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À tous ceux qui ont rendu possible cette thèse

À ma famille, à mes amis

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L'expression qui oblige à garder le meilleur pour la fin a surement été inventée

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General Introduction

"Everybody is in services."

T. Levitt, 1972

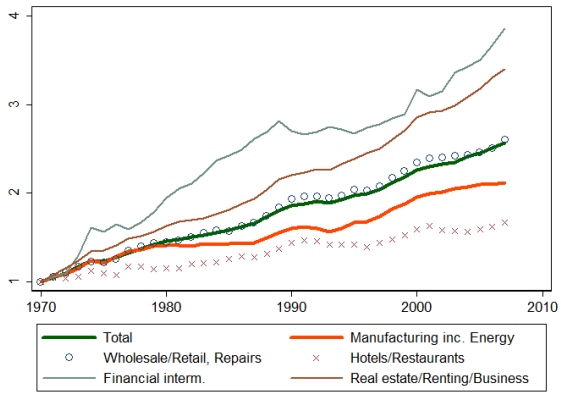
Today's developed economies are often described as service economies.[1] More than two thirds of employment and value added is generated by the service sector in OECD countries. Services are increasingly important in today's knowledge-based economies, are a crucial component of economic growth and contribute to the competitiveness of the industrial sector (Nordås and Kim, 2013). Figure IV.9 plots the evolution of value added and employment in France between 1970 and 2007. It shows that the professional service industries (Real estate/renting/business services and financial intermediation) are the main contributors to the growth of the French economy. These services (also called "complementary services" by Katouzian (1970)), have been growing much faster than the manufacturing sector, and much faster than the other service sectors (wholesale/retail, hotels and restaurant services). These fast growing services accounted for 33% of the total value added in 2007 (twice as much as the manufacturing sector) and 20% of the overall employment (14% for the manufacturing sector).

Before going any further, it is important to discuss the definition of services. In other words, we need to answer the question "what is a service?" or alternatively, "what are the differences between goods and services?". A satisfactory definition

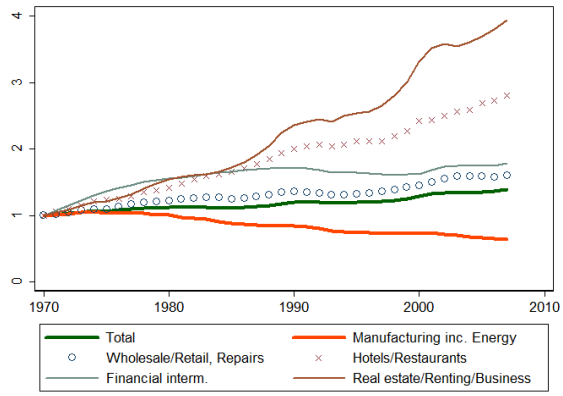
[1] Fuchs (1965) noted that *"[The United States is] now a "service economy" –that is, we are the first nation in the history of the world in which more than half of the employed population is not involved in the production of food, clothing, houses, automobiles and other tangible goods."*

Figure 1: Evolution of the value added and employment in France between 1970 and 2008

(a) Value Added



(b) Employment



source: OECD-STAN database, author's calculations

has to go beyond the usual "everything which is not the production of goods".[2] A suitable definition also has wide implications as it influences directly the industry classification on which are based the collection of data,[3] economic policies, and even some labor laws in the case of France.[4] Perhaps the most important contribution in finding an appropriate definition of what constitutes a service comes from Delaunay and Gadrey (1987) and Gadrey (2000) who built on the work by Hill (1977, 1999). Delaunay and Gadrey (1987) propose the following definition: *"A service activity is an operation intended to bring about a change of state in a reality C that is owned or used by consumer B, the change being effected by service provider A at the request of B, and in many cases in collaboration with him or her, but without leading to the*

[2] Early economists (notably Adam Smith) have long considered services as unproductive labor, although mercantilists considered transport and commerce as the most lucrative activities. Later on, economists of the mid-twentieth century would classify non-manufacturing activities into Ã "service sector" (Fischer, 1935; Clark, 1940; Fourastié, 1949), or a "tertiary sector"(Kuznets, 1957). These classifications would remain quite arbitrary however, and even now services are usually defined by negation, i.e. by what they are not, rather than by what they are.

[3] Hill (1977) argued early on that a clear definition for services was very crucial. *"Services are as important as goods in modern developed economies and they need to be identified and quantified properly if the measurement of economic growth and inflation is to have any meaning for the economy as a whole."*

[4] In France, collective labor laws are specific to each industry. They usually provide workers with additional benefits in terms of wages and holidays.

production of a good that can circulate in the economy independently of medium C". The medium C can be an object, a good, a person, a flow or an organization, and is strongly tied to the service. According to the authors, the major difference between goods and services is that property rights cannot be established over a service. Another important difference is the existence of a systematic relationship between the producer and the consumer of the service. This echoes what Hill (1999) says regarding the difference between goods and services: *"A good is an entity that exists independently of its owner"*, while services only exist within the producer-consumer relationship. This specificity of services makes factors such as communication, trust or cultural background, key components of a fruitful service relationship. Guiso et al. (2009) underline that trust (through cultural proximity and historical background) is an important determinant of economic exchanges. Regarding communication, Melitz and Toubal (2012) develop new measures of language proximity and show that the traditional common language dummy variable used in the gravity equations greatly underestimates the importance of language in international trade. Given the very nature of services described previously, communication is likely to influence greatly the success of a service transaction, especially when the two parties are located in different countries.

Other scholars, notably in management literature, have challenged the accuracy of the industry classifications. They argue that arbitrary boundaries are drawn between manufacturing and service firms, whereas the reality is more complex.[5] To view manufacturing firms as only producing physical goods and service firms as mere providers of services is misleading. Industry classifications do not account for the various activities performed by firms, and for the organizational changes that take place within sectors and within firms.[6] Levitt (1976) argued that *"Actually, there is a massive hidden service sector - that proportion of nominally "manufacturing"*

[5] This is also related to the studies on the boundary of the firm (Coase, 1937; Williamson, 1979).

[6] The industry classifications use output as the sole criteria. Some economists have argued that the occupation of workers would give a better idea of what the economies look like. With this definition, we could find "tertiary" workers employed in "secondary" industries. It would also account for the changes in the occupation mix and production mix of firms (Sauvy, 1949).

industries so much of whose expenses and revenues represent pre- and post-purchase servicing in the form of systems planning, pre-installation support, "software," repair, maintenance, delivery, collection, bookkeeping and the like". This "hidden" service activity is disregarded in the traditional industry classification, as is the production of goods by service firms. A couple of years earlier he also argued that *"There are no such things as service industries. There are only industries whose service component are greater or less than that of other industries. Everybody is in services"* (Levitt, 1972). In the **fourth chapter** of this dissertation, I will look at what has been called the "servitization" of manufacturing firms, i.e. the increasing supply of services provided by manufacturing firms.[7] The **third chapter**, on the other hand, will look at how imported services correlate with the occupation mix of firms.[8]

Despite the growing importance of the service sector, one cannot help notice the lack of research on the topic. It is mostly in the mid-1980s that the research on services took off. This was in part motivated by the decision of the Trade Ministers signatories of the General Agreement on Tariff and Trade (GATT) to include a mandate to address barriers to trade in services during the first meeting of the Uruguay Round in 1986. During this Round, a first agreement was reached: the General Agreement on Trade in Services (GATS).[9] The agreement established a framework for liberalizing trade in services.[10] Since the traditional view of international trade, with physical goods crossing a border, does not apply to services, the GATS adopted a broad definition for international trade in services. It includes four distinct modes: Mode-1 refers to the cross-border supply of services. Mode-2 refers to the consumption of a service abroad (e.g. tourism). Mode-3 refers to the commercial presence, and mode-4 refers to the presence of a natural person. In

[7] This chapter is based on a collaborative work with Matthieu Crozet.
[8] The first chapter is based on a collaborative work with Farid Toubal.
[9] Geza Feketekuty, then senior official in the Office of the United States Trade Representative is considered as one of the key architect of the agreement. The full text can be found at http://www.wto.org/english/docs_e/legal_e/26-gats_01_e.htm
[10] Negotiations on the liberalization of the service sector is a cornerstone of the current round of negotiations at the World Trade Organization.

the first two modes, the supplier of the service does not go abroad to deliver the service. In the last two modes, the provider of the service goes abroad to deliver the service. It is important to note that this definition is much more general than what is usually understood by the expression "international trade". International trade happens when a transaction takes place between a resident and a non-resident. It is unclear in the GATS's definition whether modes 3 and 4 involve a transaction between a resident and a non-resident, and mode-3 is usually referred to as foreign direct investment (FDI) and mode-4 as temporary migration. In the rest of this dissertation, I will only focus on the cross-border trade in services. Because the GATS classification can cause confusion, whenever trade in services under mode-3 will be mentioned, I will refer to it explicitly as foreign direct investment.

Early empirical studies on international trade in services (under mode-1) have shown that services respond to the same macroeconomic factors as international trade in goods. The gravity framework has proved to fit quite well the bilateral trade flows of services (Walsh, 2006; Head et al., 2009). There are, however, important differences between international trade in goods and international trade in services. Perhaps the major difference is that transportation costs for services are either zero or they are prohibitive. For instance, it is virtually costless for an architect to send a blueprint to an overseas client via email. On the other hand, it is extremely expensive to travel 5,000 km to get a haircut. While most goods can be internationally traded, this is not the case for services (under mode-1). When the "cost of transporting" the service becomes prohibitive, one sees either the consumer moving abroad to enjoy the service (mode-2), or the service provider setting up an affiliate (mode-3) or moving temporarily abroad to deliver the service (mode-4). Nevertheless, distance is found to be negatively correlated with the cross-border trade flows of services (mode-1). While distance proxies for transportation costs in the contexts of trade in goods, it is more likely to be correlated with factors such as cultural differences, communication costs or time-zone differences in the case of services. Another specificity of services is the absence of tariffs and the important role of domestic regulations. Historically,

many service industries have been heavily regulated, and often dominated by state-owned companies (transport services, energy supply, or the telecommunication sector for instance). The **first chapter** of this dissertation will focus on the specific issue of domestic regulations and how they affect the French exporters of services.[11]

Any quantitative exercise on the impact of a trade liberalization is complicated by the scarcity of the data on international trade in services. Furthermore, Lipsey (2006) argues that *"The trend in the importance of service exports and imports is even harder to measure, because the number of services covered and the number of countries measuring service exports and imports has increased, especially since 1975"*. The standard classification used is the Extended Balance of Payments Services Classification (EBOPS) of the International Monetary Fund, which classifies services into 80 categories. They range from transportation, travel, and professional services to personal and cultural services. To make a comparison with the statistics for international trade in goods, the United Nations propose a harmonised classification with more than 5,000 products in the COMTRADE data. Recently, Francois and Pindyuk (2013) put together the different data sources to create a comprehensive dataset of bilateral trade in services at the country level. The data are available for 251 countries, range from 1981 to 2010 and use EBOPS classification. Notwithstanding Lipsey's observation, the most recent available data suggest that trade in services has been growing faster than trade in goods during the last decade (Mattoo et al., 2009). Despite the efforts for greater trade liberalization, international trade in services accounts for only one fifth of total world trade (WTO, 2008). Why is there so little trade in services?

This dissertation aims at providing some answers to this question, and is divided in two parts. In the first part, I focus on the French exporters of services. I first consider the role played by domestic regulations, a trade barrier which is especially relevant for trade in services. I then take a more micro perspective and examine how the experience in the export market can explain the export pattern of individual

[11] The first chapter is based on a collaborative work with Matthieu Crozet and Daniel Mirza.

firms. In the second part, I focus on the importance of services for manufacturing firms. Services are both an input in the production process and an output of many manufacturing firms. Imported service inputs and the supply of services by manufacturing firms are discussed in the second part of this dissertation.

The rest of the introduction is organized as follows. I first present the various trade barriers inherent to international trade in services, with a special focus on domestic regulations (**chapter 1**). I then look at the individual strategy of the French exporters of services and investigate whether their export strategy differs from that of exporters of manufacturing products (**chapter 2**). In the second part of this introduction, I first look at the impact of imported services correlate with the skill composition of French firm's labor force (**chapter 3**). Finally, in **chapter 4**, I feed on the management literature and look at the supply of services by manufacturing firm, and the accompanying "servitization" of the French manufacturing industry.

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Why is there so little trade in services? Historically, many service industries have been heavily regulated (telecommunication, finance, professional services). This is true of manufacturing industries as well, but the service sectors involved provide the rest of the economy with intermediate inputs, and facilitate transactions between economic agents. This can have significant impact on the price setting of firms who rely strongly on these kind of services (Francois and Hoekman, 2010). The regulatory burden is often mentioned by professionals of the service sector as an important barrier when selling their services abroad (European Commission, 2001). Two kinds of regulations can be identified. The first kind explicitly targets foreign firms, and constitutes an additional burden for them when selling their service abroad. These regulations are designed to be discriminatory in the sense that only foreign firms have to face them (Hoekman et al., 2010). The main tool of liberalization of the GATS is to reduce as much as possible this kind of regulation by ensuring a *National*

Treatment to every service supplier.[12] The second group of regulations applies to all the firms alike, and form the general regulatory environment under which any firm operates. I call these regulations the "domestic regulations". They are mentioned in the GATS as they also cover the foreign suppliers of services. However, the Agreement is quite elusive, and merely states that members have to ensure that the domestic regulations "do not constitute unnecessary barriers to trade in services". What in practice constitutes "unnecessary barriers" is left to the discretion of each country. Because they do not discriminate against foreign suppliers, they are not considered as trade barriers. However, as foreign suppliers do not have an easy access to information that help them avoid or comply with local legislations, these suppliers are often more sensitive to such regulations than their domestic counterparts. Even if they are not deliberately discriminatory, domestic regulations are likely to exclude foreign suppliers.

The aim of the **first chapter** is to assess the impact of the domestic regulations, i.e. regulations that apply to all firms alike, on the French exporters of services. Specifically, I want to determine whether domestic regulations affect the French exporters of services more than they affect French domestic suppliers. If this is the case, then domestic regulations can be considered as an instrument of trade protection, and treated as "barriers to trade".

The existing empirical literature has provided evidence of a significant negative effect of domestic regulations on international trade in services. This literature has relied on aggregate data on bilateral trade in services, and relied on an aggregate index of the level of regulation, developed by the OECD. Kox and Nordås (2007); Lennon (2009) and van der Marel and Shepherd (2011) find that domestic regulations in both the origin country and the destination country are negatively correlated with the exports of services. Not only the level of regulation matters, but their structure too. Kox and Lejour (2005) find that the differences in regulation between countries

[12] Article XVI of the GATS states: "With respect to market access through the modes of supply identified in Article I, each Member shall accord services and service suppliers of any other Member treatment no less favourable than that provided for under the terms, limitations and conditions agreed and specified in its Schedule".

is negatively correlated with the exports of services. They estimate that a mutual recognition of the domestic regulations among the European countries could boost the exports of commercial services by between 30% and 60%. The fact that these studies find a negative effect from domestic regulations only shows that foreign suppliers are harmed by domestic regulations. Domestic regulations may reduce the supply of services of all firms alike, without harming foreign suppliers more. If this is the case they cannot be considered as trade barriers. Whether they are harmed more by the regulations in the destination market than that market's local firms is the question I ask in the **first chapter** of this dissertation. I use data on the French exporters of professional services and quantify the impact of domestic regulations on their exports and their probability of exporting to a given country.

I derive a theoretical model to determine how domestic regulations affect foreign suppliers more than domestic ones. The model is very simple and features CES preferences, monopolistic firms and iceberg trade costs.[13] Regulations are modelled in the following way: they can enter as an additional fixed cost for the exporting firms, or enter as an ad-valorem tax on the price each supplier charges. The key feature of the model is that I allow foreign and domestic firms to differ in their sensitivity to the domestic regulations. This model predicts that if foreign firms are more sensitive to domestic regulations than domestic firms, we should expect a negative sign on both the export probability and the individual exports of professional services. Only in this case does the theory predict a negative sign on the two individual margins. We test this using French firm-level data on the exports of professional services. The empirical analysis delivers a negative sign on both the export probability and the individual export sales. This result suggests

[13] These modeling choices impose strong assumptions on the model. In the appendix, I relax the assumption of ces preferences to use a quasi-linear demand system as in Melitz and Ottaviano (2008), and model regulations as a per-unit cost rather than an ad-valorem cost. These two alternative hypotheses provide less clear-cut predictions. However, both predict that the elasticity of export sales with respect to the domestic regulations is a function of the firm's productivity. I propose an empirical test to see whether more productive firms are more affected (in the case of a per-unit trade cost) or less affected (in the case of a quasi-linear demand system) than less productive firms. The results suggest that the effect is the same across firms, and does not depend on their productivity, thus confirming my first modeling choices.

that the French exporters of professional services are more sensitive to the domestic regulations in the foreign market than the local firms. The GATS clearly identifies discriminatory regulations as barriers to be removed during the coming rounds of negotiations. However, these empirical results suggest that more attention should be paid to domestic regulations too, as far as the promotion of world trade in services is concerned.

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The first chapter of this dissertation looks at how French exporters of services react when they all face the same barrier. The empirical strategy has relied on the assumption that the probability for a firm to export to a given market is independent of its decision to export to another market. For instance, the probability of a French firm to export to Germany does not depend on the characteristics of the Austrian market. In econometric jargon, we are assuming that the alternatives (exporting to Austria rather than to Germany) are independent and identically distributed (i.i.d.). The fact that Germany and Austria share a border and are culturally close is not taken into account. We relax this assumption in the **second chapter** and study how the characteristics that are common across countries can affect the firm's decision to export to new countries. Recent empirical evidence show that firms do not choose randomly their export destinations. Defever et al. (2011) look at the new export destinations of Chinese exporters after the end of the Multi-Fiber Agreement. They find that there are many more Chinese exporters entering into a market that either shares a border or a language with one of their previous export destinations than predicted by a random choice model. They find that a random choice model would predict that 90% of the firms in their sample should enter into less than 40% of new markets sharing a border with a prior export market. Their empirical distribution, though, shows that is the case for only 40% of the firms in their sample. In other words, they find that firms tend to enter relatively more markets that are less unknown to them. These characteristics of the firm's network of

foreign contacts is at odds with the standard theoretical model of international trade with heterogeneous firms. These models predict that all exporters should export to the easiest market (which would be Switzerland or Belgium in the case of French exporters, for instance). Then, as market access gets tougher (countries are smaller, further away, speak different languages, etc.), only the most productive firms are able to sell to these markets. Therefore, a clear ranking of the countries emerges. The least productive exporter is only selling to Belgium, and the most productive French exporter is selling to all the countries in the world, including Belgium. This ranking is of course not supported by the data (Eaton et al., 2004). A reason for the absence of a clear ranking in the data is that firms perceive differently which market is difficult to access and which market is not. I argue that the cost of entering a new market is different for each firm, and depends on its own experience in previous export markets.

When firms decide to enter into a new market, they have to search for new contacts. The first way of acquiring new contacts is to search from the home country. The gravity framework has been widely used to study this kind of search (Anderson and van Wincoop, 2003; Head and Mayer, 2013). In a gravity framework, the bilateral trade flow is inversely proportional to the distance between the exporters and the importers, and proportional to the size of the two countries. Additional factors such as the presence of a border, a common language or a regional trade agreement can help explain the observed trade patterns (Crozet and Koenig, 2010; Berthou and Fontagné, 2013). The basic form of the gravity equation does not take into account the experience of firms in the export market. The second method for a firm to acquire new contacts is to use its network of existing contacts. These contacts allow firms to search from remote locations for new trading partners. The idea is that the specific knowledge a firm acquires when exporting to a given country can be used to export to new countries that share some characteristics with this first country. For example, if a firm is exporting to Thailand, it is more likely to export next to Cambodia than to Brazil since Thailand and Cambodia share a border and

are culturally closer than Thailand and Brazil.

Albornoz et al. (2012) and Chaney (2014) propose theoretical models of the network structure of international trade. In their models, firms learn from their experiences in various export markets. These experiences allow them to enter more easily into new markets than inexperienced firms. Both studies find that firms are more likely to enter into markets that share a common border with one of their previous export markets. Albornoz et al. (2012) focus on the behaviour of new exporters. In their model, firms are ex-ante uncertain about their profitability in the export market. As they enter into their first market, they observe their profitability. This gives them additional information about their profitability in other export markets. In their models, profits are correlated across destinations and over time, which leads to a what the authors call a "sequential exporting". In Chaney (2014), the efficiency of the remote search (when firms use their existing contacts) is closely linked to geography. When using its foreign contacts, the number of new trade partners a firm can reach is negatively correlated with the distance between the existing foreign contacts and the potential new contacts. The remote search can also be affected by other geographical factors, and cultural differences.[14]

In the **second chapter** of this dissertation, I focus on the indirect search channel presented previously and look at the factors that make this search successful. I focus on the role of language, controlling for geographical proximity. Why should geography and language matter? The role of geography in international trade is well established. Close countries trade more with each other, especially if they share a border.[15] The transport infrastructures may be more developed, the trading countries are more likely to be in the same time zone, and natural obstacles (mountains, oceans, deserts) may be less of an issue for close countries than between countries that are far from each other. I argue that linguistic proximity is an

[14] Morales et al. (2014) call these additional variables the "extended gravity".

