The Impact of Domestic Regulations on International Trade in Services: Evidence from Firm-Level Data*

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Abstract

In order to promote international in services, most bilateral and multilateral trade agreements aim at eliminating the discriminatory barriers. However, domestic regulations, which apply to all firms alike and do not intend to exclude foreign sellers, are often seen as serious obstacles to cross-border trade in services. This paper proposes an assessment of the impact of these regulations on international trade of professional services. Our empirical analysis combines OECD measures of domestic regulation and detailed French data on firm-level bilateral export of professional services. Results show a robust and a sizeable negative impact of domestic regulations on both the decision to export and the values exported by each firm. This impact does not vary with firms' productivity, and remains significant when we focus on the European Union market, where French exporters do not face discriminatory barriers. We conduct a quantification exercise based on our estimates and find an average ad-valorem tariff equivalent of domestic regulations of 60% in 2007. The ad-valorem tariff equivalent ranges from 26% to 88%, depending on the country.

Keywords: Trade in services, Firm-level exports, Trade barriers, GATS.

JEL codes: F1.

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1 Introduction

Services account for a large share of GDP in both developed and developing economies (Francois and Hoekman, 2010), but for only 20% of world trade (WTO, 2008). Clearly, the barriers to international trade in services appear to be high. In 2001, the European Commission issued a report on the remaining barriers to trade in services (European Commission, 2001). This report revealed that a majority of European business firms were facing difficulties to export their services because they were facing heavy regulatory barriers.[1] The main goal of most international agreements on trade in services, such as the GATS (The General Agreement on Trade in Services) at the World Trade Organization is to eliminate regulatory barriers that discriminate between domestic and foreign suppliers. Nevertheless, about 60% of the respondents to the European Commission survey reported that the domestic regulations which apply to all suppliers alike regardless of their nationality were also an important obstacle to exporting their services. Much less effort has been devoted to the elimination of these barriers. For instance, Article VI:4 of GATS is quite elusive on the subject. It merely states that domestic regulations should not "constitute unnecessary barriers to trade in services".[2]

This paper aims at assessing the impact of non-discriminatory domestic regulations on international trade in services. We combine data on domestic regulations in the professional services sector in 26 OECD countries with French firm-level data on exports of professional services. The use of firm-level data is crucial to understand how domestic regulations affect the foreign suppliers of professional services. Domestic regulations can affect the probability for a firm to export to a given market (i.e. the extensive margin of trade), its individual export values (i.e. the intensive margin of trade), or both. Furthermore, we examine whether firms with different characteristics (size and productivity) react differently to regulations. Finally, the use of firm-level data allows us to quantify precisely the effect of domestic regulations on international trade in services. In the last part of the paper, we show that our results are consistent with a simple trade model with heterogenous firms. Using the prediction from this model together with the estimated elasticity of trade with respect to domestic regulations, we are able to quantify and ad-valorem tariff equivalent of domestic regulations.

The existing literature on domestic regulations and trade in services has been exclusively empirical. It has used aggregated trade data, which do not provide sufficient information to test international trade models featuring heterogenous firms. Nicoletti et al. (2003), Kox and Nordas (2007), Lennon (2009), and van der Marel and Shepherd (2011) use country-level data on bilateral trade in services from OECD countries and show that domestic regulations in the origin and destination country have a strong negative impact on the aggregate exports of services. Kox and

[1] The survey was delivered to the European Commission by the Centre for Strategy and Evaluation Services. About 505 European business firms were interviewed. One multiple-choice question was "What sort of barriers does your company face in delivering services [to other EU countries] directly from the home base or by using a team sent from there?" Four possible responses were related to domestic regulations: "Need to obtain a local registration", "Need a specific legal form", "Need specific financial criteria" and "Local Employment Regulations"; Three responses indicated discriminatory barriers: "Discriminatory taxes", "Lack of mutual recognition", and "Need a representation of a local agent". Finally, two responses were associated with geographical distance: "Difficulty of supplying services because of distance" and "Need of local presence for after care services". More than 80% responded that the distance related barriers were (very or quite) significant, while around 53% of the respondents suggested discriminatory regulations to be significant.

[2] The main objective of the GATS is to promote international trade in services by ensuring equal treatment between national and foreign suppliers. Hence, it mostly focuses on explicit barriers to trade. See the WTO website devoted to the GATS at `http://www.wto.org/english/tratop_e/serv_e/serv_e.htm`.

Lejour (2005) show that the difference in regulation between the origin and the destination country matters too. Controlling for unobserved country heterogeneity, Schwellnus (2007) finds a smaller – but still significant – elasticity of bilateral trade in services with respect to domestic regulations.[3] Because they use aggregate data, these papers do not assess the impact of domestic regulations on the margins of trade in services, or control for the firm-level determinants of export performances. Our paper also contributes to the recent literature on firm-level trade in services (Breinlich and Criscuolo, 2011; Ariu, 2012; Conti et al., 2010; Kelle and Kleinert, 2010; Walter and Dell'mour, 2010). These studies mainly describe the characteristics of firms exporting services. They all find that very few firms are able to export services. However, none of these paper looks at the impact of domestic regulations on the exporter's performances.

Following the existing literature, we use the Non-Manufacturing Regulation index (NMR) developed by the OECD to proxy for the domestic regulations in each country. This index has also been widely used in the literature linking regulations to economic performances (Alesina et al., 2005; Bourlès et al., 2013; Barone and Cingano, 2011; Nicoletti and Scarpetta, 2003). We link this index to our French firm-level data on the exports of professional services. Our final dataset is an unbalanced panel with 4,544 French exporters of professional services and three years of observations (1999, 2003, 2007). We estimate the probability for a firm to export to a given market using a conditional logit, while the individual export values are estimated using a generalized tobit to control for the selection into the different export markets. We find that French firms are less likely to export to highly regulated markets. Controlling for the probability of exporting, the export volumes decrease with the level of regulation in the destination market. These results hold even when we focus on importing countries within the European Union, where the market is supposed to be free of discrimination between European firms. We also find that domestic regulations affect in a similar way low- and high-productivity firms. These empirical findings are consistent with the theoretical prediction of simple trade models with heterogenous firms (Melitz, 2003; Chaney, 2008), where the foreign suppliers of professional services are more sensitive to the regulations in the importing market than the local firms of this market. This is consistent with domestic regulations acting as an explicit barrier to trade in services. A possible explanation for these results is that the foreign providers of professional services are more sensitive to regulations than the local firms as they do not have access as easily to information to comply with local legislations. Finally, we use our econometric estimates to calibrate a slightly modified version of a Melitz (2003) in order to obtain ad-valorem tariff equivalents of the domestic regulations. Our calculations indicate that the impact of regulations on trade is equivalent to imposing a 60% tariff rate, on average, on our sample of countries. In the next section, we present the empirical strategy we use to assess the effect of domestic regulations on firm-level exports of professional services. Section 3 describes the data and presents some descriptive stylized facts. Our empirical results are presented in Section 4, and we propose a quantification of the estimated results in Section 5. Section 6 concludes.

2 Econometric specification and estimation method

The compliance to market regulations is certainly not costless, both for domestic and foreign firms. However, measuring the exact impact of regulations in destination markets on firms' export

[3]Earlier studies focused on specific sectors or countries: Mattoo and Mishra (2008) looked at both discriminatory and non-discriminatory regulations in the case of Indian engineers, lawyers and architects in the United States. Findlay and Warren (2000) compiled several sectoral studies carried out by the Australian Productivity Commission (banking sector, telecommunications, and professional services).

performances is not trivial, for two reasons. First, it is hard to know precisely what kind of costs these regulations involve. They can take the form of an additional fixed cost of entry, a marginal cost, or both. Moreover, they can be equally burdensome for foreign and domestic companies or be discriminatory, i.e. affecting foreign firms relatively more. Second, regulations can also affect firms' export performances indirectly, through changes in the strength of competition in the market. This is why our empirical analysis, presented in this section, is deliberately very general and does not rely on a specific theoretical model. This section simply outlines the mechanisms that may be at work and presents our econometric specification. Section 5 proposes an interpretation of our empirical results, based on a more explicit theoretical framework.

2.1 Econometric specification

For the moment, we just consider a very general trade model where heterogeneous producers of professional services, located in country o, may decide to export their imperfectly substitutable variety of services to country d at year t. Sales in market d are determined by a combination of the destination country characteristics, bilateral factors linking the origin and the destination countries (such as cross-border transaction costs), and firm-level determinants of export performance, including firms' productivity. Assuming that the demand function perceived by a producer of services from a given country is multiplicatively separable, the export function for a firm a can be represented by:

$$x_{odt}(a) = \psi_t(a)\ \phi_{odt}\ S(B_{dt})\ \frac{E_{dt}}{\Phi(B_{dt})}\ \Lambda_{odt}(a), \tag{1}$$

where $\Lambda_{odt}(a)$ takes a value of one if the firm has decided to enter market d in year t and zero otherwise. The parameter $\psi_t(a)$ represents the ability of firm a and captures all firm-level determinants of export performance. E_{dt} is the nominal value of expenditure on professional services in country d and ϕ_{odt} measures the bilateral accessibility of market d for exporters in country o. It captures the impact on trade of the usual bilateral transaction costs such as travel and communication costs. $S(.)$ is a trade shifter. It captures the direct impact of market regulations (B_{dt}) on firms' exports to country d. $\Phi(B_{dt})$ is a "multilateral resistance" term which captures the strength of competition in market d (Anderson and van Wincoop, 2003). Intuitively, the sales of a given firm are decreasing in the number of competitors and increasing in the relative price charged by each competitor. This index is a weighted average of all trade barriers between country d and all potential supply sources (including country d itself). Domestic regulations will also impact this multilateral resistance term through changes in the delivery price of each service variety and the number of firms active in market d. Assuming further that firms incur a fixed cost to enter in each foreign market, the probability for a firm with ability a to export to market d is:

$$P\left[\Lambda_{odt}(a) = 1\right] = P\left[\pi\left(x_{odt}(a)\right) > F_{odt}\right], \tag{2}$$

where π is the current profit function, and F_{odt} the fixed entry cost, which may also increase with domestic regulation. We do not aim at estimating an explicit structural form of Equations (1) and (2). Instead, we estimate the following specifications, which share much common with standard gravity equations:

$$
\begin{aligned}
ln(x_{odt}(a)) &= \beta_1 \ln(Regulation_{dt}) + \beta_2 \ln(Institution_{dt}) + \beta_3 \ln(Demand_{dt}) \\
&+ \beta_4 \ln(MP_{dt}) + \beta_5 \ln(Dist_{od}) + \beta_6 Border_{od}(a) + \beta_7 Lang_{od} \\
&+ \beta_8 ExportGoods_{odt}(a) + \theta_{at} + \varphi_{dt}(a),
\end{aligned} \tag{3}
$$

$$
\begin{aligned}
P[\Lambda_{odt}(a) = 1] &= [\alpha_1 \ln(Regulation_{dt}) + \alpha_2 \ln(Institution_{dt}) + \alpha_3 \ln(Demand_{dt}) \\
&+ \alpha_4 \ln(MP_{dt}) + \alpha_5 \ln(Dist_{od}) + \alpha_6 Border_{od}(a) + \alpha_7 Lang_{od} \\
&+ \alpha_8 ExportGoods_{odt}(a) + \varrho_{at} + \zeta_{dt}(a) > 0)],
\end{aligned} \tag{4}
$$

where $\varphi_{dt}(a)$ and $\zeta_{dt}(a)$ are the errors terms. Let us detail the variables in these equations.
Dependant variable. In Equation (3), the dependant variables is the (strictly positive) value of exports of professional services reported by each French exporter to country d at year t. In Equation (4), it is a dummy taking the value one if the firm exports to country d at year t and zero otherwise. Note that our firm-level database only reports the exports of firms located in France so that the o subscript is for France only. The data on firm-level exports are presented in the next section.

