

Lodefalk, Magnus; Kyvik Nordås, Hildegunn

**Working Paper**

## Trading firms and trading costs in services: The case of Sweden

Working Paper, No. 4/2017

**Provided in Cooperation with:**

Örebro University School of Business

*Suggested Citation:* Lodefalk, Magnus; Kyvik Nordås, Hildegunn (2017) : Trading firms and trading costs in services: The case of Sweden, Working Paper, No. 4/2017, Örebro University School of Business, Örebro

This Version is available at:

<https://hdl.handle.net/10419/244526>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



WORKING PAPER

4/2017

**Trading firms and trading costs in services: The  
case of Sweden**

Magnus Lodefalk and Hildegunn Kyvik Nordås  
*Economics*

ISSN 1403-0586

# Trading firms and trading costs in services: The case of Sweden

Magnus Lodefalk, Örebro University and Ratio Institute<sup>1</sup>

Hildegunn Kyvik Nordås, OECD and Örebro University

## Abstract

This paper first portraits Swedish services exporters and services MNEs; second it analyses the determinants of services exports and affiliate sales; and third it studies the choice of mode of entering a foreign market. Emanating from a heterogeneous firm internationalization model, the main contribution of the paper is to explore the interaction between firm characteristics and foreign market characteristics, particularly policy-induced services trade barriers, in shaping services trade and investment patterns. Exploiting a large and very detailed firm-level dataset for the 2008-2013 period, the descriptive analysis finds that most exporting firms export one or two products to a few, most often other Nordic countries. Still, firms that export to 25 or more markets account for more than 80% of total export value. Furthermore, firms that export to 20 countries export more than 60% to their main destination country. Similar patterns are found for affiliate sales. Using a gravity approach we then study the determinants of the extensive and intensive margin of exports and affiliate sales in pooled as well as sector level regressions. We find that trade costs, both natural and policy-induced have the largest impact on the extensive margin of trade, suggesting that trade costs facing services exporters are mainly in the form of fixed entry costs. This is further supported by the finding that incumbency is the most important determinant of future exports and affiliate sales, and incumbents tend to be protected and thrive behind trade barriers.

JEL: D22, F13

Keywords: services trade, affiliate sales, trade costs, micro data, Sweden

## 1. Introduction

The aggregate benefits of international trade stem from exploiting comparative advantage; deepening division of labour through international production networks; and widening consumer choice without foregoing economies of scale. The aggregate outcome does, however, conceal considerable structural changes at the micro level including the entry and exit of firms; job creation as well as job destruction. In the popular debate the overall gains from open markets and trade are mostly recognised, but more attention has been paid to a possible link between globalisation and job losses and stagnating median income. To address these concerns and mitigate undesirable social impacts, a better understanding of micro-economic dynamics behind the overall gains is needed.

Recent theory developments starting with a seminal paper by Melitz (2003), supported by a growing body of empirical analysis of firm behaviour, have shed light on the impact of globalisation on structural changes and the adjustments taking place at the firm level. Empirical research using micro data has largely focussed on the manufacturing sector, but recently a small, but growing body of

---

<sup>1</sup> Lodefalk: Örebro University, SE-70182, Örebro, and Ratio Institute, Box-3202, SE-10364, Stockholm, Sweden. E-mail: [magnus.lodefalk@oru.se](mailto:magnus.lodefalk@oru.se). Kyvik Nordås (corresponding author): Trade and Agriculture Directorate, OECD, Paris, France. E-mail: [hildegunn.nordas@oecd.org](mailto:hildegunn.nordas@oecd.org).

empirical research also sheds light on the characteristics of services exporters. Similar to exporters of goods, services exporting firms tend to be larger, more productive, more often foreign owned and they pay higher wages than non-exporters (Wagner, 2012).

Micro data analyses are country-specific out of necessity because such data are compiled under strict confidentiality and there is no common methodology for sample selection and classification. Furthermore, the variables contained in the micro databases differ across countries. General insights from this body of research are still tentative (Wagner, 2012) and more research is needed to understand how the special features of services play out in the global market place. Given that services account for up to 80% of employment in rich countries and many services are substantially transformed by the digital revolution, the importance of understanding the dynamics of the services sector cannot be overstated.

This paper presents a portrait of Swedish services exporters and relates their market entry and trade performance to the policy regime they face abroad. Sweden is a relatively small and open economy home to a number of multinational enterprises with well-known brand names both in manufacturing and services. Examples are Ericsson, Volvo, IKEA, H&M, Atlas Copco and Scania to mention but a few. Manufacturing firms in Sweden are increasingly servicifying—buying, producing and exporting services (Lodefalk, 2013, 2014). Swedish entrepreneurs have also been at the technology frontier in the digital economy with firms such as Spotify taking an early and prominent position in the market for music streaming and Minecraft in computer games.

We find that Swedish firms by and large fit the portrait of exporting firms reported in other studies. However, foreign-owned firms in Sweden are less likely to export and having entered export markets they export less than Swedish-owned firms. Furthermore, Swedish firms appear to be much more sensitive to trade costs other than those related to physical distance, at the extensive margin than at the intensive margin, suggesting that services exporters largely face fixed cost of entering new markets, be it for new products or entering new countries. This interpretation is further strengthened by the fact that one of the most important determinants of both exports and affiliate sales is previous experience with exports or affiliate sales to the same country. Furthermore, incumbents tend to sell more in countries with high policy induced trade restrictions, suggesting that such restrictions may actually protect incumbents from new entrants. Services exports in one year is also a strong predictor for foreign affiliate sales in subsequent years, indicating that firms may enter a market through exports before they establish affiliate sales there. We finally observe that services exports and services imports go together. Thus, services importing firms are much more likely to export services and they export more than firms that do not import services.

## **2. Relation to previous research**

### *Descriptive analysis – portrait of exporters, importers and MNEs*

There is a small but fast-growing empirical, mainly descriptive literature portraying exporting and importing firms and comparing them to non-exporting firms over variables such as productivity, firm size, ownership structure, profits and firm survival to mention the most important. Most studies focus on manufacturing firms, but recently a few papers on services exporters have been added to the literature. Interestingly, it is documented that manufacturing firms are important services exporters, particularly of computer services and other business services. This also applies to Sweden where Gozzo (2010) found that manufacturing firms accounted for about a third of services exports.

The stylised facts that emerge from the descriptive literature are that most firms do not export; most of those that do, export to one or a few markets; and exporting firms tend to be larger, more productive and more often have foreign ownership than non-exporting firms. It is also clear that firms that export to multiple export markets are more productive than both non-exporters and firms that export to one market only. Similar patterns are found for importing firms (Bernard et al. 2007; Antràs et al. 2016) and firms that export and import goods and services are the most productive. Finally, exporting firms also tend to pay higher wages, but this effect tends to disappear once worker characteristics are taken into account (Wagner, 2012).

Lööf (2010) related export status to productivity using Swedish firm level data for the period 1997-2006. He aimed at determining whether firms are more productive because they export (the learning by exporting hypothesis) or whether they export because they are more productive (the self-selection into export hypotheses) and found support for the self-selection hypothesis. He also found that the productivity premium from exporting is larger for services firms than for manufacturing firms, a feature that few other papers report. Furthermore, while other studies have found that manufacturing firms account for a large share of services exports, Lööf (2010) found that services firms account for more than a third of total Swedish manufactured exports in 2006, up from 25% in 1997.

The findings from Swedish micro data is otherwise similar to those for the UK (Breinlich and Criscuolo, 2011), France (Gaulier et al 2010), Germany (Kelle and Kleinert, 2010; Vogel, 2011), Italy (Conti et al, 2010; Federico and Tosti 2012) the Netherlands (Kox and Rojas-Romagosa, 2010), Belgium (Ariu, 2016), Austria (Walter and Dell'mour, 2010) and two comparative studies, one for Finland, France, Ireland and Slovenia (Haller et al., 2014) and one for France, Germany and the UK (Temouri et al., 2013). The German results on the productivity premium are, however, not robust to the exclusion of outliers (Vogel and Wagner, 2011). Finally, it appears that the productivity premium for exporting firms is either smaller or about the same for services as for goods in other studies (Breinlich and Criscuolo, 2011; Kox and Rojas-Romagosa, 2010; Ariu, 2016).

A few papers have also covered trade through commercial presence, i.e. sales from subsidiaries abroad. Rouzet et al (2017) compare Finland, Germany, Italy, Japan, the UK and the US and find that firms which establish foreign affiliates in services are even larger and fewer than those that engage in cross-border trade, they establish in fewer foreign markets, but foreign affiliate sales nevertheless dwarf cross-border exports. Kelle et al (2013) and Christen and Francois (2015) report similar findings for Germany and the US respectively. Interestingly, Rouzet et al (2017) find that services exports are highly concentrated even for the firms that are present in the largest number of export markets. Thus, the top destination market accounts for about half of services exports and affiliate sales. Using a similar methodology as Rouzet et al (2017) we assess to what extent Sweden conforms to the stylized facts reported in the literature; in which aspects Sweden is different and possible explanations for such differences. We find that policy-determined trade barriers are most important at the extensive margin, and that they tend to protect incumbent firms in a given market. We find a strong relationship between trade in goods and services and between exports and imports of services. The most important determinant of current affiliate sales and exports to a given market is, however previous exports or affiliate sales to the same market, suggesting that relevant experience is highly country-specific. Contrary to other studies, we find that foreign-owned firms are less likely

to export and they export less than Swedish-owned firms, indicating that foreign-owned firms in Sweden focus on the local and possibly the Nordic market.

### *Explaining firm behaviour in international markets*

Motivated by early empirical findings largely from manufacturing firms, the role of firm heterogeneity in the structural changes following globalisation was first embedded in a model of trade and product differentiation in a seminal paper by Melitz (2003). In his model the key firm characteristic that determines export status, entry and survival is the productivity level. The model predicts that a reduction in trade costs induces the most productive firms to expand in export markets and lowers the productivity threshold for entering export markets and thus draws new firms into international markets. Less productive firms service local markets only, while the least productive firms exit. The total number of firms declines and the average size and productivity of firms in an economy increases.

The Melitz (2003) model inspired a host of papers embedding firm heterogeneity into the gravity model. Assuming that the distribution of firms along the productivity dimension follows a Pareto distribution, the resulting gravity equation could be estimated on aggregate trade data.<sup>2</sup> The major new insight from this research is the distinction between the intensive and extensive margin of trade. The model explains a previously ignored empirical feature of international trade, namely the significant number of country pairs that do not trade with each other.

By and large bilateral services trade in the aggregate as well as specific services sectors, notably business services, are well explained by the gravity model featuring heterogeneous firms.<sup>3</sup> In the same manner as for goods, bilateral trade in services increases with the market size of both parties and declines with geographical, cultural and institutional distance. Services trade is also muted by trade restricting regulation and differences in the regulatory regime (Nordås and Rouzet, 2016; Nordås, 2016).

The gravity model has also been applied to firm-level data using the variation in partner country features to explain the determinants of firms' selection into export markets and which markets they choose to enter.<sup>4</sup> This allows a richer analysis of the margins of trade, looking not only at the number of exporters and the average exports per firm, but also changes in the composition of exporting firms following a policy change. Crozet et al (2016) find that French business services are much less likely to export to countries with burdensome domestic regulation such as licensing and recognition of qualifications or lack thereof.<sup>5</sup> Firms also export less to the more restrictive markets that they enter into. From a policy perspective the models featuring heterogeneous firms provide an analytical framework for studying the possible need for and effect of incentives for entering export markets and conversely the need for and effect of policies to compensate and assist individuals that lose their jobs due to structural changes.

Rouzet et al (2017) relate trade and foreign affiliate sales to services trade restrictions measured by the OECD Services Trade Restrictiveness Index (STRI). They find that both trade and foreign affiliate sales are significantly hampered by services trade restrictions. Furthermore, small firms and firms with less experience in servicing foreign markets are more affected by services trade barriers than

---

<sup>2</sup> See Melitz and Redding (2014) for a review.

<sup>3</sup> See Francois and Hoekman (2010) for a recent survey.

<sup>4</sup> See Head and Mayer (2014) for a recent review of the gravity literature.

<sup>5</sup> The measure of burdensome regulation in this paper is the OECD Product Market Regulation (PMR) indices for professional services.

large firms with an established presence in the market in question. Finally, they find that foreign affiliates are less affected by trade restrictions in the home country of their parent than other exporters to that market. These findings suggest that services trade barriers may protect incumbents and large multinational firms from start-ups and entrants into new markets, a finding with very significant policy implications if confirmed in subsequent analysis.