[15] McCallum (1995) famously argued that trade between countries is but a fraction of the trade between the regions of the same country. He looked at trade between Canadian provinces and trade between U.S. states and showed that the U.S.-Canada border reduces greatly international trade compare to national trade.

important determinant too. Language and culture are deeply intertwined. While the cultural history of people defines how they talk and their linguistic characteristics, language is important in the transmission of culture. Individuals with similar language and culture will tend to trust each other (Guiso et al., 2009), respond to the same social codes and norms, and will be able to communicate more efficiently. As already described in this introduction, the nature of the service relationship itself makes communication a crucial factor for the success of any business relationship. Regarding communication, Melitz and Toubal (2012) argue that *"The ability to communicate in depth is never irrelevant in trade since things can go wrong. Goods may arrive late or damaged; contracts may not be honored; there may need to be recourse to the small print"*. Moreover, spoken communication connects people in a unique way, which cannot be obtained through simple emailing or written conversations.

The geographic factors include the distance between the existing export markets and the new potential trade partner, as well as whether they share a border. For linguistic proximity, I use the data on language developed by Melitz and Toubal (2012). Their measure is based on the work by ethno-linguists and ethno-statisticians working on the Automatic Similarity Judgement Program (Brown et al., 2008). The linguistic similarity is based on the comparison of the meaning of over 40 words in different languages.

Additionally, Chaney (2014) predicts that as firms acquire more and more foreign contacts, the remote search channel becomes increasingly important, and the direct search channel (the search from the home country) becomes negligible. I investigate this empirically, and look at whether the geographic or cultural factors matter more as firms export to more countries. To make my results comparable with the literature, I consider both the French exporters of goods and the French exporters of services. One could expect exporters of goods and exporters of services to be affected differently by geography and culture. However, just as the standard gravity equation performs well in explaining international trade in services, I also find that

both geography and culture matter for both types of exporters. I find evidence that as firms export to more countries, the geographic and cultural factors become increasingly important. I find that geographic proximity is more important than linguistic proximity for exporters of differentiated products, while both seem to matter equally for the exporters of services.

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The second part of this dissertation focuses on the input/output linkages between services and manufacturing. More specifically, in the **third chapter**, I look at how imported services inputs correlate with the labor demand of French manufacturing firms. In the **fourth chapter**, I look at services as an *output* of manufacturing firms, and their growing share in the total sales of these firms.

The improvements in Information and Communication Technologies (ICT) during the past decades have greatly contributed to make many services "more" tradable. If services can be traded, then the supplier and the consumer of the service do not necessarily have to be in the same location. The producer can be located in a different region of the country, or even in a different country. With the ICT revolution of the late 1990s, firms are increasingly capable of relocating some of their production process to other locations. Services are no exception in this regard, and the growing trend in service imports has been called the *"new wave of globalization"*, or the *"next industrial revolution"* (Blinder, 2006). It is noteworthy that the question of offshoring has a large echo in the media (Times, 2006; Economist, 2006, 2010) and in public debate. According to the Eurobarometer, the fear of offshoring is one of the reasons why French citizens voted NO on the referendum for the European constitution in 2005. The first waves of offshoring have mainly been about manufacturing firms outsourcing the production of components, or assembly lines. The offshored activities were customarily sent to lower wage countries, and were intensive in low-skilled workers. The waves of service offshoring are drastically different in that regard. Services activities are on average more skill-intensive.

Trade in services is mainly occurring between OECD countries. These two simple observations imply that trade in services could affect skilled workers more than unskilled workers. The **third chapter** of this dissertation looks at the correlation between the imported services and the skill composition of the French firms.

Early estimates of the impact of service imports on employment have been provided by consulting firms. Perhaps the most quoted projection was made by Forrester Research, who estimated that 3.3 million U.S. jobs in the service sector would be offshored by 2015 (or 300,000 per year). Blinder (2006) estimated that between 30 and 40 million US workers were potential candidates for offshoring.[16] These jobs are held by white-collar workers, and according to the authors, these workers are going to lose from service offshoring.[17] However informative, these estimates do not provide a satisfactory answer. Early empirical studies have relied on aggregate statistics and have found a very limited negative effect of service offshoring on overall employment (Amiti and Wei, 2005; OECD, 2006). With occupation-level data becoming more available, the focus has shifted toward an impact of offshoring on the skill composition of the workforce. Crinó (2010) uses data on 100 occupations in the United States over the period 1997-2006 and finds that service offshoring is skill biased. It raises the employment relatively more in higher skilled occupations than in lower skilled occupations. Furthermore, for a given skill-level he finds that service offshoring affects more workers performing "tradable tasks". Workers in tradable occupations are more likely to have their job outsourced. Criscuolo and Garicano (2010) find that occupations that require a specific licence are less likely to be eligible for offshoring as the cost becomes very high. A careful assessment of the impact of the imports of services on labor demand or wages requires very detailed data. Information on both the firm's activity (imports, turnover, capital, etc.) and on the firm's workers (wage, skill level, qualification, task performed, etc.) are needed to carefully capture how imported services is correlated with the wages

[16] Notwithstanding the methodology used in this studies, it important to recall that the US job markets creates and destroys about one million jobs every three months.

[17] Bhagwati et al. (2004) argues that offshoring is yet another gain from trade, and so far the United States is a net exporter of services, which coincides with its comparative advantage.

or the employment of individual workers.

In the **third chapter**, I use firm-level data to look at the impact of service imports on the skill composition of firms' labor forces. Information on workers' wages and occupations are retrieved from the DADS dataset (Déclaration Annuelle Des Salaires – Yearly Wage Statement). Information on the firms' balance sheets are obtained from the BRN (Bénéfice Réels Normaux) database provided by the French fiscal authority. Data on the firm-level imports of goods and services are obtained from the Customs Office and the Bank of France respectively. I am able to match the firm-level imports of manufacturing products and services with the skill composition of each French firm. These detailed datasets allow me to carefully assess the impact of service (and material) imports on the workers' wages at the firm-level. I do not have to rely on industry-level measures of service or material offshoring, which can result in biased estimates.[18] This paper contributes to the literature on trade and wages in several ways. First, to the best of my knowledge this is the first time firm-level data on both service imports and skill composition are used together to conduct a study. Second, I find that the imports of services complement white-collar workers and substitute for workers with an intermediate level of qualification. The imports of goods (intermediate inputs or final goods), on the other hand, complement white-collar workers but substitute for low-skilled workers. While the imports of services are correlated with a polarization of the labor market, the imports of goods are correlated with a general skill upgrading. These results capture a correlation and not a causality, however. A potential issue is that a reverse causality may be spurring the results. One could imagine that firms who decide to employ relatively more white-collar workers are also firms that decide to import services. Finding an instrument for the imports of services is a difficult task. The instrument would need to apply to firms that import services as well as to firms

[18] Winkler and Milberg (2009); Feenstra and Jensen (2012) have shown that the proportionality assumption, used to distribute the aggregate exports into the corresponding industries, can generate biased estimates.

that do not import services.[19]

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The previous chapter has outlined one aspect of the importance of services in manufacturing firms, namely their importance as an *input* in the production process. In the **fourth chapter**, I turn 180 degrees to look at the importance of services as an *output* of French manufacturing firms. The fact that many manufacturing firms produce and sell services is clear evidence of the ever growing, intertwining relationship between services and manufacturing activities. A simple calculation for 2007 from the BRN dataset described earlier reveals that for a third of the French manufacturing firms in our sample, services account for more than half of the total sales. Moreover, a quarter of the firms registered as manufacturers were not even producing goods![20] These are not negligible numbers, and gives us a new way to look at the de-industrialization process, which is a major concern for policymakers.

The debate over de-industrialization is, to a certain extent, based on the representation of the economy as a collection of separate sectors. It largely ignores the dense and complex links between manufacturing and services and the real nature of manufacturing production. Furthermore, the official industry classification draws arbitrary boundaries between manufacturing and services, as already mentioned at the beginning of this introduction. The line between manufacturing and services is in fact quite blurry. It is misleading to portray the manufacturing and service sectors as being solely about the production of, respectively, goods or services. In this **fourth chapter** I document the shift toward the supply of services by manufacturing firms. More precisely, I document the increase in the supply of services, i.e. the fact that the share of services in the total sales of manufacturing firms is increasing over time. This phenomenon has been called the *servitization* of the manufacturing firms by scholars in the management and marketing literature.

[19] This prevents us from using the strategy proposed by Hummels et al. (2014) as they only focus on firms that always import goods.

[20] It is important to note that in France, firms are seldom reclassified. The industry classification is decided at the creation of the firm, and it is costly for employers to change it as many collective labor laws are based on these classifications.

Several reasons have been put forward to explain why manufacturing firms would engage in the provision of services (Gebauer et al., 2005). First, by selling a product-service bundle, firms are proposing a product which is harder to imitate and perceived as less substitutable by the consumer. This can in turn increase customers' loyalty and improve the company's image. Second, financial benefits are expected. Services can constitute a more stable source of revenues for the firm. While the sale of a product can be a one-time operation, the service offer can be spread over longer periods of time.[21] In this chapter, I abstract from the reasons why firms may or may not engage in the supply of services and focus only on the outcome. I find that the share of services in the production sales (what I call the *service intensity*) of manufacturing firms has steadily increased between 1997 and 2007. This general trend is found in each industry, and is mainly driven by a within-firm change. This means that, on average, every French manufacturing firm is selling relatively more services. This increase is moderate though, and very few firms have changed drastically their production mix, by either specializing completely in services or in the production of goods. On average, manufacturing firms are becoming less about "pure" manufacturing production and more about services. This result allows us to take another look at the de-industrialization of the French economy. We know that the number of manufacturing firms declines every year. The results of this chapter suggest that the scenario is actually more critical than it is usually presented. There are fewer manufacturing firms, and those who stay are producing less goods and selling more services. There is a "hidden" de-industrialization, taking place within the manufacturing sector itself. I estimate that the decline in the proportion of

[21] Supplying services can be a risky business too, and the expected gains may not realize. This "service paradox" is described in Gebauer et al. (2005): *"most product manufacturers were confronted with the following phenomenon: extended service business leads to increased service offerings and higher costs, but not to the corresponding higher returns"*. Various explanations have been put forward. For example, firms may dilute their resources such that neither the supply of goods nor the supply of services becomes successful. Some others have emphasized the "people culture" of service activities as opposed to the "organization culture" of the manufacturing production. These models being radically different, the shift toward service activities may not result successful for the firm (Bharadwaj et al., 1993). The pricing of services may be more complex as costs are harder to grasp and usually spread over many departments within the firm.

workers involved in the production of goods has been up to 8% higher than the usual measures of deindustrialization based on the proportion of workers employed in manufacturing firms.

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Chapter I

The Discriminatory Effect of Domestic Regulations on International Trade in Services: Evidence from Firm-Level Data[1]

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),[2] 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

[1] This paper has been jointly written with Matthieu Crozet (Univeristé Paris XI, CEPII, IUF) and Daniel Mirza (Université de Tour, GERCIE, CEPII, Banque de France)

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

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.[3] Quite naturally, it mostly focuses on regulations that discriminate against foreign suppliers, thus granting a relative advantage to local suppliers.[4] 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)

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

[4] Davies (2013) shows that wasteful red tape can be used by government to discriminate between firms competing for the same export subsidy.

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 market regulations.[5] 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

[5] 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).

these predictions.[6] We focus our analysis on professional services, for two important reasons. First, professional services are traded under the Mode 1,[7] 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 2 describes the data and section 3 shows some stylized facts on French exporters of services. Section 4 presents the econometric results. Sections 5 and 6 check the robustness of our results to alternative empirical specifications and theoretical hypotheses. Section 8 concludes.

1 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 6.

[6] 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.

[7] 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.

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.[8] 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:

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

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

[8] 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.

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:

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

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 $\eta\geq 0$). 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:

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

In equation (I.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:

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

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 (I.1):

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

Equation (I.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.[9] Market regulations can exclude some firms from the market and raise the delivered price of each service variety. This raises the demand for services addressed to the incumbent firms. The indirect effect can have a positive impact on the individual export sales. Therefore, 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 (I.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 I.1.

Table I.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)	-	-

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 I.1.

[9] This general equilibrium effect is typically discarded in traditional international trade models. Berman et al. (2012) study the reaction of French exporters to chagne in the real price index and assume that the home country is too small to influence its own exchange rate. They argue that "[t]his assumption implies that we overestimate the elasticity of bilateral exchange rate movements on bilateral aggregate exports."

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 (I.5) becomes negative, while the first one is zero. Then, each firm which remains active in this market has larger sales: $\varepsilon_B^x > 0$.[10]

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 (I.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 (I.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 I.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

[10] It is straightforward that the case of a discriminatory fixed cost provides the same sign effects as those reported in the last column of table I.1.

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 6 investigates the consequences of relaxing these two assumptions, and shows that our data supports our baseline model against the alternative ones.

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 (I.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 (I.3) – into equations (I.1) and (I.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.

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

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

Equations (I.6) and (I.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 (I.6) and (I.7) and estimate the following two log-linear equations:

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

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

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 (I.7) and (I.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 (I.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.[11] The estimation of equation (I.9) is done using a conditional logit. Since around 90% of all trade flows are zeros, a linear probability model would be extremely biased.[12] 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 we introduce in the generalized Tobit. For the estimates of equation (I.8)) we will simply report clustered standard errors.

2 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.

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,[13] 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*

[11] 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.

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

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

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.[14] 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.[15] 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.[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 28 countries (excluding France) at most and for

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

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 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.[18]

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.[19] Questions are either qualitative ("Do national, state or provincial government control at least one firm in the Insurance sector?") or quantitative ("For

[17] 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.

[18] See table I.4 in the appendix for a list of the countries and years available in the database.

[19] 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.

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.[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 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 $NMR - Conduct$.[21] 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.[22]

We use the Rule of Law index to capture the overall political and economic environment in the destination country.[23] Market size is measured by the demand for professional services in the destination markets. We compute this variable

[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?" As a robustness check, we have included this variable into the regression. Results remain unchanged.

[21] See table I.5 for the results.

[22] 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.

[23] 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.

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.[24] 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.[25] The geographic distance between countries and a dummy for common official language are taken from the CEPII's distance database.[26] 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.[27] Finally, the information on whether the firm is also exporting goods to the same country ($ExportGoods_{odt}(a)$) 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.

3 Stylized Facts

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

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

[24] 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.

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

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

[27] 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.

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 I.1 shows the concentration of exports in 2003.[28] 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.

Figure I.1: Export Concentration in 2003

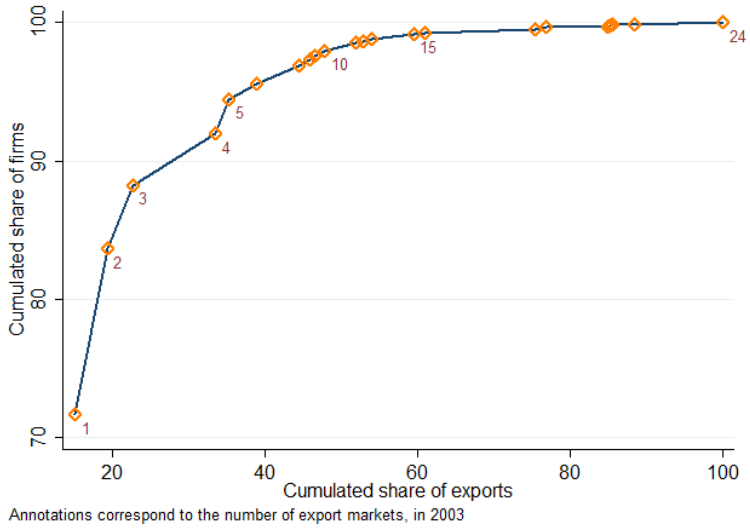


Figure I.2 displays the NMR index by country between 1999 and 2007.[29] The NMR shows substantial variations across countries and years. For most countries, the index has declined over time. This decline has been relatively

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

[29] Figure I.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.

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 I.2: Changes in Regulations over Time

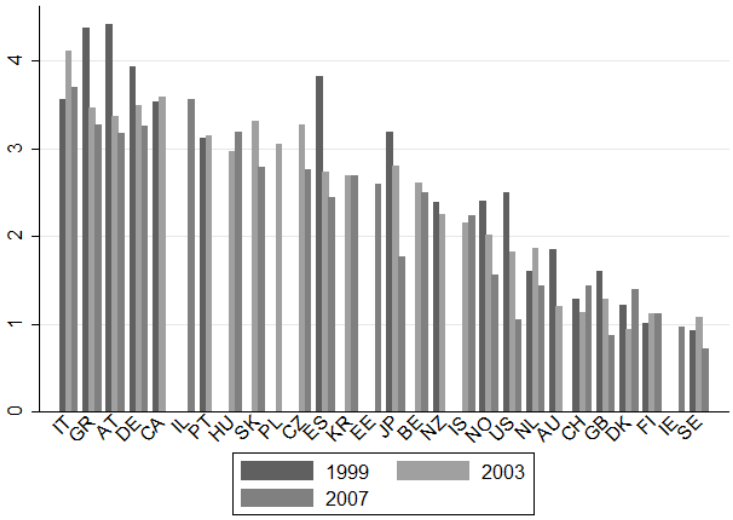
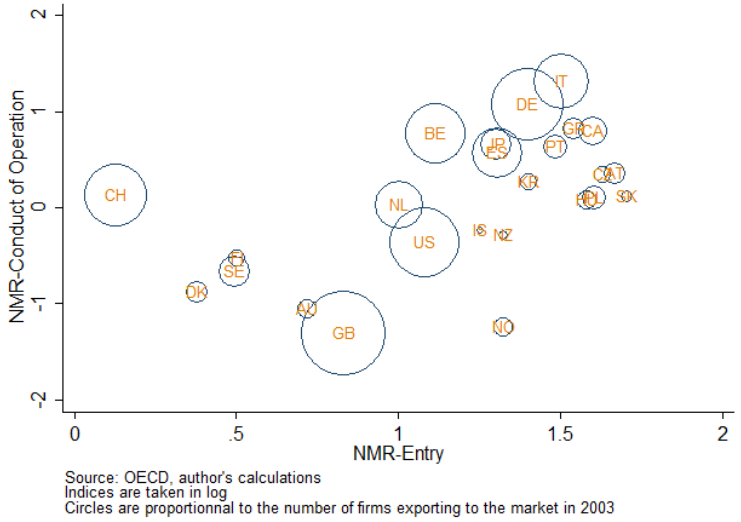


Figure I.3)crosses 3 variables from our database in 2003: the two main components of the NMR (Conduct of Operations and Entry Barriers), and the number of French exporters in each market. The figure confirms that the two main components of the NMR are highly correlated.[30] The figure fails to reveal any monotonic relationship between the level of regulations (defined by either component of the NMR) and the number of French exporters to this market.

Figure I.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

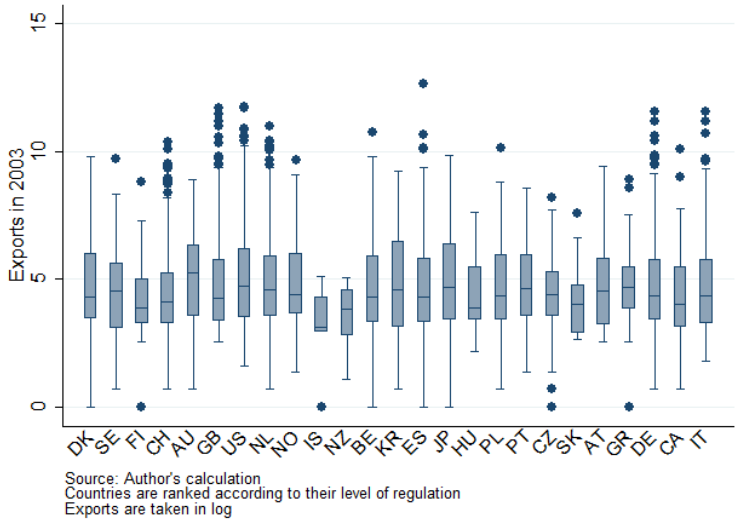
[30] A simple regression between the two components gives a coefficient of 0.88, not statistically different from 1.

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



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 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.