Domestic regulations. $Regulation_{dt}$ is our main variable of interest. It measures the level of regulations in the professional services markets in each importing country d. The measure of domestic regulations is presented in details in the next section.

Firm-level characteristics. Our econometric approach exploits cross-country variations. We introduce firm and year fixed effects in all our regressions. Note however, that the computational capacities to estimate Equation (3) constrained us to define $\theta_{at} = \theta_a + \theta_t$. However, for the probability of exporting (Equation (4)), we have allowed for firm×year fixed effects, ϱ_{at}, which ensures a better control of firm-level determinants of the export performance. The results on the probability of exporting obtained with firm-year fixed effects reported in the following tables are very similar to the (unreported) ones obtained with firm and year fixed effects separately.

Institutions. The variable $Institution_{dt}$ measures the quality of institutions in country d. This control ensures that our variable of interest (i.e. regulation) is not capturing some effects related to the political and economic environment in the destination market. We use the Rule of Law from the World Development Indicator (World Bank) as a proxy for the quality of institutions.[4]

Trade costs. We proxy trade costs ϕ_{odt}, by usual gravity variables, such as the physical distance between countries and dummies for common border and common language. The geographic distance between countries and the common official language dummy are taken from the CEPII's distance database.[5] The common border dummy, $Border_{od}(a)$, is slightly more sophisticated. It varies across firms and captures the relative location of exporters within the French territory. This variable takes the value one if firm a is located in a French region sharing a border with the destination country.[6] Furthermore, we control for the fact that firms may export both goods and services

[4] As a robustness check, we used alternative measures for the quality of institutions: the ICRG index developed by the PRS Group, and two indicators from the World Development Indicator (the Political Stability, Quality of Regulation). Results are not affected by the choice of the index.

[5] Data are available at: `http://www.cepii.fr/francgraph/bdd/distances.htm`.

[6] Our data only provides us with the location of the headquarter. There are 22 regions in metropolitan France, which correspond to the NUTS-2 classification of Eurostat.

to country d. $ExportGoods_{odt}(a)$ is a dummy taking the value one if firm a is also exporting goods to country d at time t. This control is important for two reasons. First, omitting this information could bias our results as firms exporting goods to a given country may acquire a specific knowledge about this market which can help them to export also services. Second, the exports of services may complement the exports of goods at the firm-level. In some industries, firms can propose a product-service bundle to the consumer (e.g. in the computer industry, software and hardware can be sold jointly; firms selling repair and maintenance contracts may also handle the export of the related product; etc). In this case, the supply of services is driven by the export of the good, and not necessarily by the characteristics of the service market in the destination country. The information on whether the firm is also exporting goods to the same country comes from the French Custom database. For 11% of our observations, we observe simultaneous exports of goods and services by the same firm to the same destination country.

Demand. The $Demand_{dt}$ variable measures the total expenditure in professional services in country d. It is computed by subtracting the net exports from the domestic production of professional services. For production, we use OECD-STAN data, and keep the production of sector code C71T74.[7] Data on the exports and imports of professional services are from the OECD as well.

Multilateral resistance. Accounting for the multilateral resistance term, $\Phi(B_{dt})$ is a serious issue, especially in our case. As already mentioned, we expect market regulations to have an indirect impact on firms' exports performances through changes in $\Phi(B_{dt})$. As a consequence, our treatment of the multilateral resistance term is likely to strongly affect our estimates and their interpretation. The existing empirical trade literature suggests two methods to account for this multilateral resistance term. The first approach, proposed by Anderson and van Wincoop (2003), consists in a structural estimate of $\Phi(B_{dt})$. The alternative approach consists in capturing the multilateral resistance through country×year dummies (Feenstra, 2002), a method which does not involve strong structural assumptions.

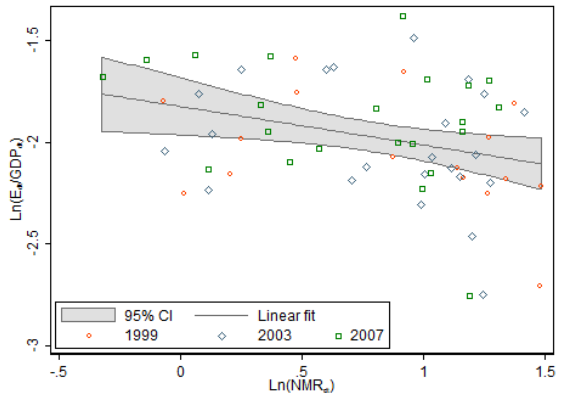
However, none of these two practices can be implemented in our case because of data limitation. A structural estimation of the multilateral resistance term would require reliable data on the domestic production and on the bilateral trade flows of professional services for a large set of countries, while the available databases are limited to a small number countries.[8] In addition, to be consistent with our firm-level data, the structural estimation of the multilateral resistance term should explicitly take into account firm heterogeneity and firm-selection into trade, which further complicates the empirical implementation (Behar and Nelson, 2014). Besides, we cannot use country×year fixed effects to account for the multilateral resistance term since $\Phi(B_{dt})$ and our variable of interest $Regulation_{dt}$ vary along the same dimension. Because we cannot use a control of the multilateral resistance term which would appropriately capture the impact of regulations on

[7]This sector includes categories C71 to C74, i.e. "Renting of Machines and Equipment" (C71), "Computer and Related Activities" (C72), "Research and Development" (C73) and "Other Business Services" (C74). Category (C72) encompasses the production of IT services. Category (C71) is not part of professional services, and should not be included in our measure of local production. However, we work with aggregate production category (C71T74) because it is available for a larger set of countries, while the details at a lower level of aggregation are missing for many countries. Besides, when the full data is available, "Renting of Machines and Equipment" accounts only for 6% of the production of category (C71T74) on average. Its inclusion is unlikely to bias our results.

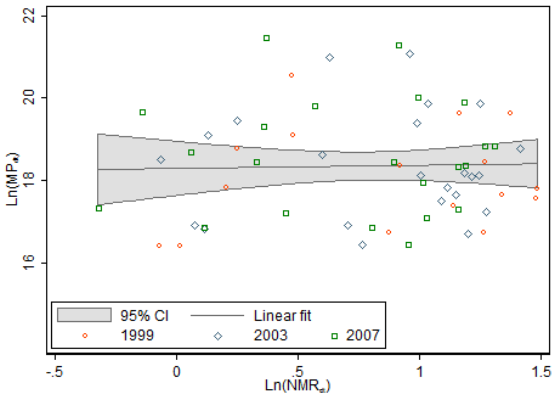
[8]Table 2 presents our attempt to compute a multilateral resistance term for professional services. The bilateral trade data on professional services are taken from Francois and Pindyuk (2013), while data on the local production of professional services come from the OECD-STAN database and are only available for OECD countries. The measure we obtain is not significantly correlated with the level of regulations in professional services, and has no significant influence on the French firm-level exports. We further detail this result in Section 4.2.

Figure 1: Market regulations versus demand and manufacturing market potentials

(a) Consumption of prof. services in GDP



(b) Manufacturing MP



the strength of competition, we propose a different approach. In Equations (3) and (4), we simply introduce a time-variant index of manufacturing market potential, MP_{dt}. This index is obtained from a structural-gravity estimation procedure, based on production and exports of manufacturing products.[9] It captures the exogenous determinants of competition in each market, such as the relative geographic location of the destination market d with respect to the largest economies at year t. Because it focuses on the production and trade of manufacturing goods, it is unlikely to be affected by the level of regulations in the professional services market. By including this index, our econometric specification takes into account the fact that, everything else being equal, competition should be fiercer in central markets (e.g. Belgium), compared to remote ones (e.g. New Zealand).

It is noteworthy that the way we control for market size, E_{dt}, and multilateral resistance, $\Phi(B_{dt})$, determines how our coefficients of interest, α_1 and β_1, are to be interpreted. The proxy for market size captures the effective aggregate demand for professional services in each country. It is negatively affected by the level of regulation in these countries, as shown in Figure 1.[10] The coefficient on the regression line is -0.19 and is significant at the 5% confidence level. Note that for domestic regulations to be qualified as trade barriers, they need to affect the export performances of foreign firms *conditional* on the local demand, captured by E_{dt}. The control for the multilateral resistance term we use does not capture the impact of domestic regulations on the strength of competition. Figure 1 (b) shows that domestic regulations are orthogonal to the Market Potential (the coefficient on the regression line is 0.07 and is highly non-significant). Therefore, the coefficients α_1 and β_1 will capture simultaneously the direct impact of regulations and their indirect impact channeled through changes in the strength of competition in each market.

2.2 Estimation method

The estimation of Equation (3) is carried out using a generalized tobit model with firm and year fixed effects. Trade models with heterogeneous firms and fixed export costs predict that we should

[9]The market potential index is described in details by Head and Mayer (2004) and available at `http://www.cepii.fr/anglaisgraph/bdd/marketpotentials.htm`

[10]The data are described in details in the next section.

not observe strictly positive export values below an exogenous cutoff value. With such a cutoff, the export data are truncated and the OLS estimates are biased. A tobit model should remove this bias, but the exact cutoff value is unobservable, and specific to each destination market. Eaton and Kortum (2001) show that an appropriate estimate of this censoring point is the minimum export value observed in each destination. Because this value changes across destinations, we use a generalized tobit model.[11] The estimation of Equation (4) is done using a conditional logit, with firm×year fixed effects. Note that a linear probability model would be extremely biased in our case, since around 90% of all trade flows are zeros. Linear probability models and logit models produce similar marginal effects when the average probability is close to 50% (Angrist and Pischke, 2008).

Since our variable of interest is at the country×year level, we cluster the standard errors at this level. However, with only 66 clusters, we may have too few clusters to get unbiased standard errors (Angrist and Pischke, 2008). Following Cameron et al. (2008) and Cameron and Trivedi (2010), a solution for this problem is to bootstrap the standard errors. We do so when estimating the export probability. Unfortunately, this solution is beyond computational capacities for the individual export equation, due to the large number of dummy variables we introduce in the generalized tobit. For the estimates of Equation (3), we will simply report clustered standard errors at the country×year level.

3 Trade and regulation data

Our empirical analysis uses two main sources of data: The Banque de France database on services exports of French firms and the OECD measures of services market regulations.

3.1 The Banque de France database for trade in services

We use an exhaustive record of French firm-level export flows of services provided by the Banque de France. The services covered in the database fall into the Mode 1 classification by the GATS. The Banque de France data come either directly from the company itself,[12] or from commercial bank declarations. For each firm, the database records the annual amount of its transactions, the nature of the service traded and the partner country. The product classification used by the Banque de France database is slightly different than the *Extended Balance of Payments Services Classification (EBOPS)*. It identifies 21 types of services, of which five are professional services: "Leasing services", "Research and development, technical services", "Management costs/Overhead fees", "Other labor remuneration", and "Subscriptions, advertising". Destinations are split between 250 destinations, and the data is available from 1999 to 2007.

Looking at the data in 2003, the complete database reports Mode 1 positive export flows for 13,703 French firms, with a total value close to 28 billion euros. Given the aim of this paper, we need to focus on a restricted sample of exporters. We focus on the firms that (i) have their main activity in business services sectors,[13] (ii) export professional services to countries for which we have information on market regulations and on local demand.[14] We detail, step by step, how the

[11] Head and Mayer (2015) discuss the various estimation techniques for gravity equations at the firm-level. They perform Monte-Carlo simulations indicating that the generalized tobit model successfully corrects the selection bias.

