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

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Abstract

In order to promote international trade in services, the General Agreement on Trade in Services (WTO-GATS) aims at progressively eliminating *discriminatory* regulations, which apply to foreign suppliers of services, by guaranteeing equal national treatment. This paper looks instead at the trade effect of *domestic* regulations, which apply to all firms indifferently and do not intend to exclude foreign suppliers and reduce imports of services. We propose a theory-based empirical test to determine whether these domestic regulations discriminate against foreign suppliers. We take this test to the data by using French firm-level exports of professional services to OECD countries. Our results show that domestic regulations in the importing markets reduce both the export probability and the individual export sales. According to our theoretical framework, this is consistent with domestic regulations being discriminatory against foreign suppliers.

Keywords: Trade in services, Domestic Regulations, Firm Heterogeneity.

JEL codes: F1, L8.

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1 Introduction

Services account for about two thirds of the GDP and nearly half of the employment in advanced economies. The share of service activities in GDP has also risen in middle and low income countries, reaching about 50% in 2007 in developing economies (Francois and Hoekman, 2010). Nevertheless, international trade in services still accounts for only one fifth of world trade (WTO, 2008). Of course, many services require proximity between buyers and sellers which prevents most of them from being internationally traded. However, if one focuses on services that do not require proximity (i.e. arm's length services),[1] international trade of services remains limited. Simple calculations from EBOPS-OECD and STAN-OECD databases for the US economy in 2008 show that the share of exports of services in the total production of arm's length services is around four times smaller than the share of exported goods in total manufacturing. Why then is there so little trade in arm's length services?

Since usual trade restrictions such as tariffs do not apply to the international provision of services, market regulations are considered to be a major impediment. Market regulations can be discriminatory or not (Deardorff and Stern, 2003). *Discriminatory regulations*, that impose to foreign suppliers a different treatment to the one applied to local suppliers, are obvious instruments of trade protection. Non-discriminatory regulations, usually referred to as *domestic regulations*, apply to all suppliers alike, and are not considered as trade barriers. However, foreigners can be more sensitive to these regulations than their domestic counterparts as they do not have access as easily to information to avoid or comply with local legislations. Even if they are not deliberately discriminatory, domestic regulations are likely to exclude foreign suppliers. In this paper, we ask whether domestic regulations can be considered as trade barriers, combining data on domestic regulations in 28 OECD countries with data on French firm-level exports of professional services.

The purpose of the General Agreement on Trade in Services (GATS) is to promote international trade in services by ensuring equal treatment between national and foreign suppliers.[2] Quite naturally, it mostly focuses on regulations that discriminate against foreign suppliers, thus granting a relative advantage to local suppliers. In Article VI, the GATS also deals with domestic regulations. This Article VI is quite elusive, however. It only states that domestic regulations should not "constitute unnecessary barriers to trade in services". A precise assessment of the effect of domestic regulations on trade in services is needed to determine whether they should receive more attention during trade negotiations.

The empirical literature has provided evidence in favor of a significant trade effect of regulations in the service sectors (see Francois and Hoekman, 2010, for a survey). Kox and Nordås (2007); Lennon (2009) and van der Marel and Shepherd (2011) use aggregate data on bilateral trade in services from the OECD and show that regulations in the origin and destination countries have a strong negative impact on aggregate export of services. Kox and Lejour (2005) show that it is not only the level of regulations which matters for exports but also their structure. Controlling for unobserved country heterogeneity, Schwellnus (2007) finds a smaller – but still significant – elasticity of bilateral trade with respect to

[1] An expression that has been made popular by Bhagwati et al. (2004).

[2] See the WTO website devoted to the GATS at `http://www.wto.org/english/tratop_e/serv_e/serv_e.htm`

market regulations.[3] It is noteworthy that all of these studies only tend to show that foreign producers are harmed by the regulations in the destination markets. They remain silent on whether foreign suppliers are more affected than domestic ones. This is an important issue because regulations may well reduce imports without being trade protections. This will be the case in markets where they reduce the sales of domestic firms as much as the sales of foreign firms. Therefore, a negative correlation between regulations and services imports does not mean that regulations can be considered as trade barriers. A necessary condition for domestic regulations to be considered as trade barriers is that they exclude foreign sellers and shift market shares towards the local producers.

We depart from the existing literature on the impact of domestic regulations on trade in services by asking whether they discriminate against foreign suppliers or not. In the process, we quantify the impact of domestic regulation on firm-level export decisions and individual exports of services. We also show that gravity equations perform well in explaining services firm's export performance.

To achieve this, our paper proposes a theory-based empirical test to determine whether domestic regulations affect foreign suppliers more than local ones. We use firm-level data on French exporters of professional services to empirically investigate these predictions.[4] We focus our analysis on professional services, for two important reasons. First, professional services are traded under the Mode 1,[5] i.e. at arm's length and independently from trade in goods (unlike transport services). Second, we need trade data that can best match the available data on domestic regulations. We use the Non-Manufacturing Regulation (NMR) index developed by the OECD. It is specific to the professional service sectors and has been widely used in the literature linking regulations to economic performances (see Alesina et al., 2005; Bourlès et al., 2013; Barone and Cingano, 2011; Nicoletti and Scarpetta, 2003, for instance). Our econometric results show that domestic regulations in the importing markets matter for trade in services. They reduce both the decision to export and the individual export sales. As it will be highlighted in the theory, this result is consistent with domestic regulations being discriminatory.

In the next section, we present the theory on which we base our empirical tests. Section 3 describes the data and section 4 shows some stylized facts on French exporters of services. Section 5 presents the econometric results. Sections 6 and 7 check the robustness of our results to alternative empirical specifications and theoretical hypotheses. Section 8 concludes.

[3]Earlier studies focused on specific sectors: 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).

[4]Few recent studies use comparable firm-level data on trade in services: Breinlich and Criscuolo (2011) for the UK, Ariu (2012) for Belgium, Conti et al. (2010) for Italy, Kelle and Kleinert (2010) for Germany and Walter and Dell'mour (2010) for Austria. These studies mainly describe the characteristics of firms engaged in international trade in services without linking them to regulations in the service sectors.

[5]The GATS classifies trade in services into four distinct modes. Mode 1 covers the cross-border transactions of services. Mode 2 covers the consumption of services abroad – mainly tourism, Mode 3 covers the commercial presence, and Mode 4 covers the temporary migration of workers.

2 Theory and Empirical Specification

In this section, we derive testable predictions on the impact of discriminatory and non-discriminatory regulations in the importing countries on firm-level exports of services. The model is based on Melitz (2003). It features CES preferences, monopolistic competition and iceberg transport costs. Alternative modelling choices are considered in Section 7.

2.1 A Simple Trade Model

Complying with market regulations is certainly not costless, both for domestic and foreign firms. However, because it is hard to know precisely what kind of cost they involve, assessing the exact impact of market regulations on bilateral trade flows is not trivial. Regulations can take the form of an additional fixed entry cost, a marginal cost, or both. Moreover, they might be equally burdensome for foreign and domestic companies or be discriminatory, i.e. affecting foreign firms relatively more. This section outlines a simple model of trade in order to present the mechanisms at work and list our empirical predictions. We do not aim at presenting a structural model to be tested but simply to determine the kind of consequences which regulations might have on firm-level trade flows. We consider the market for a given tradable service in country d. Consumers have CES preferences over a continuum of imperfectly substitutable varieties produced by monopolistically competitive firms. Firms located in country o, aiming to serve market d incur a fixed entry cost, F_{od}. The sales of firms on market d are determined by a combination of destination country characteristics, some bilateral elements linking the origin and the destination countries (such as transaction costs), and firm-level ability, a.[6] More precisely, the CES utility maximization under budget constraint provides the demand for services addressed by country d to a firm located in country o with ability a:

$$x_{od}(a) = p_{od}(a)^{1-\sigma}(E_d/\Phi_d)\Lambda_{od}(a), \tag{1}$$

where $\Lambda_{od}(a)$ takes a value of one if the firm has decided to enter market d and zero otherwise. $p_{od}(a)$ is the price which the final consumer is charged for one unit of the output of the firm; and σ is the price elasticity ($\sigma > 1$). E_d is the market size in country d. Φ_d is inversely related to the price index in country d and captures the strength of the competition. It is positively influenced by the number of competitors in this market and negatively by their respective delivered price. A firm from country o, with ability a, will enter market d if its current profits cover the fixed cost. With constant mark-up, one obtains that the probability for a firm to enter market d is:

$$P\left[\Lambda_{od}(a) = 1\right] = P\left[x_{od}(a) > \sigma F_{od}\right]. \tag{2}$$

Services market regulations in country d, B_d, might be associated either with a fixed entry cost or a marginal cost. We consider both cases. First, we set $F_{od} = B_d^{\eta}$ ($\forall o$, with $\eta \geq 0$).

