

Performance of Small and Medium-sized Enterprises in Services Trade: Evidence from French Firms

Lejárraga, Iza; Oberhofer, Harald

Published in:
Small Business Economics

DOI:
[10.1007/s11187-015-9647-z](https://doi.org/10.1007/s11187-015-9647-z)

Published: 01/01/2015

Document Version
Peer reviewed version

[Link to publication](#)

Citation for published version (APA):
Lejárraga, I., & Oberhofer, H. (2015). Performance of Small and Medium-sized Enterprises in Services Trade: Evidence from French Firms. *Small Business Economics*, 45(3), 673 - 702. <https://doi.org/10.1007/s11187-015-9647-z>

Performance of Small and Medium-sized Enterprises in Services Trade: Evidence from French Firms^{*}

Iza Lejarraga^{*}

Harald Oberhofer^{†‡}

Abstract

This paper empirically investigates the key firm- and industry-specific restrictions to the performance of small and medium-sized enterprises (SMEs) in services trade. For this purpose, we use firm-level data from firms in France operating in different services sectors over the time period 1998 to 2007 and formulate two-part models consisting of (i) (dynamic) export equations and (ii) (dynamic) export share equations. Our results confirm the view that a relatively low share of SMEs engage in services trade. In line with the new-new trade theory, our results also corroborate that more productive SMEs have a higher export probability. The key finding of this paper is that the export decisions of SMEs in services sectors are estimated to be extremely persistent, implying that trade policy efforts, including the allocation of scarce trade promotion budgets, should be directed at addressing the barriers faced in establishing the first export operation. Finally, our sub-sectoral estimates reveal considerable heterogeneity across different types of services.

JEL Codes: C23, C25, F14, F23, L80, L90.

Keywords: internationalisation, services trade, small and medium-sized enterprises, export activities, dynamic export questions.

^{*} Disclaimer: This paper builds on an earlier analysis that was published as part of the OECD Trade Policy Paper No. 165 "Small and medium-sized enterprises in global markets: A differential approach for services?" (Lejarraga, Rizzo, Oberhofer, Stone and Shepherd 2014). The opinions expressed and arguments employed herein are those of the authors and do not necessarily reflect the official views of the OECD or of the governments of its member countries.

Acknowledgements: We would like to thank Rui Baptista, two anonymous referees, the participants of the 5th FIW research conference in International Economics at the Vienna University of Economics and Business, the participants of the FIW-WIIW research seminar in International economics, and the participants of the Inter-American Development Bank-ELSNIT XI Annual Conference on "Internationalisation of SMEs." The authors also thank the OECD Working Party of the Trade Committee and the OECD Working Party on SMEs and Entrepreneurship for useful comments and discussions.

^{*}Investment Division, Directorate for Financial and Enterprise Affairs, Organisation for Economic Co-operation and Development (OECD). Address: 2, rue André Pascal, 75775 Paris Cedex 16. Email: Iza.Lejarraga@oecd.org

[†]Department of Economics, Vienna University of Economics and Business. Address: Welthandelsplatz 1, 1020 Vienna. Email: Harald.Oberhofer@wu.ac.at

[‡]Austrian Institute of Economic Research. Address: Arsenal, Object 20, 1030 Vienna. Email: Harald.Oberhofer@wifo.ac.at

1 Introduction and motivation

In virtually all industrialized countries around the world small and medium size enterprises (SMEs) constitute the overwhelming majority of firms (see, e.g., OECD 2009) and are, thus, pivotal for overall job creation (see, e.g., Davidsson, Lindmark and Olofsson 1998).¹ Moreover, during the last decades economic activity has shifted away from agriculture and manufacturing and, nowadays, is mostly conducted in service industries (see, e.g., Pilat, Cimper, Olsen and Webb 2006). In a similar vein, production processes are organized more internationally today implying that firms tend to compete on world markets rather than they focus on their domestic markets only (see, e.g., Helpman 2006). Consequently, for economies which are characterized by a large proportion of service SMEs, the international competitiveness of these firms is crucial for the overall economic prosperity.

Despite the important role played by services SMEs in national economies, their participation in international trade is perceived to be marginal, and lags considerably behind the trade performance of their counterparts in manufacturing. What (if anything) may be deterring the internationalization of services SMEs? Of course, it may not be profitable for many small providers across a range of services to trade. Notwithstanding, in light of the dominance of SMEs in the fabric of the tertiary economy, exploring the drivers and inhibitors of services SMEs' internationalization may be of interest to policy-makers concerned with augmenting services trade as a vehicle for growth.

With very few exceptions, the available literature on the trade behaviour of SMEs is firmly rooted in the evidence from manufacturing. Emerging evidence on services internationalization is yet scarce – and focuses on larger enterprises. As a result, little information is available to policy-makers on the trade patterns and channels of services SMEs. Given the intrinsic characteristics of services, and how they are traded, it may be reasonable to consider whether traditional (goods-oriented) policies for SMEs internationalization might benefit from some adaptations tailored to services providers. Recent discussions under the General Agreement on Trade in Services (GATS) and other fora have stimulated reflections on whether small services firms trade differently than large multinationals in the same services market, displaying different modes of supply and greater sensitivity to specific barriers (see, e.g., Persin 2011)

Against this backdrop, the objective of this study is to investigate the trade behaviour of SMEs, exploring any differences between manufacturing and services sectors. From a policy-makers point of view the following questions might be of special interest: How important are economies of scale in today's increasingly fragmented trading environment? To what extent are services firms similar with respect to their trading behaviour? Is the impact of trade and regulatory policies on firms identical across enterprise-sizes? Understanding in which sectors

¹Only recently, some new research results highlight the dominant role of newly created firms for overall job creation (Haltiwanger, Jarmin and Miranda 2013, Huber, Oberhofer and Pfaffermayr 2013).

smaller enterprises trade and what kind of constraints affect their trade performance most can be a useful input for trade negotiations and policy-making. Given that financial and other resources are scarce, any pro-active policies to promote the trade participation of SMEs should be directed to areas that are likely to yield the highest returns.

This paper aims at contributing especially to the last questions raised. In particular, we ask whether different service firms are heterogeneous with regard to the internationalization behavior and try to identify some crucial drivers for this potential heterogeneity. Thereby, we distinguish between extensive margin (i.e., the probability to export) and intensive margin (i.e., the relative export volume in exporting firms) trade decisions in order to disentangle the impact of fixed-cost and variable trade cost related barriers for internationalization. We also investigate a broad set of very heterogeneous service activities in order to identify industry-specific determinates for the internationalization of service firms.

The data at hand for French service firms allow to formulate a two-part model, where in its first part we estimate firm-specific export probabilities by taking firm- and industry characteristics into account and control for unobservable heterogeneity across firms. In the second part of the model we investigate differences in export shares for those firms with non-zero exports. Our main results regarding the first part of the model are the following: First, the probability of engaging in any export activities is an increasing function of firm size. Put differently, the smallest firms in the sample are least likely to export to foreign markets. Second, in line with the new-new trade theory we are able to provide some evidence for a positive impact of (total factor) productivity (TFP) on a firm's export probability.² Third, export decisions in French service firms seem to be extremely persistent. More precisely, firms which already exported to foreign markets in the previous year are much more likely to do so in this year. In quantitative terms, this persistence is estimated to dominate all other effects mentioned above and, therefore, fixed-costs related barriers for internationalization seem to be crucial also in service industries. From a policy point of view, this implies that export promotion policies might yield the highest positive returns when directed towards (small) firms which face difficulties in establishing their first international trade relationships.

The estimates for the second part of the model indicate that export shares are relatively persistent. Accordingly, differences in variable trade costs that are likely to prevail in service industries are also able to explain differences in the extent of the international engagement of the respective firms. By contrast, conditional on being an exporting firm and when accounting for persistence in the intensive margin export decision, firm size and productivity do not examine statistically significant effects on a firm's export intensity. Together with the findings from the first part, these results indicate that firm size and productivity only affects a firm's export

²The term new-new trade theory refers to models that incorporate firm-level heterogeneity in standard trade models in order to account for new stylized facts that are observed in firm-level data sets (Baldwin and Robert-Nicoud 2008).

probability but (conditional on being an exporting firm) not its relative engagement in foreign market activities. The travel services industry constitutes one notable exception where larger firms also tend to export larger shares of their services abroad. Accordingly, in this industry smaller firms seem to face variable trade costs related restrictions to exporting.

We further also detect heterogeneity in the estimates for the first part of the model when focussing on specific industries. Firm size, for example, exhibits a positive impact on the export probabilities of firms operating in financial industries, ICT and professional services. By contrast, it does not affect the internationalization probabilities of travel services providers. Furthermore, more productive ICT and professional services firms are more likely to export to foreign markets while productivity matters less for financial or travel services providers. These findings highlight to need for customized policy-making when one is interested in applying pro-active trade promoting policies for service SMEs.

The remainder of the paper is organized as follows. Section 2 offers a short review of the scarce literature on the internationalization of service SMEs. Section 3 establishes our main hypothesis for the empirical analysis, describes the data and provides some descriptive statistics. The formulation of the main hypothesis of interested is mainly guided by the findings reported in our literature review. Section 4 elaborates our econometric methodology and summarizes our empirical results. Section 5 provides some concluding remarks.

2 Internationalization of Service SMEs: A short review of the literature

As noted above, there is limited information on the export behavior of SMEs in services trade. Firm-level evidence on services internationalization is still sparse, and with very few exceptions, does not consider small-sized firms. Nevertheless, a good starting point for investigating the case of small services providers is to look at the existing portraits of successful services exporters. For this purpose we heavily borrow from Wagner (2012) who provides an excellent survey on the most recent empirical literature on international trade and individual firm performance.³ Table A1 in the appendix provides a short synopsis on the 20 studies that are discussed in this section.

First of all, Table A1 indicates that, only recently, the question on the internationalization of services firms attracted increased academic interest. Not more than 6 out of the 20 studies have been published earlier than in 2010. This finding might correspond to the fact that, nowadays, micro-level data on (the internationalization of) services firms become more easily available.

³The literature review by Wagner (2012) exclusively focuses on contributions from the international economics literature which mainly test predictions obtained from the new-new trade theory for data on service firms. In this section we augment these findings by contributions from the small business economics literature.

Unfortunately, however, this seems to be the case for only some industrialized countries. The 20 different studies apply data from 12 different countries including Austria, Canada, France, Germany, India, Italy, Netherlands, Spain, Sweden, Switzerland, United Kingdom and United States. For this reason, the available evidence is still based on some of the most developed countries in the world. One notable exception is the study by Bhattacharya, Patnaik and Shah (2012) that uses data for Indian firms operating either in the chemicals industries or are software providers.⁴

With regard to the raised research questions, the vast majority of studies (presented here) are interested in examining the crucial determinants of the export behavior in service industries. Thereby, the various authors typically approach this question from two different theoretical standpoints. Some of the papers that are also surveyed by Wagner (2012) are rooted in the new-new trade theory and, therefore, test whether more productive firms self-select them into foreign market engagement. The theoretical models put forward in this literature, typically ignore the role of firm size but rather assume that firms are heterogeneous with regard to their level of productivity. Accordingly, only more productive firms are able to profitably cope with the additional fixed-costs and variable trade costs induced by international market presence. Among this group of contributions are Love and Mansury (2009), Conti, Lo Turco and Maggioni (2010), Kox and Rojas-Romagosa (2010), Lööf (2010), Breinlich and Criscuolo (2011), Eickelpasch and Vogel (2011), Minondo (2011), Vogel (2011), Bhattacharya et al. (2012), Federico and Tosti (2012), Engel, Procher and Schmidt (2013), Kelle, Kleinert, Raff and Toubal (2013), Love and Ganotakis (2013), Temouria, Vogel and Wagner (2013), Vogel and Wagner (2013), Wagner (2013) and Wolfmayr, Christen and Pfaffermayr (2013). A related but earlier contribution in this literature by Hollenstein (2005) applies Dunning's OLI (i.e., ownership, location and internationalization advantages) framework for investigating the international engagement of service firms.

A second alternative strand of the economic literature is interested in analyzing the economic behavior of small and medium sized enterprises (SMEs). Given, the increasing relevance of the world markets for all sorts of firms and the shift of production to service industries, this literature, consequently, focuses on the role of firm size for the export behavior of services firms. More specifically, this field of economics highlights the structural differences between large and small firms and also discusses potential issues that might induce market failures with regard to the competitiveness of small firms in domestic and global markets. Examples of this literature include e.g., Ebling and Janz (1999), Masurel (2001), Gourlay, Seaton and Suppakitjarak (2005), Chiru (2007) and Lejpras (2009). With regard to the empirical modeling of export decisions, considering explicitly the theoretical arguments put forward in both of these

⁴In a similar vein, the so-far available empirical evidence is mainly based on data that end prior to the last recession that have been triggered by the financial crisis. Accordingly, evidence on the impact of a world-wide decrease in GDP on the international engagement of services firms is still very scarce and, therefore, surveys that explicitly focus on such questions could be very helpful.

typically separated strands of the literature allows to provide a broader picture. Heterogeneity with regard to productivity and firm size, thus, seems to be crucial for understanding the self-selection of firms into international market presence.

In empirical terms, all of the studies mentioned in Table A1 rely on either firm- and/or establishment level data and, thus, apply different types of micro-econometric estimators. One exception is Masurel (2001), who simply reports some descriptive statistics for survey data which reveal that exporting service SMEs perceive their international engagement as more profitable and less risky than their non-exporting counterparts. The majority of the 201 mentioned studies, apply simple (pooled or weighted) OLS or fixed and random effects estimators for variables that measure some dimensions of the export behavior of service SMEs.