[12] This mainly concerns the biggest ones, called *Déclarants Directs Généraux*.

[13] Data on the exports of services by manufacturing firms are used as a robustness check (Table 7)

[14] Recall that our econometric specification includes firm×year fixed effects. Firms that do not export are therefore not included in our sample, as they do not participate to the econometric identification. We use an unbalanced

different restrictions we impose on our sample change the number of firms and the total export values. To avoid flooding the text with numbers and confuse the reader, we only present the changes in the number of firms and the total exports in 2003.[15] We start with 13,703 firms, exporting 28 billion euros of services on aggregate. We only have information on the main activity for 6,898 of them. This information is provided by the French Statistical Institute (INSEE). These 6,898 firms export 23 billion euros of Mode 1 services. Restricting to firms exporting professional services leaves us with 5,144 firms, accounting for about 10.9 billion euros of total exports. We further restrict our sample to the firms registered in the business services sectors.[16] This second step reduces our sample to 2,543 firms, and the total exports are down to 6.1 billion euros. Finally, the match with the data on domestic regulations reduces the number of destination countries and years available for the analysis. We have information on the level of market regulations for 26 countries at most (excluding France) and for three years: 1998, 2003 and 2008. Considering that for a given country, the annual changes in the level of regulations are small, we match the regulations in 1998 with the trade data in 1999 and the regulations measured in 2008 with the trade flows observed in 2007. Besides, to reduce the measurement errors, and provide a better match with the data on domestic regulation, we aggregate the data at the firm, destination and year level.[17] The final database contains 115,086 observations. In 1999, we have 1,509 exporters and 16 destination countries for a total value of 2.8 billion euros. In 2003, the database covers 2,216 exporters and 23 countries and a total value of 4.8 billion euros. In 2007, the database covers 1,817 exporters, 22 countries representing a total of 4.4 billion euros.

A striking feature of the data is that only few firms are able to export professional services. After matching our trade data with the information on the main activity of the firm, we find that the firms exporting professional services account for only 2% of the firms in the professional services sectors. This share is nine times smaller than the share of firms exporting goods in the manufacturing sectors. Eaton et al. (2004) report that about 17% of French manufacturing firms exported some good to at least one destination in 1986. Bernard et al. (2007) report a very similar figure (18%) for the US in 2002. Moreover, the average exporter is quite small. It exports 2.2 million euros to 2.3 countries. These averages hide a large heterogeneity. The concentration of exports is very high, and only a few extremely competitive firms are able to export their services to many countries. Figure 2 shows the concentration of exports in 2003.[18] The vast majority of exporters (72%) only sell to one foreign market. However, those are small exporters; they account all together for only 15% of total exports of professional services. At the other end of the distribution, the top 1% of the exporters exports to more than 15 markets, and account for 40% of the total French exports of professional services in our sample.

panel with at most 26 countries. See Table 10 in the Appendix for the list of countries available in each year.

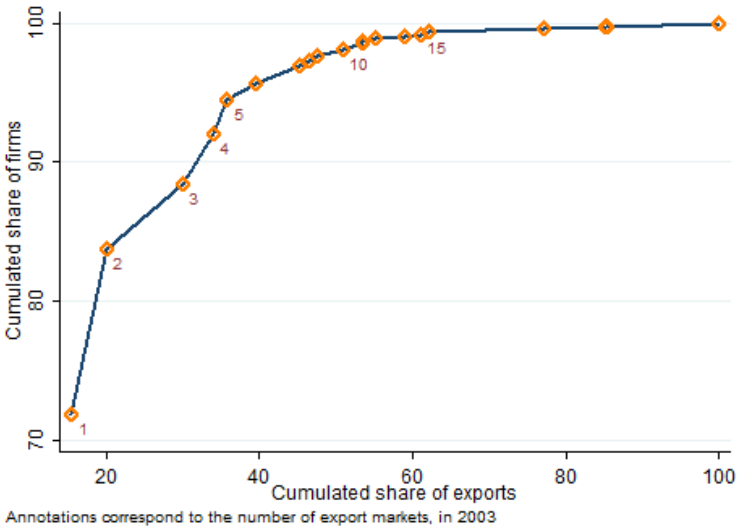
[15] Figures for 1999 and 2007 are available upon request.

[16] We drop firms belonging to the manufacturing, agricultural and extraction sectors, and those in wholesale, retail, transport, public administration, education, health, non-profit, recreative activities, and personal services sectors. The coefficients obtained on the full sample of exporters of professional services regardless of their industry classification are similar to those obtained on the sample of exporters registered in the business sectors only, although less precisely estimated. The business services sectors correspond to sectors 55 to 74 in the Nace-rev2 classification.

[17] We also use the disaggregated data for each category of service as a robustness check (see Table 5).

[18] Data for 1999 and 2007 show a very similar pattern.

Figure 2: Concentration of exports in 2003



3.2 Indicators of domestic regulation

The OECD has developed a series of indicators measuring the level of product market regulations in the manufacturing sectors (PMR) and some service sectors (referred to as the NMR, for "Non-Manufacturing Regulations"). In order to match our data on trade in services, we work with the NMR for professional services. To produce these indicators, the OECD proceeds in two steps. First, a questionnaire is sent to the competent authorities in each OECD country.[19] Questions are either qualitative (e.g. "Are there professional exams that must be passed to become a full member of the profession?") or quantitative (e.g. "For how many services does the profession have an exclusive or shared exclusive right to provide?"). Responses are then transformed into quantitative data, using a scoring algorithm which attributes a specific weight to each question. The indices range from 0 (low level of regulations) to 6 (high level of regulations). Because we are interested in purely domestic regulations, we slightly modified the NMR for professional services by excluding from the questionnaire a question which explicitly targets foreign firms, and redistributing the weights between the remaining questions.[20] The index we obtain is highly correlated with the original NMR, and using the latter in all our regressions does not alter our conclusions. In the rest of the paper, we will refer to our slightly modified index of regulation as the NMR index.

As a robustness check, we use several alternative indicators of domestic regulations. We first use two sub-indicators of the NMR: the $NMR - Entry$ and the $NMR - Conduct$. The overall NMR is the average of the two sub-indicators. The $NMR-Entry$ is based on questions that focus mainly on rules concerning licensing or minimum educational requirements. The $NMR-Conduct$ uses questions on the regulations of ongoing activities that are associated with price-setting policies

[19]The questionnaire and the individual data used to construct the NMR index for professional services can be found at: `http://www.oecd.org/eco/reform/indicatorsofproductmarketregulationhomepage.htm`. See Wolfl et al. (2009) for a detailed description of the NMR indices.

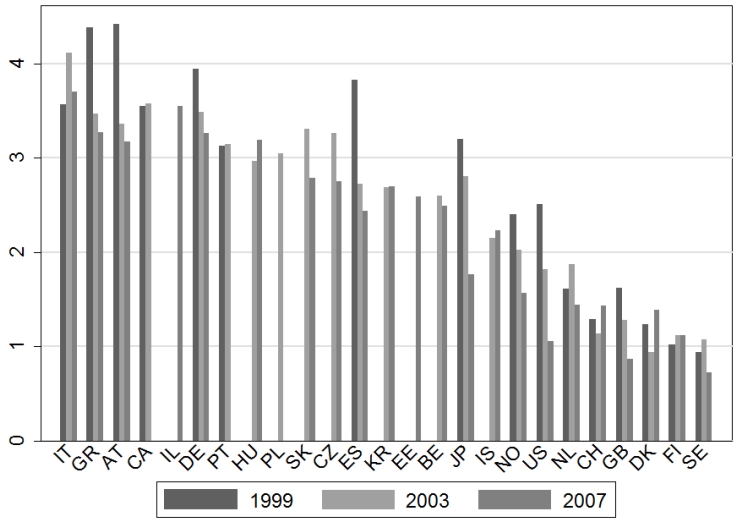
[20]The question that has been excluded is: "Is the number of foreign profesionnals/firms permitted to practice restricted by quotas or economic needs tests?".

or framing advertisements.[21] We also used the Trade Restrictiveness Index (TRI) provided by the Australian Productivity Commission. This index also measures the level of domestic regulations in the professional services sectors. It is only available for the year 1999 and for a 16 countries in our sample, and provides less robust, although qualitatively similar results to the one obtained with the NMR.[22]

Figure 3 displays the NMR index between 1999 and 2007 for the countries in our sample. For most countries, the index has declined over time. This decline has been relatively stronger for countries with high or intermediate levels of regulations, suggesting some convergence between OECD countries. The US, Japan, Spain and Austria have experienced the strongest decrease. However, the level of regulations has increased for some countries (Canada, Denmark, Finland, Hungary, Iceland, Portugal and Switzerland). Figure 4 crosses three variables from our database in 2003: the two components of the NMR ($NMR-Conduct$ and $NMR-Entry$) and the number of French exporters to each market. The figure shows that the two components of the NMR are strongly correlated with one another. Besides, the figure fails to show any monotonic relationship between the level of regulations (defined by either component of the NMR) and the number of French exporters to each market.

Figure 5 presents the distribution of the log of French exports of professional services across countries. The countries are sorted by increasing level of regulation in 2003: from Denmark (0.90) to Italy (3.79). For each destination market, the box represents the [25%;75%] interval of the export distribution. The figure also reports upper and lower adjacent values (respectively 1.5 times the inter-quartile range above the third quartile, and below the first quartile). Dots represent observations outside the range defined by the adjacent values. Again, no clear correlation between the level of regulations and the firm-level export performances emerge.

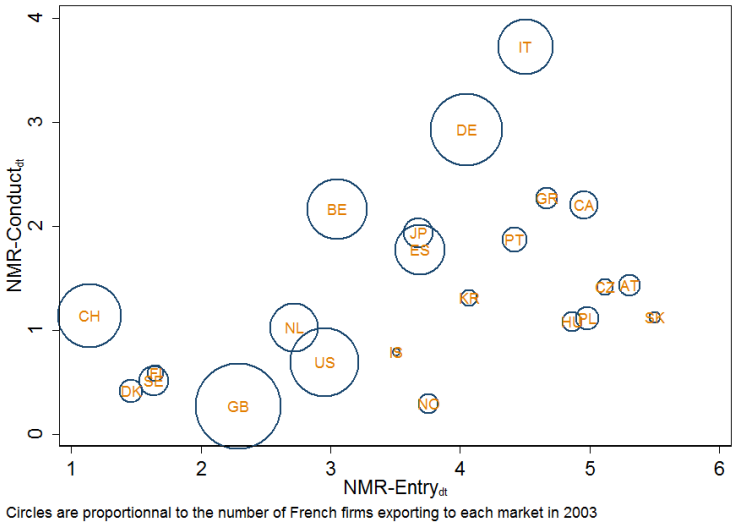
Figure 3: Non-Manufacturing Regulation Index



[21] See Table 2 for the results.

