Service Trade and Occupational Tasks: An Empirical Investigation*

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Abstract

Using micro data for Belgium we investigate the relationship between changes in the task content of production and the rise in the number of service exporters. We show that occupational tasks changes display an extremely consistent relationship with participation to service exports: in sectors in which the importance of face-to-face communication with customers has increased, the firm-level likelihood of entering in export markets has decreased; instead, the likelihood of exporting increased in sectors in which the sophistication of production and delivery has increased (following an increase in cognitive tasks). Moreover, our analysis suggests that the change in IT use per se does not strike as being a key underlying force behind the increase in the extensive margin of service exports. These results are robust controlling for comparative advantage, offshoring, trade liberalization and demand shifts.

Keywords: trade in services; extensive margin; occupational tasks; technological change.
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1 Introduction

Trade in services increased tremendously in the past fifteen years evolving from 15% to almost 30% of world trade (World Trade Organisation, 2008). This incredible performance has been seen as a consequence of the new opportunities created by information technology (IT) (Freund and Weinhold, 2002; Blinder, 2009). Many service providers started exploiting the potentiality of computers and the internet to offer their services abroad. This is particularly true for services that do not require the physical proximity of the customer and the supplier, like call-centers and standardized financial services. However, the effect of new technologies is less clear for those services requiring physical proximity and/or human interaction. On the one hand, communication of information between distant locations has become easier, thus facilitating the remote execution of services like bookkeeping and accounting. On the other hand, some services have become more and more tailored and complex thanks to the opportunities provided by increasingly powerful computers and softwares. Despite the fact that higher sophistication and tailoring might have augmented the appeal of services in the export markets, the increasing complexity of the process involved in producing and delivering services like consultancy has made face-to-face communication even more important than before thus rendering, everything else equal, export activities more difficult.

Using micro data for Belgium, we investigate how these changes in the tasks used in the production are linked to the rise of service trade. A suitable framework to tackle this question is provided by the "task approach" developed by both labor economics and international trade. Both strands consider the production process as a mix of different tasks that are combined together to deliver a final product. These can be classified in several categories depending on how repetitive is their nature and whether they imply manual, cognitive or interactive activities. Autor et al. (2003), Spitz-Oener (2006), and Autor and Acemoglu (2011) document the remarkable change occurred in workers' tasks, both within and across occupations, during the last two decades and argue that IT has been a key driving force in this process. Therefore, this framework allows us to study how the evolution of complexity and human interaction are associated to the service trade participation. Moreover, occupational tasks measures offer a much richer portrait of changes occurred in the production process as compared to standard

measures of the IT impact like the use of computers or the degree of internet diffusion.

Our results uncover a rich pattern linking occupational tasks changes and the increase in firms' participation to service trade while at the same time questioning the common view about IT diffusion and the service trade boom. In sectors in which the production has shifted more towards the use of interactive tasks we observe a relatively lower probability of firm-level entry in exports markets. At the same time, the probability of exporting increased more in sectors where cognitive tasks increased. Therefore, in sectors where services have become more elaborate, firms have been able to better leverage IT and succeed in the export market while the opposite holds in sectors in which face-to-face communication have become more prevalent. Our estimations further suggest that the change in IT use per se does not translate into a significantly higher or lower firms' participation to service export. Complexity and need of personal communication play in opposite directions and the overall balance is such that technological change does not strike as being a key underlying force behind the increase in the extensive margin of service exports. Of course, other alternative forces like offshoring (Becker et al., 2013; Baumgarten et al., 2013), demand shifts, trade liberalization and comparative advantage might also be competing drivers of the changes in the production structure and in the participation to export. However, our analysis reveals that while they might have some importance, our results remain robust when controlling for them.

Most previous analyses have used aggregate service trade data. Freund and Weinhold (2002), who are no exception to the rule, study the impact of internet diffusion on the increase in the value of trade in services by focusing on cross-country data. Their research topic is closely related to ours, some of the key differences being that we focus on changes in occupational tasks, we use firm-level trade in order to look at the extensive margin, and concentrate on a single country (Belgium). The link between trade in services and the change in the task content of jobs has been previously analyzed by Oldenski (2012), albeit in a different setting. Using US sector-level data, Oldenski (2012) analyzes the determinants of the FDI vs. export decision in the context of services. She shows that the usual trade-off between economies of scale and proximity to the final consumer, which is recognized to be a key element in the exporting versus FDI strategy for manufacturing goods, does not apply to

services. We share the same occupational tasks approach, but we use firm-level trade data and focus on the determinants of entry and exit into the export and import of services activities.

Our research is also related to recent descriptive studies of trade in services at the firm level started with Breinlich and Criscuolo (2011) for the UK and then extended by Kelle and Kleinert (2010) for Germany, Gaulier et al. (2011) for France, Federico and Tosti (2012) for Italy, Ariu (2015) for Belgium and Walter and Dell'mour (2010) for Austria. All of these studies concur that service traders share many common features with goods traders in terms of export participation patterns, exports distribution, and firm characteristics. In our analysis we make use of similar firm-level data for Belgium and build on these studies in the choice of firm-level control variables. Finally, by considering the production process as a combination of different tasks our paper is related to the frameworks developed by Baldwin and Robert-Nicoud (2014) and Grossman and Rossi-Hansberg (2008) for international trade and Autor et al. (2003), Levy and Murnane (1996), Spitz-Oener (2006) and Autor and Acemoglu (2011) for labor.

The structure of the paper is as follows. In Section 2 we describe the data and the main variables we use. Section 3 provides some key facts about trade in services in Belgium. In Section 4 we describe the econometric strategy, while in Section 5 we outline our core results. Section 6 is devoted to additional results and robustness checks. Finally, Section 7 concludes.

2 Data

2.1 What is Trade in Services?

Services are intangible flows that do not cross custom frontiers inside a package, therefore their measurement is more problematic and difficult to sort. The need for a common understanding led to the General Agreement on Trade in Services (GATS) classification where one can distinguish four modes of trade in services:

- Mode 1 (*Cross-Border*): when the service is produced in the territory of one country and consumed in the territory of another country;

- Mode 2 (*Consumption Abroad*): when the service is consumed in the territory of one country by the resident of another country;
- Mode 3 (*Presence Abroad*): when the service is provided by a supplier of one country through commercial presence in the territory of another country;
- Mode 4 (*Presence of Natural Person*): when the service supplier of one country, through presence of natural persons, provides the service in the territory of another country.

An example of mode 1 would be a call-center in India providing its services to a UK firm. Mode 2 could be medical services provided in Switzerland by a medical center to the employees of a French firm or simply services consumed by German tourists in Belgium. Mode 3 implies the commercial presence of one company in another country, which falls into the common definition of FDI. An example would be a US internet provider selling its services via an affiliate in Ireland. Finally, mode 4 could be an Italian firm sending one of its engineers to a Spanish company to provide maintenance services for some previously bought machines. Our firm-level service trade data contain information about modes 1, 2 and 4 to the extent that the foreign party is a business. Therefore, services consumed by German tourists in Belgium are not part of our data. Moreover, the information we have does not allow us to distinguish these three different modes.