A few papers have analysed empirically the decision to enter markets through exports or commercial establishment for services. Kelle et al (2013) used German firm level data and found that services firms tend to enter foreign markets mainly through exports and that the firms that engage in outward FDI are also the large exporters. Conditioning on having entered foreign markets at all, using a generalised ordered logit model, they find that firms are more likely to choose FDI in distant markets and larger markets; when cross-border trade costs are high; and when wages in the host country are not too high. Surprisingly, they find no effect of policy restrictions on FDI on choice of mode. Christen and Francois (2015) in contrast found a strong negative effect of FDI restrictions on the share of foreign affiliate sales. They studied the choice of mode for US firms and found that the distance effect was particularly strong for business services. Moreover, the relative importance of affiliate sales was larger in markets where the US had more manufacturing FDI.<sup>6</sup> Finally Bhattacharya et al. (2012) argued that FDI may be the easiest route to a foreign market in services sectors characterised by heterogeneous firms, close to zero trade costs and uncertainty related to the quality of the service. They tested their model setup on Indian data comparing chemicals where transport costs are significant but quality easily verified, to computer services where trade costs are low but quality uncertain. They found that as expected, Indian computer services exporters are more productive than computer services firms servicing foreign markets mainly through FDI.

This paper follows Rouzet et al. (2017) methodology closely to provide comparable further evidence of the relationship between trade restrictive policies and trade in services. In addition we analyse the determinants of the choice of mode of supply of Swedish services exporters using SUR and three-stage GLS estimates of exports and affiliate sales and GLM estimates of the share of exports in total services sales. We are particularly interested in shedding more light on the role of policy in shaping trade and investment patterns, given the mixed results in the literature so far. It turned out, however, that matching the export and affiliate sales data can be problematic and our results should be seen as preliminary on this account. With that caveat in mind, there is some evidence that exports precede affiliate sales and that exports are more sensitive to trade restrictions on the intensive margin than are affiliate sales. Intuitively this makes sense since affiliate sales are preceded by fixed and sometimes sunk cost of establishment, after which a foreign-owned firm in most cases faces the same regulations as local firms in the host market.

### **3. Analytical framework**

As we will see in the next sections, most services exporting firms export to one or a few markets and most MNEs establish in one or a few foreign countries. The first variable of interest is therefore the decision to enter a foreign market and what determines which firms chose to export to which markets, which firms choose to establish an affiliate in which country and to what extent the export

---

<sup>6</sup> Christen and Francois (2015) applied GLM estimations for the share of foreign affiliate sales in total sales and SUR as a robustness check.



and MNE decisions are linked. For this we build on the insights from Melitz's (2003) and subsequent empirical applications as reviewed in Melitz and Redding (2014).

Heterogeneous firms draw productivity  $\varphi$  from a Pareto distribution  $G(\varphi) = 1 - (1/\varphi)^k$  and start to produce if the productivity level exceeds a threshold for entering the local market. Entering a foreign market involves expenditure on market research, negotiating a contract with a client or customer, complying with regulation in the destination market and other costs. These are partly or fully independent of the subsequent trade volume and must be incurred in each market that the firm enters. In addition there may be variable trade costs,  $\tau_{jh}$ , that are proportional to trade values. Therefore, it pays off for a firm to enter a foreign market only if it obtains a price and export volume such that the fixed cost of entering the market is recovered. The ability of a firm to recover its entry cost depends on its own productivity, its ability to differentiate the product from competitors and the fixed cost of entering the market in question.

Making the standard assumption of monopolistic competition, a firm's mark-up over marginal costs is a constant that depends on the elasticity of substitution between different varieties of the product category,  $\sigma_h > 1$ , which may differ across sectors, but is assumed to be the same across markets within a sector. Further, we assume a simple, constant returns to scale production technology  $x(\varphi) = \varphi l$  where labour is the only factor of production. Finally, consumers are assumed to have homothetic preferences and spend constant shares of their income on each product category. The unit price, revenue and profit of firm  $i$  in sector  $h$  from selling in market  $j$  is then be given by:

$$p_{ijh}(\varphi) = \frac{\sigma_h}{1-\sigma_h} \frac{\tau_{jh} w}{\varphi} \quad (1)$$

$$r_{ijh}(\varphi) = \frac{\sigma_h}{1-\sigma_h} \frac{\tau_{jh} w}{\varphi} x_{ijh}(\varphi) = A_{jh} \left( \frac{\sigma_h - 1}{\sigma_h} \right)^{\sigma_h - 1} \left( \frac{\tau_{jh} w}{\varphi} \right)^{1 - \sigma_h} \quad (2)$$

Where  $A_{jh} = X_{jh} P_j^{\sigma_h - 1}$  represents total demand in country  $j$  for product category  $h$  and  $P_j^{\sigma_h - 1}$  is a CES price index aggregating the prices of all varieties of products in sector  $h$  available in country  $j$ .

$$\pi_{ijh}(\varphi) = \frac{r_{ijh}(\varphi)}{\sigma_h} - F_{jh} = A_{jh} \frac{(\sigma_h - 1)^{\sigma_h - 1}}{\sigma_h^{\sigma_h}} \left( \frac{\tau_{jh} w}{\varphi} \right)^{1 - \sigma_h} - F_{jh} \quad (3)$$

Firms will enter market  $j$  if the profit from doing so is positive. The cut-off productivity level for entering the market is derived by setting profits to zero and solving for the productivity parameter:

$$\bar{\varphi} = B * A_{jh}^{1/(1-\sigma_h)} \tau_{jh} w F_{jh}^{1/(\sigma_h-1)} \quad (4)$$

Where  $B$  is a constant depending on  $\sigma_h$ . The cut-off productivity level for entering the market is lower the larger the foreign market and the higher the higher is the marginal costs of production as represented by the wage rate, and the fixed and variable costs of entering the foreign market. Firms have to incur the fixed costs in each market they enter, and for various reasons such as coordination costs of operating in a large number of markets, it is unlikely to enter all the markets for which the productivity cut-off rate holds.<sup>7</sup> Entering a foreign market is therefore thought of as a probability

---

<sup>7</sup> The model abstracts from possible cost-spillovers across markets and treats entry into a new market as a decision independent from the number of markets the firm has already entered.

depending on the parameters and variables included in the zero profit condition, which can be estimated empirically:

$$d_{ijht} = Pr(D_{ijht} = 1 | \text{observed variables}) = \Phi(\alpha_0 + \gamma Z_{iht} + \delta F_{jht} + \eta \tau_{jht} + \phi_j + \varsigma_h + \chi_t + \varepsilon_{ijht}) \quad (5)$$

$D_{ijht}$  is a dummy that takes value unity if firm  $i$  exports to country  $j$  in sector  $h$  at time  $t$ .  $Z_{iht}$  represents a vector of firm-specific characteristics,  $F_{jht}$  is a vector of country-sector-time specific measures of fixed costs facing all firms that enter the market,  $\tau_{jht}$  represents variable trade costs facing all firms that exports to country  $j$  in sector  $h$  at time  $t$ . The last four terms are country, sector and time fixed effects and an error term respectively. Having entered market  $j$ , firms' export volume is determined by market demand, the relative price of the exporting firm's product and variable trade costs:

$$x_{ijht} = A_{jht} p(\varphi)_{ijh}^{-\sigma_h} \quad (6)$$

An econometric specification of this equation, using the Poisson pseudo maximum likelihood estimator can be expressed as:

$$x_{ijht} = \exp(\beta_0 + \lambda Z_{iht} + \mu S_{jt} + \varrho \tau_{jht} + \phi_j + \varsigma_h + \chi_t + \varepsilon_{ijht}) \quad (7)$$

where  $S_{jt}$  is a vector of country-time specific control variables that determine total demand.

The determinants of foreign affiliate sales can be modelled in much the same way. The difference is that there are no trade costs, the marginal cost of production is determined by host country wages and the fixed cost of entering the market is of a different nature and presumably higher than the fixed cost of exporting. Thus, we index Swedish services multinationals  $m$  in the set of equation:

$$p_{mjh}(\varphi) = \frac{\sigma_h w_j}{1 - \sigma_h \varphi} \quad (8)$$

$$r_{mjh}(\varphi) = \frac{\sigma_h w_j}{1 - \sigma_h \varphi} x_{mjh}(\varphi) = A_{jh} \left( \frac{\sigma_h - 1}{\sigma_h} \right)^{\sigma_h - 1} \left( \frac{w_j}{\varphi} \right)^{1 - \sigma_h} \quad (9)$$

$$\pi_{mjh}(\varphi) = \frac{r_{mjh}(\varphi)}{\sigma_h} - V_{jh} = A_{jh} \frac{(\sigma_h - 1)^{\sigma_h - 1}}{\sigma_h^{\sigma_h}} \left( \frac{w_j}{\varphi} \right)^{1 - \sigma_h} - V_{jh} \quad (10)$$

Firms will establish an affiliate in market  $j$  if the profit from doing so is positive. The cut-off productivity level for entering the market is found by setting profits to zero and solving for the productivity parameter:

$$\bar{\varphi}_m = B * A_{jh}^{1/(1 - \sigma_h)} w_j V_{jh}^{1/(\sigma_h - 1)} \quad (11)$$

Firms will enter through foreign affiliate when  $\pi_{mjh}(\varphi) > \pi_{ijh}(\varphi)$ , a condition that represents a trade-off between production costs and investment cost on the one hand and trade costs on the other. Previous papers suggest that  $V_{jh} > F_{jh}$  and that MNEs are significantly larger and more productive than firms that service foreign markets through trade only. Nevertheless, there is nothing in the setup that prevents that  $\bar{\varphi} > \bar{\varphi}_m$  if the foreign country has much lower wages than Sweden

and variable trade costs are low. Furthermore as shown by Bhattacharya et al (2012), if the quality of the service is uncertain and the uncertainty is higher for cross-border trade, the exporter productivity cut-off could be higher than the MNE cut-off rate. To capture this possibility the profit functions are extended by adding a probability  $\rho_{hj}$  that the exporting firm will face zero demand in sector  $h$  and market  $j$ , and  $1 - \rho_{hj}$  that it will face positive demand which would yield revenues as given by (2). By the same token, MNEs face a probability  $\rho_{mhj}$  of zero demand in sector  $h$  and market  $j$ , and  $1 - \rho_{mhj}$  that it will face positive demand which would yield revenues as given by (9). The cut-off productivity levels for exporters and MNEs would then be modified by the quality uncertainty as follows

$$\bar{\varphi}_e = B * [(1 - \rho_{hj})A_{jh}]^{1/(1-\sigma_h)} \tau_{jh} w F_{jh}^{1/(\sigma_h-1)} \quad (4a)$$

$$\bar{\varphi}_{me} = B * [(1 - \rho_{mhj})A_{jh}]^{1/(1-\sigma_h)} w_j V_{jh}^{1/(\sigma_h-1)} \quad (11a)$$

We first estimate the extensive and intensive margin of foreign affiliate sale assuming that modes of supply are independent, using regression equations (5) and (7) with affiliate sales as the dependant variable. Second, we extend the analysis to explore possible linkages between exports and affiliate sales. From the condition  $\pi_{mjh}(\varphi) > \pi_{ijh}(\varphi)$  we can derive the following regression equations:<sup>8</sup>

$$d_{mjht} = Pr(D_{mjht} = 1 | \text{observed variables}) = \Phi(\alpha_0 + \gamma \Psi_{mht} + \delta V_{jht} + \xi F_{jht} + \nu \tau_{jht} + \phi_j + \varsigma_h + \chi_t + \varepsilon_{mjht}) \quad (12)$$

Now foreign affiliate entry depends on the fixed costs of establishing an affiliate relative to the fixed and variable costs of exporting to the same market. We also include in the firm-specific controls  $\Psi_{mht}$  whether or not the firm exports to the same market in the current period or in previous periods to explore to what extent exports precede establishment of foreign affiliate.

$$x_{mjht} = \exp(\beta_0 + \lambda \Lambda_{mht} + \mu S_{jt} + \varrho \tau_{jht} + \phi_j + \varsigma_h + \chi_t + \varepsilon_{ijht}) \quad (13)$$

Where we include export value in the firm-specific control  $\Lambda_{mht}$  to asses to what extent foreign affiliate sales and exports are complements, substitutes or independent. Finally, as a robustness check we run the PPML regressions for exports and affiliate sales simultaneously (SUR).