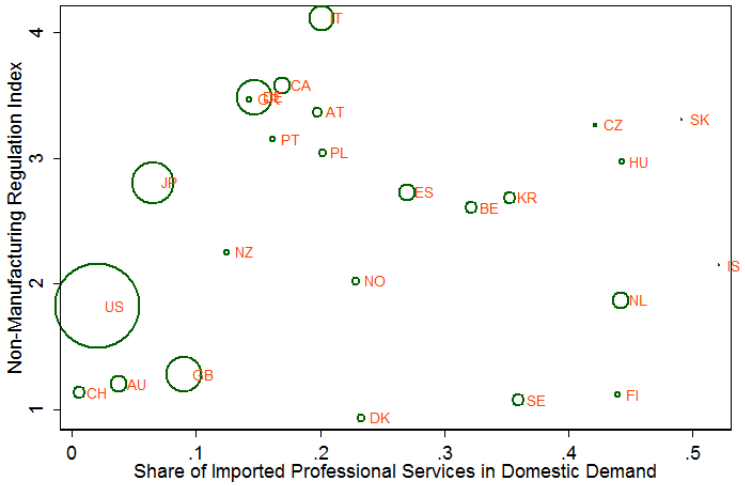
Figure I.4: Distribution of Exports - 2003



Finally, figure I.5 displays the share of imports of professional services in the total

demand, for each country in our dataset. It shows that the imports of professional services account for a significant share of the total demand in most of the countries in our sample. This suggests that the indirect effect of domestic regulations on export sales through the price index can be an important part of the total effect. Countries with a large demand and a small reliance on imports can more easily influence their price index to protect their local suppliers from foreign competition.

Figure I.5: Import Penetration ratio of professional services - 2003



Sources: OECD-STAN, Trade in service Database and PMR database.
Circles are proportionnal to the domestic demand for professional services in each market

4 Econometric Results

Our baseline results are shown in table I.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 I.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.[31] An alternative is to focus on a subset 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 ($\ln(NMR_{dt}) \times Non - EU$).[32] 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

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

[32] 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.

sectors are discriminatory.[33] 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 I.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.[34] 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.

5 Robustness to Alternative Specifications

Table I.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 $\ln(NMR_{dt})$

[33] 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).

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

Table I.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.

by a set of country dummies characterizing each quartile of the distribution of the NMR variable.[35] In 2003, countries in the first quartile (Q1 – countries with low levels of regulations) were Australia, Denmark, Finland, Sweden, Switzerland, the

[35] 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.

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.[36]

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). 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

[36] 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.

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 I.2.[37] Results in Columns (5) and (6) confirm the previous results. 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. 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 I.5, I.6 and I.7. In table I.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 I.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

[37] The interpretation of the results in Columns (3) and (4) is not straightforward. The coefficients on $Ln\ NMR \times No\ export\ of\ goods$ 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.

Table I.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.

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 I.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.[38] 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.[39] 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 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.[40] We find that linguistic proximity reduces the impact of domestic regulations significantly.[41] 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

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

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

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

[41] 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.

effect we estimate is partly involuntary, and simply results from the difficulty for foreign suppliers to deal with heterogenous legal environments. In table I.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. Finally, in table I.8 we focus on firms that were not exporting to the same destination country in the previous year. One could expect firms that already exported to the same country in the previous year to be less affected by regulations. The experience firms acquire when exporting could translate into a lesser sensitivity with respect to regulations. The results in Columns (1) and (2) are very similar to the one obtained in our baseline specification (table I.2).[42] This supports the fact that regulations affect the variable cost of exporting firms, and do not necessarily constitute a fixed cost of exporting which would be paid upon the first entry in the foreign market.

6 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 (I.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

[42] We do not know if firms exporting in 1999 were exporting to a given country for the first time or not. We drop the observations for the year 1999 and are left with 2,725 exporting firms in 2003 and 2007 that were not exporting in 2002 and 2006 respectively.

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.

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 (I.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:

$$\vartheta_B^x = \left[\frac{\gamma B_d^\gamma (1-\sigma)}{B_d^\gamma + c(a)} - \frac{\partial \tilde{\Phi}_d}{\partial B_d} \frac{B_d}{\tilde{\Phi}_d} \right]. \tag{I.10}$$

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 (I.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 $c(a)$).

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:

$$\zeta_B^x = 2\left[-\frac{\gamma[B_d^\gamma c(a)]^2}{c_d^2 - [B_d^\gamma c(a)]^2} + \frac{c_d^2}{c_d^2 - [B_d^\gamma c(a)]^2}\varepsilon_B^{c_d}\right], \tag{I.11}$$

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 (I.11) 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 $c(a)$:

$$\frac{\partial \zeta_B^x}{\partial c(a)} = c(a)\frac{4(B_d^\gamma c_d)^2}{[c_d^2 - (B_d^\gamma c(a))^2]^2}(\varepsilon_B^{c_d} - \gamma). \tag{I.12}$$

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.[43] 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.

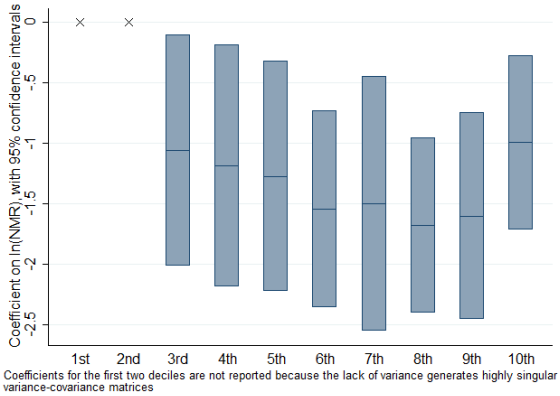
The two extensions presented above give opposite conclusions. With a per unit cost, the cost induced by regulations makes up a higher share of the delivering price for firms with a low marginal cost. Therefore, market regulations have a greater marginal impact on the trade performances of the most competitive firms. With non-CES preferences, firms have a flexible mark-up and have a dumping strategy.

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

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. Alternatively, we use value added per employee as a measure for the firm productivity. Data on value added and employment are only available for half the firms in our sample. We run our baseline regression for each decile of these distributions.[44]

Figure I.6: Differentiated Impact of Regulations across Firms'

(a) Distribution of Export Sales



(b) Distribution of Labor Productivity

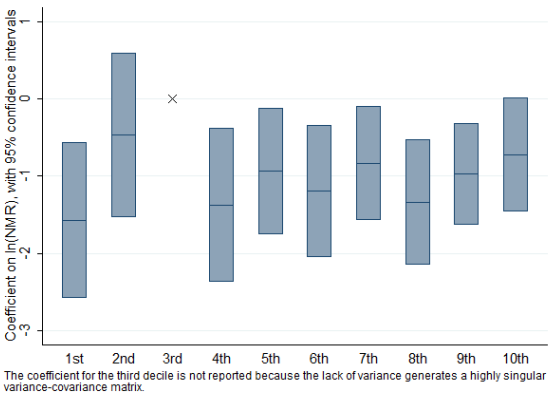


Figure I.6 shows graphically the estimated coefficients on the $Ln\ NMR$ variable, with the corresponding 95% confidence interval.[45] In Panel (a), we rank firms according to their total exports of professional services. In Panel (b), we rank firms according to their value added per employee. In panel (a), the coefficients for the first two deciles of the distribution are not reported because the lack of

[44] To avoid a composition bias across deciles, we focus on firms exporting services only. 92% of the firms in our sample are pure exporters of services.

[45] 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 (I.2).

variance generates highly singular variance-covariance matrices.[46] This is also the case for the third decile in panel (b) Figure I.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. This comforts our initial modeling choices.

7 Tariff Equivalent of Domestic Regulations

In this last section, we want to compute a tariff equivalent of the impact of domestic regulations on export sales. We place ourselves in the simple case where domestic regulations do not enter into the fixed cost of exporting. In this case, we can derive a simple expression for the elasticity of export sales with respect to domestic regulations (ε_B^x) whose expression is given by equation (I.5):

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

Let $\gamma{=}\kappa + \delta$, where δ is the discriminatory regulation faced by the foreign suppliers of services in country d. It can be shown that the expression for $\varepsilon_B^{\Phi_d}$ boils down to:

$$\varepsilon_B^{\Phi_d} \quad = \quad (1-\sigma)\kappa + (1-\sigma)\delta\frac{\sum_{o\neq d}\int_{a\in\Omega_{od}}[p_o(a)t_{od}B_d^{\gamma}]^{1-\sigma}}{\Phi_d}. \tag{I.13}$$

Plugging equation (I.1) into equation (I.13) and arranging the terms yields:

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

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

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

services produced 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 in professional services in country d, i.e it is the share of imports of services in the total demand for services. We call it IP_d. Finally, we get the following expression for the elasticity of export sales with respect to domestic regulations:

$$\varepsilon_B^x = (1-\sigma)(1-IP_d)\delta,$$

which we can re-write as:

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

Our model is analogous to a model with tariff protection where the delivery price in country d is simply $p_{od}(a) = p_o(a)t_{od}\tau_d$, with τ_d the tariff imposed by country d. In our model, B_d^δ plays the same role as τ_d. We can calibrate the model to obtain a tariff equivalent of the impact of domestic regulations on the individual export sales. From our baseline regression, we get $\widehat{\varepsilon_B^x} = -1.079$. We take the baseline estimate from Table I.2. We need to make an assumption on the value of the elasticity of substitution σ. The literature on trade in goods has produced abundant estimates for sigma (Broda and Weinstein, 2006; Anderson and van Wincoop, 2004; Head and Mayer, 2013). Few estimates of the elasticity of substitution between service varieties have been proposed in the literature however. We use several values for sigma (σ=3, 5, 7, 9), in the range of what has been estimated for goods varieties. We also follow Fontagné et al. (2011) and Park (2002) and use σ=5.6. We compute, for each year in our dataset the tariff equivalent of domestic regulations by using

the average level of regulation B_d and the average import penetration (IP_d) ratio in our sample.

	1999	2003	2007
B_d	2.315	2.251	1.970
IP_d	0.187	0.244	0.363
		σ=3	
δ	0.66	0.71	0.85
τ	1.88	1.90	1.95
		σ=5	
δ	0.33	0.36	0.42
τ	1.37	1.38	1.40
		σ=7	
δ	0.22	0.24	0.28
τ	1.24	1.24	1.25
		σ=9	
δ	0.17	0.18	0.21
τ	1.17	1.17	1.18
		σ=5.6	
δ	0.29	0.31	0.37
τ	1.32	1.32	1.34

We find a tariff equivalent of between 17% and 95%, depending on the elasticity of substitution between service varieties. When using the same elasticity of substitution as in Fontagné et al. (2011) and Park (2002) (σ=5.6), we find a tariff equivalent of about 32%. This is very close to what the authors find for the other business services, despite large differences in the methodology, country coverage, time horizon and type of service considered.

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. Considering the special scenario where domestic regulations increase only the variable cost of firms, we find that they constitute a barrier equivalent to a tariff of about 30%. 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.

I.A Appendix

Table I.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 I.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 I.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 I.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.

Table I.8: Primo Exporters

	$P_r > 0$	$\ln(x_{od})$
	(1)	(2)
Ln Demand	0.835^a	1.859^a
	(0.060)	(0.188)
Ln Distance	-0.878^a	-2.013^a
	(0.067)	(0.248)
Com. lang	0.706^a	1.501^a
	(0.143)	(0.359)
Border	1.047^a	2.209^a
	(0.133)	(0.279)
Ln Market pot.	0.003	-0.146
	(0.048)	(0.141)
Ln Rule of Law	-0.159	-0.597
	(0.187)	(0.444)
Export of Goods	4.515^a	7.580^a
	(0.329)	(0.574)
Ln NMR	-0.364^b	-0.904^a
	(0.148)	(0.305)
Obs	73,413	73,413
Nb Firms	2,725	2,725
Pseudo R2	0.294	0.215

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Columns (1) reports the 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) reports the 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.

Chapter II

Linguistic Proximity and Export Dynamics

The empirical literature on international trade has produced a wealth of information concerning the forces that shape the structure and the direction of international trade flows. We know from this literature that countries will trade more readily with each other if they have higher quality institutions (Levchenko, 2007), are geographically close (Disdier and Head, 2008), share a border (Anderson and van Wincoop, 2003), share a common language (Egger and Lassmann, 2012), host migrant populations (Rauch and Trindade, 2002; Head and Ries, 1998), are considered trustworthy (Guiso et al., 2009) or are culturally close (Felbermayr and Toubal, 2010). Recently, Melitz and Toubal (2012) have looked at the importance of communication and language in international trade. They argue that the use of a dummy variable for official language fails at capturing the full impact of language on international trade flows. In some cases, the use of an official language can be a legacy of past colonial relationship, or the official language may be only used for administrative and judicial purpose, and be little spoken by the population of the country. For instance, French is the official language of many sub-saharan African countries, but is spoken by a small share of the population in these countries. Most of these studies have been conducted at the macro level under a static framework

and thus they remain silent on the dynamics of international trade flows. Little is known concerning how firms manage to overcome the institutional, cultural, or linguistic barriers that exist between countries.

In this paper, we look at the dynamics in French export data to investigate how the linguistic proximity between countries can help describe where firms decide to export. More specifically, we look at the linguistic similarity between the countries where firms were at first exporting to and the country where they decide to export next. Language is an important aspect of the cultural identity of individuals. Lazear (1999) defines language as *"the set of common sounds and symbols by which individuals communicate."*. It follows from this definition that language is not only about spoken communication, but also about posture, body language or non-verbal communication. Language and culture are deeply intertwined, and affect the degree people trust other individuals (Glaeser et al., 2000), where people decide to migrate (Chiswick and Miller, 1994), as well as the aggregate trade flows (Melitz and Toubal, 2012). Linguistic proximity between two countries should therefore influence the ability of their population to communicate and understand each other. In this paper, we argue that language can help explain where exporting firms decide to export next. Countries that have a similar language also tend to share some cultural values such as beliefs, social norms, or preferences. For instance, if a firm finds it profitable to export to Denmark, it might be more likely to export to Norway or Finland in the future. These countries are at the same time geographically and culturally very close to one another. We argue that, controlling for the geographic proximity between countries, firms tend to exhibit a linguistic bias in their export decision.

The recent literature on firm level export dynamics has focused on the learning-by-exporting process to explain the emergence of networks in international trade. Empirical evidence suggests that firms do not randomly choose their export destinations. The decision for a firm to enter a new market is linked to its experience in other export markets. Albornoz et al. (2012) propose a model of firm level export

dynamics and network formation. In their model, firms are originally uncertain about their profitability in the export market. An important assumption the authors make is that profits in the export markets are correlated over time and across destination. Upon entry into a new market, firms uncover their profitability and decide to stay with or leave the market. With profits correlated over time, the firm also acquires information about its future profits in this very same market. With profits correlated across destination, the firm acquires information on its potential profits in other destinations. This correlation of export profits over time and destinations leads firms to engage in what the authors call a *sequential exporting*. They test their model using Argentinean customs data, and provide some evidence that primo-exporters (i.e. firms that just started exporting to a given country) are more likely to subsequently export to a country that shares a border or an official language with their previous export markets.[1] Their paper is related to this study as we could argue that the positive correlation of profits across destinations is higher for countries that are geographically and linguistically similar to the firms' previous export markets. Chaney (2014) develops a theoretical model of networks in international trade where a firm is more likely to enter markets that are closer to its existing trading partners. In his model, a firm can acquire new contacts in two ways. It can either search directly from its home country, or it can use its network of existing contacts to remotely search for new partners. The direct search includes all the bilateral links between the exporter and the importer. Empirically, the gravity equation has been intensively used to study the direct search channel. The remote search links the various export markets of a firm together. A firm uses the knowledge and information obtained through its existing contacts to act as a "local" firm when looking for new trade partners. This means that a firm is more likely to find partners in countries that are close to its existing contacts. Other empirical studies on the geographic bias in the export decision of firms include Lawless (2013); Defever et al.

[1] Morales et al. (2014) use a moment inequality method to estimate the various trade costs associated with exporting. They find that a shared border significantly reduces the cost of exporting to a new country. However, they find a common language between export destinations does not significantly affect the cost of entering a new market.

(2011) and Eaton et al. (2007). So far, the literature has focused on the geographic bias of the export decision.

This paper contributes to the international trade literature in several ways. First, we look at how linguistic proximity affects the French exporters of goods and services. Firms exporting services should be sensitive to linguistic differences for various reasons. Most services are extremely specific to the producer-consumer relationship and are usually intensive in communication and live interactions. Being able to communicate in the same language and knowing the non-verbal codes, social norms, beliefs or preferences specific to a culture are therefore crucial determinants of the success of a producer-consumer service relationship. Linguistic proximity should matter when looking for new contacts and also for the actual "delivery" of the service as well. Second, instead of looking at the linguistic differences between the exporting and the importing countries, we look at how the linguistic differences between the countries where a firm is already exporting can explain where the firm decides to export next. The results suggest that after controlling for the geographic distance between the different export markets, linguistic proximity is positively correlated with the firms' decisions to enter new markets. Firms are more likely to export to countries that are linguistically close to their previous markets. Our results are robust in controlling for other cultural and linguistic factors (common religion, official language, share of the population speaking the same native language), institution similarities (common legal system, colonial relationship) and other economic determinants (common currency, regional trade agreement). In the process, we also find a greater effect of geographical and linguistic proximity for firms exporting to many countries, as suggested by Chaney (2014). Finally, this paper contributes to the small but growing literature on firm-level trade in services. Although scarce, this literature agrees on a number of stylized facts: very few firms export services; exporters of services are bigger, more productive, and pay higher wages than domestic firms; most exporters export one service to one destination; and most of the exports are made by the top 10% of exporters. They

also find that there is some persistency in the export status. The literature has not yet considered the existing links between the different export markets.[2]

In the following section, we describe the empirical strategy we use to isolate the impact of linguistic proximity on firms' export decisions. The data are described in Section 2. Results follow in Section 3 and robustness checks are presented in Section 4. Section 5 concludes and proposes possible extensions.

1 Empirical implementation

The mechanisms we want to describe are related to the recent theoretical model developed by Chaney (2014). Chaney proposes a theoretical model to describe how firms acquire new contacts abroad. When looking to export to new markets, firms look for contacts with whom to establish trade relationships. Firms face two options when searching for new contacts. They can either directly search from their home base, or use their existing contacts to remotely search for new clients. The efficiency of the direct search can be assessed with the traditional gravity equations. Firms will find more contacts in larger markets, and less contacts in markets located far away from their home country. Most of the international trade literature has focused on this channel to explain the bilateral trade flows between countries. The gravity equation has been the main tool to investigate this (Anderson and van Wincoop, 2003). Once firms start exporting, they acquire contacts abroad, and can use these contacts as a way to search for new contacts. Chaney (2014) calls this the indirect search, whereby firms use their existing network of contacts to remotely search for new clients. The efficiency of the indirect search will also be influenced by the usual gravity forces, but this time the gravity force will work between the countries where firms are already exporting and the countries where firms want to export next. Furthermore, his model predicts that as firms reach more consumers, the

[2] Firm-level studies on firm-level trade in services include: Breinlich and Criscuolo (2011) for the UK, Ariu (2012) for Belgium, Conti et al. (2010) for Italy, Kelle and Kleinert (2010) for Germany, Gaulier et al. (2011) for France and Walter and Dell'mour (2010) for Austria.

direct search becomes negligible and only the remote search remains. This means that as firms reach more and more consumers (possibly in multiple countries), they will be more likely to find new consumers through the remote search. While we do not have direct information on the number of consumers each firm has in the export markets, we can nevertheless see whether the remote search becomes more important as firms export to more markets. In Section 4 we provide some evidence supporting this mechanism.

In this paper, we focus on the remote search channel, i.e. on the links between the countries where a given firm is exporting to. We want to assess whether firms find new contacts in countries that are linguistically close to their prior export markets. We know where firms export to in a given year and where they exported to the year before. We need to focus on the links between the different markets and see whether there is a linguistic bias in the choice of destination markets. This mechanism is therefore at the firm×country level. To wipe out any firm characteristic that would make firms more likely to export to *any country*, we use firm×year dummies. This controls for size, productivity, managerial skill, age, geographic location within France, etc. To control for any country characteristic that would make *any firm* more likely to export there, we use country×year dummies. This set of dummies accounts for all the traditional determinants of trade flows used in the gravity equations: distance from France, GDP, common border, official language, and the multilateral resistance terms (Anderson and van Wincoop, 2003). We estimate the following equation:

$$\begin{aligned} \Pr[Entry_{i,c,t}=1] &= \alpha_1 LinguisticProximity_{i,c} + \alpha_2 GeographicProximity_{i,c} + \\ &\quad \alpha_3 Controls_{i,c} + \theta_{it} + \psi_{ct} + \varepsilon_{ict}, \end{aligned} \tag{II.1}$$

where $\varepsilon_{i,c,t}$ is the error term, θ_{it} and ψ_{ct} are firm×year and country×year dummies respectively. The subscript c denotes the destination country at time t, while c' de-

notes the countries where firm i exported to in $t-1$. LinguisticProximity$_{i,c}$ measures the linguistic similarity between country c and the countries c'. GeographicProximity$_{i,c}$ measures the geographic proximity between country c and the countries c'. α_1 and α_2 capture the linguistic and geographic bias in the export decision of firm i. Controls$_{i,c}$ is a set of variables that capture other cultural, institutional and economic links between country c and the countries c'. The data are described in the next section. We define LinguisticProximity$_{i,c}$ as the average linguistic proximity between country c and the countries c':

$$LinguisticProximity_{i,c} = \frac{1}{\#c'} \sum_{c'} LinguisticProximity_{c,c'}, \tag{II.2}$$

with c' being the countries to which firm i is exporting to in the previous period. For GeographicProximity$_{i,c}$, we follow Chaney (2014) and define it as follows:[3]

$$GeographicProximity_{i,c} = \frac{1}{\#c'} \sum_{c'} \frac{1}{distance_{c,c'}}, \tag{II.3}$$

where distance$_{c,c'}$ is the geographic distance (in thousands of kilometers) between country c and country c'. Note that GeographicProximity$_{i,c}$ is inversely related to the distance between countries. We expect it to be positively correlated with the entry probability.