Some studies such as e.g., Ebling and Janz (1999), Gourlay et al. (2005), Conti et al. (2010) and Kelle et al. (2013) focus on the extensive margin internationalization decision (i.e., the probability to engage in any foreign market activities) and apply simple probit models. Moreover, some papers additionally investigate a service firm's export intensity (e.g., its share of exports relative to overall turnover) and apply estimators that are based on the truncated distribution for exporting firms only (see, e.g., Gourlay et al. 2005, Love and Mansury 2009, Conti et al. 2010, Minondo 2011, Love and Ganotakis 2013). In a similar vein, Wolfmayr et al. (2013) apply the Heckman sample-selection estimator in order to disentangle the extensive and intensive margin service export effects in a standard Gravity model for service trade. In this regard, these contributions are most similar to the below proposed two-part model.

Hollenstein (2005), Chiru (2007), Lejpras (2009), Kelle et al. (2013) and Engel et al. (2013) are interested in estimating the impact of different firm characteristics on different channels of international engagement (such as e.g., FDI and exports) and estimate multinomial logit and probit models, respectively. Bhattacharya et al. (2012) apply simple stochastic frontier analysis in order to compare productivity levels of exporting firms with firms that engage in FDI. Vogel and Wagner (2013) are interested in the impact of outlying observations for the estimates of the exporter productivity premium and, consequently, apply outlier robust estimators such as e.g., quantile- or trimmed regressions. Lööf (2010) applies system-GMM estimators as well as matching estimators in order to examine the exporter productivity premium while Temouria et al. (2013) provide evidence for the self-selection hypothesis by applying propensity score matching estimators.

Here, it's worth noting that (with the exception of Minondo 2011 who formulates the first part of his model in a dynamic fashion) none of the surveyed papers accounts for potential persistence in the exporter status and, therefore, this paper is, to our knowledge, the first one that will explicitly show that exporter persistence is prevailing. In a similar vein, only the papers by Eickelpasch and Vogel (2011) and Minondo (2011) account for the fact that export intensity as a share of export turnover over total sales is bounded by the (0,1) interval and apply the fractional response estimator proposed by Papke and Wooldridge (2008). In this regard, we

will also generalize their approach by formulating a two-part model that additionally accounts for persistence in the extensive and intensive margin export equations.

With regard to the empirical findings, some robust results can be identified. First, the predictions from the new-new trade theory are confirmed by virtually all studies mentioned in Table A1. Accordingly, more productive service firms (conditional on firm size etc.) are more likely to serve foreign markets via exports. Moreover, these firms are indicated to be more productive already before the start to serve foreign markets (see, e.g., Vogel 2011, Temouria et al. 2013, Wolfmayr et al. 2013). This finding confirms the view, that productivity differentials are crucial determinants for the self-selection into export activities thereby supporting the theoretical mechanism highlighted by the new-new trade theory. Vogel and Wagner (2013), however, highlight that the productivity premium might only be observable for a few outlying observations somehow weakening the so-far discussed findings on the productivity export relationship.

Another important and very robust finding is that firm size also matters for the decision to engage in any export activities. Typically, larger service firms are more likely to export to foreign markets and are also more export intense. Table A1 reveals that this finding holds across countries and service industries. Moreover, this finding is not altered by the econometric method applied. From a policy point of view, this result indicates that heterogeneity with regard to firm size might also be relevant for the ability to bear the additional costs involved when engaging in foreign market activities pointing to another potential source for a market failure (e.g., non-linear sunk costs for market entry) which systematically discriminates against small firms. A number of authors, however, challenge the notion that there is a positive linear relationship between firm size and the likelihood of exporting in the case of services, contrary to what the manufacturing literature suggests. Instead, they have found that there is a U-shaped or hump shaped curve, or in very few cases no significant relationship at all (Ebling and Janz 1999, Gourlay et al. 2005). Interestingly, the question on whether small firms also face relatively larger variable trade costs has not attracted a lot of attention. In fact, new-new trade theories typically assume that trade related costs are the same for all firms. The proposed two-part approach applied below allows to disentangle the fixed-cost related and variable trade cost driven restrictions for small service firms.

Another strand of studies test the impact of standard gravity variables on trade performance. Federico and Tosti (2012), for example, find evidence that physical distance plays a role in services trade, although the effects of linguistic and cultural distance are unexplored. Breinlich and Criscuolo (2011) show that the effects of distance work on services trade through the extensive margin, but do not exert any influence on the intensive margin. This could imply differences in (fixed) market entry costs. Finally, Wolfmayr et al. (2013) show that, in comparison to manufacturing firms, physical distance more negatively affects service exports. Taken these findings

together, geographical location seems to be also relevant for the international engagement of (small) service firms.

Among the few empirical studies that undertake an exploration of SMEs in a specific services sub-group, Chiru (2007) looks at the export behaviour of Canadian knowledge intensive business services (professional, scientific and technical services). The results show that very small-sized establishments with 20 employees or less are more export-oriented than those firms that employ 21 and 60 workers; the establishments that are most export-oriented have 60 to 70 employees (i.e., medium-sized). The successful export performance of small sized establishments is attributed to the importance of very specific (niche) products in the industry and the adequate use of intellectual property protection. Chiru (2007) also finds that for these kind of knowledge-intensive industries, the barriers of entry into export markets faced by micro and very small establishments are not as prohibitive as in manufacturing pointing to structural differences across these types of industries.

Finally, the available literature also identifies some other important determinants for the export behavior of service firms. To mention the most robust findings, firms that pay higher wages, employ more skilled labor, are more capital intense and possess stronger links to multinational corporate groups are more likely to serve foreign markets.⁵

This brief review of the related literature on the internationalization of service SMEs will guide both our hypothesis building which will be discussed in Section 3.1 and the econometric modelling approach that will be presented in Section 4.1. With regard to the main testable hypothesis, Section 3.1 will discuss the theoretical arguments for the different empirical findings in more detail.

3 Main hypotheses and data

3.1 Main hypotheses

In this section we briefly discuss the main theoretical hypotheses for the empirical analysis to be carried out. Here, we mainly rely on the already available research results discussed in Section 2 but also incorporate the main findings from manufacturing firms. Thereby, we demonstrate that the already established results for SMEs in manufacturing industries must not necessarily carry over to service industries.

In line with the findings of numerous other authors, we expect that firm size systematically affects a firm's export behavior. SMEs are likely to face a number of barriers that systematically

⁵The AMADEUS database does not provided a matched employer-employee dataset and, therefore, we are not able to observe worker-specific characteristics such as wages and the skill-level. Accordingly, we are not able to include this information in our empirical analysis. More details on the available data are presented in Section 3.2.

reduce their likelihood of being exporters. Standard theoretical models in the new-new trade literature, for example, assume that exporting induces additional fixed-costs as well as variable trade costs which have to be beard by the firms (see, e.g., Melitz 2003, Helpman, Melitz and Yeaple 2004). Taking this together with the financial constraints argument put forward in the empirical firm growth literature⁶ smaller firms are less able to finance these additional costs.⁷ Here, it's worth noting that, due to a lower dependence on capital formation, service firms might, however, be less severely affected by financial constraints. Furthermore, fixed-costs might vary strongly across different types of service firms inducing potentially inducing a heterogeneous firm size effect. Our approach to be discussed below allows to disentangle the impact of firm size on the extensive and intensive margin export decisions. In line with the fixed-costs argument, one could expect that firm size more severely affect a firm's export probability while the expectation on its impact on the relative magnitude of exports in exporting firms is not obvious ex-ante.

Additionally, extensive research in small business economics documents various other reasons why SMEs might be less likely to export to foreign markets. First and foremost, the risk of failure is substantially higher for smaller firms (see, e.g., Hart and Oulton 1996, Caves 1998). In order to ensure their survival, these firms tend to focus on the domestic market only. Moreover, SMEs tend to be price takers rather than price makers and this is typically accompanied by lower profits. This again reduces the financial capacities of the respective firms. Again, both of these issues might not be equally important across different service industries potentially resulting in a heterogeneous firm size effect.

Since the establishment of the new-new trade theory and the increasing availability of firm-level data sets, the economic research on internationalization strategies explicitly deals with heterogeneity across firms. Most importantly, Melitz (2003) shows that firm-specific productivity is crucial for the decision whether to serve foreign markets via exports or not. In particular, more productive firms are able to generate larger profits when serving foreign markets and, thus, would be able to bear the additional fixed-costs for establishing distributional networks in the foreign countries and to afford the variable trade costs. This theoretical argument has also been confirmed by a bulk of papers reviewed in Section 2.

Moreover, Helpman et al. (2004) generalize this result for the decision whether to serve foreign markets either through exports or foreign direct investment (FDI). Their findings imply that the most productive firms serve foreign markets via FDI while for less productive firms it is beneficial to export to these markets. Finally, the least productive (surviving) firms will serve the domestic market only.⁸

⁶Accordingly, small and newly created firms typically have only limited access to (internal and external) financial resources (see, e.g., Fazzari, Hubbard and Petersen 1988, Cabral and Mata 2003).

⁷For French manufacturing firms, Stiebale (2011), however, is able to show that once observed and unobserved firm heterogeneity is taken into account, financial constraints have no significant effects on the export probability and the export shares.

⁸This 'pecking order' of productivity with regard to the choice of internationalization strategies has been confirmed by a huge bulk of empirical contributions (see, e.g., Head and Ries 2004, Greenaway and Kneller 2007,

Only recently, Bhattacharya et al. (2012) explicitly analyze the relationship between exports and FDI in service industries and are able to show that in such industries the most productive firms tend to export to foreign markets while less productive firms engage in FDI. The reason for this is that uncertainty about product quality in service sectors is large and transportation costs are negligible.⁹

It's also important to mention that the theoretical models in the spirit of Melitz (2003) and Helpman et al. (2004) argue that more productive firms self-select them into foreign markets, implying that productivity differentials are able to explain difference in firms' export activities. Accordingly, we expect that more productive service SMEs in France are more likely to export to foreign markets while less productive firms will, *ceteris paribus*, serve the French market only. In a similar vein, more productive firms are more competitive on foreign markets and, hence, are also expected to sell a larger share of exports abroad. Accordingly, we also expect a positive impact of productivity on the intensive margin export behavior. However, since fixed-costs and variable trade costs are likely to differ across service industries, we expect these effects to be non-homogeneous.

Since the decision to serve foreign markets also induces additional fixed-costs it is very likely that firms view their internationalization strategies as long-term investments. This together with systematic differences in productivity would imply that a firm's exporter status is relatively persistent. Put differently, firms with positive revenues from exports in a given year are more likely to also exhibit positive export turnovers in the next year(s). Again, for service firms fixed-costs involved when exporting to foreign markets might be lower implying that persistence in the exporter status of these respective firms might be less pronounced. In our empirical exercise, we can test for export persistence by modeling a firm's export decision in a dynamic framework, where the past exporter status is included as an additional covariate.¹⁰ In a similar vein, in our second part of the model we can test whether export shares are also persistent over time. This would imply that firms also only infrequently adjust their exports at the intensive margin. One reason for such a behavior could be that variable trade costs are also relatively persistent over time inducing slow adjustments in the relative shares of services provided abroad. Consequently, splitting our sample into several different service industries also allows to test, whether variable trade costs are similar across these alternative activities.

Focusing on the small business economics literature, the decision on whether to serve foreign markets via exports is also affected by uncertainty about potential future profits associated with

Aw and Lee 2008, Oberhofer and Pfaffermayr 2012a, Temouria et al. 2013, Vogel and Wagner 2013). However, it's worth noting, that the vast majority of these investigations rely on manufacturing firms only (Wagner 2012).

⁹While Bhattacharya et al. (2012) test their theory for the software industry in India, Wagner (2013) provides the first empirical test of this theory for a developed country, namely Germany.

¹⁰Below we estimate two different models, where the former assumes that conditional on all other covariates a firm's export decision is independent of its past exporter status. By contrast, our second model allows to test for this by additionally including the lagged exporter status. More details on the differences between both models will be discussed below.

the participation in these foreign markets. One possibility to reduce the individual risk involved in doing business is to incorporate the firm. Thus, the firm becomes a separate legal identity which is independent inducing limited liability for its owners. Consequently, personal assets of the firm owners can not be required as payments for a firm's debt. Additionally, Sloan and Chittenden (2006) demonstrate that incorporation might also lead to financial advantages and, thus, allows to more easily finance the additional costs involved when engaging in international markets. Other potential benefits accompanied with incorporation include the possibility to sell shares in order to increase a firm's equity capital and governments might also offer some tax advantages. Already established results for the positive impact of incorporation for firm growth tend to support the view that business owners are willing to accept higher risks if their firms are incorporated (see, e.g., Storey 1994). With regard to our research question, this leads us to expect that incorporated firms are more likely to export to foreign markets. The data at hand additionally distinguish between different types of incorporated and non-incorporated firms and, thus, allows an even more precise test for the impact of incorporation on a firm's export behavior. For those firms that are already active in foreign markets differences in legal forms could again lead to deviating risk-taking behavior. Consequently, we also expect that incorporation positively affects a firm's relative export magnitude.