#### 4. Data

##### *Swedish firm-level data*

We base the empirical analysis on our matched firm-level panel dataset for Sweden in the 2008-2013 period. Using unique identification numbers for all Swedish firms, we have merged several register datasets from Statistics Sweden. Financial information on all active private firms, excluding the financial sector, comes from the Structural Business Statistics. From here we retrieve data on turnover, assets, employment, etcetera. Data on firm affiliations and firm dynamics are from the Enterprise Group Register and the Firm and Plant Dynamics Register. Data on foreign trade by firm-year-partner-product/service come from the Foreign Trade Statistics. For goods trade with countries

<sup>8</sup> The extension related to uncertainty about quality does not necessarily alter the regression function, but it does have an impact on the interpretation of the results, particularly in cases when the productivity cut-off rate is higher for exports than for MNEs. It also has some significant policy implications.

outside the EU is register-based (Extrastat data from the Swedish Customs). For goods trade with other EU countries, data is from the Intrastat population survey, with registration applying to trading firms whose total trade with the rest of the EU excludes a certain threshold (4.5 million SEK). Trade in services is recorded through a stratified survey among approximately 6,000 firms (GATS modes 1, 2 and 4), where the largest firms in terms of turnover or trade regularly are included.<sup>9</sup> Finally, we add data on firm activities abroad, using the total population survey on Swedish controlled enterprise groups with subsidiaries abroad. The survey collects information about firm activities in terms of foreign affiliates, their sales and employment. In this way, we include information on commercial presence abroad (GATS mode 3).

In line with the title of our paper, we focus our analysis on firms that export services, irrespective of whether they are in the services or manufacturing sector. We therefore include firms that export to at least one foreign market and have at least five employees at one point in time in the period studied. Data for the smallest micro-enterprises are known to be noisy and being less carefully screened by statistical offices. The restrictions are also motivated to capture firms that more regularly are included in the services trade survey. The resulting sample consists of approximately 15 million observations and each year there are approximately 1,500 firms included.<sup>10</sup>

#### *Gravity variables*

The standard gravity variables related to geographical, cultural and institutional differences are from CEPII (Head et al., 2010).

#### *The STRI*

Information on services trade policy draws on the OECD Services Trade Restrictiveness Indices (STRI) and database.<sup>11</sup> The indices reflect de jure services trade restrictions which are catalogued, scored and weighted to produce composite indices taking values between zero and one. Zero represents a fully open sector and one a completely closed market. The indices are calculated for 22 services sectors for the 35 OECD member countries plus Brazil, China, Colombia, Costa Rica, India, Indonesia, Lithuania, Russia and South Africa.

The STRIs contain a set of core measures common for all sectors and in addition sector-specific measures. Examples of the latter are access and interconnection regulation in telecommunications and rail services, conditions related to obtaining a licence in regulated professions, and measures related to copyright management across borders in audio-visual services, to mention but a few. Exemptions from such restrictions negotiated through free trade agreements are not taken into account in the STRI database and indices. This is less of a problem than one may think. First, services trade barriers are largely behind the border in the form of domestic regulation. Second, free trade agreements rarely provide meaningful market access beyond making legally binding the liberalisation that has already taken place unilaterally. The only significant exception to this is the European Economic Area (EEA), to which Sweden is a member. To control for preferential access that Swedish firms enjoy in the EEA, we include a dummy which takes the value of unity if the export destination or host country of Swedish affiliates are a member of the EEA and zero otherwise.

---

<sup>9</sup> Trade in services is defined according to the United Nations (2002) definition: a cross-border transaction related to a contract on services sales. For details on the FTS for services, see, e.g., Growth Analysis (2010).

<sup>10</sup> In addition, a very limited number of observations with negative services export are excluded, representing less than 0.1% of the total.

<sup>11</sup> The STRI database, indices, methodology, country notes, sector notes etc. are available at <http://oe.cd/stri>

## 5. A portrait of Swedish services exporters and MNEs

### *Descriptive statistics*

Table 1 reports the summary statistics of the major firm-level variables included in the empirical analysis. As in other countries, firms that serve the local market only or export only occasionally, are smaller and less productive than exporting firms and multinational firms. A special feature of the Swedish data is that exporters are both larger and more productive than multinationals. A possible explanation is related to the high share of foreign owned firms among MNEs. These are daughters or affiliates of firms with their headquarters abroad and firms with headquarters in Sweden but with majority foreign ownership. The summary statistics suggest that these may be oriented towards the Swedish and possibly the Nordic markets, a hypothesis that is supported by further analysis presented in subsequent sections of this paper.

**Table 1. Descriptive statistics, services firm characteristics, 2012**

	Total	Exporters	MNEs	Local only
Firms	1907	783	1205	142
Sales, turnover	213.16	502.20	268.78	20.19
Assets	33,015.02	76,482.40	44,936.71	4,371.14
Employment	361	808	432	63
Labour productivity (va)	0.17	0.22	0.17	0.18
Labour productivity (sales)	1.09	1.75	1.20	0.68
Foreign-owned	0.43	0.53	0.63	0

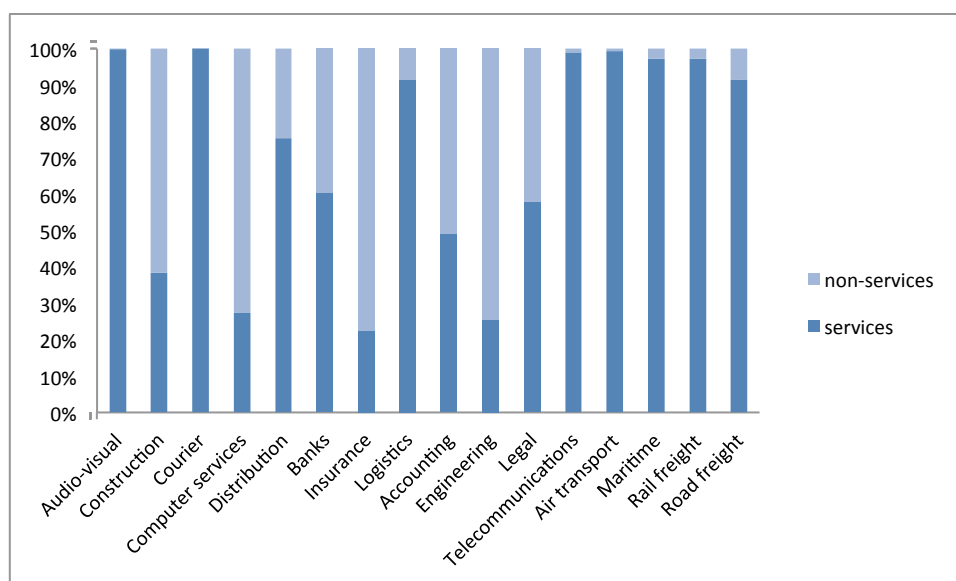
Note: Displayed are number of firms and mean values for other variables. Financial variables are in millions of USD. Local firms are firms that may export services in period 2008-2013, but not in 2012. The table reports summary statistics for the firms included in the regression analysis.

Source: authors' estimates based on data from Statistics Sweden.

As noted in the introduction, manufacturing firms are important producers, exporters and importers of services in Sweden. This is highlighted in Figures 1 and 2, which depict the share of total services exports and affiliate sales respectively undertaken by firms with their main activity in manufacturing, by STRI sector. Manufacturing firms' share varies widely across sectors, with next to no contribution in audio-visual services, telecommunications and air transport but almost three quarter of the total in engineering (which is lumped together with architecture in the data). Surprisingly, manufacturing firms appear to have a high share of exports in financial services (banking and insurance). However, a brief look at the website of Volvo, one of the largest Swedish multinationals manufacturing firms, reveals that financial services are one of its major activities in foreign markets.<sup>12</sup>

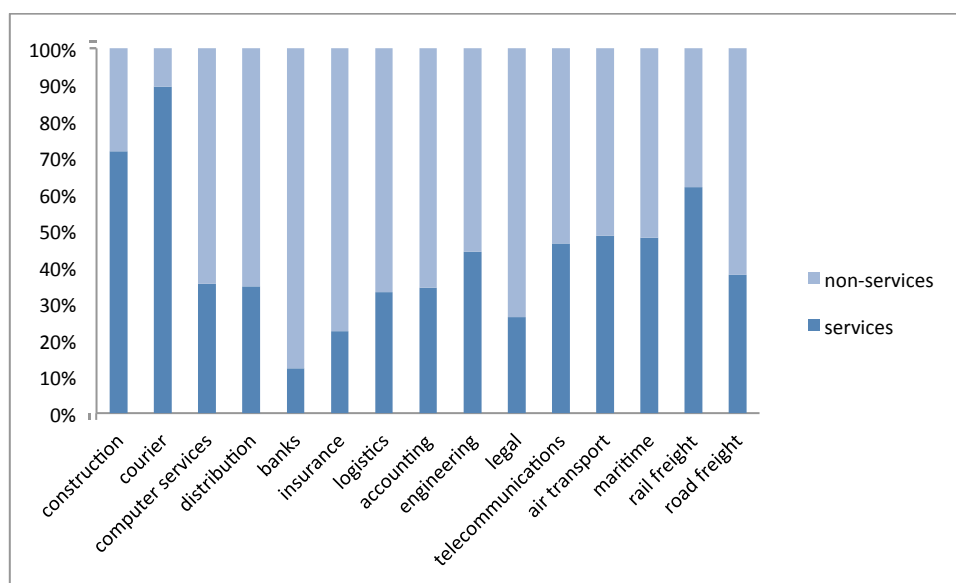
<sup>12</sup> See <http://www.volvo.com/home.html>, (consulted 08.06.2017)

**Figure 1. Distribution of export value between services and non-services firms, by sector**



Source: Authors' estimates based on data from Statistics Sweden.

**Figure 2. Distribution of foreign affiliate sales between services and non-services MNEs, by sector**



Source: Authors' estimates based on data from Statistics Sweden.

We continue the descriptive analysis with a broader sample of firms, including all firms entailed in the database that have exported at least one service to at least one foreign market at least once during the period 2008-2012. The pattern of export activities is reported in Table 2.

**Table 2. Number of exporters and services exports by firm, 2008-2012**

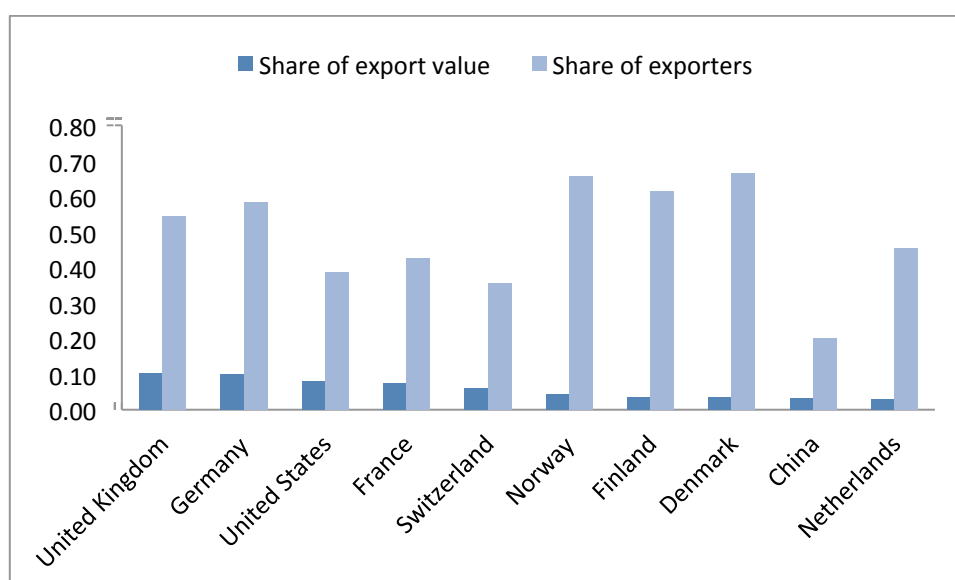
Year	Number of exporters	Average number of partner countries by firm	Average number of products exported by firm	Total exports, billion SEK	Average bilateral exports per firm, million SEK	Average worldwide exports per firm, million SEK	Share of exporters with main activity in services
2008	765	13.7	2.4	345.9	33.0	452.2	0.23
2009	799	13.7	2.5	382.2	34.8	478.4	0.23
2010	631	16.3	2.5	369.3	36.0	585.2	0.21
2011	673	16.1	2.6	403.8	37.3	600.0	0.20
2012	783	16.1	2.6	455.2	36.1	581.3	0.23

Source: authors' estimates based on data from Statistics Sweden.