We use a linear probability model to estimate equation (II.1). A general drawback of the linear probability model is the possibility for predicted probabilities to lie beyond the [0;1] interval. This should not be a concern here since we are not interested in producing any predictions, but focus on the average marginal effects (Angrist and Pischke, 2008). Furthermore, Wooldridge (2001, chap. 15) points out that linear probability models are performing well when most of the covariates are discrete variables and take only a few values, which is the case here. The use of Linear Probability Model allows us to include an important set of dummies, controlling for many unobserved factors which, if omitted, could bias our estimates. In the

[3] In Table II.8, we use alternative measures for the linguistic and geographic proximity.

next section, we present the data on the exporters of goods and services and show some descriptive statistics on the correlation between the entry probability and the linguistic and geographic proximity.

2 Data description

We use two different sources for our firm-level trade data. The first database comes from the French Central Bank and records the exports and imports of mode 1 services by French firms.[4] Data are collected through banking declarations, or directly from the company itself[5] and are available for the period 1999-2005. The database records, for each French firm, the annual exports and imports of services by country and type of service. There are 21 different types of services in this classification, which is slightly different from the *Extended Balance of Payments Services Classification (EBOPS)*. We select the exports of IT services, licence and patents, audiovisual services and other business services. These services account for two thirds of the total exports of services and almost 90% of the exporting firms in our database. This leaves out the exports and imports of construction, communication (postal and telephone fees), insurance (premia and various fees) and the services from the public administration. We want to focus here on the services that are the most likely to be affected by linguistic of geographic proximity. We aggregate the data at the year×firm×country level. We start with 21,193 firms, which account for almost €11bn of exports. Since some firms may be exporting both goods and services, we restrict our sample of firms to the pure exporters of services. This leaves out 7,911 firms from our sample.[6] Our baseline sample consists of 13,282 pure exporters of services, which account for 20% of the aggregate exports

[4] The General Agreement on Trade in Services (GATS) classifies trade in services into four Modes: mode 1 refers to cross-border trade, mode 2 to consumption abroad, mode 3 to commercial presence and mode 4 to the temporary movements of persons. See the GATS webpage on the WTO website for further information: http://www.wto.org/english/tratop_e/serv_e/serv_e.htm

[5] This concerns only the largest companies, called *Déclarants Directs Généraux*.

[6] Gaulier et al. (2011) describes the overlap in the exports of services and goods by French firms in the manufacturing and service sector.

of services from the original sample. Given the aim of this study, we need to focus on firms that export more than one year over the period, and that export to new markets. Firms exporting only one year or to the same country do not provide any information on the mechanisms we want to describe. In our sample, 8,267 firms export only one year. We thus select firms that export in consecutive years, and that export to at least one new country. This reduces the size of our sample to 2,008 firms, whose aggregate exports amount to €1.1bn. On average firms export to 3.7 countries (the median number is 2).[7] The average probability of entering a new market is 1.9%, and on average firms enter 1.8 new countries (the median number is 1). The trade statistics do not provide information on the industry classification of the firm or on its ownership. In Section 4, we will restrict our sample to firms from the service sector. To do this, we use the Enquêtes Annuelles d'Entreprises (EAE), a business survey. This survey is not exhaustive, and we are only able to match the information on the industry classification for 672 firms.

The second database we use comes from the Customs Office and records the exports and imports of goods for each French firm at the product×country×year level. To use the same time horizon as in the trade in services data, we select the years 1999-2005. There are two declaration thresholds in the data, depending on whether firms are exporting to the European Union, or outside the European Union. Exports to the EU are recorded when the yearly exports of a firm exceed €100,000. The threshold for the exports outside the EU is lower, and each transaction above €1,000 is recorded. In section 4, we present robustness checks where we apply the same declaration threshold (yearly exports larger than €100,000) to all firms. Trade flows are recorded according to the CN8 classification, which allows us to use Rauch's classification (Rauch, 1999) to distinguish between the exports of differentiated products, the exports of products with a reference price (listed products), and the exports of homogeneous goods, sold on organized markets. Empirical studies have

[7] These figures are much larger than what is traditionally seen in the literature. This is entirely due to the fact that we focus on firms that export to multiple countries, and that do not leave the export market after one year. We are therefore selecting large exporters.

shown that trade in differentiated goods is more sensitive to institutions (Ranjan and Lee, 2007) or to the presence of migrant networks (Rauch and Trindade, 2002) than trade in homogenous products. In our case, linguistic proximity could be more important for differentiated products than for homogenous products. Firms increasingly customize their product in order to meet the customer's needs, and this requires detailed information on the consumer's preferences and tastes. Firms exporting differentiated products may rely more on communication to acquire new contacts and customize their products than firms exporting homogenous goods. Applying the same set of restrictions as for the exporters of services (firms exporting more than one year, exporting only goods, and exporting to new countries) leaves us with a sample of 61,997 firms. These firms account for 48% of the aggregate exports of differentiated products in the raw database. On average firms export to 6.5 markets (the median number is 3). Remember that we focus on firms that export to new markets, and more than one year. On average firms enter 2.6 new markets in a given year (the median number is 2). In Section 4 we present results where we restrict our sample to manufacturing firms. We use the EAE business survey for manufacturing firms to make the selection. This gets rid of wholesale firms, whose export behavior may be quite different from that of direct exporters (Crozet et al., 2013; Bernard et al., 2010; McCann, 2013). The sample of manufacturing firms consists of 12,984 firms.

Data on the geographic proximity between countries (distance, presence of a border, time-zone differences) come from the gravity database developed by CEPII.[8] This database also includes information on the religious similarity between countries. Similarities in the religious composition of the populations in two countries is measured as the probability of randomly selecting two individuals in two countries, sharing the same religion. Data on the linguistic proximity and proportion of the population sharing the same native language come from Melitz and Toubal (2012). As the religious similarity measure, the native language similarity is the

[8] Data are described in Mayer and Zignago (2011), and available at http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6.

probability of randomly selecting two individuals in two countries, sharing the same native language. This measure aims at capturing the cultural similarities that arise because of migration flows.[9] The linguistic proximity measure is based on the work by ethno-linguists and ethno-statisticians on the Automated Similarity Judgement Program (Brown et al., 2008).[10] The members of the project compared the meaning of over 40 list-words in different languages. Using a scoring algorithm, they have been able to transform this similarity in meanings into data useful for quantitative analysis. Melitz and Toubal (2012) then linked countries with native languages, and produced a bilateral matrix of linguistic proximity. This measure aims at capturing various features of the differences between cultures that are persistent over time.

Beside linguistic and geographic proximity, we also control for various institutional and economical factors that may influence the firm's decision to enter new markets. The ability to write down enforceable contracts can affect the search for new contacts. Countries sharing the same legal system show similarities in how contracts are written down and enforced. We use data from La Porta et al. (1999) to control for the similarity in the legal system between countries.[11] Exporters are also exposed to exchange rate movements with their trading partners. Exporting to a country that shares a common currency with a previous export destination alleviates this exposure, as it is common to both countries. We use data from de Sousa (2012) on the use of common currencies between countries. Further,de Sousa and Lochard (2011, p.554) argue that sharing a common currency reduces the currency conversion

[9] Cultural characteristics tend to be persistent over time, especially in migrant populations (Borjas, 1995; Bisin and Verdier, 1998; Algan and Cahuc, 2013). Cultural transmission can be achieved through three channels. First, there can be a horizontal mechanism of cultural and linguistic transmission. People with different cultures and languages can learn from each other if they are located near each other. Second, there can be a vertical mechanism of transmission, where older generations teach new generations about their language and their cultural heritage. This mechanism reinforces the cultural identity of the individuals. Finally, the natural environment can also influence how societies organize and how their culture may evolve, and similar environment are generally located close to each other. See Krech et al. (1962); Welsch et al. (1992); Shennan and Collard (2005) for studies on the contribution of these three factors to the cultural transmission.

[10] Detailed information are available on the website of the project at: http://email.eva.mpg.de/~wichmann/ASJPHomePage.htm.

[11] See Porta et al. (2008) for a discussion on the link between culture and legal origin.

costs; the costs incurred by maintaining separate foreign currency expertise and it eases price decisions and comparison of international costs.[12] We also control for the growth in trade between countries. The intensification in the trade relationship between countries may benefit the French firms that export to one of these countries. We use data on bilateral export flows from the BACI database, developed by CEPII.[13] Greater integration between countries is also correlated with the presence of regional trade agreements. We use data from de Sousa (2012) to control for the presence of such agreements. Finally, we use the difference in GDP per capita between the export markets as a proxy for differences in the demand structure. This control is motivated by the well-known Linder (1961) hypothesis which states that trade between countries is positively correlated with the similarity of their demand structure. Since we do not have detailed information on the structure of the demand in each country, we use the difference in GDP per capita (scaled by the sum of the GDPs per capita) as a proxy. The measure ranges from 0 to 1, where low values indicate small differences in GDP per capita.

We present some descriptive statistics on the entry probability and the characteristics the destination market shares with the previous export destinations of firms. Statistics are presented in Table II.1. In the upper part of the table, we look at firms exporting services. In our sample, the average probability of entry is 1.9%. The first two lines show that the entry probability is significantly higher when looking at countries with an above-sample linguistic of geographic proximity. Firms are more likely to enter markets that are close to their previous export market, both in terms of linguistic proximity and in terms of geographic proximity. The entry probability is also much larger (10% and 13% respectively) for countries that share a border, or a border and an official language respectively, with the firms' previous export destinations. The lower panel of Table II.1 describes the entry probability for the exporters of differentiated products. Results are qualitatively similar to the one

[12] Dowd and Greenaway (1993, p.1188-1189) study the network externality of money, and end by suggesting that their reasoning could be applied to language as well.
[13] See Gaulier and Zignago (2010) for a description of the database.

in the upper panel. Both linguistic and geographic proximity seem to matter in the decision of firms to enter a new market. If anything, these stylized facts suggest that the linguistic proximity seem to be less important for the exporters of differentiated products than for the exporters of services. These are simple correlations however, and an econometric analysis is necessary to control for other factors.

Table II.1: Probability of entry in 2005 and cross-country characteristics

Exports of professional services	
Average probability of entry	0.019
Linguistic proximity above sample average	0.032***
Geographic proximity above sample average	0.031***
Common border=1	0.103***
Common official language=1	0.029***
Common border=1 & common official language=1	0.132***

Exports of differentiated goods	
Average probability of entry	0.021
Linguistic proximity above sample average	0.024***
Geographic proximity above sample average	0.033***
Common border=1	0.088***
Common official language=1	0.028***
Common border=1 & common official language=1	0.102***

Stars mean that the difference with the average probability of entry is significant at the 1% level.

One concern that may arise from the various measures of proximity we use is that they may be correlated with one another. Populations that are far away from each other tend to also be culturally and linguistically different. Our measures of linguistic and geographic proximities are based on the average similarity and average distance between the different export markets of a firm. The use of average measures should wipe out some of the correlation between linguistic and geographic proximity. Table II.2 presents the correlations between linguistic and geographical proximity, along with other culture-related variables. The correlation between linguistic proximity and the proportion of individual sharing the same native language is very small. Similarity in the religious composition of the population between countries is positively correlated with the linguistic proximity and the share of the population sharing the same native language. All these correlations

are statistically significant but are small in magnitude. Linguistic and geographic proximity are mildly correlated to one another in both samples.

Table II.2: Correlation table: Firms exporting services

	Exporters of services			
	Ling. $\text{Prox}_{i,c}$	Nat. $\text{Lang}_{i,c}$	Relig. $\text{Prox}_{i,c}$	Geo. $\text{Prox}_{i,c}$
Ling. $\text{Prox}_{i,c}$	1			
Nat. $\text{Lang}_{i,c}$	-0.0852	1		
Relig. $\text{Prox}_{i,c}$	0.3766	0.1879	1	
Geo. $\text{Prox}_{i,c}$	0.2836	-0.0157	0.0874	1

	Exporters of differentiated products			
	Ling. $\text{Prox}_{i,c}$	Nat. $\text{Lang}_{i,c}$	Relig. $\text{Prox}_{i,c}$	Geo. $\text{Prox}_{i,c}$
Ling. $\text{Prox}_{i,c}$	1			
Nat. $\text{Lang}_{i,c}$	-0.0217	1		
Relig. $\text{Prox}_{i,c}$	0.2851	0.3391	1	
Geo. $\text{Prox}_{i,c}$	0.0955	0.0101	-0.0289	1

3 Results

In Tables II.3 and II.4 we report the results of our estimates of equation (II.1) for the exporters of services and the exporters of differentiated goods respectively.

In column (1), we simply regress the probability to enter a new market on the linguistic proximity. The correlation is not significant for the exporters of differentiated products, and positive and significant for the exporters of differentiated products. Linguistic proximity may capture other cultural aspects shared by the countries c' and country c beside language. To control for the past waves of migrations to country c, we include the share of the population speaking the same native language. Past generations of migrants traditionally pass on some of their cultural and linguistic heritage to younger generations. We introduce this variable in column (2) to ensure that we are not merely capturing a correlation between trade and migration. The results in column (2) in Table II.3 show that once we control for the native language similarity between countries, the linguistic proximity variable becomes positive and significant In Table II.4, the inclusion of the native language

variable increases to coefficient on linguistic proximity.

Next, we control for the presence of an official languages between countries c' and country c, and for the similarity in the religious composition of their populations. The inclusion of these two additional controls leaves the coefficient on linguistic proximity virtually unaffected, in both tables. The presence of an official language is positively correlated with the export probability for the exporters of services, while the religious proximity is not. Conversely, for the exporters of differentiated products, the presence of an official language is negatively correlated with the export probability, while the religious proximity is positively correlated with it. The negative sign on the official language variable is puzzling. However, it is important to recall that the presence of an official language is not necessarily an accurate measure for language or cultural proximity between countries, especially once we control for the linguistic proximity and for the share of the population speaking the same native language.

Finally, we control for the geographic proximity between countries c' and country c. Countries that are far away form each other tend to have very different languages and cultures in general. Linguistic and cultural similarity could be correlated with geographic proximity. We expect to find a smaller coefficient on the linguistic proximity variable once we account for the geographic proximity. This is what the results in columns (5) suggest, once we only control for geographic proximity, and once we control for the presence of a border, in column (6). The coefficient on linguistic proximity remains positive and statistically significant in both tables.

It is noteworthy that in Table II.3, the coefficients on the linguistic proximity and on the similarity in native language are not statistically different from one another. They are very different in Table II.4, however. Two populations sharing the same native language tend to share some cultural values as well (social norms, common history, similar preferences or beliefs, higher trust). Our data do not give use much information on which cultural aspect is captured by the Native language$_{i,c}$ variable. Nevertheless, this cultural proximity seems to matter more for the exporters of

services than for the exporters of differentiated products.

Table II.3: Exports of **professional services**: probability of entering a new market

	(1)	(2)	(3)	(4)	(5)	(6)
Linguistic prox$_{i,c}$	-0.009	0.037^{a}	0.037^{a}	0.036^{a}	0.025^{a}	0.026^{a}
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
Native language$_{i,c}$		0.047^{a}	0.042^{a}	0.042^{a}	0.032^{a}	0.023^{a}
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Official language$_{i,c}$			0.003^{a}	0.003^{a}	0.003^{a}	0.002^{b}
			(0.001)	(0.001)	(0.001)	(0.001)
Religious prox$_{i,c}$				0.000	0.001	-0.000
				(0.002)	(0.002)	(0.002)
Geographic prox$_{i,c}$					0.009^{a}	0.003^{a}
					(0.001)	(0.001)
Border$_{i,c}$						0.039^{a}
						(0.003)
Observations	348,626					
Nb firms	2,008					
Fixed Effects	Firm×Year, Country×Year					
R2	0.14					

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level.

Table II.4: Exports of **differentiated products**: probability of entering a new market

	(1)	(2)	(3)	(4)	(5)	(6)
Linguistic prox$_{i,c}$	0.090^{a}	0.115^{a}	0.115^{a}	0.094^{a}	0.061^{a}	0.054^{a}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Native language$_{i,c}$		0.047^{a}	0.047^{a}	0.033^{a}	0.009^{a}	0.005^{a}
		(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Official language$_{i,c}$			-0.000	-0.000^{b}	-0.001^{a}	-0.001^{a}
			(0.000)	(0.000)	(0.000)	(0.000)
Religious prox$_{i,c}$				0.018^{a}	0.019^{a}	0.014^{a}
				(0.000)	(0.000)	(0.000)
Geographic prox$_{i,c}$					0.022^{a}	0.013^{a}
					(0.000)	(0.000)
Border$_{i,c}$						0.042^{a}
						(0.000)
Observations	22,027,315					
Nb firms	61,997					
Fixed Effects	Firm×Year, Country×Year					
R2	0.07					

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level.

In Tables II.5 and II.6 we control for possible omitted variable biases. We include each additional variable one at a time, and include them all together in the last column of the tables.

First, we control for the historical colonial links between countries. We use a dummy which takes the value 1 of country c had a colonial relationship (after 1945) with any of the country c'. The coefficient on $\text{Colony}_{i,c}$ is non-significant in Table II.5, and only significant in the first column of Table II.6. Note that we use country×year dummies which control for any link colonial link country c may have had with France. Therefore, the dummy $\text{Colony}_{i,c}$ captures the effect of exporting to countries that were former British colonies for instance, or that were former Spanish colonies. In columns (2) of Tables II.5 and II.6, we control for the similarity in the legal system. Writing down enforceable contacts is difficult and costly. Countries sharing the same legal system may also show some similarities in how contracts are enforced. The coefficient on $\text{Legal syst}_{i,c}$ is not significant in Table II.5, while it is positive and statistically significant in Table II.6. The non-significant coefficient in Table II.5 is rather puzzling given the great specificity of services in the producer-consumer relationship. Incomplete contracts are likely to be prevalent in service transactions. However, the legal-system dummy we use is probably not sufficient to capture the subtleties of contract enforcement. In columns (3), we control for whether country c is located in the same time-zone as one of the countries c'. Empirical evidence suggests that the time-zone difference matter for FDI and trade in services (Stein and Daude, 2007; Christen, 2012). The coefficient is however not significant in Table II.5 and positive and significant in Fable II.6, but very small in magnitude. We next control for whether country c uses the same currency as one of the countries c' (column (4)). As described earlier, firms exporting to countries that use the same currency saves on conversion costs, and is exposed to the same exchange rates fluctuations. The coefficient is positive and significant in both tables, and quite large in magnitude. On average, for firms exporting services, the probability to enter a new market is greater by 2 percentage points. The probability increases by

5 percentage points for firms exporting differentiated products. Next, we control in columns (5) for the presence of regional trade agreement between country c and one of the countries c'. Regional trade agreements are traditionally observed between countries that are show considerable economic integration. We find a non-significant coefficient in Table II.5. Traditionally, trade agreements are designed for trade in goods, not trade in services, and a separate economic integration agreement is needed. These number of these agreements has been growing over the past decade, but remain small compare the the agreements covering trade in goods (Cole and Guillin, 2013). This could why we find a non-significant result for the exporters of services, and a positive and significant coefficient in Table II.6. However, the coefficient is smaller than what we found for the use of a common currency between countries. In column (6), we investigate whether firms are more likely to export to countries with similar demand structure. The original formulation of the Linder hypothesis states that countries with similar demand structure trade more with each other Linder (1961). We empirically investigate whether this could also hold across the countries firms export to. We define the similarity in the demand structure between two countries as the difference in their GDP per capita, divided by the sum of their GDP per capita. We then take the minimum value by firm and country c:

$$Linder_{i,c} = \min_{c'} \left\{ \frac{|GDPcap_{c'} - GDPcap_c|}{GDPcap_{c'} + GDPcap_c} \right\}$$

The larger the $\text{Linder}_{i,c}$, the greater the differences in GDP per capita with country c. The coefficient is non-significant for the exporters of services, and negative and statistically significant for the exporters of differentiated products. Finally, in column (7) of tables II.5 and II.6, we control for the intensification in the trade relationship between country c and the set of countries c'. We compute the growth rate on the trade flows between all the countries c' and country c. An intensification of the trade relationships between these countries could benefit the French firms that are already exporting to one of the countries c'. Their experience in one of the countries c' would allow them to benefit from the increase in the trade flows with

country c. The French firms could, to some extent, "get on the same boat" as the firms from country c' to start exporting to country c. We do not have information on the bilateral trade in services data for a sufficient number of countries, so we use the growth in trade in goods across countries instead. The coefficient is non-significant in Table II.5 and negative and significant in Table II.6. The non-significant coefficient for the exporters of services could reflect the poor fit our the growth in trade in goods to proxy for trade in services. The negative coefficient for the exporters of differentiated products is more puzzling however. This could suggest a "crowding out" effect that leaves the French exporters out of market c. Overall, the results remain very similar when we include all the controls together in the last columns of the two tables.