[6] In the following, we implicitly consider that a represents the productivity of firms and determines the delivered price of its variety. We could have assumed that a captures the ability of the firm to attain a higher level of quality. Then, the price variable, which is apparent in the following equations, would stand for the inverse of the quality-adjusted price.

Assuming a discriminatory or non discriminatory effect of market regulations on the fixed entry cost does not change the predictions of the model. Without a loss of generality, we assume that the fixed cost is not discriminatory (i.e. $F_{od} = F_{dd},\ \forall o, d$). Second, we assume that market regulations increase the delivered price of imported and local services such that:

$$p_{od}(a) = p_o(a)t_{od}B_d^{\gamma}, \quad \text{and} \quad p_{dd}(a) = p_d(a)t_{dd}B_d^{\kappa}, \quad 0 \leq \kappa \leq \gamma. \tag{3}$$

In equation 3, $p_o(a)$ denotes the production price of a variety of services imported from country o, and t_{od} is the transaction cost (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. Market regulations in country d will be discriminatory if $\gamma > \kappa$, and non-discriminatory if $\kappa = \gamma$. Finally, the toughness of competition in the market, Φ_d, is:

$$\Phi_d = \left[\int_{a \in \Omega_{dd}} [p_d(a)t_{dd}B_d^{\kappa}]^{1-\sigma} + \sum_{o \neq d} \int_{a \in \Omega_{od}} [p_o(a)t_{od}B_d^{\gamma}]^{1-\sigma} \right], \tag{4}$$

where Ω_{od} is the set of varieties produced in country o and available in country d. We obtain the elasticity of firm-level exports with respect to market regulations in the destination country from Equation (1):

$$\varepsilon_B^x = \frac{\partial x_{od}(a)}{\partial B_d} \frac{B_d}{x_{od}(a)} = \left[(1-\sigma)\gamma - \frac{\partial \Phi_d}{\partial B_d} \frac{B_d}{\Phi_d} \right]. \tag{5}$$

Equation (5) 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 channeled by changes in the price index. Indeed, market regulations should reduce the number of competitors in the destination country and raise the delivered price of each service variety. This will impact the demand addressed to all incumbent firms in this market positively. The overall elasticity of the exports by firms with respect to market regulations is undetermined. It could be zero, positive or negative. Similarly, the impact of market regulations on the export decision of a firm in country o is undetermined. However, Equation (2) provides some clues about the sign of the elasticity of the probability of exporting with respect to the level of regulations, ε_B^P. It must be positive if $\varepsilon_B^x > \sigma\eta$ and negative if $\varepsilon_B^x < \sigma\eta$.

Let us consider different hypotheses on the nature of market regulations. They can be considered as a fixed entry cost ($\eta > 0$), a marginal cost ($\gamma > 0$ and $\kappa > 0$) or both. Moreover, they can be discriminatory ($\gamma > \kappa$) or not ($\gamma = \kappa$). The theoretical predictions are summarized in Table (1).

Let us begin with the case where regulations do not influence the marginal cost: $\gamma = \kappa = 0$. The signs of ε_B^x and ε_B^P are shown in the first two rows of Table (1). Obviously, these elasticities are simply zero if regulations have no influence on the fixed cost. But if complying with regulations involves an additional entry cost ($\eta > 0$), they should impact the export decision negatively ($\varepsilon_B^P < 0$). As the number of firms which are active in the market diminishes, Φ_d falls and the second term in Equation (5) becomes negative, while the first one is zero. Then, each firm which remains active in this market has larger sales: $\varepsilon_B^x > 0$.[7]

[7]It is straightforward that the case of a discriminatory fixed cost provides the same sign effects as those

Table 1: Signs of the Elasticities of Firm-Level Exports and Export Decisions with Respect to Destination Market Regulations

		No entry cost $\eta = 0$	Entry cost $\eta > 0$
No marginal cost	Export value (ε_B^x)	0	+
$\gamma = \kappa = 0$	Export decision (ε_B^P)	0	-
Non-discriminatory marginal cost	Export value (ε_B^x)	0	+
$\gamma = \kappa > 0$	Export decision (ε_B^P)	0	-
Discriminatory marginal cost	Export value (ε_B^x)	-	?
$\gamma > \kappa \geq 0$	Export decision (ε_B^P)	-	-

The theoretical predictions are exactly the same if the influence of regulations on marginal costs is positive and identical across domestic and foreign firms ($\gamma = \kappa > 0$). First, if they only reach variable costs (no impact on the entry cost), the first and second terms in Equation (5) exactly cancel out. Indeed, with CES preferences and ad valorem trade costs, if all firms face the same shock on their marginal costs, the direct negative impact it has on their sales is exactly offset by the lessening of competitive pressure. Second, if regulations also increase fixed costs ($\eta > 0$), we expect a positive relationship between regulations and the sales of firms due to a decrease in the number of competitors. Finally, domestic regulations may have a negative impact on the exports by foreign firms only 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 (5) will not offset the direct negative effect, and their export sales should decrease. Because $x_{od}(a)$ decreases, the probability of exporting is also negatively affected. If one further assumes that regulations increase the fixed entry cost, the negative impact on the export probability would be even greater. But if $\sigma\eta$ is very large, the decrease in the number of firms which are active in market d could be sufficiently large to compensate the direct effect of regulations on the exports by firms, leaving the sign of ε_B^x undetermined.

The theoretical predictions summarized in Table (1) suggest an empirical test to determine whether or not domestic regulations are discriminatory. The elasticities of export sales and export decision with respect to domestic regulations can be estimated. If both estimates are negative, this means that domestic regulations are discriminatory. If domestic regulations are not discriminatory, we expect a non-significant or positive relationship between the level of regulations and individual export sales. Of course, some of the theoretical predictions are specific to our modeling choices. For instance, the fact that the direct and indirect impacts of non-discriminatory regulations cancel each other out is the outcome of two assumptions: CES preferences and the ad valorem cost of complying with regulations. Section (7) investigates the consequences of relaxing these two assumptions, and shows that our data supports our baseline model against the alternative ones.

reported in the last column of Table 1.

2.2 Empirical Specification

Our empirical analysis will estimate the signs of the elasticity of firm-level exports with respect to domestic regulations (ε_B^x) and the elasticity of firm-level export probability with respect to domestic regulations (ε_B^P) to infer whether domestic regulations are discriminatory.

Equation (3) is an import demand equation, addressed to each firm, which can be estimated using firm-level data along with a country-level measure of domestic regulations. Substituting the destination-specific price (Equation 3) into Equations (1) and (2), we obtain two equations that can be estimated. The first gives the firm-level export value, while the second refers to the export decision.