In line with the traditional gravity models for service trade, one might expect that service trade costs also depend on the distance to foreign markets. Unfortunately and in contrast to Federico and Tosti (2012) and Wolfmayr et al. (2013), with our data at hand we are only able to obtain a relatively rough measure of distance to foreign markets. The AMADEUS database provides information on the region (département) where each French firm is located. We utilize this information to construct border dummies for firms located at a border region. Empirically, due to lower trade costs we would expect that firms located at border regions are more likely to export a larger share of their products to foreign markets. This should also hold true for firms located close to the Mediterranean Sea and/or the Atlantic Ocean. Moreover, we also construct a dummy for firms located in Paris. In case of agglomeration economies, these firms will be more internationally orientated and, thus we also expect a positive impact for both parts of our model to be discussed below. Geographical distance typically is seen as one of the main fixed-cost and variable trade cost related restriction for doing business. Establishing foreign trade networks will be more difficult when further away, but variable trade costs are also likely to depend on the distance. Accordingly, one would also expect a negative impact of geographical distance for the intensive margin of service trade. In some service industries, geographically related fixed-costs and variable trade-costs might also be negligible, so we will also test whether a systematic effect of geographical location can be identified across some alternative service industries.

Following previous literature on the determinants of export behavior in service industries, we additionally control for other potential driving forces of a firm's export behavior. Among these

firm-specific characteristics are previous investment decisions and the number of subsidiaries (see, e.g., Eickelpasch and Vogel 2011). We also incorporate information on whether a firm is part of a domestic or foreign corporate group. Finally, in line with the descriptive evidence discussed below we additionally control for industry- and year fixed effects in order to control for differences in export probabilities across industries and for the general (downward) trend in internationalization over time, respectively.

To sum up this discussion our econometric analysis (discussed in more detail below) aims at testing whether firm size and firm productivity has a significant impact on a firm's export activities. Consequently, our main hypotheses are that a) small service firms are less likely to serve foreign markets via exports and that b) more productive firms are more likely to export to foreign markets and also to export a larger share of their products. Thereby, we are also interested in potentially heterogeneous effects of firm size and productivity across different types of service industries. Finally, our econometric approach also allows to investigate the persistence in the export decisions of service firms. So far, this issue has mainly been neglected in the empirical literature.

3.2 Data and descriptive statistics

For the empirical analysis we rely on data provided by Bureau van Dijk in its AMADEUS database update 170 from November 2008. The AMADEUS database includes balance sheet information, profit & loss accounts and ownership information for approximately 8 million firms located in 41 European countries. The time span captured in this version of the database ranges from 1998 to 2007.

Unfortunately, the quality of the data at hand varies substantially across countries. This is especially true for information on a firm's exporter status. For this reason and following related literature on the determinants of exports in manufacturing industries (see, e.g., Stiebale 2011, Konings and Vandebussche 2013), we restrict our empirical analysis to service firms located in France. Only recently, Engel et al. (2013) also utilized a sample of French manufacturing, construction, trade and service firms from the AMADEUS database to analyze their foreign market entry and exit decisions, respectively.

In this application, we classify firms as exporters if they earn strictly positive revenues through exporting and zero otherwise.¹¹ Here it's important to note that in the AMADEUS database only one aggregated export turnover measure is available rendering an analysis of exports by

¹¹For the econometric analysis, we also apply alternative definitions for exporting firms in order to check the robustness of the baseline results. Correspondingly, we classify firms as exporters if a non-negligible share of overall revenues (i.e, 10 and 25 percent, respectively) is generated through exports.

destination countries impossible.¹² Moreover, this export measure is likely to only capture some aspects of international service activities such as cross-border sales of tradeable services. For some very specific industries (e.g., construction and professional services) export turnover might also include the movement of people to foreign countries in order to carry out the services locally. With the data at hand, we are, however, not able to distinguish between these different modes of service exports. Similarly, our export measure likely also not contains service exports via consumption abroad. By contrast, with the aid of the ownership structure reported in the AMADEUS database we are (at least) able to extract information on whether firms in our data belong to domestic or multinational corporate networks. This, in turn, enables us to investigate differences in export probabilities and (export magnitudes) across lone-standing firms and subsidiaries of larger corporate groups. Additionally, other information collected in the AMADEUS database allows to test for firm-specific restrictions to exporting such as e.g., firm size or productivity.

With regard to the selection of different types of services we take a rather broad perspective and include a wide range of different industries. In particular, the firm-level analysis is based on firms primarily operating in transport and storage industries (NACE Rev. 2 codes: 49-53), accommodation and food service industries (NACE Rev. 2 codes: 55-56), information and communication industries (NACE Rev. 2 code: 58-63), financial service activities (NACE Rev. 2 code: 64), legal and accounting activities (NACE Rev. 2 code: 69), activities of head offices and management consultancy activities (NACE Rev. 2 code: 70), architectural and engineering activities (NACE Rev. 2 code: 71), administrative and support service activities (NACE Rev. 2 codes: 77-82) and other service activities (NACE Rev. 2 codes: 94-96). We also include the available construction industries (NACE Rev. 2 codes: 41 and 43) which are not part of the service industries in the NACE classification but are typically considered as service industries. For the descriptive analysis discussed in this section we also include manufacturing firms (NACE Rev. 2 codes: 10-33).¹³

Applying our baseline definition of a firm's exporter status, Table 1 reports the share of exporting firms for the above discussed 2-digit industries and for the time span from 1998 to 2007. This aggregation at the industry level already provides some interesting insights. Focussing on the (number of observation-) weighted average export shares across main industries, we observe remarkable variation. More precisely, throughout the whole sample period more than 30 percent of all manufacturing firms export to foreign countries while this share is below three percent in accommodation and food services industries. In a similar vein, the construction industries, financial and insurance activities as well as the other service activities industry exhibit very

¹²This also implies that we are not able to distinguish between goods and service exports within firms. For this reason our definition of service firms is based on revision 2 of the NACE industry classification as well as the W120 services classification of the World Trade Organization.

¹³For our sectoral estimates reported in Section 4.3 we apply the W120 services classification of the World Trade Organization as an alternative. For more details on this industry classification see e.g., World Trade Organization (1991).

low export shares. By contrast, among the group of service industries, firms operating in transportation and storage industries as well as in information and communication have the highest unconditional probabilities to export to foreign countries. For this latter industries, the shares of exporting firms amounts to 29.68 and 28.06 percent, respectively.

It's also worth noting that we observe large within (main) industry variation in the export shares. In 2007 approximately one third of all membership organizations (NACE Rev. 2 codes: 94) export some services to foreign countries while only less than 2 percent of all other personal service providers (NACE Rev. 2 codes: 96) engage in any international activities. When focusing on different types of service industries, travel agencies, air transporters, firms that provide warehousing and support activities for transportation and publishing exhibit the largest shares of exporting firms. By contrast, in 2007, food, beverage and accommodation services providers export to foreign markets with an unconditional probability of less than 3.3 percent.

When focusing on the within-industry evolution of export shares over time some surprising results emerge. First, from 1998 to 2007 the observed export shares have declined in all major industries. This reduction of export shares has been especially pronounced in financial and service industries and in other service activities where at the end of our sample the relative number of exporting firms is less than half of its value from 1998. Second, with only a few minor exceptions (e.g., accommodation and food service activities) we observe a monotonic decrease in export shares over our sample period. Consequently, the relative decline in export shares in French manufacturing, construction and service industries is not driven by one single (negative) shock but rather seems to represent a steady downward process. Third, only a very small number of sub-industries deviate from this general trend. More precisely, we only observe six sub-sectors where the share of exporting firms in 2007 exceeds the corresponding numbers reported for 1998.¹⁴

Summing up this discussion on export shares across different industries, it turns out that, especially in comparison to manufacturing firms, service providers are less likely to export to foreign countries. For most service industries, this lower export probability has further declined from 1998 to 2007. This, in turn, suggests that in service industries the firm- and industry-specific barriers to internationalization might still be widespread.

In order to investigate this last issue further, Table 2 reports the share of exporting firms for different firm size classes and all different main industries. Thereby, we apply the European

¹⁴Among these sub-industries are manufacture of paper and paper products (NACE Rev. 2 codes: 17), manufacture of computer, electronic and optical products (NACE Rev. 2 codes: 26), water transport (NACE Rev. 2 codes: 50), programming and broadcasting activities (NACE Rev. 2 codes: 60), information service activities (NACE Rev. 2 codes: 63) and activities of membership organizations (NACE Rev. 2 codes: 94).

Table 1: Share of exporting firms by industries

Industry	Year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Manufacturing										
Manufacture of food products	18.24	15.59	15.14	14.82	14.07	14.11	13.40	12.81	12.38	11.92
Manufacture of beverages	56.23	46.39	45.34	44.92	39.92	38.66	38.46	36.27	37.15	37.91
Manufacture of tobacco products	100.00	75.00	66.67	40.00	40.00	40.00	40.00	20.00	16.67	20.00
Manufacture of textiles	58.04	57.01	57.77	56.40	55.67	54.82	54.40	53.33	52.49	51.42
Manufacture of wearing apparel	60.68	57.58	57.67	57.01	56.67	55.04	53.75	51.87	51.72	51.75
Manufacture of leather and related products	51.87	52.78	52.43	52.76	53.56	51.57	49.50	50.33	50.40	51.19
Manufacture of wood	41.01	38.88	38.04	36.23	34.83	34.03	33.78	32.56	31.94	32.35
Manufacture of paper and paper products	54.55	58.57	57.41	56.89	56.32	56.74	59.59	58.65	56.62	59.45
Printing and reproduction of recorded media	26.35	25.15	24.78	24.98	24.65	24.72	24.37	23.83	23.25	23.97
Manufacture of coke and refined petroleum products	33.33	35.59	32.81	30.16	35.94	32.81	35.82	37.88	36.76	32.26
Manufacture of chemicals and chemical products	64.36	63.24	61.85	60.66	60.99	61.47	61.93	60.72	59.74	60.56
Manufacture of basic pharmaceutical products and pharmaceutical preparations	67.77	70.85	70.44	71.09	69.84	72.17	69.71	67.66	67.21	69.04
Manufacture of rubber and plastic products	56.81	55.36	55.86	55.11	55.85	55.43	56.06	56.65	55.51	56.07
Manufacture of other non-metallic mineral products	28.18	27.71	26.19	26.38	26.35	25.56	24.78	24.00	23.62	22.26
Manufacture of basic metals	61.84	62.36	63.30	61.76	59.90	58.15	61.88	60.52	60.51	60.25
Manufacture of fabricated metal products, except machinery and equipment	40.56	39.27	39.19	39.42	38.69	39.16	39.14	38.42	38.09	37.96
Manufacture of computer, electronic and optical products	50.08	49.03	49.63	49.27	48.69	48.67	48.40	48.93	49.38	51.29
Manufacture of electrical equipment	52.39	50.96	50.23	49.58	48.21	47.73	47.67	47.23	48.18	49.56
Manufacture of machinery and equipment n.e.c.	52.41	50.66	50.23	49.49	48.46	47.83	47.23	46.98	46.90	47.31
Manufacture of motor vehicles, trailers and semi-trailers	42.34	42.08	42.57	43.26	42.86	43.15	43.72	43.67	43.44	42.99
Manufacture of other transport equipment	65.44	66.88	61.99	58.84	52.29	53.52	53.46	53.52	54.87	52.66
Manufacture of furniture	27.40	25.83	25.87	24.59	22.98	22.77	22.14	21.97	21.58	21.61
Other manufacturing	33.93	31.05	30.26	29.28	29.19	27.94	26.67	26.18	25.33	24.78
Repair and installation of machinery and equipment	27.26	26.02	25.45	25.18	24.51	24.58	24.76	24.52	24.31	24.71
Manufacturing industries: Weighted average	38.39	35.84	35.31	34.79	33.96	33.59	33.12	32.38	31.85	31.83
Construction										
Construction of buildings	3.36	3.31	3.57	2.96	3.23	2.84	2.58	2.35	2.42	2.32
Specialised construction activities	4.42	4.45	4.64	4.25	3.87	3.52	3.32	3.16	3.06	2.98
Construction: Weighted average	4.28	4.32	4.52	4.10	3.79	3.44	3.23	3.07	2.98	2.91
Transportation and storage										
Land transport and transport via pipelines	27.39	26.97	25.79	24.94	23.80	23.27	22.45	21.61	20.99	20.55
Water transport	14.53	16.14	15.70	14.84	16.19	16.16	17.66	18.32	18.07	16.03
Air transport	42.65	40.70	37.50	29.41	32.17	30.53	29.79	28.95	30.00	30.77
Warehousing and support activities for transportation	41.06	40.42	37.46	37.91	37.27	37.07	36.67	36.08	34.96	34.42
Postal and courier activities	11.40	9.09	11.60	10.36	11.16	9.17	8.82	8.38	9.94	8.92
Transportation and storage: Weighted average	29.68	28.86	27.46	26.78	25.84	25.36	24.58	23.75	23.06	22.65
Accommodation and food service activities										
Accommodation	3.03	3.35	3.66	3.49	3.34	3.22	2.89	3.01	3.01	3.25
Food and beverage service activities	1.89	2.09	2.26	1.96	1.65	1.60	1.38	1.28	1.32	1.29
Accommodation and food service activities: Weighted average	2.34	2.55	2.76	2.48	2.21	2.12	1.84	1.78	1.79	1.84
Information and communication										
Publishing activities	35.60	37.52	35.82	34.61	34.80	34.55	34.83	34.08	33.70	34.62
Motion picture, video and television programme production	29.42	28.22	27.07	25.15	24.57	24.42	24.14	23.60	23.86	23.94
Programming and broadcasting activities	18.62	14.10	15.79	12.86	12.05	14.77	13.24	13.11	17.57	21.43
Telecommunications	24.79	25.40	25.11	20.75	22.34	19.72	15.59	14.35	15.07	15.07
Computer programming, consultancy and related activities	23.16	24.01	22.47	21.87	21.48	22.06	21.10	21.01	20.89	22.09
Information service activities	19.23	19.26	18.28	18.53	19.36	19.88	20.94	20.87	21.49	21.84
Information and communication: Weighted average	28.06	28.29	26.83	25.55	25.35	25.43	24.87	24.31	24.11	24.88
Financial and insurance activities										
Financial service activities, except insurance and pension funding	10.49	9.50	8.23	7.50	6.56	6.21	5.36	4.92	4.73	4.62
Financial and insurance activities: Weighted average	10.49	9.50	8.23	7.50	6.56	6.21	5.36	4.92	4.73	4.62
Professional, scientific and technical Activities										
Legal and accounting activities	11.15	10.62	10.76	10.79	10.82	10.90	11.60	11.13	11.30	11.54
Activities of head offices; management consultancy activities	17.20	17.44	16.53	16.37	15.96	16.02	15.43	15.19	14.80	15.43
Architectural and engineering activities; technical testing and analysis	15.15	14.56	14.32	13.79	13.42	13.20	12.90	12.50	12.44	12.22
Professional, scientific and technical Activities: Weighted average	15.33	14.74	14.40	14.18	13.92	13.91	13.72	13.44	13.32	13.54
Administrative and Support Service Activities										
Rental and leasing activities	13.67	13.59	13.36	12.21	12.24	11.54	11.36	10.37	10.79	11.51
Employment activities	23.58	22.78	22.81	21.19	18.48	18.44	17.00	16.27	15.58	14.02
Travel agency, tour operator and other reservation service and related activities	43.54	42.69	42.62	41.90	41.23	41.53	42.11	41.28	39.36	41.98
Security and investigation activities	7.72	9.08	7.45	7.48	6.31	5.78	6.01	5.58	5.54	5.28
Services to buildings and landscape activities	4.13	3.78	4.13	3.80	3.54	3.45	3.42	3.09	3.31	3.05
Office administrative, office support and other business support activities	17.17	17.14	17.50	17.46	17.43	17.50	17.58	16.96	16.80	16.41
Administrative and Support Service Activities: Weighted average	15.73	15.11	15.08	14.46	13.96	13.66	13.42	12.57	12.33	12.24
Other service activities										
Activities of membership organisations	7.14	13.33	9.52	15.00	18.52	17.24	17.65	21.95	27.27	32.35
Repair of computers and personal and household goods	11.76	9.53	9.03	8.98	8.82	8.35	8.12	7.80	7.41	7.30
Other personal service activities	4.55	4.38	4.64	4.15	2.49	2.07	2.00	1.89	2.00	1.88
Other service activities: Weighted average	5.71	5.19	5.32	4.90	3.45	3.02	2.93	2.80	2.85	2.70