2.2 Data Sources

The data we use in our analysis comprise three main pieces. The first is a firm-level panel dataset containing balance-sheet information on Belgian firms over the period 1995-2005. The second consists of service trade data collected by the NBB on a monthly basis containing the universe of import and export transactions at the firm-level by service type and origin/destination. The third piece comes from the Qualification and Career Survey (QCS) collected periodically by the German Federal Institute for Vocational Training (BIBB) and the Research Institute of the Federal Employment Service (IAB). The data consist of five waves (1979, 1985/86, 1991/92, 1998/99 and 2006) from which we retrieve information on workers' occupational tasks and use of IT across industries and time.

In our empirical analysis we analyze the link between occupational tasks changes over time and the participation of firms to trade in services. For this study, we consider a long difference approach and compare two points in time (1995 and 2005) with the years' choice being driven by both data availability and the need to work with a sufficiently long time span to observe significant changes in occupational tasks. Therefore, we can only consider firms that we survive over the period 1995 and 2005 in order to understand how the change in the use of computers and tasks is associated to the choice of export. In this way, we get rid of firms that fail and entrants firms, for which it would not make any sense to correlate changes in tasks in times in which the firm does not exists (past changes for entrant firms and future changes for exiters). From 178,069 firms in 1995, 55,515 fail before 2005 and 156,007 are observed only in 2005.[1] Therefore, we use in this analysis 122,554 firms that survive along all the period considered.

Balance sheet data. Firm-level balance sheet data over the period 1995-2005 come from the Business Registry covering the population of Belgian firms required to file their (unconsolidated) accounts to the NBB. The data combine annual accounts figures with data from the Crossroads Bank on firms' main sector and legal status. Overall, most firms that are registered in Belgium (i.e., those that exist as a separate legal entity) and have limited liability are required to file annual accounts.[2] There are two types of annual accounts: full and abbreviated. Firms have to file a full annual account when they exceed at least two of the following three cutoffs: (i) employ at least 50 employees; (ii) have an annual turnover of more than 7.3 million euros; and (iii) report total assets of more than 3.65 million euros. In our analysis we make use of a number of firm-level control variables derived from these data: value added, employment in full time equivalent, wage bill, tangible assets, intangible assets,[3] and firm age. These variables are jointly available for 98,365 stayers. The loss of information is essentially due to the unavailability of employment figures, which are not mandatory for

[1]Of course, by extending the period to the 1996 and 2004 years it increases the number of surviving firms. However, the results of the analysis do not change by increasing the number of observations.

[2]Exceptions include sole traders and small companies whose members have unlimited liability as well as most of the public sector.

[3]Intangible assets include patents, licenses, and R&D capitalized costs as well as goodwill.

small firms and are not recorded for firms with only self-employed, so that our data represent the bulk of Belgian firms' employment and sales. We further assign each firm, based on its NACE rev 1.1 5-digit main activity code, to one of the 30 sectors listed in Table 1. The choice of the sectoral disaggregation is dictated by the need to create a correspondence with the classification used in the QCS which provides us with measures of occupational tasks changes.[4] Table 2 provides summary statistics of the variables obtained from balance sheet data referring to the group of firms for which variables are jointly available.

Data on trade in services. Monthly Belgian service trade data by firm, service type (IMF code), and partner country are provided by the NBB. Being the country and product dimensions not relevant to our analysis, we thus concentrate on yearly exports and imports of services at the firm-level. In particular we consider two points in time: 1995 and 2005. Micro service trade data are collected by the NBB on a monthly basis from declarations submitted either by the firms themselves or by Belgian resident banks and financial companies involved in the transaction.[5] More precisely, whenever a Belgian resident makes (receives) a payment to (from) a non-resident above a certain amount,[6] banks and financial firms involved in the payment are obliged to gather detailed information and file it on a monthly basis to the NBB. Both the IMF code of the traded service and the country of the non-resident are recorded along with the value of the operation and the identifier (VAT code) of the Belgian resident.

We merge balance sheet and service trade data using the VAT number which uniquely identifies firms in Belgium. Due to the aforementioned requirements to file annual accounts, we loose track of about 20% of service trading firms. However, these are essentially small

[4]From the 42 sectors in the QCS we end up working with 30 because we exclude agriculture, fishery, and mining due to their little participation to service trade. Furthermore, banks (NACE rev 1.1 code 6512) and some insurance companies (NACE rev 1.1 code 6601 and 6603) are also excluded from our analysis because of the particular nature of their accounts which makes it impossible to measure some key control variables like value added and intangible assets.

[5]For payments made via non-resident banks and non-resident financial firms the Belgian resident involved in the operation must report the details of the operation directly to the NBB.

[6]The threshold at which a legal obligation to report the transaction arises is rather low and has fluctuated between 12,500 and 25,000 euros during the period 1995-2005. To ensure consistency over time, we impose on the raw data the same threshold of 25,000 euros.

firms and/or firms which have a VAT number but do not exist as a separate legal entity in Belgium,[7] so that in the end we are able to cover around 80% (90%) of total traded values in 1995 (2005). Considering the merged data, we end up with 5,690 firms exporting services in 1995 and 8,752 in 2005. Figures for imports are similar: 5,488 firms in 1995 and 7,390 in 2005. Given the time span considered and the size of Belgium these increases are remarkably high. In the case of exports we divide the surviving firms into the following four categories: (i) firms that do not export in both 1995 and 2005 (never exporters), (ii) firms that export in 1995 but not in 2005 (give-up exporters), (iii) do not export in 1995 but export in 2005 (starting exporters), and (iv) firms that export in both in 1995 and 2005 (always exporters). In the case of imports we follow the same procedure ending up with the same partition.

Measuring occupational tasks and IT use changes. The third piece of the our dataset, the QCS, has been provided by the BIBB-IAB. The QCS is composed of five waves (1979, 1985/86, 1991/92, 1998/99 and 2006) and, since DiNardo and Pischke (1997) and Spitz-Oener (2006) seminal papers, the data has been extensively used by a number of scholars in different fields and in particular labour economics.[8] Given that our goal is to analyze the relationship between occupational tasks changes and the participation to service trade, we need to contemplate a sufficiently long time period for changes in occupational tasks and service trade participation to be sizable. For the purpose of our investigation, we focus on the 1991/92 and 2006 waves in order to roughly match the time coverage of our trade and balance sheet data.

In the QCS dataset every individual is classified by occupation (100 categories) and sector (42 entries). A major advantage of this dataset is that workers directly indicate whether or not they perform a given task. Such feature is particularly relevant in our analysis, where the time dimension is key, because it prevents underestimating the change in the occupational content. Indeed in the DOT (Dictionary of Occupational Titles), a similar US survey, field experts are called to assign frequency and/or importance scores to tasks used in different

[7]The latter group includes Belgian affiliates of a foreign group which do not exist as a separate legal entity in Belgium and fiscal representatives.