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

$$P\left[\Lambda_{od}(a)=1\right] = P\left[(p_o(a)t_{od}B_d^{\gamma})^{1-\sigma}(E_d/\Phi_d) > \sigma F_{od}\right]. \tag{7}$$

Equations (6) and (7) are gravity-type equations. Gravity equations have been extensively used in international trade studies. They have proved to fit quite well the aggregate trade flows of manufacturing goods, but also of tradable services (Walsh, 2006; Head et al., 2009). They also perform well in explaining firm-level exports of goods (Crozet and Koenig, 2010). One of the contribution of this paper is to apply gravity equations to firm-level trade flows of services. A way to estimate structurally this kind of equation is to introduce country×year fixed effect, to capture the aggregate demand, as well as the price index (Head and Mayer, 2013). This option is not available to us for two reasons. First, it would obviously wipe out our variable of interest because the measures of regulations are country and time specific. Second, we do not want to remove completely the price index. We want our estimates of the effect of domestic regulations on trade to also capture the general equilibrium effect channeled through the price index. We thus rely on reduced-forms of Equations (6) and (7) and estimate the following two log-linear equations:

$$\begin{aligned} ln(x_{odt}(a)) &= \beta_1 \ln(Regulation_{dt}) + \beta_2 \ln(Institution_{dt}) + \beta_3 \ln(Demand_{dt}) \\ &\quad + \beta_4 \ln(MP_{dt}) + \beta_5 TradeCosts_{odt}(a) + \beta_6 ExportGoods_{odt}(a) + \theta_{at} + \varphi_{dt}(a), \end{aligned} \tag{8}$$

$$\begin{aligned} P[\Lambda_{od}(a)=1] &= [\alpha_1 \ln(Regulation_{dt}) + \alpha_2 \ln(Institution_{dt}) + \alpha_3 \ln(Demand_{dt}) \quad (9) \\ &\quad + \alpha_4 \ln(MP_{dt}) + \alpha_5 TradeCosts_{odt}(a) + \alpha_6 ExportGoods_{odt}(a) \quad (10) \\ &\quad + \theta_{at} + \phi_{dt}(a) > \ln(\sigma F_{od})], \end{aligned}$$

where the t subscript is for time and the o subscript is for France only. The variables $\phi_{dt}(a)$ and $\varphi_{dt}(a)$ are error terms. $Regulation_{dt}$ measures the level of domestic service market regulations in the importing country. $Institution_{dt}$ measures the quality of institution in country d. This control variable ensures that the regulation variable is not capturing the overall political and economic environment in the destination market. $Demand_{dt}$ measures the demand for professional services in the country d. MP_{dt} is a index of market potential,

measuring country d's access to world market. Equations (7) and (6) suggest that we should control for the determinants of the price index (Φ_d). However, our empirical strategy is based on the interpretation of the sign of the elasticities of export decisions and export values with respect to market regulation. These elasticities include the indirect effect through on the price index. Hence, to ensure that the coefficients on the variable $Regulation_{dt}$ capture both the direct and indirect effect of the regulations, we proxy Φ_d with a measure of market potential based on the production of the manufacturing sectors only. This variable accounts for the exogenous determinants of competition such as the geographic location of the destination market, and is likely to be unaffected by the level of regulations in the services market. $TradeCosts_{odt}(a)$ is a matrix of trade costs. It includes the geographic distance between France and the destination market d, a common language dummy variable and a firm-level common border dummy variable.

Additionally, we control for the fact that firms may export both goods and services to country d. $ExportGoods_{odt}(a)$ is dummy taking the value one if the firm is also exporting goods to country d at time t. This control is important for two reasons. First, omitting this information could bias our coefficients on the trade costs variables because 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). In this case, the supply of services is driven by the export of the good, and not by the characteristics of service market in the destination country.

Finally, θ_{at} is a set of firm×year dummy variables capturing firm's ability a. All the variables used are described in more details in the following section.

The estimation of Equation (8) is carried out using a generalized Tobit model. The model predicts that we should not observe strictly positive export values below an exogenous cutoff value σF_d. 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.[8] The estimation of Equation 9 is done using a conditional logit. Since around 90% of all trade flows are zeros, a linear probability model would be extremely biased.[9] 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 further bootstrap the standard errors. This is what we do 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

[8]Head and Mayer (2013) discuss the various estimation techniques for gravity equations at the firm-level. They perform Monte-Carlo simulations indicating that the generalized tobit model we use successfully corrects the selection bias.

[9]Linear probability and logit models produce almost similar marginal effects when the average probability is around 50% (Angrist and Pischke, 2008).

we introduce in the generalized Tobit. For the estimates of equation (8), we will simply report clustered standard errors.

3 Data

Our empirical analysis uses three different sources of data. The exhaustive record of services exports by French firms, the OECD measures of services market regulations, and a set of gravity variables.

3.1 The Banque de France Database for Trade in Services

We use micro-level data, from the Banque de France, on French exporters of services. 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,[10] 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. Among them, there are five types of professional services: "Operational leasing services", "Research and development, technical services", "Management costs", "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 firm-level exports. We focus on the firms that (i) have their main activity in business services sectors, (ii) export professional services, and (iii) export to countries for which we have information on market regulations and on local demand.[11] We detail, step by step, how the 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.[12] As mentioned before, we start with 13,703 firms, exporting 28 billion euros of services on aggregate. We only have information on the main activity of the firms for 6,898 of these exporters. 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.[13] This second step reduces our sample to

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

[11] We use an unbalanced panel with at most 28 countries, but data is not available for all of them each year.

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

[13] 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

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 28 countries (excluding France) at most 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.[14] The final database contains 125,791 observations. In 1999, we have 1,517 exporters and 18 destination countries. Because very few firms export to many countries, we are left with only 2,955 positive export flows, for a total value of 3.2 billion euros. In 2003, the database covers 2,219 exporters and 25 countries. There are 4,304 strictly positive export flows, representing 4.8 billion euros. In 2007, the database covers 1,870 exporters, 23 countries, with 3,566 strictly positive trade flows, representing a total of 4.4 billion euros.[15]

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"). These indices measure the overall restriction to competition in each sector. Both the PMR and NMR have been widely used in the literature studying the impact of regulations on economic outcomes (see Alesina et al., 2005; Bourlès et al., 2013; Barone and Cingano, 2011; Nicoletti and Scarpetta, 2003). The indicators are available for 1998, 2003, 2008 and for 28 OECD countries (excluding France) at most.

In order to best 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.[16] Questions are either qualitative ("Do national, state or provincial government control at least one firm in the Insurance sector?") or quantitative ("For how many services does the profession have an exclusive or shared exclusive right to provide?"). Responses are transformed into quantitative data, by 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.[17] The index we obtain is

business sectors only, although less precisely estimated.

[14]Our results remain similar if we pool the different services and interact the regulation variable with a set of dummies for each service. The coefficients on the interaction terms are not statistically different from one another.

[15]See Table (4) in the appendix for a list of the countries and years available in the database.

[16]The questionnaire and the individual data used to construct the NMR index for professional services can be found at: `http://www.oecd.org/document/24/0,3746,en_2649_34323_35858776_1_1_1_1,00.html`. See Wölfl et al. (2009) for a detailed description of the NMR indices.

[17]The question that has been excluded is: "Is the number of foreign profesionnals/firms permitted to

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 NMR" 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, proposed by the OECD: the $NMR - Entry$ and the $NMR - Conduct$.[18] 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 or framing advertisements. These two sub-indicators are highly correlated, which prevents us from introducing them together in a regression. We did alternatively replace the NMR by either the $NMR - Entry$ or the $NMR - Conduct$. Our results remain unchanged.[19]

3.3 Control variables

We use the Rule of Law index to capture the overall political and economic environment in the destination country.[20] Market size is measured by the demand for professional services in the destination markets. We compute this variable by subtracting net exports from the national production of professional services. For production, we use OECD-STAN (ISIC-Rev.3) data, and keep the production of sector code C71T74.[21] Data on the exports and imports of Business Services are from the OECD as well. We use the market potential derived by Head and Mayer (2004) to control for the price index.[22] The geographic distance between countries and a dummy for common official language are taken from the CEPII's distance database.[23] The firm-level common border dummy takes the value one if a firm is located in a French region sharing a border with the destination country.[24] Finally, the information on whether the firm is also exporting goods to the same country ($ExportGoods_{odt}(a)$) comes

practice restricted by quotas or economic needs tests?" As a robustness check, we have included this variable into the regression. Results remain unchanged.