Table 2 shows that over this short period export growth has taken place partly on the intensive margin with more exports per firm and partly on the extensive margin where firms enter new markets and to a lesser extent export additional products. The number of services exporters has fluctuated over the period, but there does not seem to be a trend. Since the underlying data contains a core of the same firms surveyed every year and a set of firms that vary over years, small changes from one year to the next could be due to changes in the sample and should be interpreted with caution.

Figure 3 depicts the ten most important export destinations in terms of share of export value and share of exporters servicing the market in question. Export destinations are ranked by share of export value.

**Figure 3. Top ten export markets (export value and number of exporters) 2008-2012**

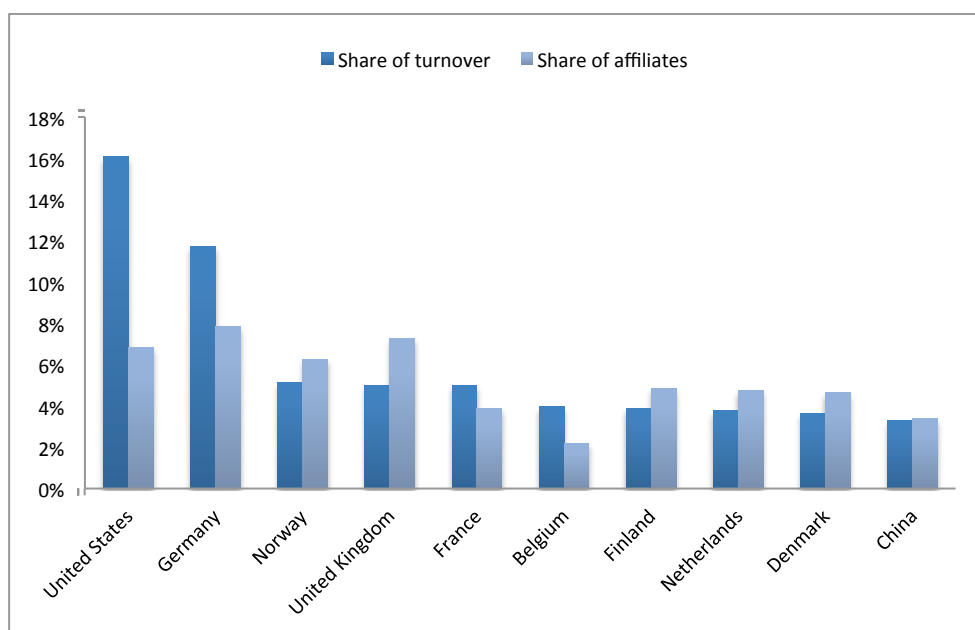


Note: Only the top ten destinations are reported in the Figure. The destination markets are ranked by the share of export value in total exports over the period considered.

Source: Authors' estimates based on data from Statistics Sweden.

As one would expect, the large EU markets and the United States are the most important export destinations measured by export value. Nevertheless, two thirds of all exporting firms are engaged in exports to one or more of the neighbouring Nordic countries. The Nordics share a common legal system, common borders and a common market predating the European Union and trade significantly more services with each other than predicted by the standard gravity model (Nordås, 2017). The high share of exporters to the Nordic countries thus reflects low entry barriers for Swedish services exporters.

**Figure 4. Top ten host countries for affiliate sales (total sale, number of affiliates), 2008-2012**



Note: Only the top ten host markets are reported in the Figure. The markets are ranked by the share of turnover in total turnover over the period considered.

Source: Authors' calculations based on data from Statistics Sweden.

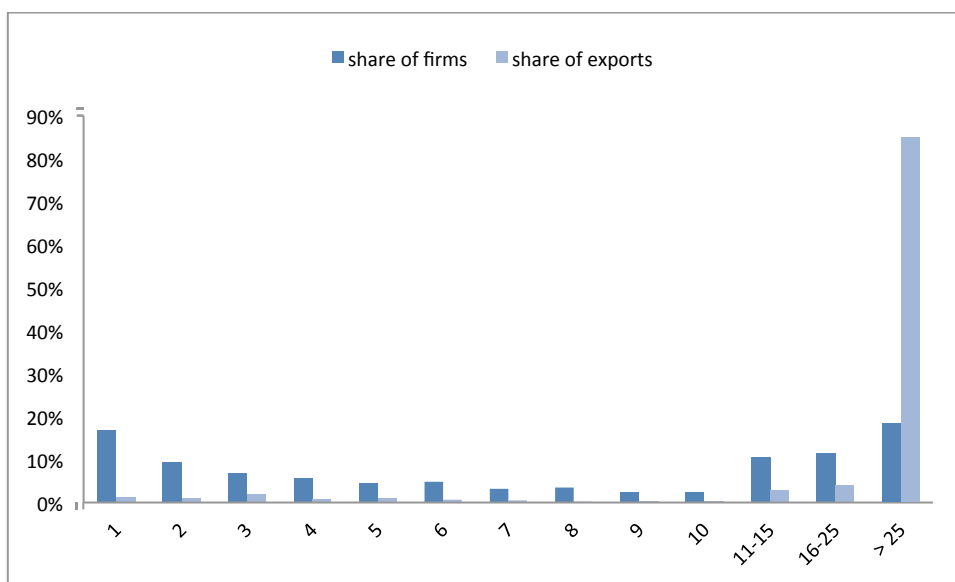
Figure 4 reports the most important host countries for Swedish affiliates. The share in terms of turnover exceeds the share in terms of number of affiliates for the largest markets, while the opposite is true in the smaller markets, with the exception for the UK. The UK is an important host of foreign affiliates servicing the European Union and beyond, particularly in financial services, which could be a factor behind this.

Previous studies from other countries have found a high degree of firm heterogeneity as far as participation in international trade and investment is concerned, which in turn is driven by heterogeneity as far as firm characteristics such as size and productivity are concerned. In the next charts and tables we describe different dimensions of firm heterogeneity related to activities in foreign markets. Figure 5 reports the share of firms that export to a given number of destination depicted on the horizontal axis, and the share of exports accounted for by firms servicing the given number of destinations. Panel A shows exports and Panel B affiliate sales.

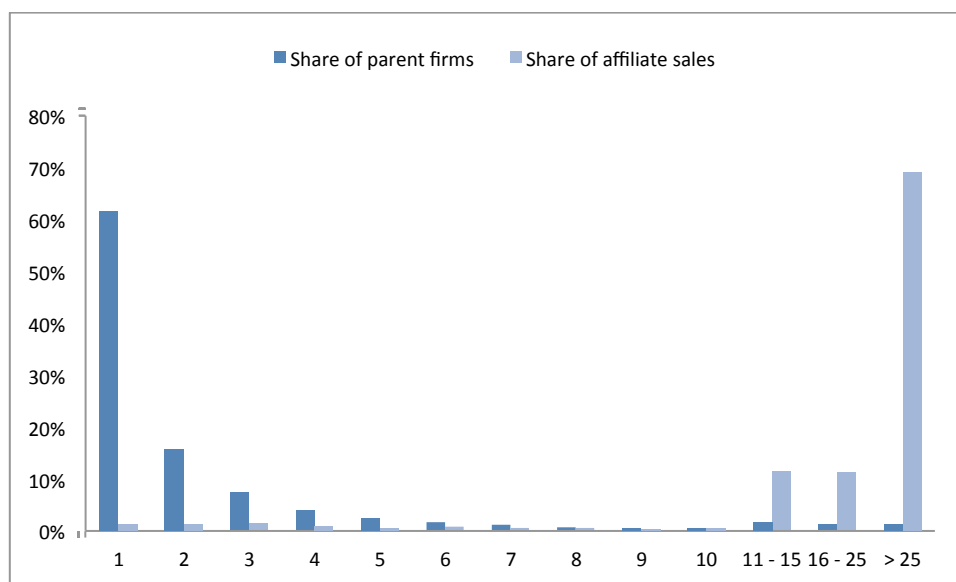


**Figure 5. Concentration of international activity by number of destinations**

**Panel A. Exports**



**Panel B. Foreign affiliate activity**



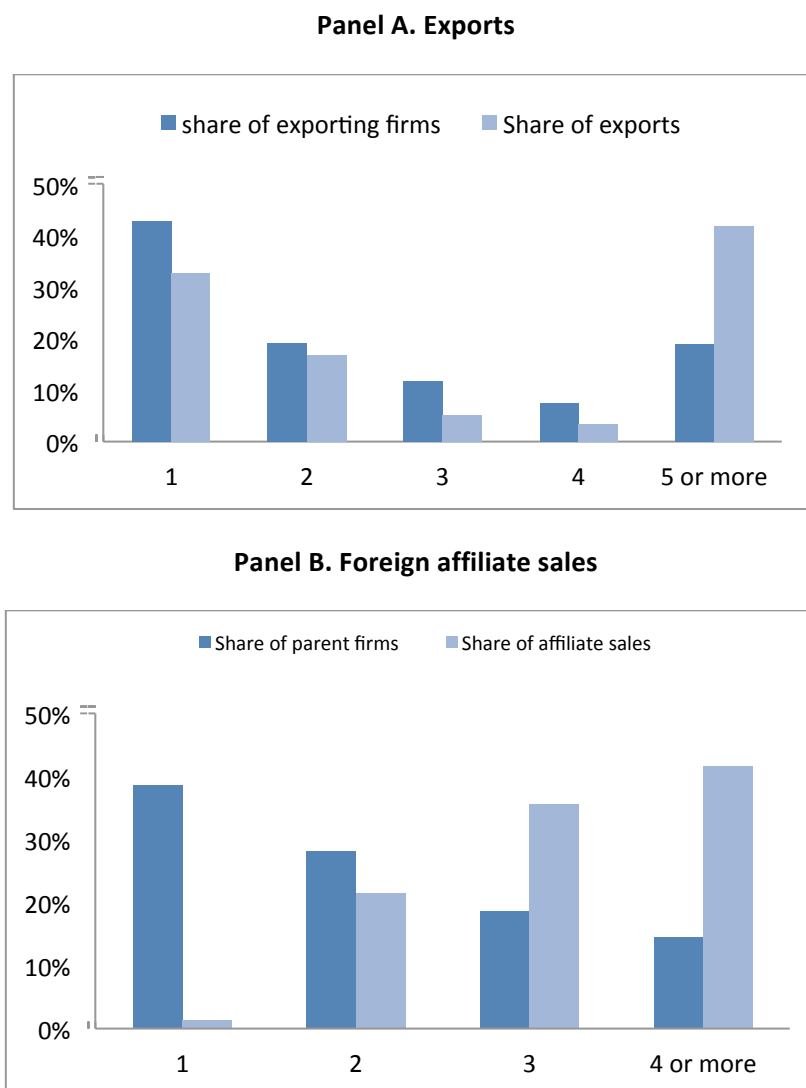
Source: Authors' calculations based on data from Statistics Sweden.

Figure 5 reveals both a high degree of concentration and polarisation among services exporters and multinational enterprises. About 17% of all exporting firms export to only one destination, while 18% export to more than 25 countries. These in turn account for as much as 85% of total exports, while those exporting to only one country account for only 1.3% of total services exports. A similar picture emerges for foreign affiliate sales where the polarisation is even more striking. More than 60% of parent firms have affiliates in only one country, but these account for only 1% of total affiliate sales.

By contrast only about 1% of parent firms have affiliates in more than 25 countries, but these account for almost 70% of total affiliate sales. This pattern is found in other countries as well (Rouzet et al., 2017)

Figure 6 illustrates the degree of specialisation on products by exporting firms and affiliate activities. It shows the share of exporting firms exporting 1, 2, 3, 4 and 5 or more different product categories, and the share of firms that export the number of products indicated on the horizontal axis.<sup>13</sup>

**Figure 6. Concentration of international activity by number of services exported**



Sources: Authors' calculations based on data from Statistics Sweden. The charts show average number of services categories exported per firm and average number of products sold per affiliate in the period 2008-2012. Statistics Sweden reports 104 services categories, and for affiliate sales the SNI 2007 (which corresponds to NAIC is applied).