Table II.5: Exports of **professional services**: probability of entering a new market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Linguistic $prox_{i,c}$	0.026^a	0.026^a	0.026^a	0.028^a	0.027^a	0.023^a	0.026^a	0.028^a
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Native $language_{i,c}$	0.024^a	0.023^a	0.024^a	0.028^a	0.025^a	0.023^a	0.023^a	0.028^a
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Off. $language_{i,c}$	0.002^b	0.002^c	0.002^b	0.001	0.002^c	0.002^b	0.002^b	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Religious $prox_{i,c}$	-0.001	-0.001	-0.001	-0.004^c	-0.002	-0.001	-0.000	-0.006^b
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Geographic $prox_{i,c}$	0.003^a	0.003^a	0.003^b	0.001	0.000	0.003^a	0.003^a	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$Border_{i,c}$	0.039^a	0.039^a	0.039^a	0.037^a	0.038^a	0.039^a	0.039^a	0.035^a
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$Colony_{i,c}$	0.002							-0.001
	(0.003)							(0.003)
Legal $syst_{i,c}$		0.001						0.001
		(0.001)						(0.001)
Time-$zone_{i,c}$			0.001					0.001
			(0.001)					(0.001)
$Currency_{i,c}$				0.022^a				0.021^a
				(0.003)				(0.003)
$RTA_{i,c}$					0.011^a			0.009^a
					(0.001)			(0.001)
$Linder_{i,c}$						-0.006		-0.003
						(0.004)		(0.004)
$\Delta Exports_{i,c}$							-0.000	-0.001
							(0.001)	(0.001)
Observations	348,626							
Nb firms	2,008							
Fixed Effects	Firm×Year, Country×Year							
R2	0.14							

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level.

Table II.6: Exports of **differentiated products**: probability of entering a new market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Linguistic prox$_{i,c}$	0.053^a	0.054^a	0.054^a	0.046^a	0.054^a	0.046^a	0.054^a	0.044^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Native language$_{i,c}$	0.007^a	0.004^a	0.005^a	0.013^a	0.004^a	0.004^a	0.005^a	0.011^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Off. language$_{i,c}$	-0.002^a	-0.002^a	-0.001^a	-0.003^a	-0.002^a	-0.001^a	-0.001^a	-0.004^a
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Religious prox$_{i,c}$	0.013^a	0.014^a	0.014^a	0.011^a	0.013^a	0.013^a	0.014^a	0.010^a
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Geographic prox$_{i,c}$	0.013^a	0.013^a	0.013^a	0.007^a	0.011^a	0.012^a	0.013^a	0.006^a
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Border$_{i,c}$	0.042^a	0.042^a	0.042^a	0.037^a	0.041^a	0.041^a	0.042^a	0.036^a
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Colony$_{i,c}$	0.006^a							-0.000
	(0.000)							(0.000)
Legal syst$_{i,c}$		0.003^a						0.003^a
		(0.000)						(0.000)
Time-zone$_{i,c}$			0.000^a					0.001^a
			(0.000)					(0.000)
Currency$_{i,c}$				0.056^a				0.055^a
				(0.000)				(0.000)
RTA$_{i,c}$					0.007^a			0.004^a
					(0.000)			(0.000)
Linder$_{i,c}$						-0.013^a		-0.005^a
						(0.000)		(0.000)
ΔExports$_{i,c}$							0.000	-0.000^b
							(0.000)	(0.000)
Observations	22,027,315							
Nb firms	61,997							
Fixed Effects	Firm×Year, Country×Year							
R2	0.07							0.08

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level.

4 Robustness checks

In this section, we present three sets of robustness checks to assess the validity of our results.

First, we use alternative measures of linguistic and geographic proximity. The various measures are summarized in Table II.7. In our baseline regression, we use the simple average linguistic proximity between the countries c', where firm i exported to in the previous year, and the potential new destination country c. Here, we use a weighted average of the linguistic proximity between countries. The weights account for the importance of each country c' in the total exports of the firm. The motivation for this is that countries that account for most of a firm's exports should matter more in terms of linguistic proximity with a third country.

The alternative measures for geographic proximity are taken from the literature. We use the alternative measures proposed by Chaney (2014) and Lawless (2013). Our baseline uses the "Chaney (2014)–1" definition. The alternative measures are positively correlated with the geographic proximity between country c and the countries c'. We therefore expect a positive sign on $\text{GeographicProximity}_{i,c}$ for these measures. Finally, we use the measure proposed by Lawless (2013), who uses the minimum distance between country c and the countries c', scaled by the distance between the origin country of the firm (France in our case) and the destination country c. This definition measures how much further away is country c from the home country (France) than country c' is from France. For instance, the distance between Austria and Bulgaria is the same as between Japan and North Korea (about a thousand kilometers). Looking from France however, the distance Japan-North Korea seems negligible compare to the distance between Austria and Bulgaria. We expect a negative sign on $\text{GeographicProximity}_{i,c}$ for this last measure.

We re-estimate our preferred specification (column (8) from tables II.5 and II.6) using alternatively each definition described in the previous table. We only report the coefficients on the linguistic and geographic variables.[14] The results are presented in

[14] The other coefficients remain very similar to the baseline estimates.

Table II.7: Measures of linguistic and geographic proximity

Weighted $LP_{i,c}$	Weighted $LP_{i,c} = \sum_{c'} LinguisticProximity_{c,c'} \times ExportShare_{i,c}$
Chaney (2014)–1	$GeographicProximity_{i,c} = \frac{1}{\#c'} \sum_{c'} \frac{1}{distance_{c,c'}}$
Chaney (2014)–2	$GeographicProximity_{i,c} = \frac{1}{\#c'} \sum_{c'} ln(20000/distance_{c,c'})$
Chaney (2014)–3	$GeographicProximity_{i,c} = \frac{1}{\#c'} \sum_{c'} exp(-distance_{c,c'}/3.5)$
Lawless (2013)	$GeographicProximity_{i,c} = \frac{1}{distance_{FRA,c}} \min_{c'} \{distance_{c,c'}\}$

Table II.8 and are very similar to the baseline. Regarding the exporters of services, linguistic proximity is still positive and significant, with a coefficient close to 0.028. It is significantly smaller in column (3) when we use the measure of geographic proximity proposed by Lawless (2013), and significantly larger in the last column, where we use the weighted measure of linguistic proximity. This last result suggest that firms are more likely to export services to countries that are linguistically close to their main export market (in terms of total sales). The coefficient on geographic proximity is quite stable too. It is negative and statistically significant in the third column. Firms are more likely to export to a new country that is close to *any* of their prior export markets. This last measure does not consider the number of countries firms export to, or the importance of these countries in the firms' network. Regarding the exports of differentiated products, the results are not sensitive to the definition we use to measure linguistic or geographic proximity, and remain very similar to the baseline estimates. The coefficient on geographic proximity is significantly larger in column (3). The scales are quite different however, so any comparison in the magnitude of the coefficients should be carefully addressed. Indeed, when standardizing the variables, we find that the coefficients are very similar to one another.[15]

[15] For the exporters of services, the standardized coefficients for the three Chaney measures are identical (equal to -0.001), while the standardized coefficient for the measure proposed by Lawless is -0.005 (significant at the 1% level). For the exporters of goods, the standardized coefficients on the Chaney–1, Channey–2 and Chaney–3 measures are equal to 0.004, 0.002 and 0.003 respectively, and equal to -0.004 for the Lawless measure.

Table II.8: Robustness checks: Alternative measures of linguistic and geographic proximity

	Exporters of Services			
	Chaney–2	Chaney–3	Lawless	Chaney–1 Weighted $LP_{i,c}$
	(1)	(2)	(3)	(4)
Linguistic $prox_{i,c}$	0.029^{a}	0.028^{a}	0.021^{b}	0.033^{a}
	(0.008)	(0.008)	(0.008)	(0.007)
Geographic $prox_{i,c}$	-0.003	-0.004	-0.004^{a}	-0.001
	(0.002)	(0.004)	(0.000)	(0.001)
	Exporters of Differentiated Products			
	Chaney–2	Chaney–3	Lawless	Chaney–1 Weighted $LP_{i,c}$
	(1)	(2)	(3)	(4)
Linguistic $prox_{i,c}$	0.043^{a}	0.044^{a}	0.046^{a}	0.039^{a}
	(0.001)	(0.001)	(0.001)	(0.001)
Geographic $prox_{i,c}$	0.008^{a}	0.017^{a}	-0.004^{a}	0.006^{a}
	(0.000)	(0.001)	(0.000)	(0.000)

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level. Each regression includes firm×year and country×year dummies, as well as all the control variables from Column (8) in Tables II.5 and II.6.

As as second set of robustness checks, we use several alternative samples of firms. The results are presented in Table II.9 In columns (1)-(3) we focus on firms exporting services. First, we restrict our sample to firms registered in the service sector. We already limited ourselves to firms that do not export goods, and this additional restriction gets rid of the manufacturing firms that may also be exporting services. Results are presented in column (1). The coefficient on linguistic proximity is much larger than in the baseline (0.050 compare to 0.028). This suggest that service firms exporting services are more sensitive to linguistic proximity than firms from the manufacturing sectors. The trade data we use may include intra-firm trade flows, which could bias our results. The decision by a firm to start exporting services could be decided by the firm's headquarters, and be uncorrelated with

geographic or linguistic proximity.[16] Unfortunately, we do not have information on the ownership of the firms. To overcome this issue, we restrict our sample of service firms to firms with less than 100 employees, thus reducing our sample to 543 firms exporting services. The results remain unchanged after this restriction, suggesting that they are not driven by the presence of very large firms in the sample. Finally, in column (3), we use the full sample of firms exporting services and restrict it to flows larger than €20,000. The size of the trade flows does not enter into our analysis since we look only at the probability to enter a new market. However, measurement errors or noise in the data that would translate into the presence of very small export flows could bias our results. The results in column (3) suggest that this could indeed be the case. The point estimate in the linguistic proximity variable is much larger than in the baseline regression (0.042 compare to 0.028 in the baseline). Interestingly, this does not affect the coefficient on the geographic proximity variable.

In columns (4) to (6), we use alternative samples for the firms exporting differentiated products. In column (4), we focus on firms registered in the manufacturing sector. This mainly gets rid of the wholesalers. This is important, as wholesalers are known for exporting to multiple countries on behalf of other firms (McCann, 2013; Crozet et al., 2013; Bernard et al., 2010). Their export strategy is therefore not necessarily based on their own experience, but rather on where their clients choose to export. Results are presented in column (4). The coefficient on linguistic proximity is not much affected by this restriction (goes up from 0.043 in the baseline to 0.05), while the magnitude of the coefficient on geographic proximity is substantially reduced (0.006 in the baseline regression). In column (5), we further restrict our sample to the manufacturing firms employing less than 100 workers. The results remain very similar to the one in column(4). Finally, in column (6) we account for the differences in declaration thresholds depending on whether firms export to the

[16] Egger et al. (2014) find that German multinational firms tend set up their affiliates sequentially in countries that are geographically and culturally close. This could drive our results if French multinational firms behave in the same manner and we do not control for their presence in our sample.

European Union or outside the EU. We apply the same declaration threshold to all firms and select firms that export at least €100,000 in a given year. This leaves us with 31,645 firms. The point estimates are considerably larger, for both the linguistic and geographic proximity variables. The larger point estimates could be driven by the fact that we are looking at larger exporter, who export to more countries. As the next robustness checks will show, the effect of linguistic and geographic proximity grows as firms export to more countries.

Table II.9: Robustness checks: alternative samples

Type of export:	Services			Differentiated goods		
Sample:	Service firms		Full	Manufacturing firms		Full
Restriction:	none	<100 emp.	flow>€20K	none	<100 emp.	EU threshold
	(1)	(2)	(3)	(4)	(5)	(6)
$LP_{i,c}$	0.050^{a}	0.049^{a}	0.043^{a}	0.045^{a}	0.041^{a}	0.077^{a}
	(0.015)	(0.015)	(0.009)	(0.002)	(0.003)	(0.002)
$GP_{i,c}$	-0.003	-0.002	-0.001	0.002^{a}	0.002^{a}	0.012^{a}
	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.000)
Observations	132,123	95,648	277,990	5,635,789	3,855,820	1,236,873
Nb firms	672	543	1,652	12,984	9,854	31,645
R2	0.16	0.16	0.14	0.09	0.08	0.09

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level. Each regression includes firm×year and country×year dummies, as well as all the control variables from Column (8) in Table II.5. $LP_{i,c}$ and $GP_{i,c}$ stand for $LinguisticProximity_{i,c}$ and $GeographicProximity_{i,c}$ respectively. In column (6), we restrict the sample to firms exporting at least €100,000 in a given year.

We present the last set of robustness checks in Table II.11. First, we examine whether the linguistic and geographic proximity matters more for firms exporting to multiple countries. Chaney (2014) suggest that as firms export to more countries, they tend to rely more on the remote search to look for new contacts. We investigate this by interacting the linguistic and geographic proximity variables with the number of countries firms export to. We only report the coefficients on the linguistic and geographic proximity, and the interaction terms. The other coefficients are very similar to the baseline estimates. The results are presented in columns(1) for the exporters of services and in column (5) for the exporters of goods. The interaction terms between the number of markets firms are exporting to and the linguistic and

geographic proximity are both positive and statistically significant. Focusing on the results on the exporters of services in column (1), we find that the total effect of the linguistic proximity on the export probability for firms exporting to exactly one market is not statistically differen from zero (the coefficient is: 0.03=-0.29+0.26, with a corresponding p-value of 0.73). Surprisingly, the coefficient on geographic proximity is negative and statistically significant for firms exporting to exactly one market (the coefficient is: -0.002= -0.005+0.003, p-value=0.06). It is non-significant for firms exporting to exactly two markets, and turns positive once firms export to at least three countries. Regarding firms export differentiated goods, the interaction terms are both positive and statistically significant. We further investigate this network size effect by re-estimating the baseline regression for firms that export to at least one market (the full sample in this case), at least two markets, at least three markets, etc. We standardize the coefficients on the linguistic and geographic proximity so that their magnitude can be compared. The point estimates measure the impact of one standard deviation in the linguistic or geographic proximity variables on the probability to export to a new market. The results are presented in Figure II.1. We plot the standardized coefficient on linguistic and geographic proximity along with a 95% confidence interval. In panel (a), we focus on the exporters of services. The results suggest that as firms export to more markets, the geographic proximity seems to increase the probability of entry into a new market more than the linguistic proximity. The point estimates are statistically different from one another when firms export to more at least 4 markets. For instance, considering a firm that is exporting to at least four markets, the average probability to export to a new market is 3.3%. An increase by one standard deviation in the geographic proximity variable increases the probability to export to a new market to 4.8%, while an increase by one standard deviation in the linguistic proximity variable increases the probability to export to a new market to 4.4%. The coefficient on the linguistic proximity gets larger as firms export to more markets, but it is also less precisely estimated. We report in Table II.10 the p-value associated with the

following null hypothesis: H0: $\beta_{Linguistic Proximity} > 0.00248$ where 0.00248 is the baseline standardized coefficient. The test results indicate that the coefficients are significantly larger than the baseline coefficient once firms export to at least 3 markets.

The results are more explicit in panel (b), for the exporters of differentiated products.[17] We see that both linguistic and geographic proximity matter more as firms export to more markets (the standardized coefficients are all statistically different from the baseline coefficient). The geographic proximity has a larger effect on the probability to enter a new market than the linguistic proximity. For instance, the average probability to enter a new market when firms are already exporting to at least four markets is 2.8%. The results suggest that an increase by one standard deviation in the geographic proximity increases the probability to 4%, while an increase by one standard deviation in the linguistic proximity increases the probability to 3.5%.

In columns (2) and (5), we examine whether the linguistic and geographic proximity matter when country c is far away from France. We define a dummy variable which takes the value one if the distance between France and country c is greater than 5,000km, and interact this dummy with our measures of linguistic and geographic proximity.[18] We find that the interaction term is not significant in column (2), suggesting that for the exporters of services, the linguistic proximity is positively correlated with the probability to enter a new market. Surprisingly, we find that the total effect on geographic proximity is negative for far away countries (the total effect is -0.004 and is statistically different from zero at a 1% significance level.). The significance of the interaction term vanishes once we look at firms that export to at least 2 markets, however. Turning to the exporters of differentiated products, results suggest that the impact of linguistic and geographic proximity is smaller (but still positive and significant) when firms enter far away

[17] See figure II.2 in the appendix for the corresponding graphs on the exporters of homogenous and listed products.

[18] Note that the country×year dummies that are included in each regression already account for this dummy.

markets.

In columns (3) and (6), we look at demand shocks in the destination countries. We define a dummy variable which takes the value one if the destination country experienced a growth in GDP larger than 8% in the previous period, and interact this dummy with the linguistic and geographic proximity variables. We remain agnostic on whether the interaction term should be positive or negative. A positive sign would suggest that the increase in demand in country c benefits more to the firms that are already exporting to countries close to country c. It would reinforce the advantage that these firms already have. A negative sign would suggest that, as the demand in country c increases, this country becomes easier to access and more attractive for *any* French firm. In this case, the experience firms acquire by exporting to countries close to country c would be less important. The interaction term is not statistically significant for the exporters of services. It is negative and statistically significant for firms exporting differentiated products though, suggesting that the (fast) growing demand can alleviate the lack of experience of some firms by making the market more accessible to everyone.

Finally, we look at whether export spillovers matter in the decision to start exporting to a new market. Krautheim (2012) develops a model where the fixed cost of exporting to a given country is decreasing in the number of firms already exporting to this country. Koenig et al. (2010) look at the local export spillovers in France and find that firms are more likely to start exporting a good k to country c if other firms in their geographic neighborhood are already export the same good k to country c. Our data do not provide information on the location of firms. However, we have information on the industry classification of the firms. We thus compute, for each firm, the number of firms in its industry j (defined at the 2-digit NACE classification) that are exporting to a given market in a specific year. We then interact this variable (Nb Exporters$_{j,c}$) with the linguistic and geographic proximity variables. A positive sign would suggest that this spillover reinforces the position of firms that are already exporting near country c. A negative sign would suggest

that experienced firms have a weaker advantage if they decide to start exporting to country c. This spillover would reduce the cost of exporting to country c for *any* firm. We find that for both the exporters of services (column4) and the exporters of differentiated products (column 8) the presence of a network of exporters from the same industry reinforces the correlation between geographic proximity and the export probability. The interaction with linguistic proximity is not significant. The point estimates are very small, however, suggesting that although significant, the presence of exporters from the same industry has a limited effect on the export probability of individual firms.