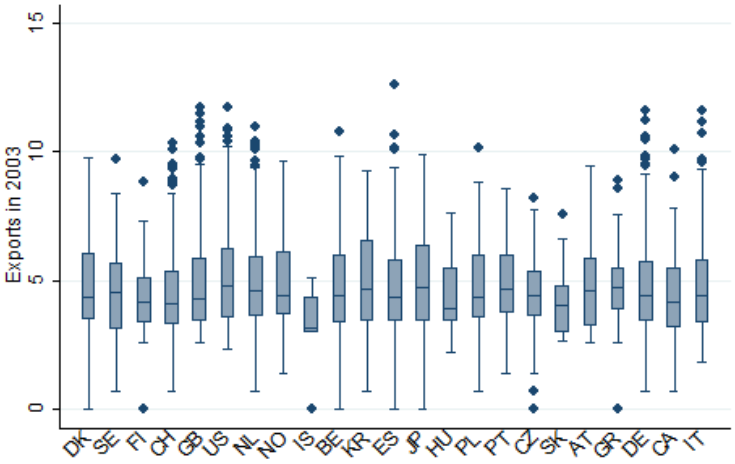
[22] Results are not shown in the paper, but available upon request.

Figure 4: NMR-Entry, NMR-Conduct and the number of French exporters - 2003



Circles are proportionnal to the number of French firms exporting to each market in 2003

Figure 5: NMR and the distribution of export values - 2003



Source: Author's calculation
Countries are ranked according to their level of regulation
Exports are taken in log

4 Econometric results

4.1 Baseline results

Our baseline results are shown in Table 1. Columns (1) and (2) report estimates from our firm-level regressions corresponding to the simplest empirical specification of Equations (3) and (4).[23]

The estimates show that the standard gravity variables explain well the individual export performances across destination countries, confirming previous evidence obtained on aggregate trade flows of services (Kimura and Lee, 2006; Walsh, 2008; Head et al., 2009). Both the export probability and the export values increase with the demand for professional services in the destination country and decrease with the bilateral distance. French exporters perform also better in francophone countries and when they are located in a French region sharing a land border with the destination country. The dummy variable $ExportGoods_{odt}$ is positive and highly significant in both equations. This result suggests the existence of complementarities between exports of goods and services at the firm-level. Estimates of the market potential are non-significant. Because this variable measures the multilateral resistance in the manufacturing sectors, we do not expect that it influences greatly the exports of services. Nevertheless, everything else being equal, it should be harder for a firm to export to a country with higher market potential. This unexpected result may be explained by the fact that we consider only one country of origin for the trade flows. Indeed, the cross-country variance in market potential is essentially driven by domestic demands and by the proximity of each country to large markets. In our sample, most of this variance is already captured by our gravity variables; the demand for professional services variable is correlated with market size, and the distance to France proxies the distance to the EU market, at least for non-EU countries. The Rule of Law index, which shows little variance in our sample of OECD countries, is also non-significant.

Looking at the results in Column (1), we find that the odds of exporting are multiplied by $e^{-0.356} = 0.7$ (or reduced by 30%) when $Ln\ NMR$ is increased by one unit. This is quite a large number. In our sample, $Ln\ NMR$ has a standard deviation of 0.5. Reducing by one standard deviation the (log) level of regulation increases the odds of exporting by 19.5%. To gauge the economic importance to this effect, consider the following example: In 2007, reducing by one standard deviation $Ln\ NMR$ is comparable to applying to Belgium the level of regulation in Norway.[24] In 2007, the odds of exporting to Belgium are 0.27. Applying the Norwegian level of regulation to Belgium would increase the odds of exporting to Belgium to reach 0.32. With 387 French firms exporting professional services to Belgium in 2007, out of a total of 1820 French exporters, this reduction in the level of regulation would allow 57 additional French firms to enter the Belgian market (an increase of 14%). In Column (2) we report the coefficients from the estimation of the export values Equation (3). The coefficients are directly interpretable as marginal effects.[25] The coefficient on $Ln\ NMR$ is negative and statistically significant. Using the same quantification exercise, the coefficient on $Ln\ NMR$ suggests that the individual exports to Belgium would in-

[23] Note that we report the estimated coefficients, not the marginal effects. The logit results shown in columns (1) and (3) have to be interpreted in terms of log odds ratios, defined as the log of the ratio of the probability of exporting over the probability of not exporting. Since our model links the log of odds of exporting to the log of explanatory variables in a linear way, the exponential of each estimated coefficient reflects by how much the odds of exporting are *multiplied* when the corresponding explanatory variable increases by one unit.

[24] In 2007, Belgium had a level of regulation of 2.49 ($\ln(2.49) = 0.91$), and Norway had a level of regulation of 1.56 ($\ln(1.56) = 0.45$)

[25] The marginal effect is on the uncensored variable – which takes into account the zero trade flows – not on the observed (strictly positive) trade flows.

Table 1: The Impact of Market Regulations on Export Probability and Export Values - Baseline results

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)
Ln Local Demand	1.013^a	2.551^a	1.019^a	2.501^a
	(0.047)	(0.142)	(0.056)	(0.143)
Ln Distance	-0.953^a	-2.234^a	-0.990^a	-2.292^a
	(0.055)	(0.217)	(0.095)	(0.260)
Common Language	0.941^a	2.076^a	0.911^a	1.720^a
	(0.116)	(0.359)	(0.147)	(0.415)
Border	1.151^a	3.196^a	1.155^a	3.141^a
	(0.152)	(0.354)	(0.154)	(0.348)
Ln RMP	-0.033	-0.064	-0.034	-0.020
	(0.037)	(0.142)	(0.043)	(0.139)
Ln Rule of Law	0.028	0.069	0.025	0.072
	(0.208)	(0.520)	(0.218)	(0.518)
Export of goods	4.453^a	7.746^a	4.454^a	7.702^a
	(0.226)	(0.430)	(0.225)	(0.415)
Ln NMR	-0.375^a	-1.047^a		
	(0.096)	(0.339)		
EU			0.001	-0.755
			(0.178)	(0.551)
Ln NMR×EU			-0.385^a	-0.895^b
			(0.114)	(0.397)
Ln NMR×Non-EU			-0.271	-1.454^b
			(0.227)	(0.575)
Observations	115,086	115,086	115,086	115,086
Pseudo R2	0.329	0.222	0.329	0.222
Number of Firms	4,544	4,544	4,544	4,544
Test: $\beta_{Ln\ NMR\times EU}=\beta_{Ln\ NMR\times Non-EU}$				
Chi-2			0.200	
Prob>Chi-2			0.655	
F				0.701
Prob>F				0.402

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1) and (3) report export probability estimates, using a conditional logit with year×firm fixed effect, and bootstrapped standard errors clustered at the country×year level (100 replications). Columns (2) and (4) report individual export estimates, using a generalized Tobit with year and firm fixed effect, standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

crease by 42%.[26] In 2007, the median export flow to Belgium was €76,000. Reducing the level of regulation in Belgium to that of Norway would increase the median export flow to €108,000.

[26]Applying Norway's level of regulation to Belgium results in a 40% reduction in Belgium's NMR. The reduction in trade values is therefore -0.4×-1.047=0.42

A concern with the results reported in Columns (1) and (2) is that there might be a positive correlation, across countries, between between explicitly discriminatory regulations and domestic regulations. In this case, omitting to control for discriminatory barriers would bias downward the coefficient on $Ln\ NMR$, leading to an overestimation of the negative impact of domestic regulations on trade. A straightforward correction of this bias would be to introduce a variable capturing discriminatory barriers. Unfortunately, this option is not available to us since none of the existing measure meets our needs.

Two indicators of discriminatory barriers in professional services are available: the Trade Restrictiveness Index (TRI) developed by the Australian Productivity Commission (Findlay and Warren, 2000) and the Services Trade Restrictiveness Index (STRI) developed by the World Bank (Borchert et al., 2010). Both indices are available for one year only (1999 for the TRI and 2008 for the STRI) and for a limited number of countries in our sample (16 out of the 22 countries in our baseline sample in 2007). Furthermore, the TRI displays a strong correlation with the NMR (In 1999 the correlation is around 0.8 and significant at the 1% level) while the STRI does not show any significant correlation with the NMR (In 2007 the correlation is 0.3 and significant at the 28% confidence level). These strong limitations expose us to very weak robustness checks. When we introduce the TRI index (in log form) as an additional control in our baseline regressions, we obtain non-significant coefficients on both $Ln\ TRI$ and $Ln\ NMR$ variables. Similarly, on the sample limited to the observations for which the STRI index is available, the coefficient on $Ln\ NMR$ in the export probability equation is still significantly negative, while the coefficient associated to $Ln\ STRI$ is not significant.[27]

Fontagné and Mitaritonna (2013) also compute an index of discriminatory trade restrictions in services, but their study is limited to the telecommunication and distribution sectors, to eleven developing countries and one year. Lastly, Francois et al. (2005) and Walsh (2008) use a gravity framework to infer the barriers to trade in services. These gravity-based measures are informative but cannot be re-introduced into a gravity equation for obvious reasons of endogeneity. They also capture all types of regulations, discriminatory and non-discriminatory alike.

Given the lack of alternative detailed and reliable control variable for discriminatory barriers, we adopt a very simple and straightforward alternative strategy. To rule out the possibility that our results are affected by this omitted variable bias, we focus on the subset of EU countries, where French exporters are not subject to discriminatory barriers. The Single Market of the European Union guarantees equal market access to all European firms while the domestic regulations remain specific to each country. Therefore, for EU countries, we are sure that the NMR_{dt} variable does not proxy for regulations that could discriminate against French firms. Results are reported in Columns (3) and (4). To investigate whether domestic regulations matter when French firms are exporting to the EU, we interact the variable of domestic regulation with a EU dummy and with a Non-EU dummy. Remember that the logit model estimates a linear relationship between the log odds of exporting and the various covariates. Because of this linearity, interaction terms can be interpreted in the same way as in a linear framework, including interaction terms (Buis, 2010).[28] Furthermore, we want to assess how regulations in European versus non-European countries affect

[27] With this limited sample, the export sales equation could not be estimated using a generalized tobit because of a highly singular variance-covariance matrix. Simple OLS with firm×year fixed effects provide a negative coefficient on $Ln\ STRI$ and a non-significant one on $Ln\ NMR$.

[28] The concern raised by Norton et al. (2004) regarding interaction terms in non-linear model arises when one wants to interpret the coefficients in terms of *marginal effects*. Marginal effects in models where the dependent variable is a dummy describe how a variable affect the probability of success. In the present case, we look at how variables affect the odds of exporting, rather than the probability of exporting.

the behavior of French exporters of professional services. The coefficient on $Ln\ NMR \times EU$ reflects the effect of domestic regulations when firms export to another EU country, and the coefficient on $Ln\ NMR \times Non\ EU$ the effect of domestic regulations when firms export outside the EU. Results in Columns (3) and (4) show that domestic regulations reduce both the log odds of exporting and the individual export sales. In both regressions the coefficients on $Ln\ NMR \times EU$ and $Ln\ NMR \times Non\ EU$ are not statistically different from one another, as the F and Chi-2 test at the bottom of the table suggest. This result indicates that even when French exporters of professional services export to countries where they do not face discriminatory barriers, domestic regulations still reduce their ability to enter these markets, and reduce their export sales. In addition, it is noteworthy that the negative effect of domestic regulations on trade within the EU suggests that the market unification is far from being completed in the European services markets.

4.2 Robustness tests

We now assess the robustness of our baseline results. In Table 2, we check that our results are robust to alternative choices of explanatory variables.

In Columns (1)-(4), we replace alternatively the NMR by its two components: The $NMR - Entry$ and the $NMR - Conduct$. The entry component focuses on regulations that prevent firms from entering the market. The conduct component focuses on regulations that complicate the day-to-day business. As previously mentioned, both components are highly correlated with each other (see Figure 4). Given that countries usually have entry and conduct regulations that go hand in hand, it is not surprising to find our baseline results confirmed.