It is observed that 42% of exporting firms export one services category only. These exporters account for about a third of total exports, indicating that Swedish exporting firms are highly specialised. Only 19% of exporters export more than five services categories, but these account for

<sup>13</sup> A product is defined by the 104 services categories included in the firm level services trade statistics from Statistics Sweden.

more than 40% of total exports. By the same token 38% of all parent firms have affiliate activities in only one product category, but these account for only 1.3% of total affiliate sales. By contrast about 15% of parent firms have affiliate activities in four or more product categories, but these account for more than 40% of total affiliate sales.

Comparing Figures 5 and 6 reveals that the large exporters are more diversified both along the destination market and the product variety dimensions, although single-product exporters also accounts for a large share of total exports.

Concentration of exports does not only occur across firms, it is also an important feature within firms as illustrated by Table 3. It shows the market share of the largest export market, the second largest export market and so on for firms. The first column shows the average for all firms. The second column shows the share of the largest market for firms that export to one country only, which is obviously 100%. But firms that export to two countries export as much as 86.7% to one of these countries. Even firms that export to 20 destinations export more than 60% to the most important market.

**Table 3. Concentration of services exports within firms**

By main destination markets, 2008-2012

Export market ranking	Share of market (all firms)	Share of market (Num. of destinations =1)	Share of market (Num. of destinations =2)	Share of market (Num. of destinations =5)	Share of market (Num. of destinations =10)	Share of market (Num. of destinations =20)
1	43%	100%	86.7%	62.9%	56.6%	61.5%
2	17%		13.3%	23.8%	18.8%	15.3%
3	10%			13.2%	9.2%	8.8%
4	7%				6.5%	6.8%
5	6%				2.9%	2.8%

Source: Authors' calculations based on data from Statistics Sweden.

**Table 4. Concentration of foreign affiliate activity within firms**

By main destination markets, 2008-2012

Export market ranking	Share of market (all affiliates)	Share of market (Num. of destinations =1)	Share of market (Num. of destinations =2)	Share of market (Num. of destinations =5)	Share of market (Num. of destinations ≥ 10)
1	38%	100%	90%	64%	49%
2	18%		10%	22%	25%
3	12%			9%	13%
4	8%			3%	5%
5	6%			1%	3%

Source: Authors' calculations based on data from Statistics Sweden.

Table 4 shows the distribution of affiliate activity among the five largest host markets by firm. Firms that have affiliates in one country only will necessarily have all its activities in that market. But similar to the observations for firms' exports, also foreign affiliate activities within Swedish multinationals are heavily concentrated in the largest host market. Even multinationals with affiliates in more than ten countries have about half of their affiliate sales in the most important host country.

## 6. Determinants of exports and affiliate sales, pooled regressions

### Exports

We start by estimating the probability that firms will export to a particular market as expressed in equation (5). The results are reported in Table 5. The first three columns run the regression of the full sample of firms in all services sectors as classified by Statistics Sweden (104 sectors), while the fourth column report the regression result for the sectors and countries included in the STRI database, adding the STRI score.

**Table 5. Probit regressions, exports**

LHS: services export dummy	Swedish classification sectors			STRI sectors
	(1)	(2)	(3)	(4)
<b>Log GDP</b>	0.206***	0.216***	0.164***	0.178***
	(0.007)	(0.007)	(0.006)	(0.010)
<b>Log distance</b>	-0.195***	-0.207***	-0.171***	-0.263***
	(0.064)	(0.068)	(0.050)	(0.07)
<b>Contiguous</b>	0.409***	0.434***	0.307***	0.311***
	(0.094)	(0.100)	(0.074)	(0.081)
<b>EEA dummy</b>	0.343***	0.358***	0.258***	0.107
	(0.086)	(0.091)	(0.068)	(0.102)
<b>Common language</b>	0.150***	0.154***	0.108***	0.126***
	(0.013)	(0.014)	(0.010)	(0.017)
<b>Labour productivity</b>	-0.017***	-0.007	-0.006	-0.053***
	(0.005)	(0.005)	(0.004)	(0.005)
<b>Log turnover</b>	0.060***	0.023***	-0.003	0.084***
	(0.005)	(0.005)	(0.004)	(0.008)
<b>Main activity in manufacturing</b>	-0.001	-0.002	-0.029***	-0.103***
	(0.016)	(0.017)	(0.010)	(0.022)
<b>Foreign owned</b>	-0.109***	-0.107***	-0.081***	-0.086***
	(0.008)	(0.008)	(0.006)	(0.010)
<b>Services importer</b>	0.154***	0.117***	0.0766***	0.144***
	(0.018)	(0.018)	(0.013)	(0.022)
<b>Goods exporter</b>	0.536***	0.537***	0.164***	0.418***
	(0.036)	(0.037)	(0.006)	(0.038)
<b>Previous exports</b>		0.703***	0.034	
		(0.007)	(0.027)	
<b>Previous exports to same country</b>			2.430***	
			(0.044)	
<b>STRI score</b>				-0.300**
				(0.147)
<b>Observations</b>	3,196,200	3,196,200	3,196,200	353,798
<b>Pseudo R<sup>2</sup></b>	0.267	0.307	0.508	0.105

Note: Pooled probit regressions of probability of exports at firm level from Sweden to all destination countries. Regressions include time and sector fixed effects. The sectors are the services sectors covered by the STRI. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

As expected, the probability to enter a market is higher the larger is the market, the closer it is to Sweden, and firms are more likely to export to EEA members than to non-members. These results

are robust to specification of the regression and to the sample size and inclusion of the STRI scores, except that the EEA dummy is no longer statistically significant when the STRI scores are added.<sup>14</sup> Turning to firm characteristics, large firms that also import services and export goods are more likely to export services than smaller firms and firms that do not engage in imports of services or export of goods. Foreign subsidiaries are less likely to export than are Swedish-owned firms, suggesting that Sweden may not be an important export platform for foreign firms e.g. into the EEA. It appears that the single most important characteristic predicting export in a given year is whether or not the firm exported to the same country the year before. Interestingly, exports to the same country appears to be driving the general previous export experience variable, suggesting that relevant export experience is quite country-specific and consistent with the observation that most firms export to a few destinations, rather than diversifying across the globe.

The fourth column adds the STRI scores, capturing policy determined trade costs in export markets. This reduces the sample to about a tenth of the original sample, dropping countries and sectors for which STRI indicators are not available. We see that policy-determined trade restrictions significantly reduce the probability that a Swedish firm exports to the market in question. The possibility that trade restricting policies may affect firms differently depending on firm characteristics is explored by introducing interaction terms between the STRI and each of the firm characteristics included in the regressions. The results are presented in Table 6 where in the interest of space we report only the coefficient on the STRI, the firm characteristic indicated in the column heading and the interaction term.

**Table 6. Interaction between STRI scores and firm characteristics, probit**

	Labour productivity	Turnover	Foreign owned	Previous exports	Previous exports to same country	Main activity in manuf.
<b>STRI score</b>	-0.272*	0.175	-0.295*	-0.492***	-0.365**	-0.170
	(0.150)	(0.281)	(0.163)	(0.177)	(0.143)	(0.165)
<b>Firm characteristics</b>	-0.061***	0.105***	-0.083***	0.590***	1.961***	-0.006
	(0.006)	(0.014)	(0.032)	(0.018)	(0.091)	(0.049)
<b>STRI*firm character</b>	0.030*	-0.087**	-0.011	0.303***	0.790***	-0.397**
	(0.016)	(0.040)	(0.119)	(0.068)	(0.282)	(0.176)
<b>Pseudo R<sup>2</sup></b>	0.105	0.105	0.105	0.141	0.345	0.105

Note: Pooled probit regressions of probability of exports at firm level from Sweden to all destination countries. Regressions include time and sector fixed effects. The sectors are the services sectors covered by the STRI. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively. Each column reports the coefficients on the STRI score, the firm characteristic indicated in the column heading and the coefficient on the interaction term.

It is observed that new entrants to a specific market are strongly deterred by trade restrictions, while incumbents with an established presence in export markets are much less sensitive to policy-induced trade restrictions. Incumbents in the same country even exhibit a positive association between the probability to remain in the market and the score on the STRI. A natural interpretation of this result is that regulatory barriers to entry impose a fixed entry cost on firms. Having absorbed such costs incumbents are protected from new entrants and may recuperate their entry costs

<sup>14</sup> Of the 44 countries included in the STRI database, 25 are EEA members.

through continued sales above marginal cost.<sup>15</sup> The first column suggests that more productive firms are less deterred by policy-determined entry barriers than are less productive firms.

Table 7 presents the PPML estimates of equation (7) on pooled services exports at the firm level for the period 2008-2013.<sup>16</sup>

**Table 7. Pooled PPML regressions, services exports from Sweden**

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Log of GDP</b>	0.856*** (0.027)	0.856*** (0.027)	0.624*** (0.020)	0.806*** (0.027)	0.608*** (0.021)	0.760*** (0.037)
<b>Log of distance</b>	-0.860*** (0.247)	-0.860*** (0.247)	-0.541*** (0.180)	-0.793*** (0.231)	-0.526*** (0.178)	-0.790*** (0.149)
<b>Contiguous</b>	0.053 (0.212)	0.053 (0.211)	-0.096 (0.170)	-0.14 (0.202)	-0.185 (0.177)	-0.112 (0.163)
<b>EEA</b>	-0.106 (0.485)	-0.106 (0.484)	-0.302 (0.378)	-0.07 (0.456)	-0.266 (0.372)	-0.145 (0.316)
<b>Common language</b>	0.647*** (0.053)	0.646*** (0.053)	0.386*** (0.039)	0.739*** (0.053)	0.431*** (0.046)	0.671*** (0.039)
<b>Main activity in manufacturing</b>	-0.052 (0.15)	-0.019 (0.144)	-0.18 (0.117)	-0.245* (0.143)	-0.275** (0.126)	-0.791*** (0.130)
<b>Foreign owned</b>	-0.427*** (0.139)	-0.442*** (0.135)	-0.244** (0.118)	-0.462*** (0.136)	-0.252** (0.118)	-0.680*** (0.145)
<b>Services importer</b>	0.566*** (0.130)	0.607*** (0.129)	0.611*** (0.122)	0.645*** (0.119)	0.651*** (0.112)	0.890*** (0.115)
<b>Labour productivity</b>	0.175*** (0.061)	0.132** (0.061)	0.168*** (0.055)	0.156** (0.062)	0.178*** (0.055)	0.332*** (0.047)
<b>Log of turnover</b>	0.710*** (0.027)	0.669*** (0.032)	0.600*** (0.035)	0.638*** (0.033)	0.578*** (0.035)	0.806*** (0.039)
<b>Previous exports</b>		1.803*** (0.079)	-1.520*** (0.096)	1.825*** (0.08)	-1.486*** (0.095)	
<b>Previous exports to same country</b>			4.726*** (0.145)		4.643*** (0.143)	
<b>Goods exporter</b>				1.153*** (0.165)	0.547*** (0.145)	1.171*** (0.197)
<b>STRI score</b>						-1.123 (0.833)
<b>Observations</b>	3,196,200	3,196,200	3,196,200	3,196,200	3,196,200	353,798
<b>R-squared</b>	0.079	0.109	0.209	0.139	0.224	0.132
<b>Log likelihood</b>	-1926	-1857	-1581	-1836	-1577	-1204
<b>Dispersion</b>	0.000627	0.000584	0.000411	0.00057	0.000408	0.00357

Note: Pooled regressions of exports at firm level from Sweden to all destination countries. Regressions include time and sector fixed effects. The sectors are the 104 services categories reported by Statistics Sweden. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

<sup>15</sup> See Rouzet and Spinelli (2016) for estimates of mark-ups in the services sectors included in the STRI.

<sup>16</sup> The database does not explicitly report zero exports. Since the database contains survey information with a core of firms included every year, it cannot be assumed that the absence of recorded exports to a particular country of a particular product in a given year implies that there is no export. Instead, it is assumed that if a firm is registered with positive exports of at least one product to at least one country in a given year, it does not export the product in question to the countries for which there is no information on positive exports that year. If a firm has not exported a specific product at all during the period covered, the firm is dropped from the regressions for that product.