Table 2: Share of exporting firms by size-class and industries

Industry/Firm Size	Year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Manufacturing										
Micro	29.98	27.84	27.39	26.26	25.53	24.62	21.14	20.36	20.00	20.02
Small	57.20	54.93	54.34	53.76	52.76	52.88	52.23	51.84	52.25	48.70
Medium	78.64	79.36	78.73	78.63	78.20	78.90	80.68	78.88	77.61	76.81
Large	81.19	81.57	81.92	82.59	81.71	81.73	83.84	85.16	83.97	80.95
Construction										
Micro	4.01	3.82	3.95	3.46	3.32	2.94	2.40	2.30	2.23	2.20
Small	8.62	8.46	8.10	7.74	7.11	6.53	6.56	5.95	6.39	5.64
Medium	17.75	17.50	18.49	18.39	17.84	15.67	16.38	15.54	15.42	15.91
Large	30.00	38.89	33.66	36.89	36.75	36.51	36.77	32.69	40.96	30.12
Transportation and storage										
Micro	26.46	26.22	23.96	23.07	21.79	20.92	16.70	16.20	15.34	15.45
Small	48.67	47.93	44.84	44.10	42.23	42.71	41.62	40.71	40.03	37.32
Medium	56.07	54.44	56.82	56.16	55.87	54.20	55.87	54.58	53.80	49.37
Large	42.34	46.75	51.14	55.29	52.17	52.19	50.00	50.78	50.20	47.20
Accommodation and food service activities										
Micro	2.46	2.39	2.63	2.41	2.00	1.86	1.50	1.48	1.55	1.63
Small	3.88	4.41	5.08	4.46	3.80	3.88	3.48	2.77	3.04	2.92
Medium	7.22	8.02	9.28	8.90	8.75	10.37	10.93	6.51	9.21	5.90
Large	6.06	14.29	15.09	12.50	16.67	16.42	14.49	16.67	10.84	12.00
Information and communication										
Micro	30.95	30.44	29.30	27.71	27.16	28.10	26.66	26.02	24.79	25.63
Small	42.48	46.68	45.03	45.55	44.77	45.80	46.14	45.26	45.36	45.37
Medium	47.39	53.15	53.88	54.24	55.34	55.29	56.95	55.97	58.17	59.16
Large	61.97	64.00	63.16	58.52	57.04	56.55	53.38	54.82	54.76	53.85
Financial and insurance activities										
Micro	9.03	8.38	7.91	7.31	6.56	6.37	5.53	5.34	5.26	4.54
Small	30.57	29.55	27.50	23.34	24.08	23.53	20.26	19.04	19.93	17.78
Medium	55.91	52.90	58.41	61.21	49.07	41.67	45.95	30.86	30.99	24.66
Large	47.37	54.55	50.00	41.18	52.00	54.17	31.25	50.00	60.00	38.89
Professional, scientific and technical Activities										
Micro	16.07	15.17	15.13	15.02	13.98	13.78	12.58	12.46	12.94	12.68
Small	33.28	30.80	29.44	30.17	29.40	29.91	29.50	29.21	29.24	27.01
Medium	47.23	46.77	46.58	44.09	45.69	53.55	53.89	49.74	52.24	49.85
Large	57.14	65.88	54.37	60.17	59.57	53.33	58.67	58.00	64.62	64.97
Administrative and Support Service Activities										
Micro	20.32	17.85	18.15	17.21	17.47	16.11	13.80	13.07	12.32	12.53
Small	22.30	21.61	21.40	20.08	19.38	19.48	18.64	18.42	18.24	17.67
Medium	21.41	23.99	20.42	21.52	18.53	19.44	17.42	16.20	16.74	14.45
Large	25.90	31.35	23.74	22.73	25.65	24.04	23.37	21.33	22.55	21.90
Other service activities										
Micro	6.24	5.32	5.65	5.08	2.90	2.63	2.29	2.16	2.38	2.17
Small	16.57	12.85	12.42	13.01	11.77	9.79	10.10	9.24	9.92	7.91
Medium	28.89	34.04	28.00	24.59	27.42	26.47	26.92	20.59	23.17	26.03
Large	42.86	36.36	46.15	38.46	35.71	41.18	25.00	36.36	42.86	27.78

Unions definition of micro, small, medium and large firms (see, e.g., Eurostat 2008).¹⁵ Table 2 reveals that micro firms, with less than ten employees, are least likely to export to foreign countries. Put differently, among the group of the smallest firms in our sample the fraction of exporting firms is lowest. However, when we compare export shares of micro firms across different industries we again observe substantial variation. In some industries such as manufacturing, transportation and storage and information and communication approximately 30 percent of all micro firms export to foreign markets. By contrast, the share of exporting micro firms is extremely small in e.g., accommodation and food service industries as well as for financial and insurance activities. Table 2 also indicates that for some industries the differences in export shares across size classes is relatively small (see, e.g., accommodation and food service industries and administrative and support service activities) while economies of scale with regard to internationalization seem to be especially crucial for manufacturing industries and professional, scientific and technical activities. For these latter two industries, the differences in export shares between large and micro firms exceed 40 percentage points throughout the whole sample period.

Another interesting result is that in some service industries the share of medium-sized exporting firms is the largest. To give an example, in 1998 56.07 (55.91) percent of all medium-sized firms in the transportation and storage industries (financial and insurance activities) exported some services to foreign markets while for the largest firms with more than 249 employees the corresponding exporter share amounted to only 42.34 (47.37) percent. Accordingly, micro and small firms are least likely to export to foreign markets while medium-sized firms with more than 49 employees seems to be relatively competitive in their export markets.

Table 2 additionally documents the evolution of industry-specific export shares by size class. In connection to the discussion from above we are thus able to analyze whether the general patterns of decreasing export shares are observable in all different size classes. Interestingly, the shares of medium and large exporting firms seem to be relatively stable over time while especially the export shares of micro firms are decreasing. Consequently, the smallest firms in our sample are mainly responsible for the general downward trend in the export activities of French firms. To give another example, in the professional, scientific and technical activities industry the share of exporters in the group of large firms has increased from 57.14 percent in 1998 to approximately 65 percent in 2007 while the share of micro firms that export has decreased from 16.07 to 12.68 percent. Similar patterns can be observed in virtually all other industries. Here the only exceptions are financial and insurance industries, administrative and support services as well as other service activities where the observed reduction in the export shares is driven by downward trends in all different size classes. Finally, another interesting result can be obtained from the information and communication industries. From 1998 to 2007

¹⁵Accordingly, a firm is classified as micro firm if it employees less than ten employees. Small (medium) firms employ ten or more (50 or more) workers but less than 50 (250). Firms with at least 250 employees are classified as large firms.

the share of smallest and largest exporting firms declined while small and medium-sized firms expand their export activities.

Summing up the main conclusions which can be drawn from Table 2 are as follows: First, the share of exporting firms substantially differs across different firms size classes. Second, the likelihood of engaging in any export activities is lowest for the smallest firms in our sample. Third, the low export shares for micro firms have further declined during our observational period. These three preliminary results commonly indicate that, especially in service industries, the smallest firms might find it most difficult to develop successful internationalization strategies.

Finally, Table 3 reports the results of a simple analysis of variance (ANOVA) for all firms operating in the service industries.¹⁶ Our dummy variable design contains 2-digit industry- and firm size dummy variables, interactions thereof and year dummies. The interaction terms allow to check whether the variation in the exporter status within industries is differently related to variation in firm size. Table 3 shows that the chosen dummy variable design is able to explain approximately 18 percent of the observed variation in a firm’s export status. Moreover, all different dummy variables (statistically) significantly explain some parts of the variation in our dependent variable, indicating that differences in firm size, industry and time are (at least) partly explain the variation in the exporter status. Moreover, the impact of firm size seems to be heterogeneous across industries as demonstrated by the significant interaction effects.

Table 3: ANOVA for a firm’s exporter status in construction and service industries

Source	Exporter status		
	Abs.	%	P-val.
Industry effects	409.46	0.33	0.000
Firm size effects	16.97	0.01	0.000
Industry * firm size effects	2,089.23	1.67	0.000
Year effects	127.50	0.10	0.000
Constant (overall mean)	19,550.72	15.61	-
Model	22,193.89	17.72	0.000
Residual	103,065.74	82.28	-
Total	125,259.62	100.00	-

Notes: Based on 1,276,326 firm-year observations. P-values are based on F-tests according to 27 d.f. (degrees of freedom) for industry effects, 3 d.f. for firm size effects, 80 d.f. for Industry * firm size effects and 80 d.f. for year effects.

However, it is also worth noting that chosen dummy variable design is only able to explain parts of the variation in the exporter status. To give an example, all 27 industry dummy variables together only explain 0.33 percent of the overall variation in the depended variable. This in turn suggests, that there might be (additional) firm specific characteristics not included in our

¹⁶Here, it’s worth noting that we exclude manufacturing firms from this analysis because in our econometric analysis below we solely focus in firms in these respective industries.

ANOVA that are crucial for differences in export decisions across firms. For this reason, a more structural econometric analysis at the firm-level might be able to provide a more reasonable picture of potential export restrictions for small service firms in France.

4 Econometric model and estimation results

4.1 A two-part model for exporting in service industries

In order to empirically test the above established hypotheses we estimate a two-part model for French service firms.¹⁷ The structure of the AMADEUS data at hand allows to apply a relatively powerful econometric framework. The main advantage of this two-part model is that it allows to compare extensive and intensive margin effects of our covariates of interest. Thereby, we refer to the discrete decision to serve any foreign market as extensive margin while the overall level of foreign engagement, measured as the share of export turnover relative to overall revenues, reflects the intensive margin decision. As stated above, in our most general specification, we want to explicitly account for persistence in each firms export behavior. For this reason the first part of the model is formulated as dynamic probability model as discussed in Wooldridge (2005). The second part, which only incorporates firms with non-zero export shares is modelled in the spirit of Papke and Wooldridge (1996) and Papke and Wooldridge (2008).¹⁸ Formally, the first part of the model reads as

$$Pr(\text{ex}_{it} = 1 | \text{ex}_{i,t-1}, \mathbf{x}_{it}, \alpha_i) = \Phi(\rho \text{ex}_{i,t-1} + \mathbf{x}_{it}\gamma + \alpha_i), \quad (1)$$

where $\text{ex}_{it} = 1$ if a firm i exports to foreign countries at time t and zero, otherwise. \mathbf{x}_{it} represents a vector of (strictly) exogenous covariates with γ as the corresponding vector of parameters to be estimated, α_i captures unobserved heterogeneity across individual firms and the estimated ρ indicates whether any persistence in the exporter status at the extensive margin are observable. Finally, Φ denotes the cdf of a normal distribution implying that we aim at estimating the first part as a dynamic probit model with (standard) maximum likelihood methods.

Before turning to this generalized export equation we estimate a model that assumes that $\rho = 0$ (below we refer to this model as our baseline). This permits a comparison of our empirical results with previous contributions (see, e.g., Eickelpasch and Vogel 2011). Additionally, the estimation of these two alternative models allows to examine the robustness of the results obtained from the more restrictive model with $\rho = 0$. The two alternative estimators also differ with regard

¹⁷A general discussion on one-part versus two-part fractional response variable (e.g., export shares) models is offered by e.g., Ramalho, Ramalho and Murteira (2011) and Oberhofer and Pfaffermayr (2012b).