Another potential concern for our study is the possible correlation between the level of regulations and the two other destination-specific determinants for export performance: the foreign demand for professional services and the multilateral resistance term of the destination market. As explained in section 2, our demand variable aims at measuring precisely the demand for professional services in the importing country, which is likely to be affected by the level of regulations. To ensure that our results are not driven by a correlation between the NMR and the demand variable, we replace in Columns (5) and (6) the demand variable by the GDP of the importing country. The regressions confirm our baseline results. Note that the coefficients on $Ln\ NMR$ are slightly larger than the one reported in Table 1 (although they are not statistically different), which is the expected effect given the negative correlation between the level of regulations and the ratio of the demand for professional services over GDP shown in Figure 1. In Columns (7) and (8) we use a proxy for the multilateral resistance term which is specific to professional services ($MP\ Serv.$), instead of using the manufacturing market potential. To compute a measure of market potential for professional services, we follow the procedure developed in Head and Mayer (2004). We use data on domestic production of professional services from the OECD-STAN database, bilateral trade in services data from Francois and Pindyuk (2013), and bilateral distances between countries as well as other geographic variables from CEPII. Unsurprisingly, the service market potential we obtain is strongly correlated to the manufacturing market potential, with a correlation coefficient of 0.6. As expected, it is also negatively correlated with the NMR. However, the correlation is weak (-0.2), and significant at the 12% confidence level only. This variable performs poorly in our regressions. The coefficients on $Ln\ MP\ Serv.$ are not statistically significant, and the use of this variable does not change significantly the coefficients on $Ln\ NMR$. Given the poor performance of this variable, it seems that the available international data on services production and trade do not allow to calculate an accurate proxy for the multilateral resistance term on services markets. This supports our empirical strategy consisting in letting the $Ln\ NMR$ variable capture both the

Table 2: The Impact of Market Regulations on Export Probability and Export Values: Alternative control variables (1)

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln Demand	1.010^a	2.546^a	1.015^a	2.547^a			1.064^a	2.668^a
	(0.054)	(0.146)	(0.038)	(0.137)			(0.071)	(0.181)
Ln Dist.	-0.939^a	-2.211^a	-1.002^a	-2.370^a	-0.992^a	-2.405^a	-0.998^a	-2.326^a
	(0.062)	(0.247)	(0.043)	(0.196)	(0.079)	(0.271)	(0.092)	(0.240)
Com. Lang.	0.895^a	1.947^a	1.054^a	2.396^a	0.945^a	2.099^a	0.975^a	2.149^a
	(0.141)	(0.382)	(0.090)	(0.331)	(0.151)	(0.389)	(0.123)	(0.360)
Border	1.109^a	3.106^a	1.178^a	3.278^a	1.106^a	3.076^a	1.164^a	3.240^a
	(0.148)	(0.349)	(0.160)	(0.356)	(0.154)	(0.352)	(0.164)	(0.375)
Ln MP	-0.045	-0.097	-0.037	-0.051	0.075	0.170		
	(0.043)	(0.145)	(0.031)	(0.130)	(0.049)	(0.141)		
Ln RoL	0.208	0.598	0.025	-0.020	0.003	0.060	0.041	0.171
	(0.223)	(0.503)	(0.184)	(0.469)	(0.207)	(0.516)	(0.201)	(0.504)
Exp. goods	4.447^a	7.789^a	4.457^a	7.692^a	4.439^a	7.806^a	4.446^a	7.802^a
	(0.226)	(0.427)	(0.225)	(0.434)	(0.224)	(0.427)	(0.251)	(0.430)
Ln NMR					-0.512^a	-1.426^a	-0.418^a	-1.121^a
					(0.110)	(0.364)	(0.114)	(0.377)
Ln NMR-Entry	-0.223^c	-0.580^c						
	(0.121)	(0.319)						
Ln NMR-Conduct			-0.251^a	-0.778^a				
			(0.051)	(0.174)				
Ln GDP					1.089^a	2.759^a		
					(0.060)	(0.155)		
Ln MP Serv.							-0.122	-0.225
							(0.086)	(0.258)
Obs	115,086	115,086	115,086	115,086	115,086	115,086	110,967	110,967
Pseudo R2	0.327	0.221	0.330	0.222	0.327	0.220	0.322	0.218
Nb Firms	4,544	4,544	4,544	4,544	4,544	4,544	4,543	4,543

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1), (3), (5) and (7) report export probability estimates, using a conditional logit with year×firm fixed effect, and bootstrapped standard errors clustered at the country×year level (100 replications). Columns (2), (4), (6) and (8) report individual export estimates, using a generalized tobit with year and firm fixed effect, standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

Table 3: The Impact of Market Regulations on Export Probability and Export Values: Alternative control variables (2)

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln Local Demand	0.992^a	2.487^a	1.012^a	2.524^a	1.005^a	2.508^a	1.013^a	2.552^a
	(0.048)	(0.143)	(0.054)	(0.143)	(0.044)	(0.140)	(0.051)	(0.141)
Ln Distance	-0.918^a	-2.138^a	-0.953^a	-2.243^a	-0.937^a	-2.157^a	-0.953^a	-2.272^a
	(0.057)	(0.223)	(0.055)	(0.212)	(0.057)	(0.201)	(0.063)	(0.220)
Common Language	0.977^a	2.183^a	0.944^a	2.122^a	0.940^a	2.050^a	0.945^a	2.150^a
	(0.115)	(0.342)	(0.118)	(0.356)	(0.117)	(0.359)	(0.123)	(0.357)
Border	1.160^a	3.226^a	1.148^a	3.157^a	1.160^a	3.244^a	1.148^a	3.155^a
	(0.156)	(0.357)	(0.155)	(0.366)	(0.153)	(0.360)	(0.153)	(0.359)
Ln Market Potential	-0.038	-0.080	-0.030	-0.043	-0.035	-0.063	-0.031	-0.064
	(0.043)	(0.143)	(0.040)	(0.136)	(0.036)	(0.138)	(0.039)	(0.142)
Ln Rule of Law	-0.025	-0.128						
	(0.186)	(0.466)						
Export of goods	4.446^a	7.761^a	4.454^a	7.742^a	4.456^a	7.737^a	4.453^a	7.744^a
	(0.222)	(0.427)	(0.226)	(0.428)	(0.226)	(0.429)	(0.225)	(0.430)
Ln NMR	-0.336^a	-0.956^a	-0.391^a	-1.227^a	-0.328^a	-0.822^b	-0.389^a	-1.171^a
	(0.105)	(0.345)	(0.106)	(0.309)	(0.113)	(0.362)	(0.100)	(0.302)
Ln FDI restrictions	-0.086	-0.318						
	(0.078)	(0.211)						
Ln ICRG			-0.141	-2.969				
			(1.201)	(2.529)				
Ln Qual. of Reg.					0.211	0.893		
					(0.246)	(0.695)		
Ln Accountability							-0.030	-0.716
							(0.369)	(0.860)
Observations	115,086	115,086	115,086	115,086	115,086	115,086	115,086	115,086
Pseudo R2	0.329	0.222	0.329	0.222	0.329	0.222	0.329	0.222
Number of Firms	4,544	4,544	4,544	4,544	4,544	4,544	4,544	4,544

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1), (3), (5) and (7) report export probability estimates, using a conditional logit with year×firm fixed effect, and bootstrapped standard errors clustered at the country×year level (100 replications). Columns (2), (4), (6) and (8) report individual export estimates, using a generalized tobit with year and firm fixed effect, standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

direct and the indirect impact of regulations on trade.

In Table 3 we replace the Rule of Law index by other indicators of governance: the ICRG index developed by the PRS Group, the Political Stability index and the Quality of Regulation index, both from the World Bank Indicator. The results show that our choice of index does not change our results. We also controlled for the restriction to Foreign Direct Investment in the destination country. There is large evidence that trade flows are correlated with foreign direct investment flows (FDI). Fillat Castejón et al. (2008) find a positive correlation between FDI outflows and cross-border exports of services. One might be concerned that our measure of regulations is correlated with the overall openness to FDI in the importing country. We include a measure of restriction on FDI, which comes from the Product Market Regulation database of the OECD.

It ranges from 0 (no restriction) to 6 (high restrictions). Our results remain similar with this additional control. However, we do not find evidence in our sample that restrictions on FDI hamper the exports of professional services.

Table 4: The Impact of Market Regulations on Export Probability and Export Values: Non-parametric estimates

	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)
Ln Local Demand	1.029^a	2.512^a
	(0.056)	(0.146)
Ln Distance	-1.003^a	-2.227^a
	(0.055)	(0.179)
Common Language	0.897^a	1.989^a
	(0.113)	(0.337)
Border	1.145^a	3.198^a
	(0.161)	(0.351)
Ln Market Potential	-0.068	-0.065
	(0.045)	(0.138)
Ln Rule of Law	-0.005	-0.153
	(0.180)	(0.479)
Export of goods	4.439^a	7.684^a
	(0.226)	(0.429)
NMR_{Q2}	-0.149	-0.999^a
	(0.142)	(0.332)
NMR_{Q3}	-0.344^c	-1.322^a
	(0.176)	(0.424)
NMR_{Q4}	-0.540^a	-1.540^a
	(0.116)	(0.320)
Observations	115,086	115,086
Pseudo R2	0.330	0.223
Number of Firms	4,544	4,544

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Column (1) reports export probability estimates, using a conditional logit with year×firm fixed effects, and bootstrapped standard errors clustered at the country×year level (100 replications). Column (2) reports individual export estimates, using a generalized tobit with year and firm fixed effects. Standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

Our benchmark regressions implicitly considered a parametric approach to estimate the impact of domestic regulations on firms' exports and imposed an explicit structure on the relationship between the domestic regulations and the trade performances. This is of course questionable, especially since the NMR is a qualitative indicator. We re-estimate Equations (3) and (4) using a non-parametric estimation approach. Results are reported in Table 4. We replace $\ln(NMR_{dt})$ by

a set of country dummies characterizing each quartile of the distribution of the NMR index. The definition of the quartiles is invariant over time and is based on the distribution of the NMR in 2003. In the first quartile – Q1 – are the countries with a $NMR \in [0; 1.8]$, in the second quartile, countries with a $NMR \in]1.8; 2.7]$, in the third quartile, $NMR \in]2.7; 3.3]$, and countries in the fourth quartile have a NMR greater than 3.3. In 2003, countries in the first quartile are Denmark, Finland, Sweden, Switzerland, the United Kingdom and the United States. In the top quartile, we find Austria, Canada, Germany, Greece and Italy. The results indicate that the influence of domestic regulations is indeed non-linear. In both columns the coefficients confirm that French exporters are less likely to export to countries with higher level of regulations and, when entered, to export less to these destinations. Note that results in Column (1) show that the group of countries with levels of regulations below the median seem equally accessible to French exporters as countries with the lowest level of regulation.[29].