It is first noted that the standard gravity control variables take the expected sign and magnitude, although contiguity does not have a significant impact.<sup>17</sup> However, recall from the probit results that firms are more likely to export to neighbouring countries (i.e. Finland and Norway) in the first place. The only country with which Sweden shares a common official language is Finland. Thus, the result suggest that Swedish firms export about 90% more to Finland than otherwise predicted due to their shared common official language.<sup>18</sup>

Turning to firm characteristics, foreign owned firms tend to export less services than locally owned companies. It thus appears that foreign services firm affiliates and daughters in Sweden first and foremost target the Swedish market. As expected from our theoretical framework, firm size measured by turnover, and labour productivity are positively associated with export value. Interestingly, services exports go together with services imports and services importers export about 70% more than services firms that do not import services even after controlling for firm size. But the most important determinant of export value in a given year is whether or not the firm exported the year before. Compared to first-time exporters, firms with experience from export markets tend to export five times more on average than firms with no export experience. The experience factor becomes huge when considering established exporters in a particular destination, and changes the sign of the general export experience.<sup>19</sup> Thus, it appears that experience from entering a foreign market is quite country-specific and may not reduce the cost of entering another country much. The final column reports the regression when adding the STRI scores by sector. The standard gravity variables as well as the firm characteristic variables are robust to this sample as well. The coefficient on the STRI score is negative, but not statistically significant. This suggests that on average policy induced trade barriers are more important for the extensive margin of Swedish exports than for the intensive margin. The average may, however, conceal interesting differences in the response to policy changes by sector and by firm characteristics. As for the probit regressions above, we introduce interaction terms for the STRI and the main firm characteristics. These are reported in Table 8. Sectoral differences are analysed in Section 7 below.

---

<sup>17</sup> Sweden shares a common land border only with Finland and Norway. One may argue that the Öresund bridge constitutes a land border to Denmark, but we have chosen to use the CEPII gravity database as is for consistency with other studies.

<sup>18</sup> Having a common official language is probably associated with a number of other cultural and institutional commonalities that may matter for services trade.

<sup>19</sup> The net effect of export experience in the same country is about 25 times predicted exports of firms with no experience (i.e. the exponential of  $4.726 - 1.520$ , regression (3)).

**Table 8. Interaction between STRI scores and firm characteristics, PPML**

	Productivity	Turnover	Foreign owned	Previous exports	Previous exports to country	Main activity in manuf.
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Firm characteristics</b>	0.638*** (0.058)	1.113*** (0.065)	-1.513*** (0.346)	1.681*** (0.218)	3.075*** (0.314)	-0.038 (0.327)
<b>STRI score</b>	-3.545*** (0.911)	9.597*** (1.408)	-2.792** (1.381)	-0.778 (1.341)	-1.438 (1.292)	-0.483 (0.872)
<b>STRI*firm characteristics</b>	-1.516*** (0.128)	-1.542*** (0.273)	4.184*** (1.583)	-0.464 (0.894)	0.969 (1.071)	-2.445 (1.690)
<b>Observations</b>	353,798	353,798	353,798	353,798	353,798	353,798
<b>R-squared</b>	0.14	0.136	0.142	0.151	0.219	0.128
<b>Log likelihood</b>	-1199	-1198	-1201	-1173	-1041	-1203
<b>Dispersion</b>	0.00355	0.00354	0.00356	0.0034	0.00265	0.00357

Note: Pooled PPML regressions of exports at firm level from Sweden to the 43 destination countries included in the STRI. Regressions include time and sector fixed effects. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

The results suggest that Swedish-owned services exporters are negatively affected by policy-induced trade barriers abroad, while foreign-owned firms are not. To the contrary, they export more to restrictive markets. Since foreign affiliates in Sweden export less both at the extensive and the intensive margin, this could indicate that foreign firms focus on the Swedish market from where they export to some of the more restrictive countries, for instance Norway, which is a major trading partner as reported in Figure 3, but has relatively high scores on the STRI. Due to the common Nordic market, Swedish firms are probably less affected by such restrictions than their non-Nordic competitors (Nordås, 2017).

Contrary to what was found for a number of other countries (Rouzet et al., 2017), large and productive Swedish firms are more sensitive to trade restrictions than smaller and less productive firms once they have entered the market. Recall, however, that less productive firms are more affected by trade restrictions at the extensive margin. Trade barriers appear to have a similar effect on the intensive margin of exports whether firms have exported before or not and whether they have their main activity in manufacturing or not.

### ***Affiliate sales***

This section reports the regression results of estimating equations (5) and (7) on affiliate sales data. Table 9 reports results of the probit regressions.



**Table 9. Probit, affiliate sales**

	(1)	(2)	(3)
<b>log GDP</b>	0.0429 (0.030)	0.0428 (0.030)	0.0483 (0.030)
<b>log distance</b>	0.0376 (0.076)	0.037 (0.076)	0.0266 (0.073)
<b>Contiguous</b>	0.383*** (0.098)	0.377*** (0.097)	0.377*** (0.096)
<b>EEA</b>	0.176 (0.154)	0.173 (0.155)	0.159 (0.149)
<b>Common language</b>	-0.140*** (0.029)	-0.136*** (0.029)	-0.112*** (0.031)
<b>Main activity in manufacturing</b>	-0.0424 (0.077)	-0.0396 (0.078)	-0.0871 (0.077)
<b>Foreign owned</b>	-1.324*** (0.448)	-1.321*** (0.449)	-0.602 (0.446)
<b>Services importer</b>	0.00769 (0.150)	0.0077 (0.149)	-0.0022 (0.150)
<b>Goods exporter</b>	0.263** (0.125)	0.270** (0.126)	0.214* (0.126)
<b>Labour productivity, head office</b>	-0.109*** (0.024)	-0.108*** (0.024)	-0.135*** (0.028)
<b>Previous FATS</b>		0.756 (0.544)	0.725 (0.747)
<b>Previous FATS to country</b>			1.297*** (0.113)
<b>Observations</b>	6117	6117	6117
<b>Pseudo R<sup>2</sup></b>	0.189	0.190	0.254

Note: Pooled probit regressions of probability of affiliate sales at firm level from Sweden in all host countries. Regressions include time and sector fixed effects. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

The standard gravity variables appear to have little effect on the probability of Swedish affiliate sales in a host market in a particular sector. The exceptions are contiguity where countries with a common border with Sweden (Norway and Finland) are more likely to host Swedish affiliates. Turning to firm characteristics, as was the case for exports, foreign owned firms based in Sweden are less likely to engage in activities abroad. Goods exporters are weakly more likely to sell services from affiliates abroad, and labour productivity at the Swedish head office is negatively associated with the probability of foreign affiliate sales. Interestingly, previous affiliate sales do not matter unless it is in the same country.

The PPML regressions for affiliate sales are reported in Table 10. The last column shows the results of adding the STRI score. This significantly reduces the sample size, and the estimates must be interpreted with great caution for this regression.<sup>20</sup>

**Table 10. Pooled PPML regressions, sales by Swedish foreign affiliates in host markets**

	(1)	(2)	(3)	(4)
<b>Log GDP</b>	0.608*** (0.046)	0.609*** (0.046)	0.612*** (0.046)	0.463*** (0.176)
<b>Log distance</b>	-0.124 (0.090)	-0.126 (0.091)	-0.114 (0.090)	0.162 (0.166)
<b>Contiguity</b>	0.303** (0.152)	0.299** (0.150)	0.319** (0.153)	-0.307 (0.218)
<b>EEA</b>	0.065 (0.188)	0.068 (0.188)	0.094 (0.187)	0.069 (0.359)
<b>Common language</b>	0.218** (0.098)	0.216** (0.099)	0.200** (0.097)	0.301*** (0.107)
<b>Labour productivity, head office</b>	-0.062** (0.025)	-0.063** (0.025)	-0.094*** (0.026)	
<b>Labour productivity, affiliate</b>	0.271*** (0.053)	0.272*** (0.053)	0.285*** (0.057)	0.127*** (0.027)
<b>Main activity in manufacturing</b>	0.290*** (0.110)	0.294*** (0.111)	0.330*** (0.114)	-0.370*** (0.161)
<b>Foreign owned</b>	-2.361*** (0.335)	-2.360*** (0.335)	-1.854*** (0.327)	-4.051*** (0.402)
<b>Services importer</b>	0.208 (0.172)	0.208 (0.174)	0.221 (0.156)	1.368*** (0.179)
<b>Goods exporter</b>	0.335** (0.141)	0.334** (0.141)	0.265* (0.148)	1.095*** (0.269)
<b>Previous FATS</b>		-0.389 (0.539)	-0.641 (0.564)	
<b>Previous FATS to country</b>			0.633*** (0.048)	
<b>STRI score</b>				2.794** (1.195)
<b>Observations</b>	6,589	6,589	6,589	1,914
<b>R-squared</b>	0.341	0.342	0.369	0.139
<b>Log likelihood</b>	-961058	-960192	-932421	-395887
<b>Dispersion</b>	290.7	290.4	281.9	414.7

Note: Pooled regressions of affiliate sales at firm level of foreign affiliates of Swedish firms in all host countries. Regressions include time and sector fixed effects. The sectors are four digit SNI categories, except for in Col (8) where STRI sectors are used. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

The patterns of foreign affiliate sales fit a standard gravity model reasonably well with the expected sign on the standard controls. Comparing to the regressions for exports, there is a notable difference. While contiguity is not relevant for exports, which fall off relatively sharply with distance, the opposite is observed for affiliate sales. Thus, affiliate sales in neighbouring countries (Finland and

<sup>20</sup> The small sample size and difficulties of establishing the zero flows also prevented us from running probit regressions for affiliate sales for the sectors and countries covered by the STRI.

Norway) is about 35% higher than predicted everything else equal, but beyond the neighbours distance does not matter. Companies with their main activity in manufacturing have about 35% more affiliate sales than services firms on average and foreign owned firms established in Sweden sell much less through affiliates outside Sweden. As for exporters, they tend to focus on the Swedish market.

Labour productivity in the affiliates is consistently associated with more affiliate sales, while foreign affiliate sales are consistently negatively associated with labour productivity in the Swedish headquarters of the firm. More analysis is needed to establish the reason for this, but the result is consistent with Swedish headquarters specialised in servicing the affiliates that are in turn specialised in production for the host market. In such cases the headquarters would have low turnover per worker in Sweden, which may also explain the negative coefficient in the probit estimates reported in Table 9.<sup>21</sup> Finally, previous affiliate sales to same country, but not affiliate sales experience in general, matters for current affiliate sales.

## **7. Determinants of exports at sector level**

This section explores sectoral differences in the determinants of services exports. The analysis is limited to the PPML regressions for exports in selected sectors for which the number of observations is sufficient for meaningful analysis. We are left with five sectors covered by the STRI database: computer services, distribution services, telecommunications, accounting, and engineering. The results are reported in Table 11.

The patterns for the aggregate services sectors are by and large repeated for individual sectors, although sectors differ in their sensitivity to distance, language and being part of the EEA. Perhaps surprisingly, the sector most sensitive to distance is telecommunications, for which trade costs probably do not vary much with distance. Nevertheless, communications over telecommunications networks connect people and firms, and the frequency of communications between them probably falls off quite sharply with distance. Turning to firm characteristics, large firms export more in all sectors, with a particularly strong scale effect in computer services, distribution services and telecommunications. Foreign owned firms export less, except in engineering where they export more. Previous exports to the same country are one of the strongest predictors for current export values in all sectors, with the strongest effect in telecommunications. Being a services importer strongly boosts services exports particularly in telecommunications, accounting and engineering, while exports of goods are positively associated with exports of service in all sectors except accounting. It is particularly strong in engineering.

---

<sup>21</sup> Labour productivity is measured as turnover per worker in the FATS regressions.