[18] See Table (5) for the results.

[19] We have also used the Trade Restrictiveness Index (TRI) provided by the Australian Productivity Commission. This index for professional services, which is only available for the year 1999 and for a 29 countries, provide less robust, although qualitatively similar results to the one obtained with the NMR. Results are not shown in the paper, but available upon request.

[20] We have used the ICRG index developed by the PRS Group, and three indicators from the World Bank Indicator database: the Political Stability, Quality of Regulation, and Voice and Accountability. Results are not affected by the choice of index.

[21] This sector includes "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.

[22] It is available at `http://www.cepii.fr/anglaisgraph/bdd/marketpotentials.htm`

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

[24] 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.

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.

4 Stylized Facts

This section displays stylized facts on French exporters of services and on regulations in destination markets.

4.1 French Exporters of Services

A striking feature of the data is that only a 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, suggesting that only a few extremely competitive firms are able to export their services to many countries. Figure 1 shows the concentration of exports in 2003.[25] The vast majority of exporters (72%) only supply 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.

4.2 Domestic Regulations

Figure (2) displays the NMR index by country between 1999 and 2007.[26] The NMR shows substantial variations across countries and years. 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 (3) crosses 3 variables from our database in 2003: the two main components of the NMR (Conduct of Operations and Entry Barriers), and the number of French exporters in each market. The figure confirms that the two main components of the NMR are highly correlated.[27] The figure fails to reveal any monotonic relationship between the level of

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

[26] Figure (2) reports the NMR only for the countries and years included in our sample. It does not report the NMR for Belgium and Ireland in 1999, for Ireland in 2003, and for Australia, Canada, New-Zealand and Poland in 2007 because of missing information on local demand for professional services.

[27] A simple regression between the two components gives a coefficient of 0.88, not statistically different from 1.

Figure 1: Export Concentration in 2003

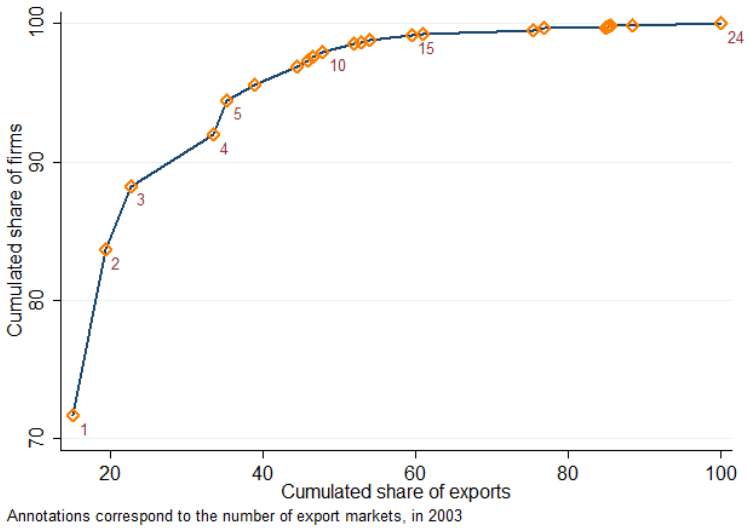
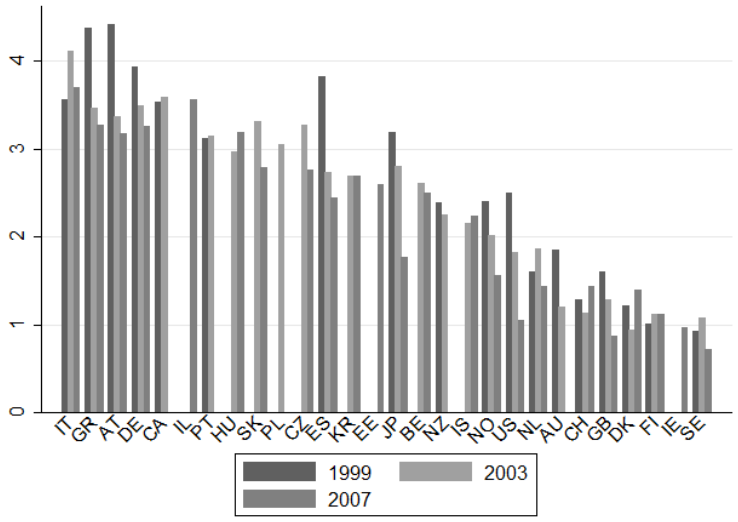


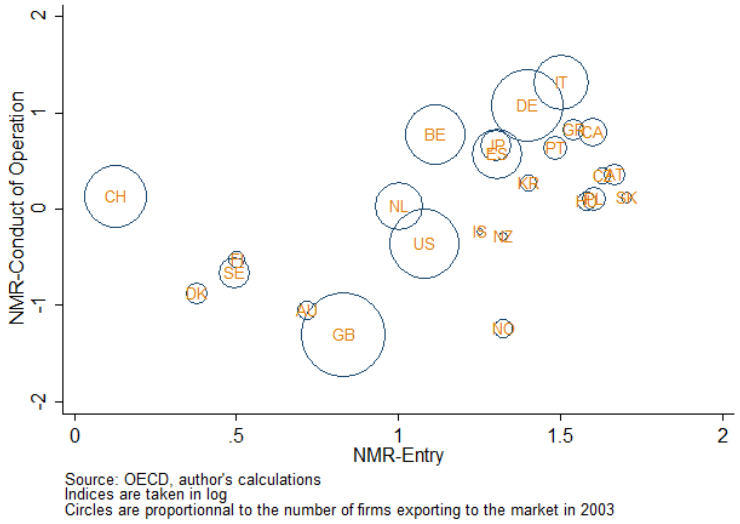
Figure 2: Changes in Regulations over Time



regulations (defined by either component of the NMR) and the number of French exporters to this market.

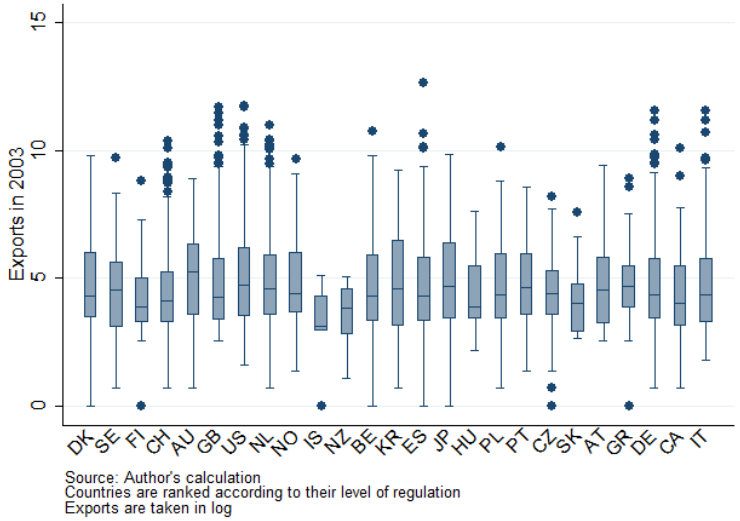
Figure (4) presents the distribution of the log of French exports of professional services across countries. The countries are sorted by increasing level of regulation: from Denmark (0.94) to Italy (4.11). For each destination market, the plain box represents the [25%;75%] interval of the export distribution, with the median inside it. The figure also report 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

Figure 3: Components of the NMR Index and Number of French Exporters - 2003



moments of the distribution of individual exports of professional services emerges from the figure. Nevertheless, the econometric analysis in the following section says otherwise, once we control for the usual determinants of bilateral trade flows.