[8]See Dustmann et al. (2009), Gathmann and Schönberg (2010), and Becker et al. (2013) among others.

occupations. However, as highlighted by Spenner (1983), this process leads to an underestimation of the time changes in jobs content. Moreover, surveys like the DOT are typically not comparable across time. By contrast, QCS waves are highly comparable. As highlighted by Spitz-Oener (2006), the occupation and sector classifications, and in general the structure of the questionnaire, have only marginally changed over time.[9]

In order to derive our measures of tasks occupational change we follow Spitz-Oener (2006). We start by classifying the different tasks considering how repetitive is their nature and whether they imply manual, cognitive or interactive activities. We end up with five categories: analytical tasks, interactive tasks, routine cognitive tasks, routine manual tasks and non-routine manual tasks. Table 3 provides a detailed list of the different tasks (analyzing, bookkeeping, serving, entertaining, etc.) associated to each of the five categories. Second, we define for every category j the individual-level task intensity as the ratio of the number of performed activities pertaining to category j to the total number of activities in category j by worker i in a particular wave t:

$$Task_{i,j,t} = \frac{number\ of\ activities\ in\ category\ j\ performed\ by\ i\ at\ time\ t}{total\ number\ of\ activities\ in\ category\ j\ at\ time\ t},$$

where $t = (1992, 2006)$ and

$$j = \left\{ \begin{array}{ll} 1 & : analytical\ tasks \\ 2 & : interactive\ tasks \\ 3 & : routine\ cognitive\ tasks \\ 4 & : routine\ manual\ tasks \\ 5 & : non-routine\ manual\ tasks. \end{array} \right\}$$

For instance, if the category interactive tasks contains six tasks and worker i indicates that he or she performs three of them, the interactive task measure for this worker will be 0.5. Third, we aggregate $Task_{i,j,t}$ averaging across workers within each of the 30 sectors (indexed

[9] In every wave a worker states which tasks he/she performs in his/her occupation. In the 2006 wave, workers are further allowed to state how often they perform a certain task (frequently, occasionally or never). We take this into account by considering that a task is performed only if a worker states that he/she performs it frequently.

by k) listed in Table 1, thus obtaining a sector k and wave t specific measure ($Task_{k,j,t}$) of the relative use of of task category j. Finally, we define the time change of $Task_{k,j,t}$ as $\Delta Task_{k,j} \equiv Task_{k,j,2006} - Task_{k,j,1992}$ and use it as our baseline measure of occupational task changes across industries. Table 4 shows the evolution across the different waves of the five task groups intensities $Task_{k,j,t}$ when pulling together all sectors. While extending the time coverage of the analysis in Spitz-Oener (2006), our results confirm the sharp increase in the use of non-routine cognitive tasks, both analytical and interactive, coupled with a steady decline in routine cognitive and manual tasks. Of course, there are other alternative ways to measure the task intensity at the industry level. One would be to divide the number of executed activities within a task category over the total amount of possible activities (in all categories), thus computing the average share of each task category for each sector. Another would be to take the number of workers using a particular activity and divide it for the total number of workers in the same industry. Despite representing different ways of measuring task intensity at the industry level, these measures deliver the same results in the empirical analysis. Therefore, in the rest of the paper we focus on the the one proposed by Spitz-Oener (2006) and we provide results for the others on demand.

In our analysis we also consider the link between technological change and the participation to service trade. In order to measure technological change, we follow Autor et al. (2003) and Spitz-Oener (2006) and focus on the utilization of information technology. The QCS provides us with a dummy variable taking value one if worker i uses computers, terminals and electronic data processing machines. In order to measure the change in the importance of IT, we start by building (for each sector k and wave t) the ratio of the number of workers using IT to the total number of workers. Analytically:

$$IT_{k,t} = \frac{number\ of\ workers\ in\ sector\ k\ using\ computers\ at\ time\ t}{total\ number\ of\ workers\ in\ sector\ k\ at\ time\ t}.$$

Second, we consider the change over time of $IT_{k,t}$ defined as $\Delta IT_k \equiv IT_{k,2006} - IT_{k,1992}$ and employ it as our measure of technological change. The last column of Table 4 reveals the dramatic increase in the use of IT (when pulling together all industries) over time, rising from

a value of 6% in 1979 to 68% in 2006.

Focusing on the impact of technological change -measured by the change in the use of IT- on the change in tasks both within and across occupations Autor et al. (2003), Levy and Murnane (1996), and Spitz-Oener (2006) show that the diffusion of IT displaces routine cognitive and manual tasks while complementing non-routine cognitive (interactive and analytical) tasks. Furthermore, Freund and Weinhold (2002) show using a cross-country data that the diffusion of internet is associated to the increase in the value of trade in services. By combining these findings, one might believe that technological change ΔIT_k should be the key variable to be compared with the rise in service trade participation among firms. However, for a number of reasons that will become clear afterwards, $\Delta Task_k$ is a much more informative measure. Anticipating our results, we will show later on that the relationship between service trade participation and occupational tasks has evolved in a manifold way that cannot be reduced to a unidimensional measure like ΔIT_k. In particular, the tension between the rise in interactive tasks and the need for some sort of proximity in the provision of services breaks the simple relationships one might conjecture about IT diffusion and rise in the number of service trading firms.

A possible issue with QCS data is that they refer to a country other than Belgium: Germany. In our view this should not be a big deal. First, there is a great affinity between Germany and Belgium. They are both part of the EU and OECD and are close in terms of geographical location, economic development, income distribution, labor market institutions, social policy and culture with a significant proportion of the Belgian population speaking German. Second, it is difficult to imagine that the demand faced by service trading firms in the two countries is substantially different. Third, it is hard to believe that services' production and distribution technology differs remarkably across developed countries. For example, the technology used for reading and transmitting X-rays in Belgium and Germany is very much likely to be commonly dictated by world best practice rather than by countries idiosyncracies.

3 Facts About Trade in Services in Belgium

In this Section we document a number of facts about trade in services in Belgium that will guide us in the subsequent econometric analysis.

We decompose the aggregate increase in exports and imports of services from 1995 to 2005 distinguishing among all firms that survive over the period 1995-2005 between those that start exporting, those that give up and those that always export. Table 5 shows that aggregate trade values increased by more than 140% for both exports and imports with the the number of exporting (importing) firms rising by 54% (58%). Such remarkable increase in the total number of trading firms comes from the fact that stayers start exporting firms largely outnumber give-up exporters. As one can further notice, the same pattern emerges for service imports.

To gain further insights of the change occurred in service trade in Table 6 we distinguish firms that have their primary activity in the group of service sectors from those whose primary activity is in manufacturing. From a static perspective service sectors account for the lion's share of both aggregate trade values and number of firms. Companies with their main activity in service sectors represent, depending on the year and type of trade, in between 68% and 90% of the firms involved in service trade with similar figures applying to total traded values. In terms of dynamics, the rise in firms' participation to service trade is entirely driven by service sectors. For example, while the number of manufacturing firms exporting services is virtually unchanged, the number of exporters belonging to service sectors increases of 40% over 10 years going from 2,217 to 3,309. At the same time manufacturing sectors decreased their weight also in terms of aggregate trade values going from 16% in 1995 to 10% in 2005 for export and from 32% to 26% for imports.

What are the sectors mainly involved in service trade? Table 7 shows the top 10 trading sectors in terms of traded values, while Table 8 shows the top 10 sectors in terms of the number of firms involved in service trade. As one can see from both Tables, the leading role is played by sectors belonging to the services group with only few of the top ten sectors belonging to the manufacturing group. But have sectors experienced the same evolution in terms of trading firms and traded values? This is a rather important question for us because,

as will become clear later on, our identification strategy relies on the existence of a sizable cross-sectoral variation in the extensive margin. Table 9 shows that such variation is present in the data with the sector experiencing the largest increase in the number of trading firms, for both exports and imports, being *Professional, Scientific and Technical Activities*. On the other hand, Transport Services and Insurance Services lead in terms of the increase in values for respectively exports and imports. Comparing absolute changes in Table 9 with the levels in 1995 from Tables 7 and 8 further reveals that variation across sectors also exists in relative terms.

