not cover the full universe of exporting firms.

Figure C.2. Composition of the FATS data by sector



Note: The data covers the period 2008-2014 for Finland, Germany, Italy and Japan. Sectors not included in these surveys are: professional services for Japan; construction for Italy; courier and postal services for Italy and Japan; logistic services for Italy and Germany; construction, distribution, financial services for Italy; transport for Italy and Finland; and audio-visual for Finland. Information on foreign affiliate sales by sector has not been disclosed for the US.

Source: Own calculations based on Statistics Finland, Foreign Affiliate Trade Statistics; Research Data and Service Centre of the Deutsche Bundesbank, Micro-database Direct Investment; Orbis sample of Italian foreign affiliates; Japan Ministry of Economy, Trade and Industry, Basic Survey on Overseas Business Activities; and UK Office of National Statistics, Annual Foreign Direct Investment Inquiry. The number of parent companies refers to the sample analysed and does not cover the full universe of multinational parents.