**Table 11. PPML regressions, exports by sector**

	Computer services			Distribution services			Telecommunications		
Log GDP	0.811*** (0.075)	0.806*** (0.079)	0.718*** (0.075)	0.759*** (0.059)	0.733*** (0.057)	0.663*** (0.058)	0.718*** (0.099)	0.717*** (0.100)	0.669*** (0.091)
Log distance	-0.329** (0.168)	-0.285 (0.178)	-0.22 (0.141)	-0.612*** (0.143)	-0.531*** (0.146)	-0.350*** (0.129)	-1.408*** (0.248)	-1.420*** (0.273)	-1.254*** (0.222)
Contiguity	0.281 (0.223)	0.459 (0.332)	0.137 (0.189)	-0.796*** (0.216)	-0.374 (0.258)	-0.737*** (0.219)	0.699* (0.385)	0.644 (0.681)	0.622* (0.377)
EEA	-0.36 (0.290)	0.297 (1.146)	-0.541** (0.231)	0.410* (0.244)	1.145** (0.506)	0.413** (0.208)	-0.55 (0.436)	-0.654 (1.115)	-0.542 (0.411)
Common language	0.662*** (0.070)	0.669*** (0.071)	0.485*** (0.070)	0.076 (0.048)	-0.012 (0.064)	-0.179*** (0.058)	-0.105 (0.194)	-0.08 (0.316)	-0.116 (0.188)
STRI score	-0.543 (1.175)	-0.126 (1.305)	0.316 (2.408)	0.009 (1.301)	0.574 (1.211)	-0.429 (1.469)	-2.85 (2.112)	-2.949 (2.458)	-2.719 (1.736)
Log turnover	1.183*** (0.117)	1.183*** (0.117)	0.954*** (0.122)	1.007*** (0.076)	1.007*** (0.076)	0.970*** (0.107)	1.204*** (0.168)	1.204*** (0.168)	0.827*** (0.106)
Main activity in manufacturing	0.481*** (0.170)	0.480*** (0.170)	0.073 (0.126)	-1.629*** (0.223)	-1.631*** (0.223)	-1.473*** (0.228)	-4.681*** (0.540)	-4.681*** (0.540)	-3.655*** (0.534)
Foreign owned	-1.313*** (0.253)	-1.313*** (0.253)	-1.121*** (0.226)	-1.033*** (0.175)	-1.034*** (0.175)	-0.889*** (0.199)	0.086 (0.164)	0.086 (0.164)	-0.306** (0.143)
Services importer	0.716** (0.320)	0.718** (0.321)	0.228 (0.291)	0.859*** (0.192)	0.860*** (0.191)	0.798*** (0.232)	2.812*** (0.673)	2.812*** (0.673)	2.850*** (0.590)
Goods exporter	0.603*** (0.165)	0.605*** (0.165)	-0.481*** (0.164)	1.611*** (0.212)	1.615*** (0.213)	0.979*** (0.204)	0.765*** (0.184)	0.764*** (0.179)	0.549*** (0.169)
STRI score* EEA		-2.764 (4.625)			-4.153* (2.261)			0.46 (4.695)	
Previous exports to country			3.550*** (0.477)			2.807*** (0.366)			4.347*** (0.312)
STRI* previous exp. to country			-0.402 (2.398)			1.129 (1.219)			0.398 (1.155)
Labour productivity	-0.448*** (0.054)	-0.448*** (0.054)	-0.312*** (0.055)	-0.140** (0.064)	-0.140** (0.064)	-0.222*** (0.085)	-0.005 (0.143)	-0.004 (0.142)	0.181 (0.16)
Observations	45,704	45,704	45,704	59,229	59,229	59,229	18,275	18,275	18,275
R-squared	0.55	0.541	0.558	0.141	0.146	0.258	0.358	0.359	0.544
Log likelihood	-158.4	-158.4	-143	-697.4	-696.7	-586.2	-48.04	-48.04	-42.04
Dispersion	0.003	0.003	0.002	0.013	0.013	0.009	0.002	0.002	0.001

**Table 11. cont.**

	Accounting and auditing			Engineering and architecture		
Log GDP	1.031*** (0.163)	0.987*** (0.123)	0.862*** (0.137)	0.681*** (0.092)	0.670*** (0.091)	0.495*** (0.096)
Log distance	-0.867** (0.381)	-1.229*** (0.350)	-0.669** (0.326)	-1.088*** (0.316)	-1.029*** (0.316)	-0.922*** (0.270)
Contiguity	0.57 (0.431)	0.163 (0.363)	0.227 (0.349)	0.157 (0.273)	0.177 (0.274)	-0.017 (0.269)
EEA	0.28 (0.665)	-2.500* (1.346)	0.122 (0.559)	-1.592*** (0.618)	-0.76 (0.689)	-1.711*** (0.510)
Common language	0.390*** (0.118)	0.414*** (0.093)	0.366*** (0.102)	0.529*** (0.082)	0.530*** (0.082)	0.461*** (0.084)
STRI score	-0.632 (1.112)	-4.519 (3.067)	-1.950*** (0.650)	1.075 (1.052)	2.391** (1.105)	0.557 (1.875)
Log turnover	0.180*** (0.053)	0.182*** (0.052)	0.035 (0.069)	0.531*** (0.054)	0.531*** (0.054)	0.395*** (0.075)
Min activity in manufacturing	0.960** (0.462)	0.967** (0.464)	0.405 (0.366)	0.324 (0.559)	0.323 (0.558)	0.272 (0.520)
Foreign owned	-1.349*** (0.230)	-1.350*** (0.230)	-0.618*** (0.209)	1.456*** (0.444)	1.455*** (0.444)	1.348*** (0.357)
Services importer	1.935*** (0.648)	1.937*** (0.649)	0.950* (0.537)	1.113*** (0.388)	1.114*** (0.388)	1.071*** (0.339)
Goods exporter	-1.344*** (0.350)	-1.365*** (0.354)	-1.184*** (0.332)	2.196*** (0.328)	2.200*** (0.327)	1.330*** (0.326)
STRI score*EEA		7.786** (3.489)			-3.257** (1.505)	
Previous exports to country			2.891*** (0.377)			3.264*** (0.607)
STRI* exports to country			1.873* (1.115)			0.864 (2.010)
Labour productivity	-0.111** -0.044	-0.111** -0.044	0.009 -0.05	-0.283*** -0.031	-0.283*** -0.031	-0.261*** -0.033
Observations	21,188	21,188	21,188	20,648	20,648	20,648
R-squared	0.039	0.06	0.123	0.0418	0.0419	0.0964
Log likelihood	-13.97	-13.87	-12.81	-39.52	-39.49	-35.55
Dispersion	0.000	0.000	0.000	0.002	0.002	0.001

Note: Regressions of exports at firm level from Sweden to all destination countries covered by the STRI. Regressions include time fixed effects. Robust standard errors clustered on destination country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

The STRI score is negatively associated with trade at the sector level, but it is not statistically significant. Membership of the EEA is weakly associated with Swedish exports in distribution services. Accounting appears to be the sector most sensitive to policy barriers. A new entrant to a market is strongly and negatively affected by restrictions captured by the STRI in this sector, while incumbents are hardly affected at all.

Comparing the results for accounting and engineering reveals interesting differences. While a high score on the STRI is associated with more exports to EEA countries in accounting, the opposite is found in engineering. This reflects the differences in regulations within the EEA for these sectors. All EEA countries regulate auditing, they apply the same accounting standards, and professional qualifications are recognised across the EEA, creating an integrated market. Engineering (and architecture) in contrast is not regulated in Sweden, but falls under the regulated professions category in many other EEA countries. The mutual recognition directive also applies to engineering and architecture, but the lack of a common approach to regulation creates a more fragmented market for such services within the EEA, which may raise the cost of doing business for engineers from a country where engineers do not need a license wishing to provide services in countries where they do. It is also noted that engineering is strongly related to manufacturing as can be seen in Figures 1 and 2, which may explain the strong relationship between goods and services exports in this sector. Using the coefficient in the third regression (1.330), exporters of goods export 275% more engineering services than services only firms.

### **8. Determinants of choices of mode**

In many cases services can be sold in foreign markets through exports or through commercial establishment in the targeted market. For some services the modes of supply may be complementary, particularly when face to face interaction is necessary for the final delivery of services. For other services, for instance those that can be fully digitised, cross-border trade and foreign affiliate sales may be substitutes. Following Kelle et al. (2013) we estimate equation (12), which introduces export experience in the FATS probit regressions. The results are reported in Table 12.

Interestingly, export experience is more important than FATS experience for the decision to enter a market. But when experience is narrowed down to the same country, FATS experience is what counts. Since establishing an affiliate involves significant fixed and sometimes sunk costs and some of these relate to compliance with country-specific regulation, this result is quite intuitive. The results also suggest that firms tend to enter international services markets through exports before they establish affiliates abroad.

**Table 12. Probit affiliate sales, with export experience**

	(1)	(2)	(3)	(4)
<b>log GDP</b>	0.0483 (0.030)	0.0483 (0.030)	0.0442 (0.029)	0.0419 (0.030)
<b>log distance</b>	0.0289 (0.075)	0.0283 (0.075)	0.0298 (0.074)	0.038 (0.072)
<b>Contiguous</b>	0.400*** (0.100)	0.397*** (0.099)	0.401*** (0.099)	0.351*** (0.092)
<b>EEA</b>	0.16 (0.152)	0.158 (0.152)	0.146 (0.150)	0.177 (0.148)
<b>Common language</b>	-0.138*** (0.029)	-0.137*** (0.029)	-0.136*** (0.029)	-0.104*** (0.032)
<b>Main activity in manufacturing</b>	-0.0785 (0.076)	-0.0751 (0.076)	-0.07 (0.077)	-0.062 (0.079)
<b>Foreign subsidiary</b>	-0.911** (0.452)	-0.910** (0.453)	-0.866* (0.448)	-0.817* (0.437)
<b>Services importer</b>	-0.0043 (0.147)	-0.0043 (0.146)	-0.0146 (0.149)	0.0155 (0.154)
<b>Goods exporter</b>	0.241* (0.124)	0.248** (0.124)	0.201 (0.124)	0.198 (0.130)
<b>Labour productivity, head office</b>	-0.125*** (0.026)	-0.124*** (0.027)	-0.124*** (0.027)	-0.117*** (0.028)
<b>Previous exports</b>	0.562*** (0.073)	0.559*** (0.073)	0.341*** (0.110)	-0.926*** (0.167)
<b>Previous FATS</b>		0.673 (0.585)		1.365 (0.957)
<b>Previous exports to country</b>			0.365*** (0.139)	-0.104 (0.209)
<b>Previous FATS to country</b>				2.052*** (0.203)
<b>Observations</b>	6117	6117	6117	6117
<b>Pseudo R<sup>2</sup></b>	0.204	0.205	0.207	0.269

To further explore the relationship between the modes of supply, we estimated equation (13) entering previous export experience into the gravity regression for affiliate sales. The results are reported in Table 13.

**Table 13. PPML regressions affiliate sales, with export experience**

	(1)	(2)	(3)	(4)
<b>Log GDP</b>	0.611*** (0.046)	0.613*** (0.046)	0.604*** (0.045)	0.605*** (0.045)
<b>Log distance</b>	-0.114 (0.090)	-0.117 (0.090)	-0.107 (0.090)	-0.106 (0.090)
<b>Contiguity</b>	0.327** (0.155)	0.319** (0.152)	0.343** (0.154)	0.332** (0.152)
<b>EEA</b>	0.079 (0.187)	0.085 (0.188)	0.066 (0.186)	0.083 (0.185)
<b>Common language</b>	0.210** (0.098)	0.205** (0.098)	0.194** (0.097)	0.184* (0.096)
<b>Labour productivity head office</b>	-0.088*** (0.024)	-0.091*** (0.026)	-0.090*** (0.024)	-0.095*** (0.025)
<b>Labour productivity affiliate</b>	0.281*** (0.055)	0.283*** (0.056)	0.278*** (0.056)	0.281*** (0.056)
<b>Main activity in manufacturing</b>	0.320*** (0.112)	0.331*** (0.114)	0.313*** (0.110)	0.320*** (0.112)
<b>Foreign owned</b>	-1.909*** (0.326)	-1.893*** (0.328)	-1.852*** (0.323)	-1.810*** (0.327)
<b>Services importer</b>	0.211 (0.157)	0.208 (0.161)	0.205 (0.148)	0.220 (0.144)
<b>Goods exporter</b>	0.292** (0.145)	0.293** (0.143)	0.224 (0.143)	0.196 (0.148)
<b>Previous exports</b>	0.569*** (0.054)	0.588*** (0.047)	-0.274** (0.121)	-1.118*** (0.380)
<b>Previous FATS</b>		-0.604 (0.557)		-0.663 (0.57)
<b>Previous export to country</b>			0.927*** (0.131)	0.914*** (0.127)
<b>Previous FATS to country</b>				0.903*** (0.333)
<b>Observations</b>	6,589	6,589	6,589	6,589
<b>R-squared</b>	0.356	0.36	0.361	0.377
<b>Log likelihood</b>	-938724	-936623	-926109	-919690
<b>Dispersion</b>	283.9	283.3	280	277.9

Note: Regressions of affiliate sales in all host countries. Regressions include time, country and sector fixed effects. Robust standard errors clustered on host country are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

Previous exports appear to have a somewhat stronger impact than previous affiliate sales in general, but the two are about equally important when it comes to experience in the same country. As mentioned above a possible explanation is that firms test the market through exports before they establish a commercial presence. Another possibility is quite the opposite. Companies may complement affiliate sales with shipment of headquarter services to the host market, or a commercial presence may be required by regulation to allow for cross-border services trade. Such



regulation is common in financial services, and implicitly also in regulated professional services for which a license is required to enter the market.<sup>22</sup>

Finally, we ran simultaneous regressions for services exports and affiliate sales at the firm level, using both seeming unrelated regressions (SUR) and three stage GLS regressions. The results are reported in Table 14 which also depicts the results of a GLM regression where the dependent variable is the share of exports in total foreign sales (i.e. exports plus affiliate sales).