Finally, Table 10 provides the list of the 10 top-trading countries in terms of traded values and number of firms, for both exports and imports of services. Possibly, the most striking feature emerging from Table 10 is the extreme stability of countries' rankings in terms of trading firms. For example, the top-10 destinations of Belgian service exports are the same in 1995 and 2005 with only the US, Luxembourg and Switzerland switching their positions. This pattern suggests that the country dimension has eventually played only a secondary role in the expansion of firms' participation to service trade.

4 Econometric Strategy

In order to analyze the link between occupational tasks change and the increase in the number of firms trading services we must first take into account that we are not dealing with a homogeneous group of firms. As outlined above, in between 1995 and 2005 among all surviving firms, a considerable number of them became exporters while others decided to stop exporting. In our investigation, we take these features into account by running different estimations for firms entering and exiting from the market. In order to further account for heterogeneity across firms we consider, building upon the evidence provided on service traders by Breinlich and Criscuolo (2011), the following firm f-level controls: log value added per worker ($Prod_f$) that is our measure of productivity, log employment ($Size_f$) which is our measure of firm size, log tangible assets value over employment ($\frac{k}{l}_f$) in order to capture capital intensity, and log intangible assets value per worker ($\frac{ik}{l}_f$) that is our proxy for expenditure in technology. The availability of such controls will also allow us to check for possible heterogeneous effects

of occupational tasks changes by means of interaction terms.

In what follows we describe the methodology used to analyze export participation with the one for imports being identical. Our dependent variable, ΔExp_f, is a dummy taking value one if firm f starts exporting (stops exporting when we analyze firms that exit from export markets). For surviving firms that enter foreign markets the reference category will be represented by firms that never export. For surviving firms that quit export markets instead the reference category is accounted by firms that continue exporting. This choice is made in order to compare firms that ex-ante are confronted with the same set of choices. Since our dependent variable is binary we use a Probit model and report marginal effects. Given that occupational tasks changes are measured at the industry level, they are identified by the cross-industry variation in $\Delta Task_{k,j}$. We thus cluster standard errors at the industry level. Moreover, as a control for initial conditions and patterns of comparative advantage across sectors we add to the specification the level of tasks intensities at the beginning of the period ($Task_{k,j,1992}$). Analytically we estimate the following equation:

$$\Delta Exp_f = Const + \alpha_j^1 \Delta Task_{k,j} + \alpha_j^2 Task_{k,j,1992} + \beta^1 Prod_f + \beta^2 Size_f + \beta^3 \frac{k}{l}_f + \beta^4 \frac{ik}{l}_f + \epsilon_f, \quad (1)$$

where $Const$ is a constant term and ϵ_f is an iid error component. In some regressions we make use of a standard measure of technological change (the change in IT use) to shed light on its relationship with the rise in the extensive margin of service trade. We employ the same specification as in (1) but substitute tasks intensities with IT use change ΔIT_k. It would be interesting to put them together in order to separate the pure effect of technology from that induced through the changes in tasks. However, as shown by Spitz-Oener (2006), the change in the use of computers is a strong predictor of changes in tasks use, so multicollinearity problems arise biasing the analysis. Our results should be taken with caution because, despite having a reasonable number of relevant controls, endogeneity might well be at work. Likely, simultaneity is not an issue in our analysis because occupational tasks changes are measured at a level of aggregation (industry) which is reasonably exogenous to a single firm while being

at the same time coming from another country. On the other hand, there might be some omitted variables correlated with $\Delta Task_{k,j}$ that could be interfering with our estimations:

- a first potential bias for our analysis might arise if occupational tasks changes are correlated with the process of service trade liberalization. If, for example, Belgium was disproportionately exporting analytical tasks intensive services to those countries with whom it has been liberalizing trade the most, one would find a positive coefficient for $\Delta Task_{k,analytical}$. However, as previously seen in Table 10, in between 1995 and 2005 the ranking of the top 10 destinations of Belgian service exports has barely changed. The lack of substantial variation in the country of destination dimension is in line with the arguments presented in Hoekman (2008) and Francois and Hoekman (2010) such that GATS has had a negligible impact on service tradability.[10] Anyway, in order to control for this potential bias we include in our regressions a measure of trade barriers at the industry-level. In particular, we weight the Product Market Regulation Index provided by the OECD by the exports of industry k (by country and service), thus obtaining a weighted industry measure of trade barriers.

- a second element driving our results might be represented by offshoring. Using data on German multinationals, Becker et al. (2013) and Baumgarten et al. (2013) show that offshoring (defined as having affiliates abroad) has a statistically significant impact on the onshore workforce composition. In particular, offshoring is associated with a statistically significant shift towards more non-routine and more interactive tasks, and a shift towards highly educated workers. Considering that the share of employment accounted by multinationals in Belgium is sizeable (16.4% in 1995 and 21.4% in 2005), the rise of offshoring likely had a substantial impact on the evolution of tasks intensities. In order

[10] First, GATS commitments of WTO members were frequently more restrictive than the actual implemented policies (Hoekman, 2008; Gootiiz and Mattoo, 2009). Second, most countries did not make any multilateral concession on the liberalization of service trade modes 2 and 4 that involve the movement of people (Hoekman et al., 2007) with a few liberalizations episodes occurring via bilateral agreements (Hoekman et al., 2007; Hoekman, 2008). Third, and most importantly, very little progress has been made so far in the implementation of concrete liberalization policies (Gootiiz and Mattoo, 2009; Hoekman, 2008; Francois and Hoekman, 2010).

to investigate to what extent offshoring is driving our results we consider, as an additional control variable in (1), both the sectoral change in the number of multinationals over the period 1995-2005 and the change in the number of foreign affiliates owned by Belgian firms.[11] These variables broadly account for the change in the quantitative importance of offshoring across sectors over the time frame we analyze.

- A third potential bias for our results might be related to demand. The IT revolution has not only changed the way people work but also the basket of goods and services they demand and consume. So, consumers' preferences might thus have shifted over time towards services whose production and distribution differ systematically in tasks intensities, so driving a re-allocation of resources across firms and sectors while at the same time pushing towards more service trade. To check whether our results are driven by demand, we insert in our estimations the change in the overall exports of services at the industry level. While being far from an orthodox way to measure demand in foreign countries, it does a good job in controlling for shifts in demand that have a strong sectoral component.

5 Results

Table 11 provides estimations of (1) for the group of firms starting exporting on the left panel and on the right panel for the group of firms quitting export markets, adding one by one all the control variables that control for the potential biases explained in the previous section. Focusing on the left panel, we observe that the change in interactive tasks is negatively correlated with starting exporting. Therefore, in industries in which the face-to-face communication became more important, firms experienced a lower propensity to engage foreign markets. This echoes the findings in Oldenski (2012): the more the production and/or provision of a particular service is intensive in direct communication with customers, the lower the probability of engaging in exports activities as opposed to FDI. Broadly speaking, both

[11] Information on the multinational status and foreign affiliates comes from the yearly survey of Foreign Direct Investments carried out by the NBB. See Behrens et al. (2013) for further details.

Oldenski (2012) and our findings underline the special role that proximity between demand and supply plays for services. In this respect, considering that $\Delta Task_{k,interactive}$ has increased over time, our results point (to the extent they have a causal interpretation) to the rise of interactive task having hampered firms' participation to services exports.