Figure 4: Distribution of Exports - 2003



5 Econometric Results

5.1 Baseline Results

Our baseline results are shown in Table (2). For each specification, we estimate both the export probability and the individual export sales. Note that our theoretical predictions are

about the sign and significance of the estimated coefficients and not about their magnitude.

Columns (1) and (2) show results using the simplest specification. We control for the usual gravity determinants of trade flows, and add our measure of regulations. Our results show that the gravity equation explains well the export probability and the individual export sales of professional services. Our firm-level results confirm previous evidence obtained on aggregate trade flows of services (see Kimura and Lee, 2006; Walsh, 2006; Head et al., 2009). The coefficients are estimated with the expected sign, and are significant at the 1% level in each regression. The higher the demand for professional services and the closer the country, the higher the probability of exporting, and the higher the individual export sales of professional services. Exporters perform also better in francophone countries and when they are located in a border region. The dummy variable $ExportGoods_{odt}$ is positive and highly significant in both equations, and appears to be a strong determinant of both the probability of exporting services and the export sales. This confirms the complementarity between exports of goods and services at the firm-level.

Estimates of the market potential are non-significant. An explanation can be that we are only considering the French exports. The cross-country variance in market potential is essentially driven by domestic demand and to the proximity 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.

Regarding our variable of interest – the NMR_{dt} – our results show that domestic regulations affect significantly both the extensive and the intensive margin of trade in services. We find a negative impact on the export probability, which fits into our theoretical predictions. We also observe a negative and significant influence of the level of regulations in the destination market on the individual export sales, conditional on being an exporter. According to our predictions in Table (1), this corroborates the hypothesis that regulations discriminate against foreign firms.

A concern with the results reported in Columns (1) and (2) is that there might be a positive correlation, across countries, between discriminatory and non-discriminatory barriers. In this case, omitting to control for discriminatory barriers would bias downward the coefficient on 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 measures meets our needs.[28] An alternative is to focus on a subset

[28]Four measures of discriminatory barriers are available. The Australian Productivity Commission develops an index similar to the NMR. This index explicitly distinguishes between discriminatory and non-discriminatory regulations. However, it is only available for one year and 29 countries, which is a too small sample to obtain robust estimates. The Service Trade Restrictiveness Index (STRI) developed by the World Bank (Borchert et al., 2010) mainly focuses on the barriers limiting Foreign Direct Investment in the service sectors. It performs well in explaining trade in services under the mode 3 (commercial presence abroad), while our data correspond to mode 1 (cross-border trade). 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 (2006) use a gravity framework to infer the barriers to trade in services. These gravity-based measures are informative. However, they cannot be re-introduced into a gravity equation for obvious reason of

of countries where French exporters are not subject to discriminatory barriers. Given our data, restricting our sample to EU countries rules out the possibility that our results are affected by this omitted variable bias. 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. In Columns (3) and (4), we interact our measure of regulations with two dummies, thereby estimating the impact of regulations when a French firm is exporting to another EU country ($\ln(NMR_{dt}) \times EU$), and when it is exporting outside the EU ($\ln(NMR_{dt}) \times Non - EU$).[29] The results offer a clear picture. The coefficients on $\ln(NMR_{dt}) \times EU$ are negative and statistically significant for both the export probability and the export sales. Moreover, they are not statistically different from the ones reported in Columns (1) and (2). Even within the European Union, where member states are not allowed to discriminate against each other, our results provide support for the hypothesis that domestic regulations in the professional services sectors are discriminatory.[30] In addition, it is noteworthy that the negative effect of domestic regulations on trade within the EU also suggests that the market unification is far from being completed in the European services markets.

Because our variable of regulation is based on qualitative measures, we cannot propose a sound interpretation of the magnitude of the coefficients. However, a simple quantification exercise applied to the results in Table (2) suggests quite a large effect. We can compute the impact of a change by one standard deviation in the level of regulation on the export probability and the individual export flows. In 2007, the average level of regulation is 2.45, with a standard deviation of 1. Reducing the level of regulation from 2.45 to 1.45 actually corresponds to applying to Belgium the level of regulation observed in the Netherlands.[31] Given the coefficient on the NMR variable reported in Column (2), this change in regulations would increase the individual exports of professional services to Belgium by 74%. In 2007, the median value of the export flows to this country was €72,000. Adopting the Dutch level of regulation would increase the median individual export to €125,000. Similarly, given the coefficient in Column (1), the odd ratio of exporting to Belgium would increase by 21% (from 0.25 to 0.3), which corresponds to an increase in the probability of exporting from 20% to 23%. In 2007, there were 387 firms in our sample exporting professional services to Belgium. Changing the level of regulation to the one in the Netherlands would allow 12 additional French firms to enter the Belgian market.

endogeneity. They also capture all types of regulations, discriminatory and non-discriminatory alike.

[29] The use of non-linear estimator changes the interpretation of interaction terms, and prevent us from simply interacting the NMR variable with the EU dummy. See Ai and Norton (2003) for a note on the use of interaction terms in non-linear models.

[30] The coefficients on $\ln(NMR_{dt}) \times Non - EU$ and $\ln(NMR_{dt}) \times EU$ are not statistically different from each other. The difference in the significance level in Column (3) could be driven by a lack of variance within the non-EU group of countries (only 10 countries in our sample are not EU members).

[31] In 2007, Belgium and the Netherlands had a NMR of 2.495 and 1.443 respectively.

Table 2: The Impact of Market Regulations on Export Probability and Export Values

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)
Ln Local Demand	0.924^a	2.322^a	0.932^a	2.290^a
	(0.055)	(0.127)	(0.059)	(0.126)
Ln Distance	-0.908^a	-2.168^a	-0.888^a	-2.136^a
	(0.079)	(0.212)	(0.091)	(0.221)
Common Language	0.809^a	1.737^a	0.886^a	1.619^a
	(0.117)	(0.330)	(0.148)	(0.381)
Border	1.158^a	3.185^a	1.165^a	3.150^a
	(0.152)	(0.339)	(0.156)	(0.337)
Ln Market Potential	-0.006	-0.021	-0.016	0.015
	(0.049)	(0.136)	(0.053)	(0.136)
Ln Rule of Law	-0.213	-0.512	-0.212	-0.503
	(0.219)	(0.511)	(0.227)	(0.514)
Export of Goods	4.408^a	7.546^a	4.408^a	7.528^a
	(0.226)	(0.400)	(0.226)	(0.391)
Ln NMR	-0.375^a	-1.079^a		
	(0.112)	(0.336)		
EU			0.131	-0.361
			(0.217)	(0.541)
Ln NMR×EU			-0.397^a	-0.987^b
			(0.143)	(0.397)
Ln NMR×Non-EU			-0.324	-1.442^a
			(0.235)	(0.477)
Observations	125,791	125,791	125,791	125,791
Number of Firms	4,594	4,594	4,594	4,594
Pseudo R2	0.33	0.21	0.33	0.22

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 (200 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.

6 Robustness to Alternative Specifications

Table (3) shows several robustness checks.

First, in Columns (1) and (2), we estimate a non-parametric relationship between trade performances and domestic regulations. We replace the variable $\ln(NMR_{dt})$ by a set of country dummies characterizing each quartile of the distribution of the NMR variable.[32] In 2003, countries in the first quartile (Q1 – countries with low levels of regulations) were Australia, Denmark, Finland, Sweden, Switzerland, the United Kingdom and the United States. In the top quartile, we found Austria, Canada, Germany, Greece, Italy and Slovakia.