In Table 5, we exploit the information on firm-level exports by type of service. In our baseline sample, data have been aggregated at the firm×country×year level, thus disregarding the characteristics of the service exported. As described in section 3, there are five types of professional services in the classification of the Banque de France database. Data for 2003 reveal that the exports of professional services are largely dominated by "Research and development, technical services" (57% of the total exports, and 44% of the exporters), followed by "Other labor remuneration" (15% of the exports, and 13% of the exporters), then "Management costs / Overhead fees" (10% of the exports, and 20% of the exporters), "Leasing services" (9% of the exports, and 18% of the exporters), and "Subscriptions, advertising" (9% of the exports, and 15% of the exporters). The aggregation of the export flows at the firm×country×year level could induce a composition bias if the influence of regulations on trade differs across services. In addition, aggregating the different kind of services alters the identification of the trade margins. It is likely that "multi-services" firms export fewer services to more regulated countries. With export flows aggregated at the firm×country×year level, the adjustment in the number of services exported to a specific country will show up as a change in the firm-level exports to this country, not as an exit. The aggregation is then likely to bias downward the estimated relationship between regulations and the probability of exporting. Conversely, it could bias upward the coefficient in the individual export values equation. However, these different bias may be limited as very few firms in our sample export several services. In 2003, for instance, the "multi-service" exporters accounted for less than 9% of the firms in our sample.[30] We first pool the observations at the firm×service×year×country level and re-estimate our baseline specification. The results in Columns (1) and (2) of Table 5 are very similar to the baseline results. The coefficients on $Ln\ NMR$ are slightly smaller but not statistically different from the ones reported in Table 1. We then interact $Ln\ NMR$ with a dummy for each service exported. The results in Columns (3) and (4) reveal some heterogeneity in the impact of domestic regulation on the exporters' performances according to the service they export. The coefficients on $Ln\ NMR$ are smaller when firms are exporting "Research and development, technical services", but also less precisely estimated. The coefficients are not statistically different from the baseline estimates.

In Table 6, we examine how some characteristics of the destination country may influence the impact of domestic regulations. We look at whether the French exporters of professional services

[29]The non-significant coefficient of the coefficient on NMR_{Q2} does not mean that exports are not affected by regulations of professional services in these markets. It simply means that the regulations in countries in the second quartile do not reduce trade more than the regulations in countries in the first quartile.

[30]These firms are relatively large however: They accounted for 48% of the total exports of professional services in 2003.

Table 5: The Impact of Market Regulations on Export Probability and Export Values: By categories of services

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)
Ln Local Demand	1.007^a	2.125^a	1.007^a	2.125^a
	(0.047)	(0.124)	(0.046)	(0.123)
Ln Distance	-0.944^a	-1.813^a	-0.943^a	-1.814^a
	(0.056)	(0.170)	(0.056)	(0.170)
Common language	0.909^a	1.919^a	0.908^a	1.917^a
	(0.115)	(0.291)	(0.115)	(0.291)
Border - Region	1.070^a	2.661^a	1.068^a	2.670^a
	(0.150)	(0.302)	(0.148)	(0.300)
Ln RMP	-0.042	-0.058	-0.041	-0.061
	(0.037)	(0.121)	(0.037)	(0.120)
Ln Rule of Law	0.029	0.194	0.033	0.217
	(0.217)	(0.440)	(0.217)	(0.441)
Export of Goods	3.418^a	5.748^a	3.423^a	5.759^a
	(0.242)	(0.315)	(0.243)	(0.314)
Ln NMR	-0.356^a	-0.839^a		
	(0.100)	(0.247)		
Ln NMR×Leasing			-0.542^a	-1.333^a
			(0.134)	(0.321)
Ln NMR×R&D			-0.222^b	-0.573^c
			(0.090)	(0.311)
Ln NMR×Overhead fees			-0.416^a	-1.289^a
			(0.139)	(0.384)
Ln NMR×Other labor remun.			-0.517^a	-0.904^b
			(0.152)	(0.383)
Ln NMR×Subscriptions, advertising			-0.346^b	-0.589
			(0.150)	(0.379)
Observations	125,338	125,338	125,338	125,338
r2_p	0.316	0.192	0.316	0.193
Number of Firms	4,544	4,544	4,544	4,544

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1) and (3) report export probability estimates, using a conditional logit with year×firm×service fixed effects, and bootstrapped standard errors clustered at the country×year level (100 replications). Columns (2) and (4) report individual export estimates, using a generalized tobit with year, firm, and service fixed effects. Standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

react in a similar way to domestic regulations when the destination country is a French-speaking country or when it shares the same legal system as France. In Columns (1) and (2), we interact *Ln NMR* with a dummy for countries that use French as an official language, and for countries where French is not the official language.[31] Results show that the coefficients on *Ln NMR* ×

[31]French is an official language in three countries of our sample: Belgium, Switzerland and Canada.

Table 6: The Impact of Market Regulations on Export Probability and Export Values: By type of countries

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)
Ln Local Demand	1.011^a	2.539^a	1.021^a	2.502^a
	(0.047)	(0.141)	(0.066)	(0.169)
Ln Distance	-0.943^a	-2.185^a	-0.941^a	-2.171^a
	(0.062)	(0.239)	(0.070)	(0.247)
Common Language	1.015^a	2.521^a	0.927^a	1.971^a
	(0.278)	(0.731)	(0.156)	(0.393)
Border	1.143^a	3.148^a	1.136^a	3.179^a
	(0.149)	(0.337)	(0.157)	(0.356)
Ln Market Potential	-0.027	-0.046	-0.039	0.021
	(0.037)	(0.142)	(0.079)	(0.209)
Ln Rule of Law	0.029	0.102	0.208	0.355
	(0.208)	(0.528)	(0.245)	(0.596)
Export of goods	4.452^a	7.725^a	4.446^a	7.744^a
	(0.226)	(0.425)	(0.224)	(0.428)
Ln NMR×Common Language	-0.482	-1.635^b		
	(0.363)	(0.741)		
Ln NMR×No common language	-0.359^a	-0.943^b		
	(0.113)	(0.391)		
Legal System			-0.034	-0.769
			(0.486)	(1.059)
Ln NMR×Common Legal System			-0.196	-0.225
			(0.486)	(0.989)
Ln NMR×No Common Legal System			-0.393^a	-1.111^a
			(0.115)	(0.358)
Observations	115,086	115,086	115,086	115,086
Pseudo R2	0.329	0.222	0.329	0.222
Number of Firms	4,544	4,544	4,544	4,544

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1) and (3) report export probability estimates, using a conditional logit with year×firm fixed effect, and bootstrapped standard errors clustered at the country×year level (100 replications). Columns (2) and (4) report individual export estimates, using a generalized tobit with year and firm fixed effect, standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

Common Language and on *Ln NMR × No Common Language* are not statistically different from one another, although the coefficient on *Ln NMR × Common Language* in Column (1) is not statistically significant.[32] In Columns (3) and (4), we control for the similarity in the legal system. The legal system influences the enforcement of contracts, which are the mainstay of any

[32]In order to better control for the ease of communication between countries, we also used – in unreported regressions – the Common Spoken Language variable developed by Melitz and Toubal (2014). This variable measures the probability of randomly selecting two individuals in two countries that can speak the same language. Our results remain unchanged when we introduce this variable.

international transaction and the presence of a common legal system is an important determinant of international trade flows (Nunn, 2007). To make sure that the measure of regulations we use is not somehow capturing this dimension, we introduce a dummy variable which takes the value 1 if the importing country shares the same legal origin as France and 0 otherwise.[33] The results in Columns (3) and (4) show that after controlling for the usual determinants of trade flows, French exporters are more likely to export to countries sharing a common legal system with France than to countries that do not. In both columns, the coefficients on $Ln\ NMR \times Common\ Legal\ System$ and on $Ln\ NMR \times No\ Common\ Legal\ System$ are not statistically different from one another, but only the coefficients on $Ln\ NMR \times No\ Common\ Legal\ System$ are significant. This tends to suggest that domestic regulations are less burdensome for foreign firms when they are produced by a legal system closer to that of the exporting country.

4.3 Differentiated Impact of Regulations across Firms

Our baseline estimation results provide us with an average effect of domestic regulations on the odds of exporting and individual export sales. This average effect could hide a strong heterogeneity depending on the kind of firm exporting professional services. In this subsection, we look at how various firms characteristics could affect our econometric results.

First, we ask whether firms that already exported to a given destination in the past are less sensitive today to the regulations in this destination market. If domestic regulations were to act as an entry fixed cost, or if there is some learning effect, we could expect experienced exporters to be less sensitive to the domestic regulations. Columns (1) and (2) of Table 7 replicate our benchmark regressions on a sample of "experienced" firms, i.e. those that were already exporting professional services in the previous two years to a given destination. This reduces our sample to two years of observation (2003 and 2007) as we do not have information on the export flows of firms prior to 1999. We are left with 1,470 firms, which are by far the largest exporters in our sample, as they account for 90% of the total exports of professional services in our sample in both years. The results do not indicate that domestic regulation matter less for experienced firms. The coefficients on $Ln\ NMR$ are still negative, statistically significant and very close to the baseline estimates.

Second, we examine in Columns (3) to (6) the specific case of firms which have some activity in manufacturing. The product and industry classification draw arbitrary lines between the different activities of the firm. Evidence from microeconomic analysis of production show that a large share of firms produce and sell simultaneously goods and services.(Christensen and Drejer, 2007; Crozet and Milet, 2014). In the Banque de France database, about 14% of the exporters of professional services are registered as manufacturing firms. Moreover, matching the Banque de France database with the records of firm-level exports of goods (provided by the French customs) reveals that 11% of the service firms in our sample that export professional services to a country also export goods to the same destination. For these firms, the supply of professional services may complement the supply of manufacturing products. In this case, one might think that the sales of professional services are, to a certain extent, less sensitive to the regulations in the services sectors. Columns (3)-(4) and (5)-(6) propose two empirical tests of this hypothesis. In Columns (3)-(4), we interact our measure of regulations with the status of exporter of goods to the same destination. In Columns (5)-(6), we use a completely different sample of firms. Instead of considering firms from the service sector only, we replicate the results in Columns (3)-(4) using the sample of manufacturing firms that

[33]Countries in our sample that share the same legal origin as France are Belgium, Spain, Greece, Italy, the Netherlands, and Portugal

Table 7: The Impact of Market Regulations on Export Probability and Export Values: By type of firms

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)	(5)	(6)
Firms	Experienced		All		Manuf. Firms	
Ln Local Demand	1.118^a	2.544^a	1.014^a	2.554^a	0.681^a	1.084^a
	(0.072)	(0.159)	(0.047)	(0.142)	(0.056)	(0.086)
Ln Distance	-1.061^a	-2.120^a	-0.954^a	-2.234^a	-0.459^a	-0.635^a
	(0.107)	(0.301)	(0.055)	(0.217)	(0.081)	(0.155)
Common Language	0.987^a	2.025^a	0.941^a	2.084^a	0.481^a	0.586^a
	(0.179)	(0.384)	(0.116)	(0.359)	(0.173)	(0.218)
Border	1.038^a	2.667^a	1.153^a	3.205^a	0.805^c	1.379^a
	(0.191)	(0.417)	(0.152)	(0.353)	(0.447)	(0.389)
Ln Market Potential	-0.017	0.031	-0.033	-0.064	0.028	0.032
	(0.064)	(0.159)	(0.037)	(0.142)	(0.064)	(0.101)
Ln Rule of Law	0.037	0.113	0.028	0.067	-0.022	0.128
	(0.254)	(0.450)	(0.208)	(0.523)	(0.133)	(0.300)
Export of goods	3.454^a	6.250^a	4.069^a	6.841^a	6.103^a	11.007^a
	(0.275)	(0.460)	(0.325)	(0.571)	(0.328)	(0.169)
Ln NMR	-0.336^b	-0.880^b			-0.153	-0.247
	(0.158)	(0.364)			(0.111)	(0.192)
Ln NMR×Export of Goods			0.122	0.199		
			(0.317)	(0.597)		
Ln NMR×No Export of Goods			-0.381^a	-1.096^a		
			(0.095)	(0.340)		
Observations	39,147	39,147	115,086	115,086	28,497	28,497
Pseudo R2	0.381	0.251	0.329	0.222	0.682	0.380
Number of Firms	1,470	1,470	4,544	4,544	1,136	1,136

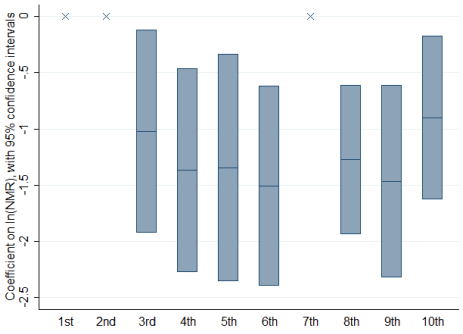
Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1), (3) and (5) report export probability estimates, using a conditional logit with year×firm fixed effect, and bootstrapped standard errors clustered at the country×year level (100 replications). Columns (2), (4) and (6) report individual export estimates, using a generalized tobit with year and firm fixed effect, standard errors are clustered at the country×year level. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country. Experienced firms are firms that were already exporting professional services in t-1 or in t-2. Columns (1) and (2) use data for 2003 and 2007 only.

also export professional services. This sample is made of 1,136 firms. The results shown in these four columns confirm that exporters are less sensitive to regulations when they are also involved into manufacturing activity. In Columns (3) and (4), the coefficient on *Ln NMR×Export of goods* is non-significant, while it is negative and significant on *Ln NMR × No export of goods*. For firms that only export services, the impact of domestic regulations on trade is very similar to the one reported in Table 1. Columns (5) and (6) deliver the same message. While the usual gravity variables are significant and have the expected sign, regulations in the service sector do not seem to matter for manufacturing firms.