Figure II.1: Linguistic, geographic proximity and network size – standardized coefficients

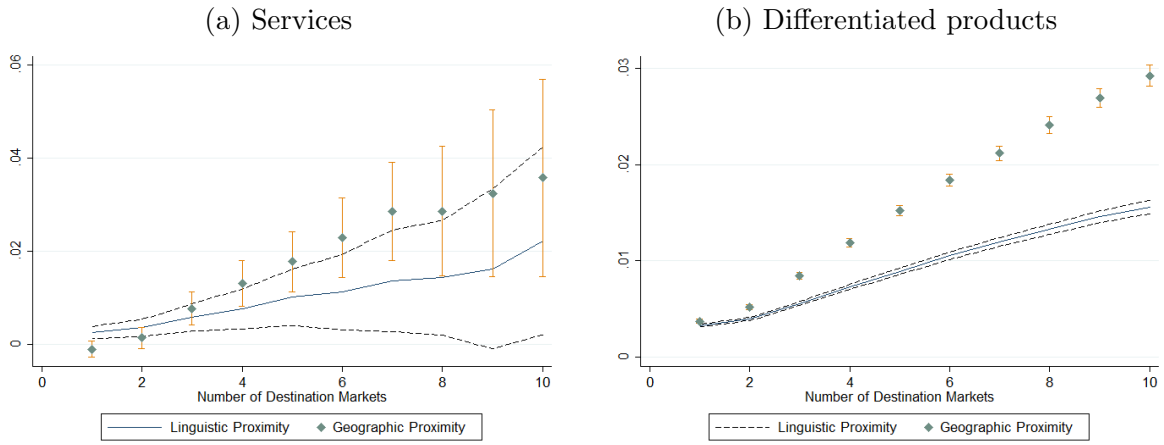


Table II.10: Statistical tests – Comparison between the different coefficients of figure II.1

	Exporters of services									
Nb Destination Markets	1	2	3	4	5	6	7	8	9	10
H0: $LP_{i,c}$=$GP_{i,c}$	0.00	0.11	0.37	0.07	0.05	0.02	0.03	0.10	0.10	0.27
H0: $LP_{i,c}$>0.00248	1	0.14	0.01	0.01	0.01	0.02	0.02	0.03	0.06	0.03
	Exporters of differentiated products									
Nb Destination Markets	1	2	3	4	5	6	7	8	9	10
H0: $LP_{i,c}$=$GP_{i,c}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H0: $LP_{i,c}$>.00326	1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table II.11: Robustness checks: introducing interaction terms

	Services				Differentiated products			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$LP_{i,c}$	-0.029^{a}	0.034^{a}	0.029^{a}	0.046^{a}	0.019^{a}	0.072^{a}	0.046^{a}	0.043^{a}
	(0.009)	(0.013)	(0.008)	(0.014)	(0.001)	(0.002)	(0.001)	(0.002)
$LP_{i,c}$×Nb markets$_{i}$	0.026^{a}				0.007^{a}			
	(0.003)				(0.000)			
$LP_{i,c}$×Far Away$_{c}$		-0.014				-0.055^{a}		
		(0.014)				(0.002)		
$LP_{i,c}$×Demand Boost$_{c}$			-0.017				-0.036^{a}	
			(0.011)				(0.002)	
$LP_{i,c}$×Nb Exporters$_{j,c}$				-0.000				0.000
				(0.001)				(0.000)
$GP_{i,c}$	-0.005^{a}	-0.001	-0.001	-0.003	0.001^{a}	0.005^{a}	0.006^{a}	0.001^{b}
	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
$GP_{i,c}$×Nb markets$_{i}$	0.003^{a}				0.002^{a}			
	(0.000)				(0.000)			
$GP_{i,c}$×Far Away$_{c}$		-0.003^{c}				-0.002^{a}		
		(0.002)				(0.000)		
$GP_{i,c}$×Demand Boost$_{c}$			-0.001				-0.004^{a}	
			(0.001)				(0.000)	
$GP_{i,c}$×Nb Exporters$_{j,c}$				0.000^{a}				0.000^{a}
				(0.000)				(0.000)
Observations	348,626	348,626	348,626	132,123	22,027,315	22,027,315	22,027,315	5,635,789
R2	0.15	0.14	0.14	0.16	0.08	0.08	0.08	0.09
Nb Firms	2,008	2,008	2,008	672	61,997	61,997	61,997	12,984

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Standard errors reported in parenthesis are clustered at the firm-level. Each regression includes firm×year and country×year dummies, as well as all the control variables from Column (8) in Table II.5

5 Concluding Remarks

Firms do not randomly choose their export destinations. While most of the trade literature has focused on the bilateral determinants of trade flows, a new strand of trade literature has emphasized some learning-by-exporting factors. Recent empirical evidence points to a geographic bias in the export decision of firms. Firms tend to enter markets that are close to where they exported in the past. In this paper, we argue that firms tend to export to countries that are also linguistically close to their previous export markets. We use firm-level data on the French exporters of goods and services over the period 1999-2005. The evidence suggests that, after controlling for the geographic bias in the export pattern, firms are more likely to start exporting to countries that are linguistically close to their existing export markets. We also find that the geographic and linguistic bias grows as firms export to more markets, as suggested by Chaney (2014).

We remained silent, however, on the reasons behind the linguistic bias in the firms' export decisions. We considered the existing export pattern of firms as given and focused on where firms decide to export conditional on being an exporter. A possible explanation is that firms have a specific "social capital". This capital can materialize in the form of native workers speaking one (or several) foreign language(s) or having social connections in foreign countries, or workers from foreign origins having connections with their home country. This social capital is not static and can grow over time. Workers can learn new languages and firms can hire workers with new language skills. Firms can use this social capital to increase the efficiency of their search for new contacts. Parrotta et al. (2014) find that Danish firms employing workers from different ethnic origins are more likely to become exporters, to export to more markets and have higher export sales per employees than firms only employing native workers.[19] This asset is firm- and country-specific and could explain why firms choose to export to some countries rather than others in the first

[19] This specific asset, i. e. the diversity of the workforce, is referred to as the "relational capital" in the business literature. See Shoobridge (2006) for a survey on the link between ethnic minorities and business performances.

place.

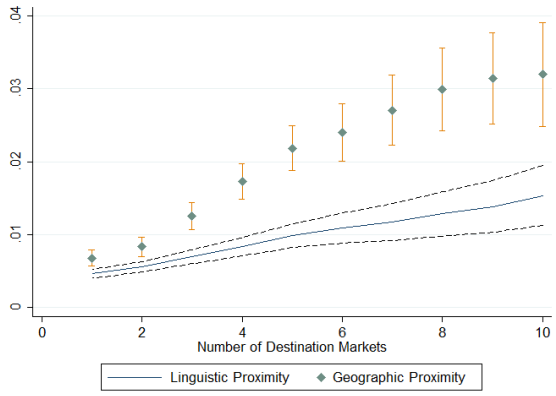
An additional reason why firms may decide to enter new markets is that they might decide to follow their clients overseas. The decision to enter new markets is therefore correlated with the behavior of the firms' clients (in France or overseas). Unfortunately, we do not have information on the identity of the exporting firms' clients located overseas or in France. This could bias our estimates both ways. If the client has the same linguistic bias as the French exporter, then we are capturing the behavior of this unknown client, and not the behavior of the French exporter. If on the other hand, this client is exporting or setting up affiliates in countries that bear no linguistic similarity with the French exporter's network, this would introduce a downward bias in our estimates. Unfortunately we do not have information on this kind of linkage between firms and their clients.

This paper focused on the linguistic proximity, which may be capturing other cultural factors such as trust. Bilateral data on trust is not available for a large set of countries, however. It would be interesting to see if exporting to countries that are perceived as highly trustworthy by some countries can generate a "trust capital" for French exporters. These exporters would appear more trustworthy when exporting to countries that otherwise, on average, have a lower degree of trust in French firms. The firms' experiences with trustworthy countries could help them overcome the lack of trust French exporters face with some countries. These questions deserve particular attention and are left for future research.

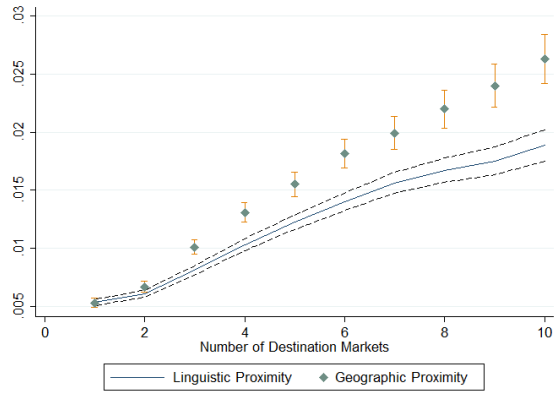
II.A Appendix

Figure II.2: Linguistic, geographic proximity and network size: The case of trade in homogenous and listed products

(a) Homogenous Products



(b) Listed Products



Chapter III

Services Imports and Job Polarization[1]

While traditional theories based on comparative advantage predict that trade raises wage inequalities between sectors, the most recent theories based on firm heterogeneity point to a within sector impact of trade (Biscourp and Kramarz, 2007; Helpman et al., 2011). Most of the trade literature has focused on international trade in goods. This literature finds that the declining share of unskilled workers in total employment and the wage dispersion are mostly a within-industry phenomenon. Additionally, a recent study (Helpman et al., 2012) found that it is a between-firm phenomenon. In this paper, we extend the analysis to trade in services and to trade in inputs using a very rich employer-employee dataset.

Our data has detailed information on French firm-level trade in goods, materials *and* services from 1999 to 2006. We match this data with information on the firms' balance sheets and income statements, as well as on the employment and the wage structure of each firm. First, we document that wage inequality arises within sector. As far as it is within sector, the within component is almost entirely driven by within firm wage inequalities. Then , we document that trade in services is highly

[1] This paper has been jointly written with Farid Toubal (École Normale Supérieure, Paris School of Economics, CEPII)

concentrated among a very small number of firms.[2] The analysis we carry in this paper identifies the effect of trade in intermediate inputs, final goods and services at the firm-level on the composition of each firm's labor force. Given the dimension and the quality of the information available in the data, we can control for important factors such as technological change and sector×year specific shocks, which also account for changes in the regulatory environment. We use firm-level fixed-effects techniques to analyze the *within*-firm impact of trade.

Our paper contributes to the empirical literature on offshoring and wage inequality in several ways. To the best of our knowledge, this paper is the first to take into account the impact of trade in services at the firm-level,[3] conditioning on the firm's trade in final goods and in materials. We find that service imports complement white-collar workers and substitute for workers with intermediate skills (skilled blue-collar workers). This effect is different from the impact of material offshoring, where the substitution takes place at a lower qualification (unskilled blue-collar workers). We find that service imports are correlated with a polarized skill upgrading, while imports of materials and final goods are correlated with a general skill upgrading. This result is consistent with Levy and Murane (2004) who argue that computerisation and service offshoring can have similar effect by substituting for jobs performed by workers with an intermediate qualification. Our results remain robust after controlling for technological change and sector×year specific shocks. Using the industry classification of the firm, we report the results for the manufacturing, the wholesale-retail and the service sectors. We find a positive and significant correlation between service imports and the share of white-collar

[2] This fact is in line with the recent literature on trade in services at firm-level: Breinlich and Criscuolo (2011) on UK firms, Kelle (2012) on German firms, Federico and Tosti (2012) on Italian firms, Walter and Dell'mour (2010) on Austrian firms, Ariu (2012) on Belgian firms, and Gaulier et al. (2011) on French firms). Most of these studies are descriptive, and converge to a set of common stylized facts about firms engaging in international trade in services. In particular, these firms are on average larger, pay higher wages, and are more productive than their domestic counterparts.

[3] Researchers have traditionally used Input-Output tables to divide the aggregate imports of services between the different industries. The underlying "proportionality assumption" can lead to large bias in the estimation of the impact of service offshoring (Winkler, 2010; Feenstra and Jensen, 2012).

workers in the manufacturing and wholesale-retail sectors, but not in the service sector.

A potential drawback of our study is that we are not able to fully isolate the impact of service imports from other factors on the labor market. First, it might be that imports of services is the outcome, rather than the cause, of changes in the labor market. For example, firms may choose to outsource some activities because of pressures on the domestic labor market (changes in regulations, unions ...). This reverse causality implies that we are merely capturing a correlation, and not a causal relationship. Second, service imports may be correlated with other factors such as technology change, or the imports of goods. Failing to control for such factors would cast doubt on the causal interpretation of our results.[4] We deal with these issues in the following way. To control for changes in the regulation environment, we include industry×year dummies. To control for the potential reverse causality, we would need an instrument correlated with the service imports, and uncorrelated with the share of white-collar workers in the wage bill. We account for materials imports by controlling for the imports of both final goods and intermediate goods (Biscourp and Kramarz, 2007). We use a firm's change in share of intangible asset as the proxy for change in technology. Finally, the endogeneity issue is discussed at the end of the paper.

In the next section, we review the literature on services offshoring and job polarization, and present the data in Section 2. In Section 3, we present stylized facts linking the change in the skill composition in France with service offshoring. The theoretical framework we use to analyze our data is presented in Section 4, and results follow in Section 5. Section 6 presents robustness checks and discusses endogeneity issues. Section 7 concludes the paper.

[4] See Acemoglu (2002) and Chusseau et al. (2008) for surveys on the impact of technical change on wage inequalities, and Feenstra (2008) for the impact of trade in intermediate inputs on wages

1 Related Literature

Strictly speaking, offshoring refers to the outsourcing to a foreign country of an activity previously performed by a firm. Since data on *actual* offshoring are very hard to get, researchers have used the imports of material and services as a proxy for offshoring. In the 1990s, the focus was on trade in intermediate inputs and wage inequalities between skilled and unskilled workers, or production versus nonproduction workers (Feenstra and Hanson, 1996, 1999). It has been documented that both technological change and trade in intermediate inputs contributed to the increase in wage gap between the different type of workers. Berman et al. (1994) find that production labor-saving technical change (such as investment in computers and R&D) is the main factor behind the shift in labor demand toward skilled workers. Feenstra and Hanson (1999) find that the increasing use of computers can explain a third of the increase in the relative wage of nonproduction workers, while international outsourcing can explain about 15% (see Feenstra and Hanson, 2001, for an excellent survey).

Since the mid 1990s-early 2000s, offshoring has expanded and includes now business services.[5] Trade in commercial services has been growing faster than trade in goods over the past decades (UNCTAD, 2013), and the accompanying expansion of service offshoring has been referred to as the "new wave of globalization" or the "next industrial revolution" (Blinder, 2006). Amiti and Wei (2005) find no correlation between service offshoring and the employment growth in the United Kingdom between 1995 and 2001. Similarly, a report by the OECD (2006) fails at finding any significant correlation between service offshoring and employment in OECD countries between 1996 and 2003. With individual data on workers and occupations becoming more available, the focus has shifted form the traditional skilled versus unskilled worker paradigm. Crinó (2010) uses data on the occupation of the US workers and finds that service offshoring is biased toward white-collar

[5] Service offshoring is considered a new phenomenon. Wilson (1995) reports anecdotal evidence that some U.S. companies were already offshoring service activities in the Caribbean or in Ireland in the 1970s and 1980s.

workers, and toward workers performing non-tradable tasks. Criscuolo and Garicano (2010) show that the specific license requirement of some professions increases the costs of offshoring, within a given skill or occupation group. They give use he example of the British lawyers who have to be members of the bar to be able to practice. They find that an increase of 1% in exposure to imports of services reduces by 0.2% the wages of non-licensed occupations, and increases by 0.5% of the wages of licensed occupations. Using the CPS data, Ebenstein et al. (ming) study the impact of trade and offshoring on US workers and find a significant effect on occupation wage differentials. They also provide evidence of a costly (in terms of lower wage) reallocation of workers across industries and occupations due to globalization. Liu and Trefler (2011) provide similar evidence when looking at the impact of trade in services with China and India. Geishecker and Gorg (2011) uses data on workers in the UK and find that service offshoring reduces the wage of medium- and low-skilled workers, while increasing the wage of high-skill workers. The vast majority of these studies finds that service offshoring leads to a general skill upgrading.

An emerging literature has shifted the focus to trade in task rather than trade in physical output (Grossman and Rossi-Hansberg, 2008). The authors argue that the traditional view workers as skilled or unskilled fails at capturing the complex division of the production. Workers should be classified according to the task they perform rather than their level of education for instance. The recent technological change made the most "routine" or "codifiable" of these tasks potential candidate for offshoring. This lead to a polarization of the labor markets, where tasks performed by workers with an intermediate qualification are being offshored, thus leading to a drop in their relative wage (Goos and Manning, 2007; Autor et al., 2013). Workers at both end of the distribution experience in increase in their wage while the "middle-workers" performing routine tasks experience a wage reduction. As suggested by Levy and Murane (2004), both technological change (computers, or the automatization and codification of routine tasks) and offshoring are likely to be responsible for the change in the wage structure in the United States. Oldenski

(2012) finds that communication and nonroutine tasks are more present at both end of the wage distribution than in the middle.

2 Data

We use four firm-level datasets in order to cautiously assess the link between service imports and the composition of the workforce of French firms. Each firm possess a single identification number (called *SIREN*) which allows us to merge the different datasets together.

First, we gather information on workers from the DADS dataset (Déclaration Annuelle des Salaires). This dataset provides information on the wages and the number of employees for various occupations. Our access to this dataset is limited to three broad occupational categories: white-collar workers, skilled blue-collar workers and unskilled blue-collar workers.[6]. We know, for each firm, the number and the wages of the workers of each category.[7] Second, we use the BRN dataset (Bénéfices Réels Normaux) to obtain information on the balance sheets of firms. This dataset is provided by the fiscal authority (Département du Trésor) and focuses on firms with a turnover larger than €777,000 (€240,000 in the service sector). We use information on total sales, capital stock, stock of tangible and intangible assets, and the purchase of intermediate inputs. Third, information on firm-level exports and imports of services come from the French Central Bank. Data are collected either directly from the company itself,[8] or through banking declarations. In the latter case, the transaction must take place between a foreign and French bank account to be included in the data. This means that intra-firm trade flows may be included, as long as this condition is verified. The services recorded fall into

[6] See Table III.7 for a description of the occupations within each category

[7] We use gross salaries as they better represent the labor cost of the firm. Gross salaries include the wage received by the worker and the taxes paid by the employer.

[8] This mainly concerns the biggest firms, the so-called *Déclarants Directs Généraux*.

the mode-1 classification by the GATS (i.e. cross-border trade).[9] The data are collected at the firm×service×year×country level. The classification used by the Bank of France is more aggregated and slightly different from the *Extended Balance of Payments Services Classification (EBOPS)* and identifies 21 types of services.[10] For the purpose of this study, we aggregate the import and export flows at the firm×year level. In our econometric analysis, we will distinguish between imports originating from western European countries, eastern European countries, other non-EU OECD countries, and the rest of the world. Additionally, we will also distinguish between imports originating from skilled- or unskilled-labor abundant countries. Finally, data on the imports and exports of goods are provided by the Custom office. Goods are classified according to the CN8 classification which allow us to use Rauch (1999)'s classification and differentiate between the imports of intermediate and final goods. Note that this difference is only relevant for firms in the manufacturing sector. The French Customs Office reports the total imports and exports at the firm×product×year×country level. We aggregate the import and export flows at the firm×year level. Data are available over the period 1999-2006.

Merging these four datasets together gives us information on an unbalanced panel of 92,275 firms. The sample consists of 44,342 firms registered in the manufacturing sector, 27,747 firms in the wholesale-retail sector and 23,121 firms in the service sector. Firms can change their industry classification over time, which is why the number of firm in each industry does not add-up to the number of firms in full sample. We propose some simple descriptive statistics for the last year in our sample. In 2006 we have 73,646 firms in our sample. About 5,300 firms are part of a group (either a multinational or a domestic French group). 47% are registered as manufacturing firms, 30% as wholesale-retail firms, and 23% as service firms. The manufacturing firms account for 55% of the total value added and 50% of the total employment in our sample. Wholesale-retail and service firms account for 23% and

[9] The GATS classifies international trade in services into four distinct modes: mode-1 is for cross-border supply of services, mode-2 refers to consumption abroad (mainly tourism), mode-3 refers to commercial presence, and mode-4 refers to the temporary movement of persons.

[10] See Table III.8 for a detailed list of the Bank of France classification.

22% of the total value added respectively, and 25% and 24% of the total employment respectively. In 2006, 22,561 firms were importing manufacturing products (30% of the firms in our sample). More than half of them were manufacturing firms (13,517 firms), a third were in the wholesale-retail sector (7,511 firms) and the rest in the service sector (1,533 firms). The number of firms importing services was much smaller. Less than 2000 firms were importing services in 2006 (less than 3% of the firms). Among these firms importing services, about 80% were also importing manufacturing products. This overlap in import activities suggest that controlling for the imports of manufacturing products is crucial if we want to isolate the effect of service imports. Firms importing goods are larger than non-importers. These large firms account for two thirds of the employment in our sample, and 74% of the value added. Additionally, firms importing services are extremely large firms. They represent less than 3% of the firms in our sample, but account for 30% of the value added and 20% of the total employment in our sample.

The empirical literature has formulated two definitions for service offshoring. Amiti and Wei (2005) consider the imports of telecommunications, computer services, and other business services as the narrow definition, and overall service imports as the broad definition. For our narrow definition of service offshoring, we select the imports of communication, license and patents, IT, and other business services. These imports categories accounted for 77% of the total imports of services in 2006.[11] We follow the exiting literature and scale the imports of intermediate inputs and services by the production cost of the firm.[12] Firm production cost includes the wage bill, the purchase of intermediate inputs and other variable operating costs. Considering the sub-sample of firms that were importing services in 2006, we find that on average, service imports accounted for slightly less than 5% of the total cost of the firm. The ratio is close to 12% if we look at the imports of intermediate goods over total cost. It is noteworthy that very few firms import

[11] For the same year, they accounted for 68% of the imports of services by manufacturing firms.

[12] Feenstra and Hanson (1996) scale the import of intermediate inputs by the total purchases of non-energy materials. Biscourp and Kramarz (2007) scale the imports of intermediate and final goods by total sales. Our results remain similar if we use this method instead

services, and that the import values are small compare to the imports of goods.