The results indicate that the influence of domestic regulations is non-linear. Results in Column (1) and (2) show that French exporters are less likely to export to countries with regulations above the median than to countries below the median. Estimates on $NMR-Q3$ and $NMR-Q4$ are not statistically different from each other, suggesting that regulations in these countries are equally burdensome for French exporters of services. Similarly, the group of countries with levels of regulations below the median seem equally accessible to French exporters.[33]

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.(Levitt, 1972; Malleret, 2006; Christensen and Drejer, 2007; Bernard and Fort, 2013; Crozet and Milet, 2013). In the Banque de France database, about 14% of exporters of professional services are registered as manufacturing firms. Moreover, matching the Banque de France database with the French customs one 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 replicates the results in Columns (3)-(4) using the sample of manufacturing firms that also export professional services. This sample is made of 1,142 firms. The results confirm that exporters are less sensitive to regulations when they also export goods.

In Columns (3) and (4), the coefficient on $Ln\ NMR \times Export\ of\ goods$ is non-significant, while it is negative and significant on $Ln\ NMR \times No\ export\ of\ goods$. For firms that only export services, the impact of domestic regulations on trade is very similar to the one reported in Table (2).[34] Results in Columns (5) and (6) confirm the previous results. While the usual

[32]The definition of the quartiles is invariant over time and is based on the distribution of the NMR variable in 2003. In the first quartile – Q1 – we find 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, $NMR \in]2.7; 3.2]$, and countries in the fourth quartile have a NMR greater than 3.2.

[33]The non-significant coefficient on $NMR-Q2$ does not mean that firms are not discriminated against 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.

[34]The interpretation of the results in Columns (3) and (4) is not straightforward. The coefficients on

gravity variables are significant and have the expected sign, regulations in the service sector do not seem to matter for manufacturing firms. This strongly suggest that the export of services by these firms are essentially driven by what happens on the goods markets.

We further assess the robustness of our results by running additional sets of regressions. The results are presented in the appendix in Tables (5), (6) and (7). In Table (5), we estimate the impact of the two components of the NMR index: $NMR-Entry$, and $NMR-Conduct$. 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 mentioned before, both components are highly correlated with each other (see Figure 3). Given that countries usually have Entry and Conduct regulations that go hand in hand, it is not surprising to find our baseline results confirmed. A potential concern for our study is the possible correlation between the size of the local market for services and the level of regulations. To ensure that the coefficients on the NMR variable are not affected by such a correlation, we estimate a more standard gravity equation, replacing the demand for professional services in the destination market by the GDP of the importing country. Again, the results confirm our previous conclusion, and show that our main result is not driven by a correlation between the level of regulations in the destination market and the demand for professional services in the country. The coefficients on the NMR are slightly larger than the one reported in Table (2) although they are not statistically different. In Columns (3) to (8), we add several control variables. There is large evidence that trade flows are correlated with foreign direct investment flows. 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. In Columns (3) and (4) we include a measure of restriction on FDI, which comes from the Product Market Regulation database of the OECD.[35] The index 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. In Columns (5) and (6), we control for the similarity in the legal system. The legal systems influence the enforcement of contracts, which are the mainstay of any 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.[36] Following the same procedure as in the baseline, we interact the NMR variable with the common legal system dummy. The results in Columns (5) and (6) show that after controlling for the usual determinants of trade flows, French exporters are not more likely to

Ln $NMR \times$ *No export of goods* confirm that the NRM captures discriminatory regulations which exclude some foreign suppliers from the market, thereby reducing the competitive pressure. In this case, local firms, and all incumbent suppliers incurring the same regulations cost, should sell relatively more when the NMR is higher. Therefore, if French exporters of goods were not discriminated against, we should have a positive coefficient on *Ln* $NMR \times$ *Export of goods* in Column (4). Instead, the non-significant coefficient suggests that they are less affected by regulations than the firms which solely export services, but more than the local producers.

[35]Data are available at `http://www.oecd.org/investment/fdiindex.htm`

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

Table 3: The Impact of Market Regulations on Export Probability and Export Values: Robustness Checks

	Service Firms				Manufacturing 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)
Ln Local Demand	0.940^a	2.283^a	0.924^a	2.324^a	0.638^a	1.024^a
	(0.064)	(0.130)	(0.055)	(0.127)	(0.049)	(0.080)
Ln Distance	-0.965^a	-2.180^a	-0.908^a	-2.169^a	-0.456^a	-0.653^a
	(0.076)	(0.173)	(0.079)	(0.213)	(0.080)	(0.148)
Common Language	0.741^a	1.743^a	0.810^a	1.743^a	0.413^a	0.491^b
	(0.119)	(0.32)	(0.117)	(0.329)	(0.158)	(0.194)
Border	1.150^a	3.175^a	1.160^a	3.195^a	0.795^c	1.363^a
	(0.158)	(0.340)	(0.152)	(0.337)	(0.460)	(0.388)
Ln Market Potential	-0.055	-0.052	-0.006	-0.012	0.037	0.057
	(0.057)	(0.136)	(0.049)	(0.136)	(0.056)	(0.099)
Ln Rule of Law	-0.215	-0.579	-0.213	-0.514	-0.178	-0.149
	(0.213)	(0.484)	(0.218)	(0.514)	(0.146)	(0.305)
Export of Goods	4.403^a	7.500^a	4.041^a	6.684^a	6.158^a	11.04^a
	(0.226)	(0.403)	(0.340)	(0.536)	(0.351)	(0.300)
NMR_{Q2}	-0.051	-0.596				
	(0.169)	(0.364)				
MNR_{Q3}	-0.337^b	-1.432^a				
	(0.151)	(0.354)				
NMR_{Q4}	-0.491^a	-1.365^a				
	(0.135)	(0.304)				
Ln NMR×Export of goods			0.103	0.111	-0.141	-0.240
			(0.310)	(0.596)	(0.215)	(0.263)
Ln NMR×No export of goods			-0.381^a	-1.125^a	-0.145	-0.227
			(0.113)	(0.337)	(0.146)	(0.225)
Observations	125,791	125,791	125,791	125,791	31,074	31,074
Number of Firms	4,594	4,594	4,594	4,594	1,142	1,142
Pseudo R2	0.12	0.22	0.33	0.22	0.68	0.39

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 (200 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. Columns (1)-(4) use the sample of exporters registered in services sectors only. Columns (5) and (6) use a sample of exporters of professional services registered in manufacturing. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.

export to countries sharing a common legal system with France. However, the results on the regulation variable suggest that the marginal effect is lower when countries share a common legal history with France. In Columns (7) and (8), we perform the same exercise with the

common language dummy variable.[37] We find that linguistic proximity reduces the impact of domestic regulations significantly.[38] All together, the results in Columns (5)-(8) show that domestic regulations are less burdensome for foreign firms when they are more easily understandable and produced by a legal system closer to that of the exporting country. They suggest that the discriminatory effect we estimate is partly involuntary, and simply results from the difficulty for foreign suppliers to deal with heterogenous legal environments. Finally, in Table (7) we use different measures for the overall business environment. We alternatively replace the Rule of Law Index by the ICRG index, and by three different indicators from the World Development Indicator (WDI): the "Political Stability" index, the "Quality of Regulation" index and the "Voice and Accountability" index. The results show that our choice of index does not change our results.

7 Robustness to Alternative Hypotheses

We acknowledge that our identification of the discriminating nature of market regulations relies on the prediction of a very specific model. Our baseline model assumes CES preferences and ad valorem regulations costs, which has important consequences on our theoretical predictions. More specifically, these two assumptions involve that the direct and indirect effects of a non-discriminating regulation, shown in Equation (5), cancel each other out. In this section, we consider two extensions of our model, in which we relax these specific assumptions. The two extensions lead to less clear-cut predictions on the impact of discriminatory and non-discriminatory market regulations. But they also predict that the elasticity of the exports by firms with respect to the level of regulations should not be the same for all firms. We show below that our data provide very little evidence in favor of this additional prediction, which comforts our initial modeling choices.