Looking at the other tasks changes, it is clear how in industries where the use of manual tasks increased (both routine and non-routine), firms had a lower probability of entering in exports markets. This might be related to the fact that manual tasks are associated with services which have lower quality and so might be more difficult to place in foreign markets. Instead, in industries in which the cognitive tasks increased (both analytical and routine cognitive) the likelihood of observing new exporters is higher. As explained in the introduction, an increase in these types of tasks might result in more more sophisticated services that might be easier to sell abroad. Regarding our controls, productivity and size are strong predictors of change in export participation, meaning that more productive and bigger firms have a higher likelihood to become exporters. At the same time, the industry measure of trade barriers faced by exports is negatively correlated with the probability of entering in the export markets for services. Our controls for the offshoring motive indicate that the probability of becoming exporter increases if the firm is part of a multinational group. Finally, the demand exerts a positive effect on becoming exporter, confirming the idea that consumers' demand is intensively shifting towards services. All the controls prove that the alternative mechanisms are in place, however, they do not affect the signs and significances of our tasks measures. Switching to the right panel of Table 11, we observe that the change in tasks at the industry level is not consistently associated to the exit decision of quitting export markets. The only exception is represented by the change in analytical tasks: in industries in which there is a decrease in their use, the likelihood of exiting increases. It looks like producing simpler services might make harder the survival of firms in foreign markets. One particular interesting result comes from the variable measuring the change in the number of foreign affiliates: in industries in which there has been more a important increase in the number of foreign affiliates, there has also been a higher likelihood of quitting export markets. This could be the result of firms switching from exports to FDI, in line with the mechanism

described in Conconi et al. (2013).

Table 12 shows estimations of (1) where we replace $\Delta Task_{k,j}$ with a measure of the increase in the use of IT over time: ΔIT_k. Indeed, an influential literature including among others Autor et al. (2003) and Spitz-Oener (2006) show that technological change (as measured by the change in IT use) has a been a key driving force in shaping the evolution, both across and within occupations, of tasks. In particular, technological change is a substitute for routine-cognitive and routine-manual tasks and a complement for non-routine analytical and interactive tasks. Indeed, this is perfectly in line with the figures we provide in Table 4 where in between 1992 and 2006 the increase in the use of IT goes hand in hand with the increase (decrease) in the intensity of analytical, interactive, and non-routine manual (routine cognitive and manual) tasks. Our estimations indicate that the change in IT use does not translate into a significantly higher firms' participation to service export. Given previous results on tasks intensities this should come at no surprise. The impact of interactive and cognitive tasks we identify above play in opposite directions with a strength determined by the magnitude of their correlation with ΔIT_k. The overall balance is such that technological change does not strike as being a key underlying factor behind the increase in the extensive margin of service exports. Such findings are somewhat at odds with Freund and Weinhold (2002). Using country-level data, Freund and Weinhold (2002) show that the diffusion of the internet is associated to an increase in the value of trade in services. Besides differences in the type of data (micro vs macro), the outcome measure (extensive margin vs aggregate trade value), and the geographical scope (Belgium vs World) we believe that IT use and internet diffusion might not be necessarily capturing the same thing. In our data IT use is measured from the workers/firms side while the diffusion of internet in Freund and Weinhold (2002) likely refers to both commercial and private use. Therefore, one way of reconciling the two results is that computerization and the internet contribute to the rise of service trade from the consumers' side but not much from the firms' side.

6 Additional Results and Robustness checks

In this Section we provide a number of additional results that corroborate and further qualify our analysis.

Heterogeneous effects? The recent trade literature spurred by, among others, Melitz (2003) seminal paper emphasizes the importance of firm heterogeneity and intra-industry reallocation patterns like those documented in Bernard et al. (2006) and Pavcnik (2002). Table 13 provides results of an augmented version of (1) where we consider interactions of $\Delta Task_{k,j}$ with our firm-level controls (productivity, size, tangible and intangible assets per worker). Besides a few exceptions, interaction coefficients are not significant and do not display any consistent pattern for the new exporters (left panel). The positive role of analytical tasks tends to be less (more) binding for more productive (more intangible capital intensive) firms and the negative role of interactive tasks is lessened for capital intensive firms. For exiters (right panel) the negative role of analytical tasks is more pronounced for more capital intensive firms. These findings further qualify our results by suggesting that within-industry reallocations across firms did not play an important role for occupational tasks changes and service trade participation.

Patterns of comparative advantage? One possible issue with the interpretation of our results is that occupational tasks changes might be correlated with specialization patterns across industries driven by comparative advantage. Despite having used the initial levels of tasks intensities $Task_{k,j,1992}$ as controls, it might still be the case that, for example, Belgium has a comparative advantage (disadvantage) in industries characterized by a high intensity in analytical (interactive) tasks due to fundamentals other than the tasks (natural resources, amenities, abundance of industry-specific factors, etc.). In a scenario of trade liberalization and/or decrease in trade costs, comparative advantage along these dimensions would induce Belgium to further specialize its service trade structure and firm export participation accordingly. These features might only be imperfectly captured by $Task_{k,j,1992}$ thus leading to some degree of spurious correlation with $\Delta Task_{k,j}$. One way of getting a feeling about this prob-

lem is to check whether our results still apply to service imports participation. Indeed, if the same patterns are present in both exports and imports it is quite unlikely for comparative advantage to be driving them. Columns 1 and 3 of Table 14 provide a reassuring reply to these concerns: changes in analytical and routine cognitive tasks intensities follow the same behavior described in the case of export service participation, so our results should not driven by comparative advantage patterns.

Is it the same for trade in goods? One key question is whether the same change in technology and in the use of tasks has affected also trade in goods. As for services, new technologies have made information more democratic, increasing the internationalization opportunities of goods exporters. One key difference is that the production and delivery of goods is less intensive in the need of personal communication with customers with respect to services. So, goods exports might have suffered less from the increased face-to-face interaction dictated by new technologies and exploited more the new opportunities coming from the increased complexity of production processes and products. Columns 2 and 4 of Table 14 indicate that this is actually the case. Both for goods and services in sectors in which analytical tasks increased, the likelihood of entering in export markets increased. Instead, a more intensive use of interactive tasks by sectors is not related to the choice of starting exporting.

7 Conclusions

Using micro data for Belgium, we analyze the relationship between the remarkable increase in the number of service trading firms in the last decade and changes in the task content of occupations. Our results uncover a rich pattern linking occupational tasks changes and the increase in firms' participation to service trade while at the same time questioning the common view about IT diffusion and the service trade boom. In sectors in which the production has shifted more towards the use of interactive tasks we observe a lower probability of firm-level entry in exports markets. At the same time, the probability of exporting increased in sectors where the cognitive tasks increased. Therefore, in sectors where the services became more

sophisticated, firms succeeded to entering more easily in the export market for services while the opposite in sectors in which face-to-face communication became more binding. As also highlighted by Oldenski (2012) the more the production and provision of a particular service is intensive in face-to-face communication with customers, the harder is to serve customers using exports. Our estimations further suggest that the change in IT use does not translate into a significantly higher or lower firms' participation to service export. Complexity and need of personal communication play in opposite directions and the overall balance is such that technological change does not strike as being a key underlying force behind the increase in the extensive margin of service exports. The results are robust controlling for alternative explanations leading to higher participation of service exports such as comparative advantage, offshoring, trade liberalization and demand shifts.