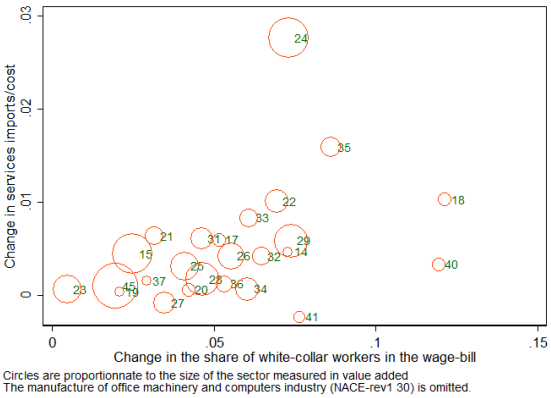
3 Stylized facts

Here we present some simple stylized fact on the extent of skill upgrading in the manufacturing, wholesale-retail and service sector. Figure III.1 shows the change in the share of each type of worker in the industry wage bill along with the change in service imports between 1999 and 2006 in the manufacturing sector. As will become clear in the rest of the paper, most of the skill upgrading and effect of trade takes place in the manufacturing sector. In the appendix, we present the corresponding figures for the wholesale-retail and the service sector. In Panel (a), we look at the change in the share of white-collar workers. We see a positive (and statistically significant) correlation. Industries where the labor demand shifted towards white-collar workers are also industries where service imports increased between 1999 and 2006. This correlation is negative and statistically significant in Panel (b) where we look at the share of skilled blue-collar workers,i.e. workers with an intermediate qualification. The correlation becomes insignificant in Panel (c), i.e. for unskilled blue-collar workers. Figure III.1 suggests that service imports are correlated with a polarization effect of the labor demand in manufacturing industries. The corresponding figure for the wholesale-retail and service sectors show no correlation between white-collar, skilled blue-collar or unskilled blue-collar workers and service imports.

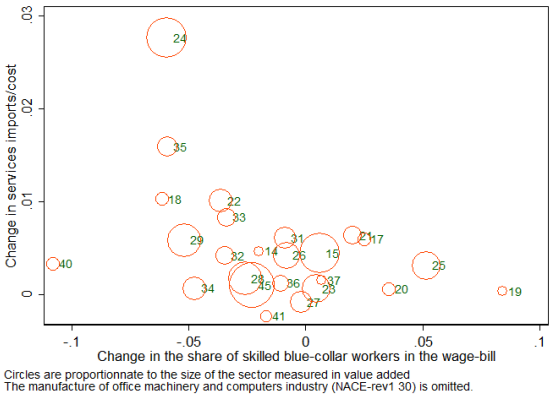
We now take a closer look at the change in the share of white-collar workers in the wage bill. Figure III.1 suggests that the change in labor demand is taking place in each industry. To get a broad view of these changes, we decompose the total variation into a between-industry and a within-industry component. The between-industry component captures how much of the total variation in the share of white-collar workers is due to the differences in growth rates of each industry. As is usually done in this kind of analysis, we use the following decomposition:

Figure III.1: Change between 1999 and 2006 in the share of each type of worker in the wage bill and change in the service imports – Manufacturing sector

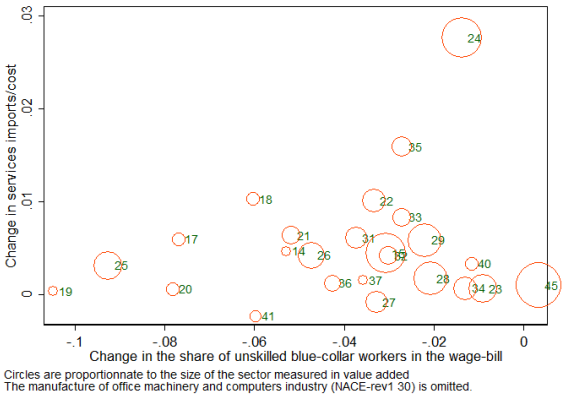
(a) White-collar workers



(b) Skilled blue-collar workers



(c) Unskilled blue-collar workers



$$\Delta P = \sum_s \Delta S_s \overline{P}_s + \sum_s \Delta P_s \overline{S}_s,$$

where $s = 1, ..., N$ denotes industries. ΔP denotes the aggregate change in the share of white-collar workers in the wage bill. ΔS_s is the change in the relative size of industry s. $\overline{P}_s$ represents the average share of white-collar workers in industry s over the period. This first term is the between-industry component. ΔS_s is the change in the share of white-collar workers in industry s, and $\overline{S}_s$ is the average size of industry s over the period. This term is the within-industry component. Since

we are using firm-level data, we can further decompose the within-industry change into between- and within-firm components, using the same decomposition.

$$\Delta P_s = \sum_i \Delta S_{i,s} \overline{P}_{i,s} + \sum_i \Delta P_{i,s} \overline{S}_{i,s},$$

where $i = 1, ..., I$ denotes firms. Averaging over all industries, the total within effect is:

$$\Delta P^{within} = \sum_s \overline{S}_s \sum_i \Delta S_{i,s} \overline{P}_{i,s} + \sum_s \overline{S}_s \sum_i \Delta P_{i,s} \overline{S}_{i,s},$$

Results are displayed in Table III.1. The first row shows the aggregate change in the share of white-collar workers in the wage bill for the whole sample of firms. We have to restrict ourselves to firms that are continuously present over the period, and who do not change industry classification. On average, the share of white-collar workers in the wage bill increased by almost 4 percentage points between 1999 and 2006. This change is almost entirely a within-industry change. On average, in each industry, the share of white-collar workers increased by 3.4 percentage points. The within-industry change is in turn almost entirely driven by within-firm changes. The previous figures suggest that the phenomenon is within industries, but the magnitude of the effect varies between industries. The next rows of Table III.1 indicate that the change in the skill composition is much more pronounced in the manufacturing sectors than in the wholesale-retail or in the service sectors. In the manufacturing sector, the share of white-collar workers increased by 5 percentage points, while it increased by only 1 percentage point in the wholesale-retail sector, and by 1.5 percentage points in the service sector. Again, in each sector the change takes place within industries, and within-firms. An important factor we need to take into account in our data is the presence of firms belonging to a group. One can imagine a situation where the group's headquarters decides to reorganize the production

between its different plants (or firms), therefore leading to a relocation of workers across plants. The change in the skill composition induced by this decision may not be correlated with the decision to import goods or services. To account for this, we split our sample between independent firms and firms belonging to a group. We find that the change in the share of white-collar workers is more pronounced in firms that are part of a group (+5.4 percentage points) than in independent firms (+2.8 percentage points). Next, we look at whether the average change in the share of white-collar workers depends on the size of the firm.[13] We consider two categories of firms: firms with less than 50 employees, and those with 50 or more employees.[14] In the French system, firms with more than 50 employees face considerably more regulations than firms with less than 50 employees (Gourio and Roys, 2012; Garicano et al., 2013), and this can affect a firm's skill composition. We find that in firms with less than 50 employees, the share of white-collar workers has increased on average by 2.8 percentage points, while it increased by 3.6 percentage points in firms with more than 50 employees. As a robustness check in our econometric analysis, we will use this threshold again. Finally, we look at whether firms importing goods or services have increased their share of white-collar workers more than other firms. On average, firms importing services have increased by 5.2 percentage points their share of white-collar workers. This is more than the average change (+3.5 percentage points). It is important to note that, with this sample, only 2,710 firm are importing services over the period. They represent less than 5% of this panel of firms. Firms importing intermediate inputs have increased their share of white-collar workers by 5.6 percentage points. The augmentation is less for firms importing final products (+4.2 percentage points). As already mentioned, many firms are importing both intermediate inputs and final goods, or both services and goods. These figures give a broad view of the extent of skill upgrading in our dataset. In the econometric analysis, we will control for the import and export activity of each firm to make

[13] Epifani and Gancia (2006) develop a theoretical model where output expansion is biased in favor of skilled workers. They find that as firms grow larger, they employ relatively more skilled workers.

[14] We take the average employment over the period 1999-2006 as the threshold of 50 employees.

sure that we are carefully assessing the impact of service and material imports on the share of white-collar workers.

Table III.1: Changes in the share of white-collar workers in the wage bill

		Total	B. Ind	W. Ind		
Sample	Firms			Tot	B. firms	W. firms
All	45,226	0.035	0.000	0.035	-0.001	0.035
Manufacturing	22,659	0.051	0.002	0.049	-0.001	0.049
Wholesale-Retail	12,661	0.011	-0.004	0.015	0.000	0.015
Service	9,906	0.015	0.001	0.014	-0.001	0.015
Independent	42,528	0.028	0.000	0.028	0.001	0.027
Group	2,698	0.052	0.006	0.047	-0.003	0.049
less than 50 emp.	35,647	0.028	-0.000	0.028	0.001	0.027
more than 50 emp.	9,579	0.036	0.000	0.036	-0.002	0.037
Imp. Services	2,710	0.052	0.004	0.047	-0.001	0.049
Imp. II	11,937	0.056	0.005	0.051	-0.001	0.052
Imp. FG	15,613	0.042	0.004	0.037	-0.001	0.038

Figures measure changes in the share of white-collar workers in the total wage bill. Group consists of firms belonging to a group, which can be multinational or not. Imp. II and Imp. FG stand for imports of intermediate inputs and imports of final goods respectively.

4 Econometric Specification

We follow the existing literature and use a translog specification to study the link between international trade and the skill structure of labor demand. This methodology, first introduced by Berman et al. (1994) has been widely used in the empirical literature on trade and wage inequalities. We assume the short-run cost function of the firm can be approximated by a translog function, twice differentiable and linearly homogeneous in factor prices. As usual in this framework, we treat the imports of goods and services as a shift-factor, which means that the firm chooses optimally its employment composition for a given level of imports. The translog form of the short-run cost function is given by:

$$
\begin{aligned}
lnC_{SR} = \gamma_0 &+ \sum_c \gamma_c lnW^c + \gamma_Y lnY + \gamma_K lnK + \sum_z \gamma_z Z \\
&+ \frac{1}{2}\Big[\sum_c \sum_{c'} \gamma_{cc'} lnW^c lnW^{c'} + \gamma_{YY}(lnY)^2 + \gamma_{KK}(lnY)^2 + \sum_z \sum_{z'} \gamma_{zz'} ZZ'\Big] \\
&+ \sum_c \gamma_{cY} lnW^c lnY + \sum_c \gamma_{cK} lnW^c lnK + \sum_c \gamma_{cZ} lnW^c Z \\
&+ \gamma_{YK} lnY lnK + \sum_{zY} \gamma_z Z lnY + \sum_z \gamma_{zK} Z lnK,
\end{aligned}
\tag{III.1}
$$

where the index c is for the different kind of worker (white-collar, skilled blue-collar and unskilled blue-collar workers). lnW^c is the log-wage of workers c, Y is output, K is capital, and Z is the set of cost-shifters. In Z, we include services and materials imports, along with a proxy for technological change, and a dummy for whether the firm belongs to a group. This expression can be simplified by imposing linear price homogeneity and symmetry. These restrictions apply to the following coefficients:

$$
\sum_c \gamma_c = 1;\ \sum_c \gamma_{cc'} = \sum_{c'} \gamma_{c'c} = \sum_c \gamma_{cY} = \sum_c \gamma_{cK} = \sum_c \gamma_{cZ} = 0, \gamma_{cc'} = \gamma_{c'c},\ \gamma_{zz'} = \gamma_{z'z}.
\tag{III.2}
$$

We then apply Shephard's lemma, and get the following system of relative labor demand functions:

$$
S^c = \gamma_c + \sum_{c'} \gamma_{cc'} lnW^{c'} + \gamma_{cY} lnY + \gamma_{cK} lnK + \sum_z \gamma_{cz} Z, \quad c \in (H, M, L). \tag{III.3}
$$

To keep the notation as simple as possible, we denote the different kind of workers by he following index: H is for white-collar workers, M is for skilled blue-collar workers and L is for unskilled blue-collar workers. On the left hand side, we have the share of each worker in the wage bill. The complete system of labor demand is estimated using Zellner's method for seemingly unrelated regressions (SUR). Given that we use the exact same set of regressors in each equation of the system, this method simply accounts for the cross-equation correlation in the error terms.

Because of the restrictions imposed on the coefficients, we cannot estimate the full system at once, and need to drop an equation. The results are not affected by the choice of the equation dropped. Without loss of generality, we decide to drop the equation for unskilled blue-collar workers. We estimate the following system of equations:

$$Wsh^H = \gamma_W + \gamma_{H,H} ln(\frac{W^H}{W^L}) + \gamma_{H,M} ln(\frac{W^M}{W^L}) + \gamma_{H,Y} lnY + \gamma_{H,K} lnK + \sum_{z \in Z} \gamma_{H,z} Z + u^H \tag{III.4}$$

$$Wsh^M = \gamma_M + \gamma_{M,H} ln(\frac{W^H}{W^L}) + \gamma_{M,M} ln(\frac{W^M}{W^L}) + \gamma_{M,Y} lnY + \gamma_{M,K} lnK + \sum_{z \in Z} \gamma_{M,z} Z + u^M, \tag{III.5}$$

where Wsh^H and Wsh^M are the shares of white-collar workers and skilled blue-collar workers in the wage bill, respectively. u^H and u^M are the error terms. To wipe out time-invariant firm heterogeneity, all variables are deviated from firm averages, and standard errors are adjusted to account for the loss of degrees of freedom. We retrieve the coefficient $\gamma_{H,L}$ and $\gamma_{M,L}$ in Equations (III.4) and (III.5) and the coefficients for the unskilled blue-collar worker equation by applying the set of restrictions described in (III.2). If service imports are correlated with a skill upgrading, we would expect $\gamma_{H,Service\ Imports} > 0$, as it would shift outward the demand for white-collar workers. If service imports were correlated with a polarized skill upgrading, we would expect the coefficient $\gamma_{M,Service\ Imports}$ to be negative, and $\gamma_{H,Service\ Imports}$ and $\gamma_{L,Service\ Imports}$ either positive or null.

5 Results

Table III.2 presents the estimation of Equation (III.4) using the full sample of firms. The upper part of the table displays the different cost shifters, and the

lower part reports the translog variables. Since our study is first motivated by the link between service imports and the share of white-collar workers, we report in Columns (1)-(3) the coefficients for the white-collar workers equation, where we add one by one the different cost shifters. In Columns (4)-(6), all the cost shifters are included, and we also control for industry×year specific shock. Columns (4), (5) and (6) reports the results for the white-collar, skilled blue-collar and unskilled blue collar workers respectively. The coefficients on output, capital and individual wages are always significant and estimated with the expected signs (although quite puzzlingly the coefficient on capital turns negative and the coefficient on output turns non-significant in the last specification when we include industry×year dummies). Column (1) reports the results from the simplest specification, where the service imports are the only cost shifter. The results suggest that the imports of services are positively correlated with the share of white-collar workers in the wage bill. In Columns (2), we control for the imports of intermediate inputs and final goods. As describe in the previous section, most of the firms that are importing services are also importing goods. The results suggest that the import of manufacturing products (either final or intermediate goods) is also positively correlated with the share of white-collar workers. Note that the coefficient on service imports is very little affected by this additional control. Controlling for the imports of goods, we still find a positive and highly significant coefficient for service imports. In Column (3), we control for technical change using the share of intangible assets, and control for the ownership of the firm. Being part of a group could bias our results, as the change in skill-intensity within the firm could be decided at the firm's headquarter and be, to some extent, uncorrelated with the imports of services. Our results remain statistically unchanged by the inclusion of these two controls. Technical progress and the group dummy are both associated with an greater skill-intensity, but the coefficients on services and goods imports remain positive and statistically significant. The change in the share of white-collar workers could also be driven by some external factors such as measures of deregulations at the industry level.

Since we do not have data on the various changes in the regulatory environment in each industry, we use industry×year dummies to control for this. The results are presented in Column (4) and constitute our preferred specification. This additional control seems quite important as it changes a lot the magnitude of our coefficients, but not their significance level. Services and materials imports are still positively correlated with the share of white-collar workers in the wage bill. The effect is about twice as small as in the previous specification without industry×year controls. However, we are more confident in these last results as we control for a lot of potential omitted factors. In this last specification, the imports of final goods have a stronger correlation on the share of white-collar workers than the imports of intermediate inputs. This is in line with the results by Biscourp and Kramarz (2007) who find a strong negative correlation between the change in the share of unskilled production workers and an increase in the imports of final products. The results suggest that service imports and the imports of final products have a similar effect on the share of white-collar workers. In Columns (5) and (6) we report the coefficients for skilled blue-collar and unskilled blue-collar workers. Taken together, the last three columns constitute the whole labor demand system. Results suggest that service imports are negatively correlated with the share of *skilled* blue-collar workers, i.e. those with an intermediate qualification. This strongly contrasts with the imports of goods which are both negatively correlated with *unskilled* blue-collar workers. While trade in goods is correlated with a *general* skill-upgrading, the imports of services are correlated with a *polarized* skill-upgrading. Note that the correlation is silent on whether workers gain or lose on average with the imports of goods or services. First, our results only describe a correlation, and not a causal relationship. Second, we cannot say anything about whether the change in the composition of the firms' labor force happens through entries or exits (or both) of workers. Because our results are based on cost-share estimations, they are silent about the number of white-collar, skilled blue-collar or unskilled blue-collar workers actually employed by firms. The results only suggest that service imports are correlated with changes

in the occupation-mix of the firm, and that this change is biased toward a greater of white-collar workers and a lower share of skilled blue-collar workers.

Table III.2: Baseline Specification: Full Sample

	White-collar workers			White	Sk. Blue	Unsk. Blue
	(1)	(2)	(3)	(4)	(5)	(6)
Service Imports	0.052^a	0.049^a	0.048^a	0.028^a	-0.024^a	0.004
	(5.513)	(4.950)	(5.854)	(2.841)	(-2.761)	(0.435)
II Imports		0.068^a	0.067^a	0.013^a	-0.002	-0.011^b
		(17.539)	(17.191)	(3.149)	(-0.480)	(-2.134)
FG Imports		0.034^a	0.034^a	0.023^a	-0.007	-0.016^a
		(5.679)	(5.692)	(3.993)	(-1.343)	(-3.164)
Intang. Assets (%)			0.010^a	0.008^a	-0.004	-0.004
			(3.208)	(2.611)	(-1.478)	(-1.398)
group			0.009^a	0.003^a	-0.000	-0.003^b
			(6.849)	(2.794)	(-0.013)	(-2.711)
Ln Output	0.004^a	0.004^a	0.004^a	0.001	-0.004^a	0.002^a
	(4.798)	(4.414)	(4.471)	(1.493)	(-4.705)	(3.075)
Ln Capital	0.004^a	0.004^a	0.003^a	-0.004^a	0.002^a	0.002^a
	(6.001)	(5.428)	(4.877)	(-6.351)	(3.235)	(3.688)
Ln W^{White}	0.049^a	0.049^a	0.049^a	0.045^a	-0.016^a	-0.029^a
	(40.625)	(43.573)	(40.616)	(37.192)	(-14.265)	(-29.176)
Ln $W^{Skilled\ Blue}$	-0.034^a	-0.034^a	-0.034^a	-0.039^a	0.067^a	-0.028^a
	(-25.991)	(-25.948)	(-25.983)	(-30.108)	(52.264)	(-23.824)
Ln $W^{Unskilled\ Blue}$	-0.015^a	-0.015^a	-0.015^a	-0.006^a	-0.051^a	0.057^a
	(-17.622)	(-17.636)	(-19.030)	(-7.173)	(-51.013)	(68.371)
Observations	657,609					
Number of Firms	92,275					
Firm f.e.	YES					
Industry×Year f. e.	NO	NO	NO	YES	YES	YES

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Robust standard errors clustered at the firm level. t-statistics between parenthesis.

As suggested in Table III.1, the change in the share of white-collar workers varies strongly between the manufacturing, the wholesale-retail, and the service sector. We now split our sample according to these three broad sectors and replicate the results from our preferred specification for each sector (Columns (4)-(6) in Table III.2). Results are displayed in Tables III.3 for the manufacturing sector and in Table III.4 for the wholesale-retail and service sectors. Table III.3 uses the sample of manufacturing firms, which consists of 44,342 firms. Our results suggest that the average effect from the previous table is mostly driven by manufacturing

firms. Regarding the different cost-shifters, the results are qualitatively unchanged but the point estimates are larger. We find that service imports are associated with a polarized skill upgrading. They are positively correlated with the share of white-collar workers and negatively correlated with the share of skilled blue-collar workers. Interestingly, the share of unskilled blue-collar workers is uncorrelated with service imports. We interpret this as evidence of a polarization of the labor demand by manufacturing firms. Workers with an intermediate qualification substitute for service imports. We find that a one percentage point increase in the service imports is associated with a 0.057 percentage point increase in the share of white-collar workers. This coefficient is twice as large as the one obtained in the baseline regression but remains quantitatively small. We do not find evidence in favor of the "fear of offshoring" argument which has fulled the debate on service offshoring in the recent years Blinder (2006); Bhagwati and Blinder (2009). This argument underlines the fact that because services are on average skill-intensive, workers with a high qualification would lose from service offshoring. Our result suggest that it is workers with an intermediate level of qualification who substitute for service imports, not workers performing high-end tasks. This result contrasts with the correlation we find regarding the imports of intermediate and final goods. We find that importing goods is correlated with a general skill upgrading. Unskilled blue-collar workers are substitutes for this kind of trade, and white-collar workers are complements to it. This result is in line with what Biscourp and Kramarz (2007) find for the period 1986-1992 using similar data. Results for wholesale-retail and service firms are presented in Table III.4. We find that service imports is correlated with the white-collar workers in the wholesale-retail sector, but not in the service sector. Furthermore, the imports of goods are not statistically significant in any of these regressions. In the rest of the paper, we perform robustness checks on manufacturing firms as this is where the correlation is statistically significant. Moreover, this makes our results comparable with the existing literature on services and goods offshoring.