7.1 Non-Ad Valorem Cost of Regulations

Let us first consider the case where complying with the market regulations in the destination country involves a per unit cost rather than an ad valorem one. The cost of delivering one unit of service in country d now differs from Equation (3). If we assume, without loss of generality, $t_{od} = 1$, the delivered price is $p_{od}(a) = p_o(a) + B_d^\gamma$. Then, the profit maximizing price charged by the producer is, as in Martin (2012), $p_o(a) = [B_d^\gamma + \sigma c(a)]/(\sigma - 1)$, where $c(a)$ denotes the marginal cost of a firm with ability a. The export revenue is $x_{od}(a) = p_{od}(a)^{1-\sigma}(E_d/\tilde{\Phi}_d)\Lambda_{od}(a)$, where $\tilde{\Phi}_d$ is the component of the CES price index that captures the competition pressure in country d, when one assumes the per unit cost of regulations. The elasticity of firm-level exports with respect to market regulations in the destination country is:

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

[38] To better control for the ease of communication, we used the Common Spoken Language variable developed by Melitz and Toubal (2012), which measures the probability of finding two individuals in two countries that can speak a common language. Results remain unchanged.

$$\vartheta_B^x = \left[\frac{\gamma B_d^\gamma (1-\sigma)}{B_d^\gamma + c(a)} - \frac{\partial \tilde{\Phi}_d}{\partial B_d} \frac{B_d}{\tilde{\Phi}_d} \right]. \tag{11}$$

Again, we find a direct and indirect effect of market regulations. As for an ad valorem cost, the direct effect is clearly negative while the indirect one, channeled by the price index, is positive. The most important difference with the elasticity shown in Equation (5) is that the direct effect is now specific to each firm. The indirect effect being the same for all firms, we have $\partial \vartheta_B^x / \partial c(a) > 0$. In other words, when the cost of regulations is per unit rather than ad valorem, it has a greater marginal impact on the exports by firms producing cheaper varieties (i.e. the ones with a lower marginal cost $c(a)$).

7.2 Flexible Mark-Ups

Now, we relax the assumption of the CES preferences and consider a linear demand model, as in Melitz and Ottaviano (2008). Again, we neglect the delivering cost, setting $t_{od} = 1$. The cost of supplying a service in country d, for a firm located in country o with a marginal cost of production, $c(a)$, is $c_{od}(a) = c(a) B_d^\gamma$. In a Melitz and Ottaviano (2008) framework, the revenue of the firm is $x_{do}(a) = A_d \left[c_d^2 - [B_d^\gamma c(a)]^2 \right]$, where A_d is an exogenous parameter, and c_d is the cost cutoff value in market d. Of course, the latter includes the cost of regulation. As in the other models, we can compute the elasticity of sales with respect to market regulations:

$$\zeta_B^x = 2 \left[-\frac{\gamma [B_d^\gamma c(a)]^2}{c_d^2 - [B_d^\gamma c(a)]^2} + \frac{c_d^2}{c_d^2 - [B_d^\gamma c(a)]^2} \varepsilon_B^{c_d} \right], \tag{12}$$

where $\varepsilon_B^{c_d}$ is the elasticity of the cutoff value c_d with respect to the market regulations, B_d. Again, a change in the level of regulations has both a direct effect and an indirect one through the change in competition pressure on market d, represented in Equation (12) by the cutoff value c_d. However, this model is more complex since the magnitude of the two effects now varies with the marginal cost of the firm. As in the case of a non-ad valorem cost, we can compute the derivative of this elasticity with respect to $c(a)$:

$$\frac{\partial \zeta_B^x}{\partial c(a)} = c(a) \frac{4 (B_d^\gamma c_d)^2}{[c_d^2 - (B_d^\gamma c(a))^2]^2} (\varepsilon_B^{c_d} - \gamma). \tag{13}$$

Here too, the marginal impact of market regulations on the exports by firms should vary with their ability. Whether the impact of market regulations increases or decreases with $c(a)$ depends on the sign of the difference between $\varepsilon_B^{c_d}$ and γ. This difference depends on the distribution of the cost draw. But it is very likely that $(\varepsilon_B^{c_d} - \gamma) < 0$. For example, with a Pareto distribution and a non-discriminatory regulation, we have $\varepsilon_B^{c_d} = \gamma \varrho / (\varrho + 2)$, where ϱ is the shape parameter of the Pareto distribution.[39] Then, with $\frac{\partial \zeta_B^x}{\partial c(a)} < 0$, the impact of market regulations is stronger for firms with a higher marginal cost.

[39] Note that with a discriminatory regulations ($\kappa < \gamma$), we have $\varepsilon_B^{c_d} < \gamma \varrho / (\varrho + 2)$.

7.3 Empirical Verification of a Differentiated Impact of Regulations across Firms

The two extensions presented above give opposite conclusions. With a per unit cost, the cost induced by regulations makes up a higher share of the delivering price for firms with a low marginal cost. Therefore, market regulations have a greater marginal impact on the trade performances of the most competitive firms. With non-CES preferences, firms have a flexible mark-up and have a dumping strategy. As a consequence, more competitive firms tend to absorb the regulations cost in their markups, making their export performances less sensitive. By contrast, our baseline model, with the ad valorem cost and CES, predicts that the marginal impact of market regulations on individual exports is the same for all firms. We now test whether the marginal impact of regulations varies across firms, in order to discriminate between the different models. To do so, we rank all firms according to the value of their exports of professional services, and assign each firm to its corresponding decile in the distribution. We run our baseline regression for each decile of the distribution.[40]

Figure 5: Differentiated Impact of Regulations across Firms' Size Categories

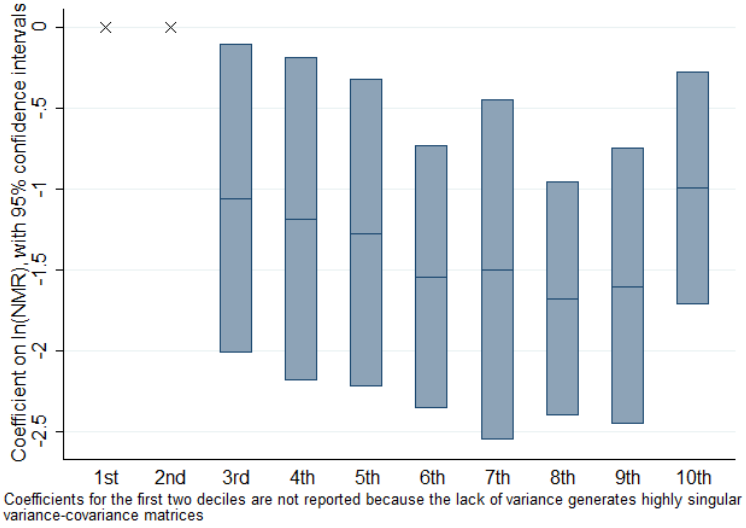


Figure (5) shows graphically the estimated coefficients on the $Ln\ NMR$ variable, with the corresponding 95% confidence interval.[41] The coefficients for the first two deciles of the distribution are not reported because the lack of variance generates highly singular variance-covariance matrices.[42] Figure 5 delivers a plain message: the effect of regulations is not statistically different across the decile distribution, which comforts our initial modeling choices.

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

[41] 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 (2).

[42] In these deciles, firms export to very few destinations.

8 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 foreign suppliers as an important barrier (European Commission, 2001), even when these barriers do not explicitly discriminate against them. 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 equally 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. Our results 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.