¹⁸A very similar model for the exporter status and export shares of French manufacturing firms is presented by Stiebale (2011). In econometric terms, the main difference is that Stiebale (2011) applies a Tobit model for the second part while we make use of a fractional response model. This latter model has the main advantage that it explicitly accounts for the bounded nature of the export share data at hand.

to the assumptions regarding the distribution of α_i . The more restrictive specification without dynamics in the exporter status assumes that α_i is normally distributed and independent of \mathbf{x}_{it} (i.e., $\alpha_i|\mathbf{x}_{it} \sim N(0, \sigma_a^2)$). This results in a simple random effects probit model. Obviously, this assumption is very restrictive and might not hold for our sample of French service firms.

For this reason, in our dynamic framework we follow Wooldridge (2005) and apply simple econometric approaches that allow to simultaneously deal with the initial conditions problem and more structurally account for unobserved heterogeneity captured by α_i . Drawing from Mundlak (1978) and Chamberlain (1980) this approach models the distribution of the unobserved individual effect α_i conditional on the initial value $\text{ex}_{i,0}$ and all exogenous variables. For our empirical exercise this implies that we can apply standard random effects probit estimation routines to $Pr(\text{ex}_{it} = 1)$ with $(\text{ex}_{i,t-1}, \mathbf{x}_{it}, \text{ex}_{i,0}, \bar{\mathbf{x}}_i)$ as our generalized vector of covariates. $\bar{\mathbf{x}}_i$ denotes the firm-specific (time) averages of all covariates collected in \mathbf{x} . More formally, this approach assumes that $\alpha_i|\mathbf{x}_{it} \sim N(\gamma + \bar{\mathbf{x}}_i\zeta, \sigma_a^2)$ implying that firm-specific averages of the strictly exogenous variables allow to control for unobserved heterogeneity (see, e.g., Wooldridge 2010).¹⁹

The second part of the model is given by:

$$E(\text{ex-share}_{it}|\text{ex-share}_{i,t-1}, \mathbf{x}_{it}, \eta_i, \text{ex}_{i,0}) = G(\lambda \text{ex-share}_{i,t-1} + \mathbf{x}_{it}\beta + \eta_i), \quad (2)$$

where, ex-share_{it} denotes a firm i 's export share at time t . \mathbf{x}_{it} is the same vector of exogenous variables and η_i captures unobserved heterogeneity. $G(\cdot)$ represents a cdf satisfying $0 < G(z) < 1$ for all $z \in \Re$ which, in this case, is chosen to be the logistic function so that $G(z) \equiv \Lambda(z) = \frac{\exp(z)}{\exp(1+z)}$. Based on the Bernoulli log-likelihood equation, the second part of the model is estimated using quasi maximum likelihood methods. Here, we again estimate two alternative models where the first one assumes that $\lambda = 0$. By contrast, the alternative model additionally estimates λ and accounts for unobserved heterogeneity by again applying the Mundlak (1978) and Chamberlain (1980) approach.

It's also worth noting that equations (1) and (2) are non-linear econometric models. Consequently, the marginal effects of the covariates of interest are not constant over their ranges. For these types of models two alternative measures for marginal effects have been proposed, the *marginal effect at the mean* (MEM) and the *average marginal effect* (AME) (see, e.g., Bartus 2005). In our empirical application we again follow Wooldridge (2005) and calculate AMEs. There, the basic idea is to calculate each marginal effect separately for all individual

¹⁹In our application, we assume that only averages of time-varying covariates directly affect the random effects α_i . Otherwise, we would not be able to obtain (short-run) estimates for the impact of legal form and the number of subsidiaries, respectively. We also alternatively estimated the first part using a conditional (fixed effects) logit model. In this model the identification of the parameters of interest is only possible for time-variant covariates and solely relies on the sub-sample of firms that switch their exporter status during our observational period (see, e.g., Train 2003). The estimates for the time-varying covariates from the conditional logit model are virtually identical to our random effects probit estimates and are available from the authors upon request.

observations and average over all estimated effects in order to obtain one single measure of the impact of a given covariate on a firm's export decision.

In both empirical specifications \mathbf{x}_{it} contains the log number of employees, log total factor productivity (TFP), net investment per employee (measured as annual nominal change in fixed assets), a firm's number of subsidiaries as well as two dummy variables capturing whether the firm is part of a domestic or multinational corporate network and a set of dummy variables for different legal forms. We also incorporate a set of border and seaside dummies, as well as a dummy for firms located in the region surrounding Paris.

Following the large literature on the estimation of production functions at the firm-level (see, e.g., Del Gatto, Di Liberto and Petraglia 2011, Van Beveren 2012, for recent surveys), we construct our measure of TFP by applying the Levinsohn and Petrin (2003) approach. In order to deal with the simultaneity of input and output choices, Levinsohn and Petrin (2003) suggest to apply a semi-parametric estimator that utilizes a firm's demand for intermediate inputs (such as materials or electricity) in order to proxy for unobservable productivity shocks.²⁰ Engel et al. (2013), among others, also apply this procedure for their sample of French firms taken from the AMADEUS database.

In line with the discussion from above, we expect that larger service and construction firms are more likely to export and also export a larger share of their services abroad. In a similar vein, the literature on heterogeneous firms and internationalization suggests that more productive firms are more likely to serve foreign markets. With regard to a firm's export behavior and its organizational network previous results indicate that investment decisions only affect a firm's exports at the intensive margin while firms with more (domestic) subsidiaries are more likely to export abroad (Eickelpasch and Vogel 2011).

With regard to a firm's legal form, we are able to distinguish between five different types of enterprises, namely the Société à responsabilité limitée (SARL), the Entreprise unipersonnelle à responsabilité limitée (EURL), the Société anonyme simplifiée (SAS), the Société anonyme (SA) and the Société en nom collectif (SNC). Thereby, the SA is equivalent to a public limited company (Stiebale 2011), the SARL is a private limited company (comparable to a Ltd. in UK or a limited liability company in the USA), the SAS is unlisted public company, and the EURL is similar to a single-member company in the United Kingdom. By contrast, a SNC is a general partnership and as such unincorporated. Following the discussion from above, we expect that incorporation should examine a positive impact on a firm's export likelihood.

Table 4 reports some summary statistics for our main variables of interest. Accordingly, only 15 percent of the firms in our sample export to foreign countries. Consequently, the share of exports for both groups of exporting and non-exporting firms only amounts to 2.5 percent.

²⁰More details on this estimation procedure and the parameter estimates for the Cobb-Douglas production function can be found in Lejárraga et al. (2014).

Table 4: Summary statistics for the full sample of construction and service firms

Variable	Firms^a	Mean	Std.Dev.	Min.	Max.
Exporter status	159,776	0.151	0.358	0	1
Export shares	159,776	0.025	0.112	0	1
Export shares in exporting firms	28,777	0.163	0.247	0.0002	1
No. of employees	159,776	28.556	152.175	1	9603
Log(TFP)	159,776	3.880	0.515	2.385	5.584
Net investment per employee (in thousands)	159,776	1.512	13.815	-61	169
No. of subsidiaries	159,776	0.292	1.389	0	50
Foreign corporate group	159,776	0.009	0.093	0	1
Domestic corporate group	159,776	0.501	0.500	0	1
<i>Legal forms</i>					
Société à responsabilité limitée (SARL)	159,776	0.615	0.487	0	1
Entre. unip. à responsabilité limitée (EURL)	159,776	0.059	0.235	0	1
Société anonyme simplifiée (SAS)	159,776	0.195	0.396	0	1
Société anonyme (SA)	159,776	0.116	0.320	0	1
Société en nom collectif (SNC)	159,776	0.007	0.081	0	1
<i>Regional dummies</i>					
Paris region	159,776	0.091	0.288	0	1
Belgian border	159,776	0.062	0.242	0	1
German border	159,776	0.045	0.208	0	1
Swiss border	159,776	0.049	0.216	0	1
Italian border	159,776	0.040	0.196	0	1
Spanish border	159,776	0.044	0.205	0	1
Mediterranean Sea	159,776	0.099	0.299	0	1
Atlantic Ocean	159,776	0.215	0.411	0	1

Notes: ^aThe 159,776 firms in the sample are typically observed repeatedly, leaving us with 498,298 observations for the empirical exercise below.

However, when only focusing on the sub-group of exporting firms this average share increases to 16 percent. The average firm in our sample employs approximately 28.5 workers. Moreover, on average net investment per employee amounts to EUR 1,512 and every third firm own a subsidiary. Here it's worth noting that the distribution is extremely skewed implying that only a very few firms have subsidiaries while the majority of firms is lone-standing. More precisely, only one percent of French service firms in our sample belong to a multinational corporate network. By contrast, 50 percent of all firms are part of domestic (i.e., French) corporate groups.

Table 4 also reports the most important legal forms for the firms in our sample. Here it's worth noting that only SNCs are non-incorporated firms while the other legal forms represent different types of incorporations. In a similar vein, we present our regional dummies at the bottom of this Table. Accordingly, approximately 9 percent of all firms in the sample are located in and around Paris, while only 4.5 percent are located in regions that share a common border with Germany.

4.2 Full sample estimation results

Turning to the estimation results, Tables 5 and 6 report our main findings. Thereby, the results displayed in Table 5 correspond to our baseline models without dynamics in a firm's exporter activities. By contrast, Table 6 is based on the generalized models with dynamics and parametrized random effects as discussed above. Moreover, the three different blocks in both tables correspond to our alternative cut-off values for defining a firm's exporter status at the extensive margin.

The extensive margin results reported in Table 5 are in line with our theoretical discussion from above. Most importantly, larger firms are more likely to export to foreign markets. This result reinforces our descriptive evidence and again indicates that export restrictions are most crucial for the smallest service firms. Quantitatively, our most generous definition for exporting firms with any positive amount of export turnover (i.e., ex-all) suggests that a one percent increase in the number of employees, on average, increases a firm's export probability by 2.5 percentage points. Moreover, in our baseline model we are also able to confirm the prediction put forward by the new-new trade theory. Accordingly, more productive firms are more likely to export to foreign markets. Qualitatively, these two findings are robust to changes in the definition of exporting firms as indicated by positive and significant AMEs in the blocks for Ex-10 and Ex-25, respectively. Note, as discussed in Footnote 11 for the Ex-10 (Ex-25) blocks we classify firms as exporters if at least 10 (25) of the overall revenues are generated through exports.

With regard to the other variables included in our model, we obtain ambiguous results. To start with, net investment per employee has virtually no impact on a firm's export probability. While this result is well in line with extensive margin results put forward by Eickelpasch and Vogel (2011) we obtain deviating results for the number of subsidiaries. More precisely, Eickelpasch and Vogel (2011) report positive effects while, in our sample for the full set of all exporting firms, enterprises with a larger number of subsidiaries exhibit lower export probabilities. This effect disappears for the more restrictive export thresholds. By contrast, our extensive margin estimates indicate that firms that are either part of domestic or multinational corporate groups are more likely to export to foreign markets.

Focusing on the impact of different legal forms we again obtain ambiguous results. In comparison to the baseline category, which contains firms with legal forms of minor relevance, some of the incorporate firms are more (less) likely to export to foreign markets. More precisely, single person incorporations possess of a lower likelihood to export to foreign markets while publicly quoted firms more likely serve them. Finally, geographic location also seems to matter for a firm's decision to engage in any export activities. Applying our baseline export definition Ex-all, only firms located at the seaside to the Atlantic Ocean are less likely to export to foreign markets. In quantitative terms, the AME is largest for firms located in regions which share a

Table 5: Full sample two-part model estimates without dynamics

Variable	Ex-all		Ex-10		Ex-25	
	First part	Second part	First part	Second part	First part	Second part
Log (no. of employees)	0.025*** (0.001)	-0.021*** (0.001)	0.001*** (0.000)	-0.019*** (0.002)	0.000*** (0.000)	-0.018*** (0.002)
Log(TFP)	0.029*** (0.001)	0.039*** (0.002)	0.003*** (0.000)	0.056*** (0.004)	0.001*** (0.000)	0.056*** (0.004)
Net investment p.e. (in th.)	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)
No. of subsidiaries	-0.001* (0.000)	0.002*** (0.000)	0.000* (0.000)	0.000 (0.001)	0.000 (0.000)	0.001 (0.001)
Foreign corporate group	0.030*** (0.007)	0.026*** (0.006)	0.005*** (0.002)	0.045*** (0.011)	0.002*** (0.001)	0.045*** (0.012)
Domestic corporate group	0.029*** (0.001)	-0.002 (0.002)	0.003*** (0.000)	-0.003 (0.004)	0.001*** (0.000)	0.003 (0.004)
<i>Legal forms</i>						
SARL	-0.002 (0.006)	0.017** (0.008)	-0.001 (0.001)	0.037*** (0.014)	0.000 (0.001)	0.025 (0.017)
EURL	-0.018*** (0.005)	0.026*** (0.009)	-0.002*** (0.001)	0.060*** (0.017)	0.000 (0.001)	0.030 (0.019)
SAS	0.023*** (0.007)	0.023*** (0.007)	0.002* (0.001)	0.026* (0.013)	0.001** (0.001)	0.013 (0.017)
SA	0.028*** (0.007)	0.030*** (0.008)	0.003** (0.001)	0.035** (0.014)	0.002*** (0.001)	0.014 (0.017)
SNC	-0.007 (0.009)	0.002 (0.013)	-0.002 (0.001)	-0.012 (0.023)	0.000 (0.001)	-0.035 (0.028)
<i>Reginal dummies</i>						
Paris region	0.046*** (0.003)	0.028*** (0.003)	0.009*** (0.001)	0.015*** (0.005)	0.003*** (0.000)	0.018*** (0.005)
Belgian border	0.058*** (0.003)	-0.015*** (0.003)	0.004*** (0.001)	-0.029*** (0.006)	0.001*** (0.000)	-0.012* (0.007)
German border	0.066*** (0.004)	0.016*** (0.003)	0.009*** (0.001)	-0.023*** (0.006)	0.003*** (0.000)	-0.044*** (0.007)
Swiss border	0.044*** (0.004)	0.000 (0.004)	0.004*** (0.001)	-0.005 (0.007)	0.001*** (0.000)	0.008 (0.008)
Italian border	0.012*** (0.004)	-0.008 (0.005)	0.001 (0.001)	-0.028*** (0.009)	0.003* (0.000)	-0.051*** (0.010)
Spanish border	0.011*** (0.003)	-0.012*** (0.004)	0.000 (0.001)	-0.026*** (0.008)	0.000 (0.000)	-0.025*** (0.009)
Mediterranean Sea	0.019*** (0.002)	0.032*** (0.003)	0.004*** (0.001)	0.034*** (0.006)	0.001*** (0.000)	0.031*** (0.006)
Atlantic Ocean	-0.010*** (0.001)	0.016*** (0.002)	0.000 (0.000)	0.007 (0.004)	0.000 (0.000)	-0.003 (0.005)
<i>Fixed effects</i>						
2-digit industry ^a	14157.30***	11502.73***	6594.92***	3934.85***	5995.86***	1431.90***
Year ^b	98.27***	29.98***	50.04***	12.88	25.38***	10.04
Observations	498,298	75,167	498,298	27,097	498,298	16,063