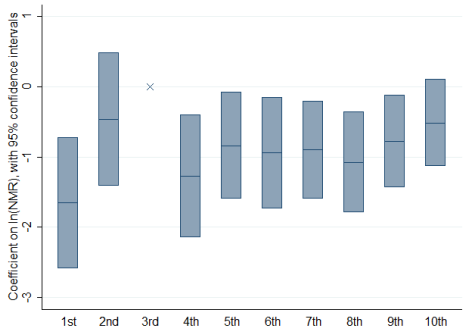
Finally, we look at whether the elasticity of export performances with respect to market regulations depends on the firm's productivity or firms' size. Larger or more productive firms may have the resources to cope better with the domestic regulations in the foreign market than small

Figure 6: Impact of domestic regulations on the export values across different categories of firms' performances

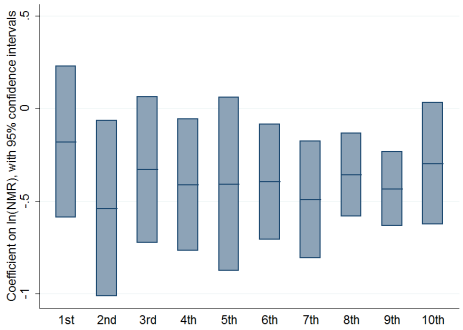
(a) By deciles of total exports: values



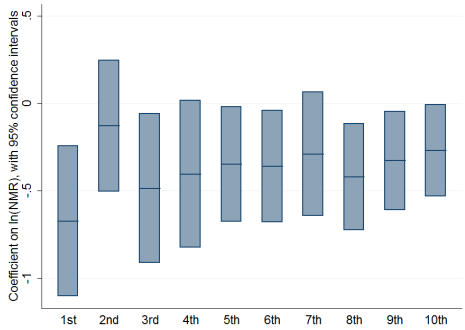
(b) By deciles of productivity: Values



(c) By deciles of total exports: Probability



(d) By deciles of productivity: Probability



or less productive firms. Larger producers may also have a different markup strategy when facing an additional trade cost, which may affect their export sales. In order to test this, we rank firms according to their total exports of professional services in each year, and assign each firm to its corresponding decile in the distribution. Alternatively, we use value added per employee as a measure for the firm's productivity. Note that data on value added and employment are only available for about half of the firms in our sample. We run our baseline regressions for each decile of these two distributions.[34] Figure 6 show graphically the estimated coefficients on $Ln\ NMR$, with the corresponding 95% confidence interval, from the export sale and the export probability regressions.[35] In panels (a) and (c), we rank firms according to their total exports of professional services. In panels (b) and (d), we rank firms according to their value added per employee. In panel (a), the coefficients for the 1^{st}, 2^{nd}, and 7^{th} deciles of the distribution are not reported because the lack of variance generates highly singular variance-covariance matrices. This is also the case for the 3^{rd} decile in Figure 6 (b). Figure 6 delivers a plain message: The effect of regulations is not statistically different across the decile distribution, and not statistically different from our baseline result. The correlation between domestic regulations and the firms' export performance is virtually the same for large (or more productive) suppliers and small (or less productive) one.

We conclude this section by a summary of our main empirical findings:

[34]To avoid a composition bias across deciles, we focus on firms exporting services only.

[35]We do not report the other coefficients as they are very similar in terms of magnitude and level of significance to those reported in Table 1.

1. The probability that a French producer of services exports to a given country is consistently smaller, the higher the level of domestic regulations of professional services in the destination country.

2. Conditional on firms' decision to export, the export sales of professional services are consistently smaller, the higher the level of domestic regulations in professional services in the destination country.

3. We do not observe a significant correlation between market regulations and the French export performances in destinations sharing the same legal system as France.

4. The negative correlation between market regulations and export performances is not significant for firms that also export goods and/or are registered as manufacturing firms.

5. The negative correlation between market regulations in a given destination market and export performances is not lower for firms that have already exported to this destination in the past.

6. The elasticity of export performances with respect to market regulations does not vary significantly with firms' ability.

5 Discussion

In this section, we propose a simple exercise to quantify the distortion effect of domestic regulations on international trade of professional services. This exercise consists in computing an ad-valorem equivalent (AVE) which represents the tariff that would generate a trade barrier equivalent to the estimated impact of domestic regulations on export sales.

5.1 Theoretical predictions in a simple CES-iceberg framework

To interpret properly and quantify our econometric results, we have to make explicit modeling choices. We use a very simple trade model with heterogenous producers, CES preferences, ad-valorem trade costs and fixed export cost (Melitz, 2003; Chaney, 2008). We assume further that domestic market regulations generate an additional variable cost of operating on the market, such that they increase the delivered price of imported and local services. Assuming further that the cost of complying with market regulations is larger for foreign suppliers than for local ones, the delivered price of a service provided by a firm in country d with a marginal cost a is:

$$p_{od}(a) = p_o(a)t_{od}B_d^{\gamma}, \quad \text{and} \quad p_{dd}(a) = p_d(a)t_{dd}B_d^{\kappa}, \quad 0 \leq \kappa \leq \gamma. \tag{5}$$

In Equation (5), $p_o(a)$ denotes the production price of a variety of services produced by a firm located in country o, B_d is the level of market regulations in country d and t_{od} is the transaction cost to deliver to country d. Similarly, $p_d(a)$ is the production price of services delivered domestically and t_{dd} is the intra-national delivering cost. With CES preferences, the demand addressed to a firm with a marginal cost a, located in country o, by consumers in country d is:

$$x_{od}(a) = \left(\frac{\sigma}{\sigma - 1} a t_{od} B_d^{\gamma}\right)^{1-\sigma} (E_d/\Phi_d), \tag{6}$$

where σ is the elasticity of substitution between varieties of professional services.[36] The price index Φ_d takes the form:

$$\Phi_d = \left[\int_{a \in \Omega_{dd}} [p_d(a) t_{dd} B_d^{\kappa}]^{1-\sigma} + \sum_{o \neq d} \int_{a \in \Omega_{od}} [p_o(a) t_{od} B_d^{\gamma}]^{1-\sigma} \right], \tag{7}$$

where Ω_{od} is the set of varieties produced in country o and available in country d. The first term in the brackets covers the price of the domestic firms, while the second term covers the foreign suppliers of professional services. Let F be the fixed cost of exporting. The probability that a firm from country o exports to country d is:

$$P\left[\Lambda_{od}(a) = 1\right] = P\left[x_{od}(a) > \sigma F\right]. \tag{8}$$

We obtain the elasticity of firm-level exports with respect to market regulations in the destination country from Equation (6):

$$\varepsilon_B^x = \frac{\partial x_{od}(a)}{\partial B_d} \frac{B_d}{x_{od}(a)} = \left[(1-\sigma)\gamma - \frac{\partial \Phi_d}{\partial B_d} \frac{B_d}{\Phi_d} \right]. \tag{9}$$

Equation (9) indicates that the impact of destination market regulations on firm-level export values is twofold. A direct effect is captured by the first term in the brackets. It is unambiguously negative if γ is positive. The second term shows an indirect effect channelled by changes in the price index. If market regulations exclude some firms from the market and raise the delivered price of each service variety, this indirect effect has a positive impact on the demand for services addressed to the incumbent firms.

Therefore, the sign of the elasticity exports sales with respect to domestic regulations is undetermined a priori. However, it is straightforward from Equations (6) and (7) that domestic regulations will have a negative impact on the value exported by foreign firms when they act as a discriminatory marginal cost, i.e. $\gamma > \kappa \geq 0$. In this case, for foreign firms, the indirect positive effect in Equation (9) does not offset the direct negative effect, and export sales are a decreasing function of the level of market regulations in the importing country. Because $x_{od}(a)$ decreases with B_d, the expected profit on market d is also a negative function of B_d and the probability of exporting is thus negatively affected by regulations.

Despite its simplicity, this model provides theoretical predictions in line with all our empirical findings. The model predicts that domestic regulations affect negatively both the probability of exporting and the individual export sales, and marginal impacts of regulations on trade performances do not vary across firms' ability. We acknowledge that this theoretical framework makes very specific assumptions, namely (1) the fact that we consider that market regulations impact the marginal delivering cost and not the fixed entry cost on the market and (2) that we impose CES preferences and ad valorem regulation costs, which generate exogenous markups. However, alternative assumptions would provide theoretical predictions which receive little support from our empirical results. Let us discuss briefly the consequences of these two key assumptions. In the case where regulations do not affect the marginal cost, but only the fixed entry costs, the first term of Equation (9) is zero ($(1-\sigma)\gamma = 0$), and all the impact of regulation on export values is channeled by changes in Φ_d. Higher level of regulations should reduce the export probability of each firm,

[36] Equation (6) is analogous to the export function shown in Equation (1) where time subscript have been omitted and with $\psi(a) = \left(\frac{\sigma}{\sigma-1} a\right)^{1-\sigma}$, $\phi_{od} = t_{od}^{1-\sigma}$, and $S(B_d) = (B_d)^{\gamma(1-\sigma)}$.

thus reducing the number of firms active in the market. As the number of competitors decreases, the price index Φ_d falls, and the sales of each incumbent increases ($\varepsilon_B^x > 0$). This prediction is at odds with the robust finding of a negative impact of regulation on export flows.[37] Of course, it is possible that the regulations impact both the fixed and the variable cost. In this case, the direct effect (due to the marginal impact of the regulation) is still negative, while the fixed costs tends to reduce $\frac{\partial \Phi_d}{\partial B_d}\frac{B_d}{\Phi_d}$ and increase ε_B^x. In this case the sign of ε_B^x is undetermined. Our empirical results indicate, however, that the marginal cost effect dominates, which suggests a relatively moderate influence of regulation on fixed entry costs. Note that, since the probable influence of regulations on the fixed entry cost pulls up ε_B^x, neglecting this channel will provide a lower bound for the tariff equivalent we calculate below.