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Table 1: Sectoral Breakdown

Manufacturing	**Services**
Food Beverages and Tobacco	Distribution of Energy, Water, Gas and Electricity
Textile Industry	Construction Services
Leather and Leather Products	Wholesale and Retail Trade
Wood and Wood Products	Transport Services
Cellulose and Paper Industry	Postal Services
Publishing, Printing and Reproduction	Hotels and Restaurants
Chemical Industry, Rubber and Synthetic Materials	Information, Art and Communication Services
Stone and Clay, Glass and Ceramics	Financial Services
Manufacture of Basic Metals	Insurance, Reinsurance and Pension Funding
Manufacture of Fabricated Metal Products	Professional, Scientific and Technical Activities
Precision and Optical Instruments	Health and Veterinary
Electrical Engineering	Schooling, Education
Machinery Construction	Other services
Car Industry	
Shipbuilding, Aircraft, and Aerospace	
Office and Data-Processing Machines	
Other manufacturing	

Table 2: Summary statistics of variables coming from balance sheet data

Variable	**Obs.**	**Mean**	**Std.Dev.**	5^{th} **Perc.**	95^{th} **Perc.**
			1995		
Employment	98,365	0.056	1.106	-1.354	2.155
Value added	98,365	0.085	0.848	-1.351	1.208
Tangible capital	98,365	0.608	1.522	-2.402	2.582
Intangible capital	98,365	0.164	2.630	-4.191	8.564

Note: we show in this table the logged employment (full time equivalent), value added, wages, tangible and intangible capital.

Table 3: Classification of tasks

Classification	**Task**
Analytical	researching, analyzing, evaluating and planning, making plans, constructions, designing, sketching, working out rules/prescriptions, using and interpreting rules
Interactive	negotiating, lobbying, coordinating, organizing, teaching or training, selling, buying, advising customers, advertising, entertaining or presenting, employ or manage personnel
Routine Cognitive	calculating, bookkeeping, correcting of texts/data, measuring of length/weight/temperature
Routine Manual	operating or controlling machines, equip machines
Non-Routine Manual	repairing or renovating houses, apartments and machines, restoring of art/monuments, serving or accommodating

Table 4: Evolution of tasks and IT intensity over time

	Non Routine Tasks			**Routine Tasks**		**IT use**
	Analytic	Interactive	Manual	Cognitive	Manual	
1979	0.04	0.09	0.14	0.36	0.31	0.06
1986	0.09	0.10	0.21	0.34	0.27	0.12
1992	0.11	0.17	0.20	0.27	0.23	0.28
1999	0.12	0.31	0.28	0.20	0.17	0.53
2006	0.13	0.32	0.23	0.16	0.23	0.68

Table 5: Decomposing the increase: aggregate values and number of firms

		Exports				Imports			
		Aggregate		# of Firms		Aggregate		# of Firms	
		1995	2005	1995	2005	1995	2005	1995	2005
Stayers	Non Exp	0	0	(116,625)		0	0	(117,452)	
	Give-up Exp	834	0	1,574	(1,574)	920	0	1,428	(1,428)
	Start Exp	0	2,358	(3,105)	3,105	0	3,474	(2,739)	2,739
	Always Exp	4,091	10,548	1,271	1,271	4,253	8,938	1,316	1,316
TOTAL		4,925	12,096	2,845	4,376	5,173	12,412	2,564	4,055
% GROWTH		146%		54%		140%		58%	

Note: values are in million of Euros. The numbers inside parentheses indicate the number of firms in that category. They are not used for computing the total and the % growth.

Table 6: Trading values and number of trading firms per sector

Aggregate Trade Values

	Exports				Imports			
	1995	Perc.	2005	Perc.	1995	Perc.	2005	Perc.
Manufacturing	728	15%	1,686	15%	1,590	32%	3,423	29%
Services	3,952	85%	9,785	85%	3,319	68%	8,340	71%
Total	4,680		11,471		4,909		11,763	

Number of Firms

	Exports				Imports			
	1995	Perc.	2005	Perc.	1995	Perc.	2005	Perc.
Manufacturing	425	16%	395	10%	839	32%	876	26%
Services	2,217	84%	3,309	90%	1735	68%	2,424	74%
Total	2,642		3,704		2,574		3,300	

Note: aggregate trade values are in million of Euros.

Table 7: Top 10 trading sectors (values traded)

Export

Rank	Sector	1995	Sector	2005
1	Transport Services	37%	Financial Services	22%
2	Professional, Scientific and Technical Activities	19%	Professional, Scientific and Technical Activities	21%
3	Wholesale and Retail Trade	10%	Transport Services	20%
4	*Chemical Industry, Rubber and Synthetic Material*	9%	Insurance, Reinsurance and Pension Funding	7%
5	Financial Services	6%	Information, Art and Communication Services	6%
6	Information, Art and Communication Services	5%	Wholesale and Retail Trade	6%
7	Construction	3%	*Chemical Industry, Rubber and Synthetic Material*	4%
8	Postal Services	2%	Construction Services	3%
9	Other services	2%	Other Services	3%
10	*Manufacture of Fabricated Metal Products*	1%	Postal Services	1%

Import

Rank	Sector	1995	Sector	2005
1	Transport Services	22%	Financial Services	20%
2	Wholesale and Retail Trade	16%	Professional, Scientific and Technical Activities	18%
3	*Chemical Industry, Rubber and Synthetic Material*	14%	Transport Services	15%
4	Professional, Scientific and Technical Activities	14%	*Chemical Industry, Rubber and Synthetic Material*	12%
5	Financial Services	11%	Insurance, Reinsurance and Pension Funding	11%
6	Other Services	3%	Wholesale and Retail Trade	9%
7	Information, Art and Communication Services	2%	Information, Art and Communication Services	4%
8	*Car industry*	2%	Other services	3%
9	*Manufacture of Basic Metals*	2%	Construction Services	1%
10	*Machinery Construction*	2%	*Manufacture of Fabricated Metal Products*	1%

Table 8: Top 10 trading sectors (number of firms)

Export

Rank	Sector	1995	Sector	2005
1	Wholesale and Retail Trade	25%	Professional, Scientific and Technical Activities	38%
2	Professional, Scientific and Technical Activities	23%	Wholesale and Retail Trade	15%
3	Transport Services	16%	Information, Art and Communication Services	12%
4	Construction Services	7%	Transport Services	8%
5	Information, Art and Communication Services	5%	Construction Services	7%
6	Other Services	4%	Financial Services	6%
7	*Chemical Industry, Rubber and Synthetic Material*	2%	Hotels and restaurants	2%
8	*Manufacture of Fabricated Metal Products*	2%	Insurance, Reinsurance and Pension Funding	2%
9	*Publishing, Printing and Reproduction*	2%	*Manufacture of Fabricated Metal Products*	1%
10	Hotel and Restaurants	2%	Health and Veterinary	1%

Import

Rank	Sector	1995	Sector	2005
1	Wholesale and Retail Trade	31%	Professional, Scientific and Technical Activities	26%
2	Professional, Scientific and Technical Activities	16%	Wholesale and retail trade	24%
3	Transport Services	9%	Transport Services	8%
4	*Chemical Industry, Rubber and Synthetic Material*	6%	Information, Art and Communication Services	6%
5	Information, Art and Communication Services	4%	Other Services	5%
6	Construction Services	4%	Construction Services	5%
7	*Food Beverages and Tobacco*	4%	*Chemical Industry, Rubber and Synthetic Material*	4%
8	Other Services	4%	*Manufacture of Fabricated Metal Products*	2%
9	*Textile Industry*	3%	*Food Beverages and Tobacco*	2%
10	*Manufacture of Fabricated Metal Products*	3%	Financial Services	2%

Note: sectors belonging to Manufacturing are in italics.