**Table 14. Simultaneous regressions, exports and affiliate sales**

<i>Exports</i>	SUR		3 stage GLS		GLM export share
	Full sample	STRI sample	Full sample	STRI sample	STRI sample
<b>Log FATS</b>	0.150*** (0.011)	0.048*** (0.014)	-0.066*** (0.022)	-0.027 (0.027)	
<b>log GDP</b>	0.238*** (0.018)	0.366*** (0.028)	0.359*** (0.022)	0.403*** (0.031)	0.557 (0.649)
<b>Log distance</b>	-0.065** (0.026)	-0.015 (0.040)	-0.009 (0.026)	0.019 (0.040)	6.701 (8.676)
<b>Contiguity</b>	0.192* (0.111)	0.459*** (0.149)	0.308** (0.113)	0.516*** (0.150)	20.114 (25.668)
<b>Common language</b>	-0.080 (0.147)	-0.323 (0.193)	-0.122 (0.148)	-0.356** (0.193)	0.939 (1.261)
<b>Log labour productivity</b>	0.129*** (0.017)	0.327*** (0.030)	0.005 (0.014)	0.249*** (0.027)	0.255*** (0.050)
<b>Log turnover</b>	0.101*** (0.011)	0.167*** (0.017)	0.071*** (0.009)	0.099*** (0.015)	0.086*** (0.021)
<b>Main activity in manufacturing</b>	-0.540*** (0.054)	-1.307*** (0.073)	-0.994*** (0.049)	-1.565*** (0.070)	-0.991*** (0.111)
<b>Foreign owned</b>	-0.697 (0.957)	-0.658 (1.061)	1.607** (0.724)	1.074 (0.920)	-2.274*** (0.648)
<b>Services importer</b>	-0.122 (0.122)	-0.155 (0.154)	-0.538*** (0.093)	-0.288** (0.133)	0.904*** (0.180)
<b>Goods exporter</b>	-0.138*** (0.056)	-0.008 (0.077)	-0.316*** (0.045)	-0.214*** (0.071)	-0.561*** (0.092)
<b>STRI score</b>		-3.376*** (0.321)		-3.355*** (0.323)	-1.508** (0.731)

<sup>22</sup> See the STRI database at <http://oe.cd/stri>

FATS	SUR		3 stage GLS		
	Full sample	STRI sample	Full sample	STRI sample	
<b>Log exports</b>	0.085*** (0.005)	0.007 (0.008)	-0.483*** (0.053)	-0.353*** (0.032)	
<b>Log GDP</b>	0.559*** (0.011)	0.573*** (0.020)	0.759*** (0.023)	0.730*** (0.026)	
<b>Log distance</b>	0.084*** (0.017)	0.075** (0.028)	-0.004 (0.023)	0.007 (0.033)	
<b>Contiguity</b>	0.728*** (0.075)	0.717*** (0.106)	0.915*** (0.097)	0.916*** (0.121)	
<b>Common language</b>	-0.126 (0.099)	-0.151 (0.138)	-0.146 (0.127)	-0.238 (0.156)	
<b>Log labour productivity</b>	0.604*** (0.009)	0.638*** (0.012)	0.588*** (0.011)	0.637*** (0.014)	
<b>STRI score</b>		1.724*** (0.232)		0.338 (0.287)	
<b>Observations</b>	15,696	8,048	15,696	8,048	39,662
<b>R<sup>2</sup> exports</b>	0.049	0.116	0.021	0.104	
<b>R<sup>2</sup> FATS</b>	0.348	0.333	-0.073	0.148	
<b>Chi<sup>2</sup> exports</b>	931.81	1059.19	1192.88	1141.56	
<b>Chi<sup>2</sup> FATS</b>	8532.52	4022.67	5133.21	3267.04	

Note: Standard errors are reported in parentheses. \*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% respectively.

The results of these regressions are preliminary and should be interpreted with caution as it turned out to be quite difficult to match exports and affiliate sales data. It is not possible to establish firmly whether exports and affiliate sales are substitutes or complements as the SUR regressions suggest they may be complements and the three stage GLS indicate that they may be substitutes. It appears, however, that the STRI score negatively affect exports, but stimulates FATS at the intensive margin, and shift total foreign sales towards affiliate sales.

## 9. Concluding remarks

Swedish services exporters and affiliates follow a similar pattern as reported in recent studies portraying trading firms in other countries, but differ from the general findings in three important ways. First, foreign ownership is negatively associated with exports and affiliate sales, suggesting that Sweden is not an important export platform destination, with the possible exception of exports to other Nordic countries. Second, services exports are more strongly related to manufacturing than in most other countries, and affiliate sales even more so. This is probably related to the servicification of manufacturing reported in several Swedish studies, combined with a number of long-established global manufacturing firms headquartered in Sweden. This relationship is particularly strong for engineering and computer services. Third, it appears that Swedish SMEs are strongly engaged in international trade and not much more affected by policy barriers than larger firms. However, a closer look reveals that SMEs tend to be active mainly in the Nordic countries, which form a closely integrated market, even within the EEA.

Policy shapes exports and affiliate sales in interesting ways. First, services trade barriers have a strong negative effect on the extensive margin of trade, deterring firms from entering new markets.

By the same token preferential access to markets, notably the European Economic Area strongly and positively affects the entry of Swedish firms into these markets. Having entered the market, incumbency is a great advantage for future exports and affiliate sales and incumbent firms are much less affected by policy-related trade barriers, if at all. In some cases they are even more likely to stay in the market after having jumped high trade barriers. The advantage of incumbency is country-specific, indicating that policy-related trade costs are fixed and country-specific such that general export or affiliate sales experience from one country does not necessarily spur entry into another country.

## References

- Antràs, P., T.C. Fort and F. Tintelnot (2016), "The margins of global sourcing: theory and evidence from U.S. Firms", Harvard Working Paper, <http://scholar.harvard.edu/antras/publications/types/working-paper>
- Ariu, A. (2016), "Services versus goods trade: a firm-level comparison", *Review of World Economics*, 152(1), pages 19-41.
- Bhattacharya, R., I. Patnaik and A. Shah (2012), "Exports versus FDI in Services", *The World Economy*, doi: 10.1111/j.1467-9701.2011.01385.x
- Bernard, A.B., J. Bradford Jensen, S.J. Redding and P.K. Schott (2007), "Firms in international trade", *Journal of Economic Perspectives*, 21, 105-130.
- Breinlich, H. and C. Criscuolo (2011), "International trade in services: A portrait of importers and exporters", *Journal of International Economics*, Elsevier, vol. 84(2), pages 188-206, July.
- Christen E. and Francois, J. (2015), "Modes of supply for US exports of services", *The World Economy*, DOI: 10.1111/twec.12330
- Conti, G., A. Lo Turco, and D. Maggioni, (2010), "Exporters in services: New evidence from Italian firms." *Applied Economics Quarterly*, 56(1), 73–98. (Special Issue: The Internationalisation of Services – Evidence from Micro Data)
- Crozet, M., E. Milet and D. Mirza (2016), "The impact of domestic regulations on international trade in services: Evidence from firm-level data", *Journal of Comparative Economics* 44, 585–607
- Francois, J. and B. Hoekman (2010), "Services trade and policy", *Journal of Economic Literature*, 48(3) 642-692.
- Gaulier, G. E. Milet and D. Mirza (2010), "Les firmes Françaises dans le commerce international de services", *Économie et Statistique* vol. 435-436, p. 125-147.
- Gozzo, M. (2010), "Tjänsteexporten – den snabbast växande sektorn i svensk ekonomi", Slutrapport från Exportrådet, maj 2010.
- Greene, W. (2010), "Testing Hypotheses about interaction terms in nonlinear models", *Economic Letters*, 107, 291-296.

- Haller, Stefanie A., Damijan, Jože, Kaitila, Ville, Kostevc, Črt, Maliranta, Mika, Milet, Emmanuel, Mirza, Daniel and Rojec, Matija (2014), "Trading firms in the services sectors: comparable evidence from four EU countries", *Review of World Economics*, vol. 150(3), pages 471–505.
- Hausman, J. (2001), "Mismeasured variables in econometric analysis: problems from the right and problems from the left", *Journal of Economic Perspectives*, 15(4) 57-67.
- Head, K., T. Mayer and J. Ries (2010), "The erosion of colonial trade linkages after independence", *Journal of International Economics*, vol. 81(1), pages 1-14.
- Head and Mayer (2014), "Gravity equations: workhorse, toolkit and cookbook", chapter 3 in Gopinath, G., E. Helpman and K. Rogoff (eds) *Handbook of International Economics Volume 4*, Amsterdam: Elsevier.
- Kelle, Markus and Kleinert, Jörn (2010), "German Firms in Service Trade", *Applied Economics Quarterly*, vol. 56(1), pages 51-71. (Special Issue: The Internationalisation of Services – Evidence from Micro Data)
- Kelle, Markus, Kleinert, Jörn, Raff, Horst and Toubal, Farid (2013), "Cross-border and Foreign Affiliate Sales of Services: Evidence from German Microdata", *The World Economy*, vol. 36(11), pages 1373-1392, November.
- Kox, H. L. M. and H. Rojas-Romagosa (2010), "Exports and productivity selection effects for Dutch firms," *De Economist*, 158(3), 295–322
- Lodefalk, M. (2013), "Servicification of Manufacturing—Evidence from Sweden", *International Journal of Economics and Business Research*, vol.6(1), pages 87-113.
- Lodefalk, M. (2014), "The role of services for manufacturing firm exports", *Review of World Economics*, vol. 150(1), pages 59-82.
- Lööf, H. (2010), "Are services different exporters?" *Applied Economics Quarterly*, 56(1), 99–117. (Special Issue: The Internationalisation of Services – Evidence from Micro Data)
- Melitz, M. J. (2003), "The impact of trade on intra-industry reallocations and aggregate industry productivity", *Econometrica*, 71(6), 1695–1725
- Melitz, M.J and S.J. Redding (2014), "Heterogeneous firms and trade", chapter 1 in Gopinath, G., E. Helpman and K. Rogoff (eds) *Handbook of International Economics Volume 4*, Amsterdam: Elsevier.
- Nordås, H.K. and D. Rouzet (2016) "The impact of services trade restrictiveness on trade flows", *World Economy*, doi: 10.1111/twec.12424, available online 27 July 2016.
- Nordås, H.K. (2016) "Services trade restrictiveness index: the trade effect of regulatory heterogeneity", OECD Trade Policy Paper no 189.
- Nordås, H.K. (2017), "What drives trade in services? Lessons from the Nordics", Örebro University Working Paper no 3/2017.
- Rouzet, D. and F. Spinelli (2016), "Services trade restrictiveness, mark-ups and competition", OECD

Trade Policy Paper No. 194.

Rouzet, D., S. Benz and F. Spinelli (2016), "Trading firms and trading costs in services: Firm-level analysis" TAD/TC/WP(2016)19, Paris: OECD.

Temouri, Y., A. Vogel and J. Wagner (2013), "Self-selection into export markets by business services firms—Evidence from France, Germany and the United Kingdom", *Structural Change and Economic Dynamics*, 25, 146-158.

Vogel, A. (2011), "Exporter performance in the German business services sector", *The Services Industries Journal*, 31(7), 1015–1031

Vogel, A., and J. Wagner (2011), "Robust estimates of exporter productivity premia in German business services enterprises", *Economic and Business Review*, 13, 7-26

Wagner, J. (2012), "International trade and firm performance: a survey of empirical studies since 2006", *Review of World Economics*, 148, 235-267.