What about models with variable markups? Variable markups can result either with non-CES preferences (Melitz and Ottaviano, 2008) and/or by assuming per-unit delivering costs rather than ad-valorem (Martin, 2012). In both cases, the theoretical predictions about the marginal impact of market regulations on export sales, are more complex. The elasticity of firm-level exports with respect to market regulations is still composed of a direct effect and of an indirect effect channeled by the price index. Now, the direct effect depends on each firms' ability. We need to put some structure on the trade costs functions and on the distribution of firms' ability to get a prediction of the sign of the elasticity.[38] Nevertheless, models with flexible markups will predict that the elasticity of trade with respect to regulations varies with firms' ability. As shown in Figure 6, our data provide very little evidence in favour of this prediction.

5.2 Quantification

In this section, we propose a simple exercise to quantify the distorting effect of domestic regulations on international trade of professional services. This exercise consists in computing a tariff equivalent of the impact of domestic regulations on export sales. To do so, we exploit the structure of the Melitz/Chaney framework exposed above. We define the discriminatory regulation faced by the foreign suppliers of services in country d as $\delta = \gamma - \kappa$. The expression for the elasticity of export sales with respect to domestic regulations $\varepsilon_B^{\Phi_d}$ boils down to:

$$\varepsilon_B^x = (1-\sigma)\delta + (1-\sigma)\delta \frac{\sum_{o \neq d} \int_{a \in \Omega_{od}} [p_o(a) t_{od} B_d^\gamma]^{1-\sigma}}{\Phi_d}. \tag{10}$$

Again, it is clear in Equation (10) that in the case of non-discriminatory regulations (i.e. $\delta = 0$), the firm-level export sales should not be affected by the level of regulations. Plugging Equation (6) into Equation (10) and arranging the terms yields:

$$\varepsilon_B^x = (1-\sigma)\delta + (1-\sigma)\delta \sum_{o \neq d} \frac{X_{od}(a)}{E_d}, \tag{11}$$

where X_{od}=$\int_{a \in \Omega_{od}} x_{od}(a)$ represents the aggregate expenditure in country d in services produced

[37] In addition, the assumption that regulations have a large impact on the fixed entry costs is at odds with the econometric results shown in column (1) of Table 7, where experienced firms are still affected by the domestic regulations.

[38] In the case of CES preferences but per unit trade costs, the elasticity is $\vartheta_B^x = \left[\frac{\gamma B_d^\gamma (1-\sigma)}{B_d^\gamma + a} - \frac{\partial \tilde{\Phi}_d}{\partial B_d}\frac{B_d}{\tilde{\Phi}_d}\right]$. In a Melitz and Ottaviano (2008) model (with ad-valorem trade costs but linear preferences), the elasticity is: $\zeta_B^x = 2\left[-\frac{\gamma [B_d^\gamma a]^2}{c_d^2 - [B_d^\gamma a]^2} + \frac{c_d^2}{c_d^2 - [B_d^\gamma a]^2}\varepsilon_B^{c_d}\right]$, where $\varepsilon_B^{c_d}$ is the elasticity of the cutoff value c_d with respect to the market regulations.

in country o, E_d is the total expenditure in country d over all service varieties. In other word, $\sum_{o \neq d} \frac{X_{od}(a)}{E_d}$ is the import penetration ratio of professional services in country d, i.e the share of imports of services in the total demand for services. We call this IP_d. Finally, we obtain the following expression for the elasticity of export sales with respect to domestic regulations:

$$\varepsilon_B^x = (1-\sigma)(1-IP_d)\delta, \tag{12}$$

which we can re-write as:

$$\delta = \frac{\varepsilon_B^x}{(1-\sigma)(1-IP_d)}. \tag{13}$$

Table 8: Average Ad-Valorem Equivalent

	1999	2003	2007
ε^x_{NMR+1}	-1.699	-1.699	-1.699
NMR_{dt} (sample average)	2.656	2.521	2.251
IP_{dt} (sample average)	0.108	0.134	0.145
σ=4			
δ	0.63	0.65	0.66
Ad-Valorem Equivalent (%)	128	128	118
σ=6			
δ	0.38	0.39	0.40
Ad-Valorem Equivalent (%)	64	64	60
σ=8			
δ	0.27	0.28	0.28
Ad-Valorem Equivalent (%)	42	42	40

Our model is analogous to a model with tariff protection where the delivery price in country d is simply $p_{od}(a) = p_o(a)t_{od}(1+\tau_{dt})$, with τ_{dt} the tariff imposed by country d at time t. In our model, B_d^δ plays the same role as $(1+\tau_{dt})$, where NMR_{dt} is analogous to τ_{dt}. From Equation (5), we see that the ad-valorem equivalent is simply $(1+NMR_{dt})^\delta$. We can use Equation (13) to calculate δ, which is a function of the elasticity of export sales with respect to domestic regulations, the elasticity of substitution between professional service varieties σ and the import penetration ratio of professional services IP_d. From the data we can easily calculate the import penetration ratio. We need to make an assumption about the elasticity of substitution between service varieties σ. The literature on trade in goods has produced abundant estimates for σ (Broda and Weinstein, 2006; Anderson and van Wincoop, 2004; Head and Mayer, 2015). Few estimates of the elasticity of substitution between service varieties have been proposed in the literature however. We use several values for σ in the range of what has been estimated for goods varieties, namely $\sigma = 4$, 6 and 8. In the empirical section, the we have estimated the elasticity of export sales with respect to NMR_{dt}. To execute carefully the quantification exercise, we need to re-estimate Equation (3) using $Ln\ (1+NMR_{dt})$ as an explanatory variable, instead of $Ln\ (NMR_{dt})$. Results are qualitatively very similar to the baseline estimates. For the elasticity of export sales with respect to $1+NMR_{dt}$, we obtained the value $\varepsilon^x_{NMR+1} = -1.699$.

We can now calibrate the model to obtain an ad-valorem tariff equivalent (AVE). We compute,

Table 9: Ad-Valorem Equivalent in 2007 and difference from the AVE in Great Britain

	Ad-Valorem Equivalent τ_d (%)			$\tau_{GB} - \tau_d$		
	σ=4	σ=6	σ=8	σ=4	σ=6	σ=8
	(1)	(2)	(3)	(4)	(5)	(6)
AT	157	76	50	110	50	32
BE	129	64	43	82	38	25
CH	67	36	25	20	10	7
CZ	134	67	44	87	41	26
DE	150	73	48	103	47	30
DK	81	43	29	34	17	11
EE	156	76	50	109	50	32
ES	131	65	43	85	40	25
FI	82	43	29	36	18	11
GR	149	73	48	102	47	30
HU	186	88	57	139	62	39
IL	168	81	53	121	55	35
IS	123	62	41	76	36	23
IT	175	84	54	129	58	36
JP	85	44	30	38	19	12
KR	150	73	48	103	47	30
NL	89	46	31	42	21	13
NO	89	46	31	42	21	13
SE	47	26	18	0	0	0
SK	139	69	45	92	43	27
US	52	28	20	5	2	2
UK	47	26	18	0	0	0
Average	118	59	39	74	34	22

for each year, the AVE using the unweighted average level of regulation, the unweighted average import penetration ratio, and various values for the elasticity of substitution across service varieties. The results are presented in Table 8. In 2007, the average NMR_{dt} was 2.251, and the average import penetration 14.5%. For a low level of substitution across service varieties ($\sigma = 4$), the ad-valorem equivalent is of 118 percentage points. In our preferred calibration (with $\sigma = 6$, close to what Fontagné et al. (2011) and Park (2002) use),[39] we get an ad-valorem equivalent of 60 percentage points. These numbers are quite large, reflecting the large barriers that exist in trade in services (See Anderson et al., 2014, for estimations of the barriers to trade in services in Canada).

The average ad-valorem equivalents shown in Table 8 hide a strong heterogeneity across countries. Columns (1) to (3) of Table 9 display the AVE for each country in our sample in 2007. With $\sigma = 6$, the AVEs range from 88% for Hungary to 26% for Sweden and Great Britain, the two countries with the lowest level of NMR in 2007.

We acknowledge these figures should be treated with caution. The NMR index is a qualitative index that can be hardly interpreted as a linear measure of trade impediments. For this reason, it

[39]They both use an elasticity of substitution across services varieties of 5.6.

appears more reasonable to present our results as the consequence of adopting the best practice in terms of market regulations observed in our data. Columns (4) to (6) show for each country in 2007, the equivalent of the tariff cut (in percentage points) that would result from adopting a level of regulations comparable to the level observed in the UK. Consider the first line of Table 9 where we computed the ad-valorem equivalent for Austria, and the figure in Column (5) where the elasticity of substitution is equal to 6. This tells us that if Austria was to reduce its level of regulation to that of the UK, it would be reducing by 50 percentage points its ad-valorem equivalent. In the case of the United States, the reduction would be much smaller (only 2 percentage points, with $\sigma = 6$) as in 2007 the level of domestic regulations in the US is close to the British one. On average, if all countries in our sample were to converge to the level of domestic regulations observed in the UK, the impact on international trade in services would be equivalent to an ad-valorem tariff cut between 22 and 74 percentages points, depending on the elasticities of substitution.

6 Conclusion

Trade in services is growing but remains a small fraction of world trade. Our data on French firm exports of professional services show that very few firms are able to enter the export market, and that exports are highly concentrated among very few firms. This suggests the presence of high trade barriers, and domestic regulations in service sectors are often mentioned by suppliers as an important barrier even when these barriers do not explicitly discriminate against them (European Commission, 2001). We investigate this idea by looking at the impact of domestic regulations on the exports of professional services by French firms. Our results show that non-discriminatory barriers, i.e. regulations that affect all firms alike regardless of their nationality, affect both the export decision and the individual export sales of French firms. Using a simple model of international trade, we show that this is consistent with domestic regulations discriminating against foreign suppliers. Foreign suppliers are more sensitive than domestic firms to the same regulations. Our results still hold when looking at the exports by French firms within the European Union, where regulations cannot discriminate against suppliers from another member state. These findings provide an interesting insight into the multilateral trade negotiations taking place at the World Trade Organization. While members stress the importance of market access as a stepping stone for further liberalization, our results indicate that an important determinant of trade patterns lies in domestic regulations. The estimates shown in this paper suggest that more attention should be paid to article VI of the GATS related to domestic regulations, as far as the promotion of world trade in services is concerned. Furthermore, given the heterogeneity in the level and the nature of domestic regulations in Europe, it seems that much remains also to be done to complete the EU single market of professional services.

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Appendix

A.1. List of countries

Table 10: List of Countries and Years Available

Iso code	Country	Years
AT	Austria	1999, 2003, 2007
BE	Belgium	2003, 2007
CA	Canada	1999, 2003
CH	Switzerland	1999, 2003, 2007
CZ	Czech Republic	2003, 2007
DE	Germany	1999, 2003, 2007
DK	Denmark	1999, 2003, 2007
EE	Estonia	2007
ES	Spain	1999, 2003, 2007
FI	Finland	1999, 2003, 2007
GB	United Kingdom	1999, 2003, 2007
GR	Greece	1999, 2003, 2007
HU	Hungary	2003, 2007
IE	Ireland	2007
IL	Israel	2007
IS	Iceland	2003, 2007
IT	Italy	1999, 2003, 2007
JP	Japan	1999, 2003, 2007
KR	South Korea	2003, 2007
NL	Netherlands	1999, 2003, 2007
NO	Norway	1999, 2003, 2007
PL	Poland	2003
PT	Portugal	1999, 2003
SE	Sweden	1999, 2003, 2007
SK	Slovakia	2003, 2007
US	United States	1999, 2003, 2007