Table 9: Sector change in the number of trading firms and values traded

Export

Rank	Sector	Δ # of firms	Sector	Δ values
1	Professional, Scientific and Technical Activities	613	Transport Services	1,671
2	Construction Services	246	Insurance, Reinsurance and Pension Funding	1,430
3	Transport Services	211	Professional, Scientific and Technical Activities	1,220
4	Other Services	160	Information, Art and Communication Services	781
5	Information, Art and Communication Services	111	Financial Services	563
6	Hotel and Restaurants	69	Construction Services	522
7	Wholesale and Retail Trade	58	Other Services	495
8	Insurance, Reinsurance and Pension Funding	47	*Chemical Industry, Rubber and Synthetic Materials*	463
9	Health and Veterinary	26	*Manufacture of Fabricated Metal Products*	229
10	*Publishing, Printing and Reproduction*	21	Postal Services	146

Import

Rank	Sector	Δ # of firms	Sector	Δ values
1	Professional, Scientific and Technical Activities	310	Insurance, Reinsurance and Pension Funding	2,253
2	Wholesale and retail trade	153	*Chemical Industry, Rubber and Synthetic Material*	1,665
3	Construction Services	126	Professional, Scientific and Technical Activities	765
4	Transport Services	91	Transport Services	690
5	Other Services	75	Wholesale and Retail Trade	463
6	Information, Art and Communication Services	71	Information, Art and Communication Services	438
7	*Manufacture of Fabricated Metal Products*	31	Other Services	295
8	Hotels and Restaurants	30	Construction Services	175
9	Insurance, Reinsurance and Pension Funding	17	*Manufacture of Fabricated Metal Products*	167
10	*Publishing, Printing and Reproduction*	15	Postal Services	157

Note: sectors belonging to Manufacturing are in italics. Values for aggregate changes are in millions of Euros

Table 10: Top 10 trading partners

Aggregate Trade Values

Exports			Imports		
Rank	**1995**	**2005**	**Rank**	**1995**	**2005**
1	Germany	UK	1	USA	UK
2	USA	USA	2	UK	France
3	France	Netherlands	3	France	Germany
4	Netherlands	France	4	Germany	USA
5	UK	Germany	5	Netherlands	Netherlands
6	Switzerland	Luxembourg	6	Switzerland	Italy
7	Luxembourg	Switzerland	7	Luxembourg	Spain
8	Italy	Spain	8	Italy	Switzerland
9	Spain	Ireland	9	Japan	Luxembourg
10	Japan	Sweden	10	Austria	Hong Kong

Number of Firms

Exports			Imports		
Rank	**1995**	**2005**	**Rank**	**1995**	**2005**
1	Netherlands	Netherlands	1	Netherlands	Netherlands
2	France	France	2	France	France
3	Germany	Germany	3	Germany	Germany
4	UK	UK	4	UK	UK
5	USA	Luxembourg	5	USA	USA
6	Switzerland	USA	6	Switzerland	Luxembourg
7	Luxembourg	Switzerland	7	Italy	Switzerland
8	Italy	Italy	8	Luxembourg	Italy
9	Spain	Spain	9	Spain	Spain
10	Sweden	Sweden	10	Sweden	Sweden

Table 11: Tasks' Changes and Export Entry and Exit

	Entrants					Exiters				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Prob y=1	0.01656	0.01640	0.01623	0.01623	0.01618	0.5431	0.5430	0.5430	0.5435	0.5435
Change in Tasks:										
Δ Analytical	0.0008^{b}	0.0010^{a}	0.0002	0.0004	0.0002	0.0033	0.0008	-0.0004	-0.0104^{c}	-0.0096^{c}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)
Δ Interactive	-0.0023^{a}	-0.0017^{a}	-0.0024^{a}	-0.0023^{a}	-0.0021^{a}	0.0129^{c}	0.0093	0.0080	0.0038	0.0031
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)
Δ Non-Rout. Manual	-0.0007	-0.0014^{a}	-0.0016^{a}	-0.0016^{a}	-0.0016^{a}	-0.0043	0.0028	0.0021	0.0061	0.0063
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.008)	(0.008)	(0.009)	(0.007)	(0.007)
Δ Routine Cognitive	0.0004	0.0008^{a}	0.0006^{a}	0.0006^{a}	0.0005^{a}	-0.0022	-0.0051^{c}	-0.0053^{c}	-0.0029	-0.0026
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Δ Routine Manual	-0.0001	-0.0001	-0.0007^{b}	-0.0007^{b}	-0.0006^{b}	0.0089^{b}	0.0092^{b}	0.0086^{c}	0.0055	0.0051
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)
Firm-level controls:										
Productivity	0.0078^{a}	0.0077^{a}	0.0076^{a}	0.0076^{a}	0.0075^{a}	-0.0589^{a}	-0.0573^{a}	-0.0574^{a}	-0.0570^{a}	-0.0566^{a}
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)
Size	0.0122^{a}	0.0122^{a}	0.0121^{a}	0.0121^{a}	0.0120^{a}	-0.0876^{a}	-0.0872^{a}	-0.0871^{a}	-0.0864^{a}	-0.0866^{a}
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Capital Intensity	0.0004	0.0003	0.0003	0.0003	0.0003	0.0156^{b}	0.0167^{b}	0.0167^{b}	0.0200^{a}	0.0202^{a}
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Intangible Cap. Int.	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0013	0.0015	0.0015	0.0012	0.0013
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Industry-Level controls:										
Analytical$_{1995}$	0.0014^{b}	0.0014^{a}	0.0001	-0.0003	-0.0001	-0.0210^{b}	-0.0170^{b}	-0.0192^{b}	0.0087	0.0080
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.008)	(0.008)	(0.010)	(0.007)	(0.007)
Interactive$_{1995}$	-0.0019^{a}	-0.0017^{a}	0.0007	0.0010	0.0014^{c}	0.0157^{b}	0.0150^{b}	0.0190	0.0035	0.0022
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.006)	(0.006)	(0.015)	(0.009)	(0.010)
Non-Rout. Manual$_{1995}$	-0.0002	-0.0007^{a}	-0.0003	-0.0004	-0.0004	-0.0064^{b}	-0.0012	-0.0008	0.0025	0.0025
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Routine Cognitive$_{1995}$	-0.0001	0.0002	-0.0006^{a}	-0.0007^{a}	-0.0010^{a}	-0.0011	-0.0036	-0.0049	-0.0028	-0.0011
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
Routine Manual$_{1995}$	-0.0013^{a}	-0.0014^{a}	-0.0009^{a}	-0.0008^{a}	-0.0006^{a}	0.0172^{a}	0.0170^{a}	0.0177^{a}	0.0155^{a}	0.0147^{a}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Trade Barriers		-0.4018^{a}	-0.3778^{a}	-0.3618^{a}	-0.3581^{a}		4.6092^{b}	4.5398^{b}	3.0299^{c}	3.0864^{c}
		(0.078)	(0.083)	(0.088)	(0.075)		(2.143)	(2.185)	(1.743)	(1.723)
Multinationals			0.0002^{a}	0.0002^{a}	0.0002^{a}			0.0003	-0.0040^{a}	-0.0039^{a}
			(0.000)	(0.000)	(0.000)			(0.001)	(0.001)	(0.001)
Foreign Owed				-0.0000	-0.0000				0.0028^{a}	0.0028^{a}
				(0.000)	(0.000)				(0.000)	(0.000)
Demand					0.0000^{c}					-0.0000
					(0.000)					(0.000)
Observations	95,723	95,714	95,714	95,714	95,714	2,642	2,642	2,642	2,642	2,642
Pseudo R^2	0.1329	0.1352	0.1374	0.1375	0.1380	0.1296	0.1314	0.1315	0.1375	0.1376

Note: Industry-clustered standard errors in parentheses, ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The table reports marginal effects of a Probit model in which the dependent variable takes value one if the firm changes export status. In the left panel entrants are confronted with never exporters and on the right panel exiters are confronted with always exporters.