Notes: Average marginal effects reported (see Bartus 2005). *, ** and *** denote significance at 10%, 5% and 1% levels, respectively. ^aWald-test with 27 degrees of freedom. ^bWald-test with 8 degrees of freedom.

common border with Germany. Firms located in Paris also tend to export to foreign markets with a higher probability.

The second part estimation results reported in the second columns of each block reveal some interesting and new results. For the group of exporting firms, Table 5 suggests that larger firms are less export intense. This would imply that, in relative terms, larger exporting firms less heavily rely on foreign markets while exports constitute a larger fraction of overall turnovers for smaller firms. However, when applying the generalized specification which includes lagged export shares this statistically negative effect disappears (see Table 6). Taken these findings

together, firm size seems to only significantly affect a service firm's extensive margin export decision while for already exporting firms, firm size is not able to explain variation in the export intensity.

By contrast, the second part estimates indicate that more productive firms also export a larger fraction of their services. This result again supports the pecking-order productivity hypothesis formulated by the new-new trade theory. In a similar vein, the second part results with regard to the different legal forms suggest that, conditional on serving foreign markets, incorporated firms export larger shares of their services. Finally, the intensive margin results for regional location are ambiguous. To give only one example, the Ex-all estimates for sharing a common border with Germany indicate an increase the (conditional) share of exports, while exporting firms located close to Belgium tend to export smaller shares of their services. Variable trade costs, thus, might be asymmetric across different host countries.

1

Turning our attention to the generalized export equation, Table 6 reveals some interesting results.²¹ Most remarkably, the AMEs associated with the lagged exporter status indicate that the export decisions are extremely persistent. This implies that the more restrictive specification which assumes that $\rho = \lambda = 0$ misses some important aspects for understanding the export behavior of French service firms. This is also confirmed by likelihood ratio tests for both parts and the most generous ex-all definition based on the sample of observations available for the dynamic model. The static specifications are rejected in favour of the dynamic model with the corresponding p-values being smaller than 0.0000 for both parts, respectively.

Quantitatively a firm which already exported in the previous year, *ceteris paribus*, exhibits a 43 percentage points larger export likelihood for this year. Comparing this effect with the impact of firm size in column 1 of Table 6, it turns out that a 23.75 percentage points increase in employment has an equivalent impact on a firm's export probability. From a policy point of view this suggests that policies that support initial internationalization efforts might be most successful in increasing the share of exporters in the French service industries. In a similar vein, the marginal effects corresponding to the second part of the model indicate that the export shares are also extremely persistent.

Moreover, Table 6 reveals that TFP does only marginally affect a firm's export probability, when one controls for persistence in a firm's exporter behavior and more structurally model unobserved heterogeneity. This is especially true for the alternative definitions of the extensive margin export decision. Moreover, this effect fully disappears in the second part of our model.

²¹Due to the inclusion of the lagged export information, the number of observations in the full sample is reduced to 276,039. There are two reasons for this. First, the inclusion of lagged information does not allow to include the first observed year. Second, the AMADEUS data set provides data with missing observations for some years leaving us with an unbalanced panel dataset which further reduces the number of available observations.

Table 6: Full sample two-part model estimates with dynamics and controlling for unobserved heterogeneity

Variable	Ex-all		Ex-10		Ex-25	
	First part	Second part	First part	Second part	First part	Second part
Lagged exporter status/share	0.427*** (0.006)	0.391*** (0.004)	0.488*** (0.013)	0.566*** (0.010)	0.503*** (0.014)	0.463*** (0.017)
Log (no. of employees)	0.018*** (0.002)	-0.005 (0.004)	0.003 (0.002)	-0.004 (0.009)	0.001 (0.002)	0.007 (0.016)
Log(TFP)	0.014*** (0.002)	0.003 (0.004)	0.004** (0.002)	0.017* (0.009)	0.001 (0.002)	0.015 (0.015)
Net investment p.e. (in th.)	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
No. of subsidiaries	-0.001*** (0.000)	0.001*** (0.000)	0.000 (0.000)	0.001 (0.001)	0.000 (0.000)	0.000 (0.002)
Foreign corporate group	0.007 (0.004)	0.009* (0.005)	-0.001 (0.003)	0.014 (0.014)	-0.001 (0.003)	0.020 (0.022)
Domestic corporate group	0.012*** (0.001)	-0.002 (0.002)	0.003*** (0.001)	0.001 (0.004)	0.001 (0.001)	0.012* (0.007)
<i>Legal forms</i>						
SARL	0.005 (0.005)	0.002 (0.006)	0.007* (0.004)	0.023 (0.015)	0.006 (0.005)	0.024 (0.047)
EURL	-0.002 (0.005)	0.005 (0.008)	0.006 (0.006)	0.019 (0.020)	0.008 (0.007)	-0.011 (0.051)
SAS	0.014*** (0.005)	0.003 (0.005)	0.010** (0.005)	0.001 (0.015)	0.007 (0.005)	-0.013 (0.047)
SA	0.014*** (0.005)	0.003 (0.006)	0.011** (0.005)	0.014 (0.015)	0.008 (0.005)	0.003 (0.047)
SNC	0.010 (0.007)	-0.003 (0.010)	0.015* (0.008)	-0.008 (0.028)	0.010 (0.009)	0.007 (0.070)
<i>Reginal dummies</i>						
Paris region	0.010*** (0.002)	0.004 (0.002)	0.004** (0.002)	-0.003 (0.006)	0.004** (0.002)	0.006 (0.011)
Belgian border	0.024*** (0.002)	-0.012*** (0.002)	0.004** (0.002)	-0.024*** (0.006)	0.000 (0.002)	-0.013 (0.011)
German border	0.019*** (0.002)	-0.002 (0.002)	0.004** (0.002)	-0.037*** (0.006)	0.001 (0.002)	-0.065*** (0.010)
Swiss border	0.016*** (0.002)	-0.003 (0.003)	0.004* (0.002)	-0.003 (0.008)	0.005** (0.002)	0.011 (0.013)
Italian border	0.007** (0.003)	-0.005 (0.004)	0.000 (0.002)	-0.034*** (0.012)	-0.002 (0.002)	-0.060*** (0.020)
Spanish border	0.003 (0.002)	-0.002 (0.003)	-0.001 (0.002)	-0.005 (0.010)	0.001 (0.002)	0.002 (0.016)
Mediterranean Sea	0.005*** (0.002)	0.000 (0.003)	0.000 (0.002)	-0.002 (0.007)	0.002 (0.002)	-0.001 (0.012)
Atlantic Ocean	-0.002* (0.001)	0.001 (0.002)	-0.001 (0.001)	-0.002 (0.005)	0.001 (0.001)	-0.017** (0.009)
<i>Fixed effects</i>						
2-digit industry ^a	3302.69***	336.61***	751.33***	227.83***	390.20***	145.40***
Year ^b	19.92***	7.22	3.70	11.60**	8.61*	10.52**
Observations	276,039	31,551	118,268	7,331	76,202	2,723

Notes: Average marginal effects reported (see Bartus 2005). *, ** and *** denote significance at 10%, 5% and 1% levels, respectively. ^aWald-test with 27 degrees of freedom. ^bWald-test with 8 degrees of freedom.

In a similar vein, in our generalized export models, the choice between various legal forms has virtually no impact on the decision to serve foreign markets via exports. By contrast, applying the Ex-all definition, our estimates for regional variation in the extensive margin export equation are qualitatively in line with our baseline model without persistence in the exporter status.

4.3 Selected sectoral results

In this section we investigate whether the general results outlined above can be confirmed for different types of service industries. For this reason and based on the W120 services classification of the World Trade Organization (World Trade Organization 1991), we divide our sample into different service sectors and re-estimate our two-part model for the most generous extensive margin definition Ex-all. In the following, we solely focus on our second specification that controls for persistence in export activities and models unobserved heterogeneity using the Mundlak (1978) and Chamberlain (1980) approach.

Table 7 reports the estimation results for a selected group of sectors including financial services, information and communication technologies (ICT), professional services and travel-related services. The selection of these sectors is based on their growing relevance within the group of service industries. Moreover, in our sample these industries are well represented and thus allow to infer the most powerful results.²²

Table 7 reveals some interesting differences across industries. Our estimates indicate that persistence matters across all different sectors. More precisely, already exporting firms are far more likely to continue to export. In comparison to a solely domestically oriented firm a travel services provider that already engages in any exporting activities is 48.8 percent more likely to do so in the next year. For the other three sectors, this effect ranges from 53.8 percent (for ICT firms) to 57.2 percent (for financial services providers). In the W120 services classification, travel services include accommodation, food service activities as well as travel agencies, tour operators and other reservation services. In these industries, you can more easily sell the same services to domestic and/or foreign clients. In this regard, it seems plausible that the estimated marginal persistence effect is similar to the average effect across all industries reported in Table 6. By contrast, in the financial industries, the provision of services to foreign customers seems to be most difficult. The latter industries are characterized by country-specific market regulations which make market entry more difficult. In case, a financial service firm wants to also serve customers abroad, it has to acquire specific knowledge which is typically only applicable in this country. According to this, one might argue that fixed-costs for entry are relatively large in financial services industries, while travel services providers are likely to face relatively little barriers.

In a similar vein, for firms engaging in any export activities the last year's export share positively affects current export shares. This effect is most (least) pronounced for travel services (ICT) firms. Again, comparing travel services firms with financial services providers we are not observing large differences in the export intensities. This finding indicates that variable export costs are relatively similar and low in both industries. Once, a financial service provider accepts the fixed-costs for obtaining country-specific regulatory knowledge, the variable costs

²²The estimation results for other service industries are available from the authors upon request.

Table 7: Two-part model estimates with dynamics and controlling for unobserved heterogeneity for selected service sectors