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Appendix

Table 4: List of Countries and Years Available

Iso code	Country	Years
AT	Austria	1999, 2003, 2007
AU	Australia	1999, 2003
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
NZ	New Zealand	1999, 2003
PL	Poland	2003
PT	Portugal	1999, 2003
SE	Sweden	1999, 2003, 2007
SK	Slovakia	2003, 2007
US	United States	1999, 2003, 2007

Table 5: Dissecting the NMR Index: Impact on Export Probability and Export Values

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)
Ln Local demand	0.922^a	2.318^a	0.924^a	2.315^a
	(0.060)	(0.130)	(0.049)	(0.122)
Ln Distance	-0.893^a	-2.132^a	-0.948^a	-2.282^a
	(0.089)	(0.236)	(0.062)	(0.194)
Common language	0.753^a	1.590^a	0.913^a	2.020^a
	(0.150)	(0.351)	(0.100)	(0.300)
Border	1.121^a	3.108^a	1.179^a	3.252^a
	(0.145)	(0.331)	(0.160)	(0.345)
Ln market potential	-0.015	-0.037	-0.012	0.012
	(0.053)	(0.140)	(0.041)	(0.122)
Ln Rule of law	-0.061	-0.063	-0.179	-0.451
	(0.213)	(0.495)	(0.207)	(0.480)
Export of goods	3.831^a	6.255^a	4.372^a	7.493^a
	(0.361)	(0.523)	(0.242)	(0.356)
Ln NMR-Entry×Export of goods	0.271	0.558		
	(0.293)	(0.531)		
Ln NMR-Entry×No export of goods	-0.269^b	-0.769^b		
	(0.136)	(0.343)		
Ln NMR-Conduct×Export of goods			0.075	-0.069
			(0.254)	(0.450)
Ln NMR-Conduct×No export of goods			-0.229^a	-0.728^a
			(0.065)	(0.173)
Obs.	125,791	125,791	125,791	125,791
Nb Firms	4,594	4,594	4,594	4,594
Pseudo R2	0.33	0.22	0.33	0.22

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 (200 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.

Table 6: Further Controls: Impact on Export Probability and Export Values

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln GDP	1.056^a	2.656^a						
	(0.063)	(0.148)						
Ln Demand			0.908^a	2.270^a	0.941^a	2.292^a	0.927^a	2.322^a
			(0.055)	(0.129)	(0.071)	(0.158)	(0.055)	(0.127)
Ln Distance	-0.961^a	-2.314^a	-0.881^a	-2.084^a	-0.893^a	-2.081^a	-0.918^a	-2.172^a
	(0.095)	(0.257)	(0.077)	(0.219)	(0.095)	(0.232)	(0.084)	(0.230)
Com. lang.	0.901^a	2.003^a	0.842^a	1.844^a	0.797^a	1.637^a	0.729^b	1.704^a
	(0.170)	(0.385)	(0.110)	(0.305)	(0.141)	(0.370)	(0.352)	(0.636)
Border	1.106^a	3.096^a	1.168^a	3.221^a	1.131^a	3.140^a	1.166^a	3.188^a
	(0.155)	(0.347)	(0.156)	(0.341)	(0.159)	(0.342)	(0.155)	(0.327)
Ln Market pot.	0.065	0.154	-0.010	-0.027	-0.021	0.053	-0.013	-0.014
	(0.057)	(0.143)	(0.047)	(0.135)	(0.091)	(0.206)	(0.050)	(0.140)
Ln Rule of law	0.033	0.133	-0.251	-0.675	0.077	0.156	-0.215	-0.514
	(0.203)	(0.473)	(0.200)	(0.460)	(0.259)	(0.585)	(0.221)	(0.514)
Export of goods	4.062^a	6.734^a	4.056^a	6.706^a	4.395^a	7.532^a	4.409^a	7.547^a
	(0.342)	(0.537)	(0.336)	(0.460)	(0.225)	(0.397)	(0.227)	(0.399)
Ln NMR	-0.098	-0.292	0.110	0.183				
×Goods	(0.316)	(0.600)	(0.307)	(0.609)				
Ln NMR	-0.529^a	-1.514^a	-0.348^a	-1.041^a				
×No-Goods	(0.130)	(0.355)	(0.121)	(0.339)				
Ln FDI restr.			-0.073	-0.292				
			(0.080)	(0.203)				
Com. legal					-0.026	-0.712		
					(0.456)	(1.040)		
Ln NMR					-0.100	-0.070		
×Legal					(0.405)	(0.912		
Ln NMR					-0.403^a	-1.172^a		
×No-Legal					(0.123)	(0.346)		
Ln NMR							-0.257	-1.034
×Lang.							(0.414)	(0.651)
Ln NMR							-0.393^a	-1.086^a
×No-Lang.							(0.131)	(0.380)
Obs.	125,791	125,791	125,791	125,791	125,791	125,791	125,791	125,791
Nb Firms	4,594	4,594	4,594	4,594	4,594	4,594	4,594	4,594
Pseudo R2	0.33	0.23	0.33	0.23	0.33	0.23	0.33	0.23

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 (using 200 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 7: Alternative Controls for the Business Environment: Impact on Export Probability and Export Values

	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln Demand	0.913^a	2.285^a	0.863^a	2.109^a	0.921^a	2.294^a	0.919^a	2.316^a
	(0.054)	(0.127)	(0.065)	(0.132)	(0.055)	(0.124)	(0.054)	(0.125)
Ln Distance	-0.914^a	-2.192^a	-0.910^a	-2.171^a	-0.910^a	-2.133^a	-0.917^a	-2.228^a
	(0.078)	(0.208)	(0.062)	(0.173)	(0.083)	(0.194)	(0.086)	(0.213)
Com. lang.	0.797^a	1.741^a	0.834^a	1.852^a	0.788^a	1.668^a	0.802^a	1.780^a
	(0.117)	(0.323)	(0.118)	(0.300)	(0.115)	(0.323)	(0.123)	(0.334)
Border	1.165^a	3.181^a	1.176^a	3.251^a	1.174^a	3.261^a	1.167^a	3.180^a
	(0.157)	(0.351)	(0.181)	(0.392)	(0.155)	(0.347)	(0.156)	(0.347)
Ln Market pot.	-0.009	-0.009	0.008	0.021	-0.013	-0.020	-0.012	-0.034
	(0.046)	(0.124)	(0.043)	(0.109)	(0.048)	(0.132)	(0.050)	(0.133)
Export of goods	4.041^a	6.643^a	4.020^a	6.512^a	4.035^a	6.701^a	4.038^a	6.667^a
	(0.340)	(0.527)	(0.321)	(0.510)	(0.338)	(0.539)	(0.339)	(0.535)
Ln NMR	0.142	0.150	0.105	0.199	0.183	0.420	0.159	0.191
×Goods	(0.312)	(0.577)	(0.295)	(0.538)	(0.310)	(0.608)	(0.312)	(0.574)
Ln NMR	-0.341^a	-1.143^a	-0.319^a	-1.053^a	-0.309^a	-0.805^b	-0.327^a	-1.071^a
×No-Goods	(0.105)	(0.320)	(0.079)	(0.267)	(0.118)	(0.314)	(0.106)	(0.314)
Ln ICRG	-0.819	-4.018^a						
	(1.072)	(2.422)						
Ln Pol. stability			-0.337^b	-1.282^a				
			(0.149)	(0.337)				
Ln Quality					-0.009	0.440		
of regulation					(0.255)	(0.708)		
Ln Accountability							-0.192	-1.051
							(0.348)	(0.842)
Obs.	125,791	125,791	120,644	120,644	125,791	125,791	125,791	125,791
Nb Firms	4,594	4,594	4,534	4,534	4,594	4,594	4,594	4,594
Pseudo R2	0.33	0.22	0.34	0.34	0.33	0.23	0.33	0.23

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 (using 200 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. Political Stability, Quality of Regulation and Accountability come from the World Development Indicators. The ICRG index comes from the PRS Group. All variables, but the dummies, are in logs. NMR measures the level of regulations in Professional Services in the destination country.