Table 12: Computer Use and Export Entry and Exit

	Entrants					Exiters				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Prob y=1	0.02054	0.02049	0.01910	0.01777	0.01748	0.5374	0.5371	0.5398	0.5419	0.5422
Change in Tasks:										
Δ Computer	0.0359	0.0381	-0.0518	-0.0694^{c}	-0.0434	0.1007	0.0894	1.0514^{a}	1.0757^{a}	0.6425^{b}
	(0.043)	(0.044)	(0.068)	(0.037)	(0.032)	(0.428)	(0.440)	(0.325)	(0.175)	(0.317)
Firm-level controls:										
Productivity	0.0083^{a}	0.0083^{a}	0.0076^{a}	0.0079^{a}	0.0079^{a}	-0.0278	-0.0294	-0.0226	-0.0541^{a}	-0.0610^{a}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.028)	(0.026)	(0.018)	(0.012)	(0.012)
Size	0.0138^{a}	0.0138^{a}	0.0135^{a}	0.0128^{a}	0.0127^{a}	-0.0808^{a}	-0.0774^{a}	-0.0883^{a}	-0.0820^{a}	-0.0840^{a}
	(0.004)	(0.004)	(0.004)	(0.002)	(0.001)	(0.008)	(0.009)	(0.011)	(0.012)	(0.011)
Capital Intensity	0.0003	0.0003	0.0003	0.0003	0.0003	0.0128	0.0163	0.0117	0.0203^{a}	0.0213^{a}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.011)	(0.010)	(0.008)	(0.007)	(0.007)
Intangible Cap. Int.	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0038^{b}	0.0033^{c}	0.0010	0.0020	0.0017
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Industry-Level controls:										
Computer_{1995}	0.0360^{c}	0.0394^{c}	0.0095	0.0088	-0.0062	-0.4001^{b}	-0.4480^{b}	-0.1427	-0.1393	0.0428
	(0.022)	(0.022)	(0.024)	(0.023)	(0.020)	(0.188)	(0.186)	(0.150)	(0.129)	(0.092)
Trade Barriers		-0.1086	-0.0701	0.1212	0.0573		4.4101^{b}	5.3808^{b}	3.0852^{a}	3.7443^{a}
		(0.173)	(0.204)	(0.163)	(0.148)		(2.222)	(2.156)	(1.140)	(1.135)
Multinationals			0.0001^{b}	0.0003^{a}	0.0002^{b}			-0.0014^{a}	-0.0040^{a}	-0.0023^{b}
			(0.000)	(0.000)	(0.000)			(0.000)	(0.000)	(0.001)
Foreign Owed				-0.0002^{a}	-0.0001^{a}				0.0019^{a}	0.0015^{a}
				(0.000)	(0.000)				(0.000)	(0.000)
Demand					0.0000^{c}					-0.0001^{b}
					(0.000)					(0.000)
Observations	95,723	95,714	95,714	95,714	95,714	2,642	2,642	2,642	2,642	2,642
Pseudo R^2	0.08153	0.08203	0.09706	0.1151	0.1198	0.05659	0.06398	0.09873	0.1215	0.1265

Note: Industry-clustered standard errors in parentheses, ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1. The table reports marginal effects of a Probit model in which the dependent variable takes value one if the firm changes export status. In the left panel entrants are confronted with never exporters and on the right panel exiters are confronted with always exporters.

Table 13: Interactions

	(1)				(2)			
	Entrants				**Exiters**			
Prob y=1	0.01597				0.5416			
	Productivity	Size	K Intensity	Int. K Intensity	Productivity	Size	K Intensity	Int. K Intensity
Δ Analytical	-0.0004[a]	0.0003	0.0000	0.0001[a]	-0.0055	-0.0025	0.0012	-0.0013[a]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.002)	(0.002)	(0.000)
Δ Interactive	0.0001	-0.0004	0.0002[b]	0.0000	0.0096[a]	0.0025	-0.0016	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.002)	(0.000)
Δ Non Rout. Man.	0.0000	-0.0004	-0.0001	0.0000	0.0082[a]	-0.0005	-0.0032[c]	0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.002)	(0.000)
Δ Rout. Cognitive	-0.0001[c]	-0.0000	0.0001[a]	0.0000[c]	-0.0003	0.0002	-0.0002	-0.0003[a]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Δ Routine Manual	0.0000	0.0002	0.0000	-0.0000	-0.0009	0.0018	0.0005	-0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)	(0.000)
Task Change Variables	Yes				Yes			
Firm-level Controls	Yes				Yes			
Industry-level Controls	Yes				Yes			
Observations	95,714				2,642			
Pseudo R^2	0.1441				0.1455			

Note: Industry-clustered standard errors in parentheses, [a] p<0.01, [b] p<0.05, [c] p<0.1. The table reports marginal effects of a Probit model in which the dependent variable takes value one if the firm changes export status. In the left panel entrants are confronted with never exporters and on the right panel exiters are confronted with always exporters.

Table 14: Tasks' Changes and Entry and Exit

	Entrants		Exiters	
	(1)	(2)	(3)	(4)
	Imports Services	Exports Goods	Imports Services	Exports Goods
Prob y=1	0.009721	0.02868	0.5053	0.4621
Change in Tasks:				
Δ Analytical	0.0007[a]	0.0015[a]	-0.0065[c]	-0.0078[c]
	(0.000)	(0.000)	(0.004)	(0.004)
Δ Interactive	-0.0010[a]	-0.0013	-0.0018	-0.0211[a]
	(0.000)	(0.001)	(0.005)	(0.006)
Δ Non-Rout. Manual	-0.0004[b]	-0.0014	0.0103[b]	0.0089[c]
	(0.000)	(0.001)	(0.004)	(0.005)
Δ Routine Cognitive	0.0002[c]	0.0010	-0.0081[a]	-0.0106[a]
	(0.000)	(0.001)	(0.002)	(0.002)
Δ Routine Manual	-0.0000	0.0000	-0.0021	-0.0080[a]
	(0.000)	(0.000)	(0.002)	(0.002)
Firm-level Controls	Yes	Yes	Yes	Yes
Industry-level Controls	Yes	Yes	Yes	Yes
Observations	95,782	82,140	2,574	16,216
Pseudo R^2	0.1854	0.0981	0.1039	0.09683

Note: Industry-clustered standard errors in parentheses, [a] p<0.01, [b] p<0.05, [c] p<0.1. The table reports marginal effects of a Probit model in which the dependent variable takes value one if the firm changes export status. In the left panel entrants are confronted with never exporters and on the right panel exiters are confronted with always exporters.