Variable	Financial industries		ICT firms		Professional services		Travel services	
	First part	Second part	First part	Second part	First part	Second part	First part	Second part
Lagged exporter status/share	0.572*** (0.025)	0.419*** (0.037)	0.538*** (0.016)	0.308*** (0.011)	0.539*** (0.012)	0.394*** (0.008)	0.488*** (0.022)	0.458*** (0.010)
Log (no. of employees)	0.036*** (0.007)	0.010 (0.019)	0.033*** (0.010)	-0.009 (0.006)	0.025*** (0.006)	-0.006 (0.007)	0.010* (0.006)	0.044** (0.018)
Log(TFP)	0.008 (0.009)	-0.023 (0.025)	0.033*** (0.011)	0.001 (0.007)	0.033*** (0.007)	0.003 (0.009)	0.004 (0.007)	0.005 (0.019)
Net investment p.e. (in thousands)	-0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)
No. of subsidiaries	-0.002* (0.001)	0.002 (0.002)	-0.005** (0.002)	-0.002** (0.001)	-0.004*** (0.001)	-0.001 (0.001)	0.001 (0.001)	0.004 (0.003)
Foreign corporate group	0.040 (0.030)	0.011 (0.034)	0.004 (0.018)	-0.006 (0.011)	0.060*** (0.017)	0.013 (0.010)	-0.014 (0.010)	-0.022 (0.036)
Domestic corporate group	0.022*** (0.006)	0.005 (0.009)	0.012* (0.007)	-0.002 (0.003)	0.029*** (0.004)	0.003 (0.004)	0.007** (0.003)	-0.005 (0.009)
<i>Legal forms</i>								
SARL	-0.000 (0.024)	0.029 (0.025)	-0.003 (0.022)	-0.006 (0.010)	0.036* (0.019)	0.007 (0.015)	0.024 (0.022)	-0.008 (0.031)
EURL	0.007 (0.030)	0.017 (0.029)	0.002 (0.030)	0.018 (0.016)	0.014 (0.022)	0.019 (0.021)	0.031 (0.026)	-0.007 (0.036)
SAS	-0.002 (0.023)	0.030 (0.024)	0.021 (0.024)	0.003 (0.010)	0.053** (0.015)	0.002 (0.015)	0.031 (0.024)	0.005 (0.030)
SA	-0.008 (0.023)	0.023 (0.025)	0.028 (0.025)	-0.001 (0.010)	0.053** (0.022)	0.015 (0.015)	0.034 (0.025)	0.001 (0.030)
SNC	-0.067** (0.029)	-0.277*** (0.055)	0.022 (0.045)	-0.020 (0.021)	-0.015 (0.025)	0.003 (0.020)	0.040 (0.029)	-0.008 (0.032)
<i>Regional dummies</i>								
Paris region	0.017* (0.010)	-0.015 (0.016)	0.008 (0.007)	0.010*** (0.003)	0.036*** (0.025)	0.006 (0.005)	0.001 (0.004)	0.018 (0.011)
Belgian border	0.001 (0.011)	-0.003 (0.015)	0.062*** (0.017)	0.005 (0.006)	0.018** (0.008)	-0.016** (0.007)	0.001 (0.007)	-0.036 (0.023)
German border	0.010 (0.013)	-0.023* (0.013)	0.030 (0.019)	-0.001 (0.007)	0.032*** (0.010)	-0.000 (0.007)	0.001 (0.007)	0.006 (0.017)
Swiss border	0.002 (0.012)	-0.029** (0.012)	0.031 (0.021)	0.013 (0.010)	-0.001 (0.009)	-0.022*** (0.007)	0.007 (0.006)	-0.005 (0.021)
Italian border	0.018 (0.018)	-0.009 (0.039)	0.038 (0.024)	-0.007 (0.007)	0.023** (0.011)	0.000 (0.010)	0.001 (0.006)	-0.011 (0.017)
Spanish border	-0.017 (0.012)	-0.013 (0.016)	-0.010 (0.013)	-0.001 (0.007)	0.009 (0.008)	0.004 (0.008)	0.009 (0.006)	0.010 (0.014)
Mediterranean	0.014 (0.011)	-0.003 (0.015)	0.001 (0.011)	0.015** (0.006)	-0.004 (0.006)	-0.008 (0.007)	0.004 (0.004)	0.002 (0.013)
Atlantic Ocean	-0.003 (0.007)	0.004 (0.013)	-0.024*** (0.008)	-0.013** (0.006)	-0.009* (0.005)	0.003 (0.005)	-0.003 (0.004)	0.007 (0.012)
<i>Fixed effects</i>								
2-digit industry	-	-	32.47*** (6.05)	75.53*** (4.45)	64.06*** (2.90)	123.46*** (5.33)	209.17*** (14.37**)	2.10 (2.67)
Year	5.21	7.64	6.05	4.45	2.90	5.33	14.37**	2.67
Observations	10,871	821	13,008	5,435	35,327	5,529	46,858	2,617

Notes: Average marginal effects reported (see Bartus 2005). *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.

for serving more clients is almost zero. This is also true for travel services firms as long as available capacities are not fully utilized.

With regard to firm size, we also estimate heterogeneous effects both in terms of statistical significance and economic relevance. For travel services providers, firm size only marginally affect the extensive margin decision while larger exporting firms serve substantially larger shares of their services to foreign customers. With regard to the former a one percent increase in firm size only increase the probability to serve any foreign customers by only one percentage points. For the other reported industries the effect of an increase in firm size for the probability to export to foreign markets is at least 2.5 times larger. This finding again supports the view that serving any foreign customers is not very difficult in the travel services industries. In terms of magnitude, larger firms are clearly in a favourable situation. Economies of scale are an issue in travel services. Again, a lot of travel services are mainly fixed-costs intense, such as e.g., coach trips. As long as some seats in the coach are still available, the marginal costs for an additional customer are close to zero. For the other three industries, we observe opposing effects. Larger ICT firms, for example, are more like to serve foreign markets but, conditional on serving markets abroad, do not serve larger shares of their services. Establishing a trade relationship with foreign customers typically involves the establishment of ICT networks. Based on our findings, these fixed-costs can more easily be beard by larger firms. Once, these networks have been established our second part results do not point to any differences in the export intensity across larger and smaller firms.

In a similar vein, the sectoral analysis also reveals that productivity is only able to explain differences in export behavior in professional services or ICT industries but has no statistically significant effect on financial services firms or travel services providers. First, these findings indicate that the mechanism proposed by the new-new trade theory might not be able to explain self-selection into foreign markets in all service industries. One potential argument for this finding might be that the concept of productivity and its subsequent measurement is not very useful for some service industries. The quality of financial an travel services might mainly be determined by provider-customer relationships which are clearly not covered by the (manufacturing industries based) concept of productivity. ICT operations can be rather technical and also need capital as well as labor inputs. This might explain the positive effect of productivity for the probability to engage in export activities in these industries. Applying such a reasoning, the significant estimated effect for professional services is somewhat puzzling. In our data, this sector is dominated by activities of head offices, legal and account activities and architectural and engineering activities which are at least partially related to manufacturing production. This is certainly the case for engineering and also for head office activities. Thus, for the professional services data at hand, productivity differentials could be useful for understanding differences in the export behavior of firms. This is at least what our results would suggest.

With regard to the additional control variables we also observe heterogeneous effects. To only mention a few, professional services firms that are parts of corporate groups are more likely to export to foreign markets. This effect is true for both domestic and foreign corporate groups. By contrast, within the other three services industries, only members of domestic corporate groups are more likely to serve foreign markets while foreign ownership does not affect a firm’s export probability. Focusing on different legal forms, we are not able to identify very strong results but these tend to be most important for professional services providers.

Finally, we also obtain some interesting results for the regional location of firms. Financial services firms that are located in or close to Paris are slightly more likely to export to foreign markets while otherwise location has no impact on firms operating in the analysed sub-sectors. One simple reason for this could be that transport costs are zero in the financial services market and that agglomeration economies are crucial. Typically, global players in the financial industries are located geographically close to important financial markets which, in the case of France, would be Paris.

By contrast, professional services providers that are located close to the German, Belgian and Italian borders are more likely to export any non-zero shares of their services abroad. For this type of firms its reasonable to assume that transport (or travel) costs are positive and, therefore, regions close to the foreign market might dispose of a comparative advantage. Put differently, for supporting activities the proximity to the clients is crucial for successful business relationships. Consequently, firms that are located close to the border are more likely to also serve foreign customers.

Table 8: Average export probability and share predictions by size classes

	Financial industries		ICT firms		Professional services		Travel services	
	Ex. prob.	Ex. share	Ex. prob.	Ex. share	Ex. prob.	Ex. share	Ex. prob.	Ex. share
Micro	6.53	17.32	38.48	8.94	14.73	14.95	4.56	24.72
Small	22.32	13.91	50.44	8.52	27.96	15.73	5.92	22.11
Medium	50.38	12.60	61.24	9.34	52.36	12.60	13.04	25.35
Large	54.50	19.96	62.87	8.74	63.86	12.13	20.80	20.45
Total	12.62	15.20	49.04	8.82	23.69	14.76	5.68	23.62

Notes: The export probability and export share predictions are based on the estimation results reported in Table 7. Percentages reported. The export probability estimates are based on all firms while the export share predictions are conditional on being an exporting firm.

Provided with the estimation results from Table 7 we predict the export probabilities and export shares for all firms in the four selected industries. Table 8 reports the corresponding average export probabilities and export shares by different size classes. Following our discussion from Section 4 we split our samples into groups containing micro , small, medium and large firms. In line with the descriptive evidence our estimates again reveal that micro firms are least likely to export and that export probabilities monotonically increase with firm size. To give an example,

micro (large) financial services provides export to foreign markets with an average conditional probability of 6.53 (50.40) percent. In qualitative terms, this result is also confirmed by all other service industries but travel services providers are least likely to serve foreign markets. In line with our discussion from above, these quantitative differences can be explained by the deviating importance of fixed-cost type of investments necessary for a foreign market presence.

With regard to the conditional export shares, we obtain more heterogeneous results. Most impressively, for ICT firms the export shares are virtually identical across all different size classes. By contrast, micro firms that operate in financial industries export approximately 17.3 percent of their services abroad while this number is only 13.9 and 12.6 percent for small and medium firms in the same industries. This latter finding again supports the view, that conditional on exporting, the share of exports is larger for very small firms in industries with low variable trade costs. Overall, the sectoral analysis supports the view that internationalization strategies substantially differ across different types of service firms. In this regard, putting the focus only on pooled data (for all service industries) is likely to hide some important heterogeneities within the service sector.

5 Concluding remarks

The last decades are dominated by two economic developments, namely the increasing economic importance of service firms and the still ongoing process of globalization of production processes. This latter phenomenon is accompanied by the formation of global markets for goods and services while both change the way how economic activities are organized. Thereby, service industries are typically characterized by a large number of extremely small firms. Taken these issues together modern economies necessarily consist of small service firms which are competitive on international markets.

This paper investigates the crucial firm-specific restrictions to internationalization of service SMEs. Thereby, we rely on a firm-level dataset containing French service firms for the time period from 1998 to 2007. Empirically, we provide descriptive evidence which clearly shows that especially the smallest firms are least likely to participate in international markets. In order to investigate this issue further, we formulate a (dynamic) econometric model for a firm's export activities.

Our main results of this econometric exercise are the following: First, the probability of engaging in any export activities is an increasing function of firm size. Put differently, the smallest firms in our sample are least likely to export to foreign markets. Second, in line with the new-new trade theory we are able to provide some evidence for a positive impact of total factor productivity (TFP) on a firm's export probability. Third, export decisions in French service firms seem to be extremely persistent. More precisely, firms which already export to foreign

markets in the previous year are much more likely to do so in this year. From a policy point of view, this implies that export promotion policies should be directed towards (small) firms which face difficulties in establishing their first export relationships.

Our estimates for the intensive margin export behavior indicate that the fraction of exports to foreign markets is relatively persistent. By contrast, conditional on being an exporting firm and with the exception of the travel services industry, firm size does not significantly affect a firm's export intensity. Finally, our estimates also reveal that the impact of firm size and productivity on a firm's export activities differ substantially across different types of services. By contrast, all different service industries are characterized by persistence in the firms' export decisions. In quantitative terms, the role of fixed-costs and variable trade costs related barriers for doing business (substantially) differs across service industries. This finding confirms the view that different service activities are rather heterogeneous and points to the necessity of designing tailored policy measures for each separate service sector.

References

- Aw, B. Y. and Lee, Y. (2008), Firm heterogeneity and location choice of Taiwanese multinationals, *Journal of International Economics* **75**, 167–179.
- Baldwin, R. and Robert-Nicoud, F. (2008), Trade and growth with heterogeneous firms, *Journal of International Economics* **74**, 21–34.
- Bartus, T. (2005), Estimation of marginal effects using margeff, *Stata Journal* **5**, 309–329.
- Bhattacharya, R., Patnaik, I. and Shah, A. (2012), Export versus FDI in services, *The World Economy*, **35**, 61–78.
- Breinlich, H., and Criscuolo, C. (2011), International trade in services: A portrait of importers and exporters, *Journal of International Economics*, **84**, 188–206.
- Cabral, L. M. B and Mata, J. (2003), On the evolution of the firm size distribution: Facts and theory, *American Economic Review* **93**, 1075–1090.
- Caves, R. E. (1998), Industrial organization and new findings on the turnover and mobility of firms, *Journal of Economic Literature* **36**, 1947–1982.
- Chamberlain, G. (1980), Analysis of variance with qualitative data, *Review of Economic Studies* **93**, 225–238.
- Chiru, R. (2007), Innovativeness and export orientation among establishments in knowledge-intensive business services (KIBS) 2003, Working Paper No. 1, Science and Innovation Surveys Section, Statistics Canada.

- Conti, G., Lo Turco, A., and Maggioni, D. (2010), Exporters in services: New evidence from Italian firms, *Applied Economics Quarterly*, **56**, 73–98.
- Davidsson, P., Lindmark, P. and Olofsson, C. (1998), The extent of overestimation of small firm job creation: An empirical examination of the regression bias, *Small Business Economics* **11**, 87–100.
- Del Gatto, M., Di Liberto, A. and Petraglia, C. (2011), Measuring productivity, *Journal of Economic Surveys* **25**, 952–1008.
- Ebling, G. and Janz, N. (1999), Export and innovation activities in the German service sector: empirical evidence at the firm level, ZEW Discussion Papers, No. 99-53, Centre for European Economic Research
- Eickelpasch, A. F. and Vogel, A. (2011), Determinants of export behavior of German business services companies, *The Service Industries Journal* **31**, 513–526.
- Engel, D., Procher, V. and Schmidt, C. M. (2013), Does firm heterogeneity affect foreign market entry and exit symmetrically? Empirical evidence for French firms, *Journal of Economic Behavior & Organization* **85**, 35–47.
- Eurostat (2008), *Enterprises by Size Class: Overview of SMEs in the EU*.
http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-08-031/EN/KS-SF-08-031-EN.PDF
- Fazzari, S. M., Hubbard, R. G. and Petersen, B. C. (1988), Financing constraints and corporate investment, *Brookings Papers on Economic Activity* **1988**, 141–206.
- Federico, S. and Tosti, E. (2012), Exporters and importers of services: Firm-level evidence on Italy, Bank of Italy Temi di Discussione (Working Paper) No. 877, Bank of Italy.
- Gourlay, A., Seaton, J. and Suppakitjarak, J. (2005), The determinants of export behaviour in UK service firms, *The Service Industries Journal* **25**, 879–888.
- Greenaway, D. and Kneller, R. (2007), Firm heterogeneity, exporting and foreign direct investment, *Economic Journal* **117**, F134–161.
- Haltiwanger, J. C., Jarmin, R. S. and Miranda, J. (2013), Who creates jobs? Small vs. large vs. young, *Review of Economics and Statistics* **95**, 347–361.
- Hart, P. E. and Oulton, N. (1996), Growth and size of firms, *Economic Journal* **106**, 1242–1252.
- Head, K. and Ries, J. (2004), Exporting and FDI as alternative strategies, *Oxford Review of Economic Policy* **20**, 409–423.

- Helpman, E. (2006), Trade, FDI, and the organization of firms, *Journal of Economic Literature* **44**, 589–630.
- Helpman, E., Melitz, M. and Yeaple, S. (2004), Export versus FDI with heterogeneous firms, *American Economic Review* **94**, 300–316.
- Hollenstein, H. (2005), Determinants of international activities: Are SME's different?, *Small Business Economics* **24**, 431–450.
- Huber, P., Oberhofer, H. and Pfaffermayr, M. (2013), Who creates jobs? Estimating job creation rates at the firm level, Working Papers in Economics and Finance 2013-05, University of Salzburg.
- Kelle, M., Kleinert, J., Raff, H. and Toubal, M. (2013), Cross-border and foreign-affiliate sales of services: Evidence from German micro-data, *The World Economy*, **36**, 1373–1392.
- Konings, J. and Vandebussche, H. (2013), Antidumping Protection hurts exporters: Firm-level evidence from France, *Review of World Economics*, **149**, 295–320.
- Kox, H. L. M. and Rojas-Romagosa, H. (2010), Exports and productivity selection effects for Dutch firms, *De Economist* **158**, 295–322.
- Lejárraga, I., Rizzo, H. L., Oberhofer, H., Stone, S. and Shepherd, B. (2014), Small and medium-sized enterprises in global markets: A differential approach for services?, OECD Trade Policy Paper No. 165, OECD Publishing.
- Lejpras, A. (2009), Determinants of internationalization: differences between service and manufacturing SMEs, Discussion paper No. 886, German Institute for Economic Research (DIW Berlin).
- Levinsohn, J. and Petrin, A. (2003), Estimating production functions using inputs to control for unobservables, *Review of Economic Studies* **243**, 317–342.
- Love, J. H. and Ganotakis, P. (2013), Learning by exporting: Lessons from high-technology SMEs unobservables, *International Business Review* **22**, 1–17.
- Love, J. H. and Mansury, M. A. (2009), Exporting and productivity in business services: Evidence from the United States, *International Business Review* **18**, 630–642.
- Lööf, H. (2010), Are services different exporters?, *Applied Economics Quarterly* **56**, 99–117.
- Masurel, E. (2001), Export behaviour of service sector SMEs, *International Small Business Journal* **19**, 80–84.
- Melitz, M. J. (2003), The Impact of trade on aggregate industry productivity and intra-industry reallocations, *Econometrica* **71**, 1695–1725.

- Minondo, A. (2011), Exporters of services in Spain, Orkestra Working Paper Series in Territorial Competitiveness No. 2011-R04, Basque Institute of Competitiveness
- Mundlak, Y. (1978), On the pooling of time series and cross section data, *Econometrica* **46**, 69–85.
- Oberhofer, H. and Pfaffermayr, M. (2012a), FDI versus exports: Multiple host countries and empirical evidence, *The World Economy* **35**, 316–330.
- Oberhofer, H. and Pfaffermayr, M. (2012b), Fractional response models – A replication exercise of Papke and Wooldridge (1996), *Contemporary Economics* **6**, 56–64.
- OECD (2009), *Measuring Entrepreneurship: A Collection of Indicators*.
<http://www.oecd.org/dataoecd/43/50/44068449.pdf>
- Papke L. E. and Wooldridge J. M. (1996), Econometric methods for fractional response variables with an application to 401(k) plan participation rates., *Journal of Applied Econometrics* **11**, 619–632.
- Papke L. E. and Wooldridge J. M. (2008), Panel data methods for fractional response variables with an application to test pass rates., *Journal of Econometrics* **145**, 121–133.
- Persin, D. (2011), Market access for small versus large service enterprises: The preferential and multilateral trade liberalization tracks compared, *Journal of World Trade* **45**, 785–819.
- Pilat, P., Cimper, A., Olsen, K. and Webb, C. (2006), The changing nature of manufacturing in OECD economies, STI Working Paper 2006/9, OECD.
- Ramalho, E. A., Ramalho, J. J. and Murteira J. M. (2011), Alternative estimating and testing empirical strategies for fractional regression models. *Journal of Economic Surveys* **25**, 19–68.
- Sloan, B and Chittenden, F. (2006), Fiscal policy and self-employment: Targeting business growth, *Environment and Planning C: Government and Policy* **24**, 83–98.
- Stiebale, J. (2011), Do financial constraints matter for foreign market entry? A firm-level examination, *The World Economy* **34**, 123–153.
- Storey, D. J. (1994), The role of legal status in influencing bank financing and new firm growth, *Applied Economics* **26**, 129–136.
- Temouria, Y., Vogel, A. and Wagner J. (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.

- Train, K. E. (2003), *Discrete Choice Methods with Simulation*, Cambridge, UK: Cambridge University Press.
- Van Beveren, I. (2012), Total factor productivity estimation: A practical review, *Journal of Economic Surveys* **26**, 98–128.
- Vogel, A. (2011), Exporter performance in the German business services sector, *The Service industries Journal*, **31**, 1015–1031.
- Vogel, A. and Wagner J. (2013), Exports, R&D and productivity in German business services firms: A test of the Bustos-model, *Empirical Economics Letters*, **12**, 1–6.
- Wagner, J. (2012), International trade and firm performance: A survey of empirical studies since 2006, *Review of World Economics* **148**, 235–267.
- Wagner, J. (2013), Exports, foreign direct investments and productivity: Are services firms different?, *The Service Industries Journal* **forthcoming**.
- Wolfmayr, Y., Christen, E. and Pfaffermayr M. (2013), Pattern, determinants and dynamics of Austrian service exports – A firm-level analysis, FIW-Research Reports 2012/13 No. 05, Research Centre International Economics (FIW).
- Wooldridge, J. M. (2005), Simple solutions to the initial conditions problem in dynamic, non-linear panel data models with unobserved heterogeneity, *Journal of Applied Econometrics* **20**, 39–54.
- Wooldridge, J. M. (2010), *Econometric Analysis of Cross Section and Panel Data*, 2nd ed., Cambridge, MA: MIT Press.
- World Trade Organization (1991), *Services Sectoral Classification List*, Geneva: WTO Publications.

Appendix

Table A1: Empirical studies on the export behavior of service firms

Authors /Year	Country Time	Periode	Research Question(s)	Methods	Main Findings
Bhattacharya et al. (2012)	India	2000-2008	Productivity pecking order for services firms	Descriptive statistics, Stochastic frontier analysis, Kolmogorov-Smirnov tests	Uncertainty in product quality leads to a reversal in the productivity pecking order. Less productive firms engage in FDI.
Breinlich and Criscuolo (2011)	United Kingdom	2000-2005	Provision of 'stylized' facts on international trade in services at the firm-level	Descriptive statistics, Weighted least-squares regressions (WLS)	Firm-level heterogeneity is a key feature of service trade, Exporters and importers are larger and more productive, At the firm-level services and goods trade are similar
Chiru (2007)	Canada	2003	Relation between innovation and the international orientation in the KIBS industries	Descriptive statistics, Logit models, Multinomial logit models	Innovation is not significant in explaining export tendency of small firms, but is very significant for large firms. Having a high proportion of highly skilled staff has a positive influence on the export probability
Conti et al. (2010)	Italy	2003	Export performance of service firms in Retail and Wholesale Trade, Transport and Communication and Renting, IT, R&D and Other Business Activities	Descriptive statistics, Probit models and truncated regressions	More experienced firms and firms that are part of domestic/ international networks are more successful exporters. Productivity matters only for distant destination markets. Firm size is only significant for wholesale and retail trade. Larger firms are less export intensive
Ebling and Janz (1999)	Germany	1997	Relationship between export and innovation activities	Descriptive statistics, Probit models, Simultaneous equations model	Large firms are more likely to innovate and innovative firms are more likely to export. Consequently, firm size only indirectly affects a firm's export probability
Eickelpasch and Vogel (2011)	Germany	2003-2005	Determinants of export behavior of business services firms	Descriptive statistics, Quasi-maximum likelihood fractional response models with and without controlling for unobserved heterogeneity	More productive and human capital intense firms are more successful exporters only when unobserved heterogeneity is not controlled for. Firm size always examines a positive impact on the export performance of business services firms
Engel et al. (2013)	France	2000-2007	Impact of firm characteristics for the decision to enter into and exit from foreign markets	Descriptive statistics, Multinomial probit models	More productive firms are more likely to engage in foreign market activities. In the aftermath, productivity is not able to explain which firms cease their international engagement. Firm size has no impact on the export decision but larger firms are more likely to set up foreign affiliates. Firm size also has no impact in the decision to exit from foreign markets

Table A1 continued

Federico and Tosti (2012)	Italy	2008-2009	Determinants of imports and exports in service firms	Descriptive statistics, OLS regression	Export and import of services is highly concentrated among few firms, firm-level variation in trade is positively correlated with firm size and productivity. Country-level variation is to a large extent explained by the standard gravity variables, Smaller and less productive firms choose to export rather than sell through foreign affiliates
Gourlay et al. (2005)	United Kingdom	1988-2001	Determinants of export behavior of service industry firms	Descriptive statistics, Probit models, Tobit and truncated regressions	Firm size, research intensity, managerial remuneration and the exchange rate positively affect a firm's export performance. Export probability and export intensity should be modeled separately
Hollenstein (2005)	Switzerland	1998	Determinants of the choice of specific internationalization strategies	Descriptive statistics, Multinomial logit models	Dunning's OLI framework is able to accurately explain differences in internationalization strategies. Small firms are less likely to directly engage in foreign market activities
Kelle et al. (2013)	Germany	2005	Determinants of export market participation and for the choice of export mode	Descriptive statistics, Probit models, Generalized ordered logit models, Multinomial probit models	Larger and more productive firms choose exporting by foreign affiliate sales. There is little evidence of complementarities or substitution effects between mode 1 and 3. Distance raises reliance of mode 3
Kox and Rojas-Romagosa (2010)	Netherlands	1997-2005	Test of heterogeneous firms theories for international trade of dutch firms and plants	Descriptive statistics, Probit models, OLS regressions and Fixed effects estimators	Firms self-select into export participation. The most productive firms engage in exports and/or FDI Establishment size positively affects the export probability
Lejpras (2009)	East Germany	2003-2004	Determinants of the decision to to export and/or relocate production or other operations abroad	Descriptive statistics, Bivariate probit models	Larger firms, with their main competitors being located abroad that introduce new products are most likely to engage in any foreign market serving activity. Manufacturing firms are more likely to serve foreign markets than service firms
Löf (2010)	Sweden	1997-2006	Goods trade of service firms	Descriptive statistics, Pooled OLS estimation, Random effects and fixed effects OLS, system GMM estimation, matching estimators	Larger, more productive and high-equity firms, with more skilled labor, higher capital intensity and stronger links to multinational groups are more likely to export. Exporter productivity premium is larger for service firms
Minondo (2011)	Spain	2001-2007	Characteristics of service exporter	Descriptive statistics, (dynamic) random effects probit models, Quasi-maximum likelihood fractional response models	The self-selection hypothesis can be confirmed. No statistical evidence for the learning-by-doing hypothesis. Exporters are larger in terms of employees, turnover and are more productive compared to non-exporters.
Masurel (2001)	Netherlands	1996	Examination of risks and profits associated with international engagement in service industries	Descriptive statistics	Exporting service SMEs perceive international engagement as more profitable than their non-exporting counterparts. The perceived risks associated with exporting are also lower for exporting firms

Table A1 continued

Temouri, et al. (2013)	France, Germany, United Kingdom	2003-2007	Determinants of export behavior of business services firms	Descriptive statistics, Pooled OLS estimation, Fixed effects OLS, Propensity score matching	Exporters are more productive and pay higher wages (evidence for self-selection), German (French) exporters are less (more) profitable than domestic firms
Vogel (2011)	Germany	2003-2005	Examination of whether export premia and self-selection into export markets exist in business services enterprises	Descriptive statistics, Pooled OLS estimation, Fixed effects OLS	Exporting business services enterprises are larger, more productive and pay higher average wages. Large business services firms also self-select into export markets while more productive and high-wage firms only tend to self-select them when they are located in Western Germany
Vogel and Wagner (2012)	Germany	2003-2007	Outlier-robust estimation of exporter productivity premia in business services enterprises	Descriptive statistics, Pooled OLS estimation, Fixed effects OLS, Quantile regressions, Trimmed data regressions, Outlier robust pooled and fixed effects estimation	The estimates of exporter productivity premia for German business service firms are very sensitive to outlying observations. The estimated exporter productivity premium is significant when a standard fixed effects estimator is used, but it drops to zero when a robust estimator are applied. Larger firms tend to have lower exporter productivity premia
Wolffmayr et al. (2013)	Austria	2006-2009	Patterns, determinants and dynamics of service exports at the firm-level	Descriptive statistics, OLS estimation, Transition matrices, Heckman sample-selection estimator	Service export participation is very low and highly concentrated among a few firms. Service exporters are on average larger and more productive than non-exporters. Productivity increases with the number of export markets served. Evidence for both self-selection of firms as well as learning. Export exits are common for export starters in the first year of exporting, especially for small firms.