Table III.3: Manufacturing sector: results by type of workers

	White	Sk. Blue	Unsk. Blue
	(1)	(2)	(3)
Service imports	0.057^{b}	-0.055^{b}	-0.001
	(2.560)	(-2.511)	(-0.081)
II imports	0.015^{a}	-0.004	-0.011^{b}
	(3.483)	(-0.642)	(-2.176)
FG imports	0.047^{a}	-0.012	-0.035^{a}
	(5.094)	(-1.188)	(-3.342)
Intangible Assets (%)	0.015^{a}	-0.007	-0.008^{c}
	(2.992)	(-1.162)	(-1.713)
group	0.004^{b}	0.003	-0.006^{a}
	(2.484)	(1.265)	(-3.493)
Ln Output	-0.002	-0.002	0.003^{a}
	(-1.392)	(-1.209)	(2.847)
Ln Capital	-0.004^{a}	0.004^{a}	-0.001
	(-3.799)	(3.825)	(-0.812)
Ln W^{White}	0.055^{a}	-0.015^{a}	-0.04^{a}
	(31.209)	(-7.762)	(-24.743)
Ln W$^{Skilled\ Blue}$	-0.058^{a}	0.068^{a}	-0.01^{a}
	(-30.438)	(28.967)	(-5.126)
Ln W$^{Unskilled\ Blue}$	0.003^{a}	-0.053^{a}	0.05^{a}
	(3.276)	(-34.233)	(41.692)
Observations		311,890	
Number of firms		44,342	
Fixed Effects		Firm, Industry×Year	

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Robust standard errors clustered at the firm level. t-statistics between parenthesis.

6 Robustness Checks and Endogeneity Issues

We now perform a series of robustness check to assess the validity of our results. We focus on the manufacturing sector, and only report the coefficient on the service imports variable for each type of worker.[15]

First, instead of using the aggregate service imports, we focus on what other authors have labelled the narrow definition of service offshoring. It includes the imports of communication, license and patents, IT, and other business services.[16] Results are shown in the first raw of Table III.5. This alternative definition does

[15] The remaining coefficients are very similar from the baseline specification. The full results, not shown here, are available upon request.

[16] Both measures are actually strongly correlated, with a coefficient of correlation of 0.73

Table III.4: Wholesale-retail sector: regression by type of worker

	Wholesale-retail firms			Service firms		
	White	Sk. Blue	Unsk. Blue	White	Sk. Blue	Unsk. Blue
	(1)	(2)	(3)			
Service imports	0.036^{b}	-0.021	-0.014	0.011	-0.013	0.002
	(2.008)	(-1.556)	(-0.912)	(0.819)	(-0.908)	(0.216)
FG imports	0.005	-0.002	-0.002	0.016	-0.006	-0.006
	(0.591)	(-0.362)	(-0.366)	(0.819)	(-0.321)	(-0.321)
Intangible Assets (%)	0.005	-0.001	-0.004	0.001	0.000	-0.001
	(0.887)	(-0.130)	(-0.856)	(0.129)	(0.036)	(-0.204)
group	0.003	-0.000	-0.003	0.002	-0.006^{b}	0.004^{c}
	(1.104)	(-0.073)	(-1.281)	(0.590)	(-2.07)	(1.648)
Ln Output	0.008^{a}	-0.008^{a}	-0.001	0.001	-0.006^{a}	0.004^{a}
	(4.552)	(-5.030)	(-0.336)	(0.765)	(-3.54)	(2.964)
Ln Capital	-0.008^{a}	0.002	0.006^{a}	0.000	-0.002	0.001
	(-6.394)	(1.632)	(5.680)	(0.258)	(-1.387)	(1.286)
Ln W^{White}	0.039^{a}	-0.015^{a}	-0.023^{a}	0.034^{a}	-0.016^{a}	-0.018^{a}
	(16.994)	(-8.086)	(-12.645)	(13.46)	(-6.949)	(-9.452)
Ln W$^{Skilled\ Blue}$	-0.009^{a}	0.064^{a}	-0.055^{a}	-0.047^{a}	0.068^{a}	-0.022^{a}
	(-3.637)	(29.418)	(-26.391)	(-17.751)	(25.682)	(-10.085)
Ln W$^{Unskilled\ Blue}$	-0.030^{a}	-0.048^{a}	0.078^{a}	0.012^{a}	-0.052^{a}	0.040^{a}
	(-17.970)	(-31.152)	(54.842)	(5.729)	(-21.971)	(22.105)
Observations		189,723			155,996	
Number of Firms		27,747			23,121	
Fixed Effects			Firm, Industry×Year			

Significance levels: ^{c} $p < 0.1$, ^{b} $p < 0.05$, ^{a} $p < 0.01$. Robust standard errors clustered at the firm level. t-statistics between parenthesis.

not quantitatively change much our results. The coefficient on service imports turns slightly nonsignificant in the white-collar worker equation (The p-value is actually 10.06), and is not statistically different from the baseline estimate. We still find the negative correlation between the imports of services and the share of skilled blue-collar workers in the wage bill.

Next, we control for the export activity of the firms. Bernard and Jensen (1997) argue that exporters account for most of the increase in the wage gap between high- and low-skilled workers in the United States during the 1980s. We include the exports of goods and services (scaled by total sales) in the regression. The inclusion of these two additional variables does not change the coefficient on service imports. Interestingly (results not shown here but available upon request), we find

that the exports of services are negatively correlated with the share of white-collar workers, and positively correlated with the skilled blue-collar workers. This brings additional support for the substitutability between skilled blue-collar workers and service imports.

In the third row of Table III.5, we use the share of workers in employment rather than in the wage bill as our dependent variable. In the presence of rigidities in the labor market, wages may not immediately respond to shifts in relative labor demand. Our results remain similar when we use the employment share as the dependent variable.[17] The results remain qualitatively similar, suggesting that they do not hinge on the specificities of the French labor market.

In the next four rows, we look at whether the import origin of services matters. Biscourp and Kramarz (2007) find that the imports of goods from non-EU OECD countries have the strongest impact on production workers in the French manufacturing firms between 1986 and 1992. We distinguish between four different geographic regions: Western Europe, Eastern Europe, the non-EU OECD countries, and the rest of the world (RoW). The results suggest that our baseline results are driven by the imports from Western European countries, and from non-EU OECD countries. The coefficients are precisely estimated and similar to the baseline results. The imports from Eastern European countries and from the rest of the world (mainly developing economies), are not correlated with the labor demand of any type of worker. This result highlights the fact that trade in services is mostly taking place between developed economies. The competition from China or India, often mentioned as providers of services at low costs (Liu and Trefler, 2011), does not seem to be correlated with the relative labor demand by French manufacturing firms. When it comes to the imports of services by French firms, the competition is more likely to come from OECD countries than from developing economies. This result is confirmed in the last rows of the table, where we decompose countries based

[17] Crinó (2012) and Davies (2013) use the same theoretical framework to study the effect of service offshoring and greenfield FDI respectively on the relative labor demand using a panel of OECD countries. They do not find any significant difference in their result when using the employment share as dependent variable.

on their skill abundance. We use the World Development Indicator database from the World Bank and classify countries based on the share of their population with a tertiary education.[18]

Table III.5: Robustness Checks. Sample: Manufacturing firms

	White-collar	Skilled Blue-collar	Unskilled Blue-collar
	(1)	(2)	(3)
Narrow Definition	0.056	-0.064**	0.008
	(1.617)	(-1.967)	(0.428)
Control for Export/sales	0.064***	-0.061***	-0.003
	(2.900)	(-2.720)	(-0.185)
Share in Employment	0.068***	-0.065***	-0.003
	(2.860)	(-2.536)	(-0.180)
Imports from Eastern EU	0.069	0.120	-0.189
	(0.621)	(0.931)	(-1.602)
Imports from Western EU	0.063***	-0.061**	-0.002
	(2.483)	(-2.256)	(-0.121)
Imports from non-EU OECD	0.083	-0.111**	0.029
	(1.244)	(-1.997)	(1.239)
Imports from the RoW	-0.004	0.036	-0.031
	(-0.046)	(0.404)	(-0.508)
Imports from high-skill countries	0.071***	-0.065***	-0.006
	(2.685)	(-2.567)	(-0.349)
Imports from middle-skill countries	-0.060	-0.001	0.060
	(-0.437)	(-0.004)	(0.351)
Imports from low-skill countries	0.054	-0.012	-0.042
	(0.391)	(-0.097)	(-0.711)
Observations	311,890		
Number of firms	44,342		
Fixed Effects	Firm, Industry×Year		

Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the firm level. t-statistics between parenthesis. The last estimation is carried on 276,528 observations and 39,527 firms.

We now look at whether the imports of services have a different impact for small versus large firms, and for independent firms versus firms belonging to a group. We first look at firms with different sizes. According to the French labor laws, firms have to face heavier regulation when they reach the threshold of 50 employees. Garicano et al. (2013) and Gourio and Roys (2012) find that this has a strong effect on the

[18] For each year, we split in tiers the distribution of the share of the population with tertiary education. Countries in the top tier, i.e. countries with the highest share, are classified as high-skill countries.

distribution of firms' size and productivity. We look at whether our baseline results hold for these two categories of firms. The results are presented in the first two rows of Table III.6. The baseline results are partly driven by the small firms in our sample. The coefficients on service imports are not significant in the sample of firms with more than 50 employees. The coefficients on service imports in the small firms sample are larger (at a slightly lower significance level) than in the baseline. This could suggest that smaller firms adjust faster their skill composition. Alternatively, this could be due the simple statistical fact that when small firms add a worker for instance, this extra worker can change significantly the relative shares of the workers in the firm. This in turn would mean that there is more variance to be captured by our set of regressors in small firms than in larger firms. In the third row of Table III.6, we focus on domestic independent firms. We find that the polarization effect vanishes, suggesting that the correlations are partially driven by the firms members of a group. A quick look at the data reveals that among firms importing services, 70% a part of a group. Dropping them leaves us with very few importers of services and therefore a possible weaker correlation. However, it is noteworthy that the coefficient on service imports in the white-collar worker equations is twice as large as in the baseline regression for manufacturing firms (table III.3).

Table III.6: Manufacturing sector: Size category and origin of the imports of service

	White-collar	Skilled Blue-collar	Unskilled Blue-collar
	(1)	(2)	(3)
Less than 50 employees	0.093**	-0.074*	-0.019
	(2.345)	(-1.925)	(-0.823)
More than 50 employees	0.027	-0.033	0.006
	(1.247)	(-1.395)	(0.398)
Independent firms only	0.111**	-0.068	-0.042
	(2.432)	(-1.524)	(-1.439)
Observations	311,890		
Number of firms	44,342		
Fixed Effects	Firm, Industry×Year		

Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors clustered at the firm level. t-statistics between parenthesis.

One last concern that may arise is the case where there is a reverse causality

between the share of white-collar workers and the imports of services. Instrumental variables are typically used to handle this kind of endogeneity. We would need an instrument that is correlated with the imports of services variable but uncorrelated with the share of white-collar workers. A two step procedure using an strictly exogenous variable as instrument would ensure that we are capturing a causal link and not a simple correlation. Our econometric analysis is using firms that import services as well as firms that do not. We would need an instrument that applies to all the firms in our sample, importers and non-importers alike. Therefore, we cannot use the strategy used in Hummels et al. (2014) as they only rely on firms that are always importing, thus focusing on the effect of offshoring at the intensive margin. We are aware that any firm-level variable from the firm's balance sheet is going to be correlated with both the share of white-collar workers and the imports of services. Abramovsky and Griffith (2006) use the share of workers in the IT department of the firm as an instrument for service offshoring. IT workers can lower the search cost and find foreign suppliers more easily. However, we believe this would be correlated with the share of white-collar workers, as IT workers are classified as white-collar workers in our dataset. Moreover, any firm-level variable from the firm's balance sheet is likely to be correlated with both service offshoring and the share of white-collar workers in the wage bill. Variables that exploit the country×service dimension of the trade in services data, such as the variables used in the gravity framework for instance, are very good candidates, but they only apply to firms that are importing services, not to non-importers.

7 Conclusion

Trade in services is growing, and importing services is becoming increasingly feasible. The debate over the impact of service imports on the labor market is fueled by the fear that high-skilled jobs are going to be lost. While the trade in intermediate inputs is of great concern for low-skilled workers, service imports are seen as a

possible threat for skilled workers. Concerns arise as to whether this "new wave of globalization" is going to weaken the comparative advantage of developed economies. Due to the lack of data, little is still known about the impact of service imports on employment. We contribute to fill this gap by using very detailed data on individual imports of services by French firms, along with information on the skill composition of its labor force. We first look at the data and find that between 1999 and 2006, the share of white-collar workers in the wage bill increased by 3.5 percentage points on average. This increase is much more pronounced in the manufacturing sector (+5.2 percentage points) than in the other sectors of the economy. We then use a translog short-run cost function to estimate the link between service and material imports on the share of white-collar workers in the wage bill. Our results suggest that imported services are positively correlated with the share of white-collar workers, and negatively correlated with the share of skilled blue-collar workers. This is consistent with a polarization of the workforce in the manufacturing firms, correlated with service imports. Conversely, material imports is correlated with a general skill upgrading. These results hold for manufacturing firms, especially firms with less than 50 employees, and for imports originating from skill-abundant countries such as in Western Europe and other non-EU OECD countries. Our empirical results suggest that the "fear" over service imports among white-collar workers is ill-placed, as we find that they complement service imports. Our results hold after controlling for technical change and industry×year characteristics such as changes in the regulatory environment.

III.A Appendix

Table III.7: Classification of Occupations

occupation	type of worker
Chief executive	White-collar
Health professional, and Lawyer	White-collar
Executive civil Servant	White-collar
Professors, scientific profession	White-collar
Occupation in Information, art and entertainment	White-collar
Administrative executives, sales representatives	White-collar
Engineers and executive technicians	White-collar
Teachers	White-collar
Occupation Health and Social Work technicians	White-collar
Religious activities	White-collar
Administrative civil servants	White-collar
Administrative occupation	White-collar
Technicians	White-collar
Foreman, supervisor	White-collar
Administrative employee	Skilled blue-collar
Skilled worker	Skilled blue-collar
Drivers	Skilled blue-collar
Skilled workers in transport, handling, stockage	Skilled blue-collar
Unskilled worker	Unskilled blue-collar
Farm worker	Unskilled blue-collar
Civil service agents	Unskilled blue-collar
Security guards	Unskilled blue-collar
Worker in small businesses	Unskilled blue-collar
Personal services worker	Unskilled blue-collar

Table III.8: Service data

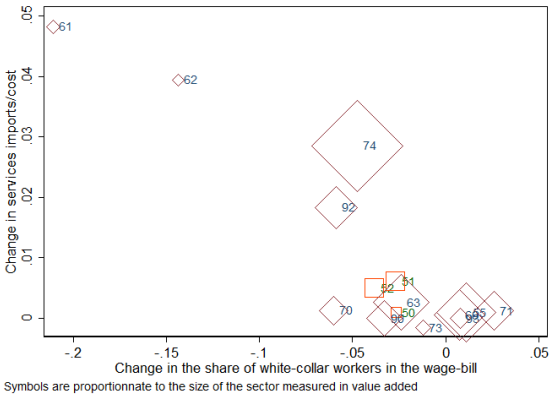
Communication	Telecommunication and post
Construction	Foreign merchandise designated for major works
	Major works
Insurance	Insurance on merchandises bonus and service charge
	Bonuses, other insurance: bonus and service charges
	Reinsurance
Financial	Service charge and banking or financial charges from banking sector
	Service charge and banking or financial charges from non-banking and private sector
Computer and Information	Computer Services
Royalties, Licenses, Patents	Royalties on Patents, trade in know-how
	Sales of licences, property rights, author's rights
Other Business Services	Leasing of mobile and immobile goods (other than ships)
	Studies, Research and Technical Assistance
	Overheads, management costs
	Other labour remuneration
	Subscriptions, advertising
Personal and cultural services	Audiovisual
	other services
Public Administration	Other payments from the French government
	Military expenditures

Figure III.2: Change in the share of each type of worker in the wage bill and change in the service import intensity in the wholesale-retail and service sector

(a) White-collar workers



(b) Skilled blue-collar workers



(c) Unskilled blue-collar workers



Chapter IV

The Servitization of French Manufacturing Firms[1]

The fate of the manufacturing sector is not very bright in most developed economies. The share of manufacturing firms in total employment or value added has been decreasing for many years. Using data from the United Nations (the National Accounts Main Aggregate Database), we find that between 1970 and 2010 the share of the manufacturing sector in value added dropped by 10 percentage points in most OECD countries. In 2010, this share was on average less than 20%, making developed countries undoubtedly "service economies" (Fuchs, 1965).[2] Moreover, data exploited by Pilat et al. (2006) show that the share of the manufacturing sector in total employment has been decreasing for more than 200 years, suggesting that the shift toward services (and the corresponding deindustrialization of developed economies) is the result of a slow and steady trend, and seems to some extent ineluctable.

A vast literature suggests that the shift toward services is a natural consequence of the economic development process. It is for instance the main prediction

[1] This paper has been jointly written with Matthieu Crozet (Univeristé Paris Sud, CEPII, IUF)

[2] Fuchs noted that by 1960 in the United States, more than half of the workforce was employed in service sectors. "We are now a "service economy" – that is, we are the first nation in the history of the world in which more than half of the employed population is not involved in the production of food, clothing, houses, automobiles, and other tangible goods."

of Baumol's models of unbalanced growth, which emphasize the fundamental difference in long-term productivity growth between the manufacturing and the service sectors (Baumol, 1967; Baumol and Bowen, 1966). This argument has been recently revived by Acemoglu and Guerrieri (2008) and Ngai and Pissarides (2007), and discussed by Triplett and Bosworth (2003). An alternative explanation stems from the difference in the income elasticity of demand between services and goods (Kuznets, 1957, 1973; Chenery, 1960). Finally, the outsourcing strategy of firms can also help explain the decline of the manufacturing sector.[3] Nevertheless, deindustrialization remains a major concern for policy makers. It is essentially because it generates large labor market adjustment costs, and also because the relative importance of manufacturing is now so small in some countries that further shifting toward services creates uncertainty about the nature and the strength of possible engines of long-term growth.

The debate on the extent, the causes and the consequences of the deindustrialization process is implicitly based on a representation of the economy as a collection of distinct sectors. It largely ignores the complex interdependencies between sectors and the real nature of the manufacturing production. Although official statistics draw arbitrary lines between the two types of activities, a vast literature in management and marketing stresses that the frontier between manufacturing and services is quite blurry, as stated by Levitt (1972) in the following words: *"There are no such things as service industries. There are only industries whose service components are greater or less than those of other industries. Everybody is in service."* Acknowledging that the manufacturing sector is not only about the production of goods, this literature delivers another way of looking at the deindustrialization process. It is not only a relocation of employment and value added between firms and industries, but also a shift toward service activities

[3] Firms can outsource part of their production locally, or rely on foreign suppliers. In both cases, this implies a relocation of labor toward other firms, and perhaps other sectors. Some firms may outsource most (if not all) of the production process to focus only on service activities. Apple, with its "Designed by Apple in California, assembled in China" label is a famous example of such an organization choice.

within manufacturing firms. This literature uses the expression "servitization" of manufacturing to describe this trend.[4]

In this paper, we document the importance of the servitization of French manufacturing firms over the 1997-2007 period, by looking at their supply of services. Let us clarify one important point. We *do not* aim to assess the importance of service tasks in the production process of manufactured products, but to enlighten the importance of the production and the *sales* of services produced by firms registered in the manufacturing sector.[5] We exploit a quasi-exhaustive database providing detailed information on about 635,000 French manufacturing firms. We take advantage of a very nice feature of the data, which for each firm report the value of the production of goods and the production of services sold during the year. So far, deindustrialization has mainly been considered as a mechanism between sectors. With this information, we are able to assess the importance of an additional margin through which the deindustrialization can take place. Within the manufacturing sector, firms themselves may be deindustrializing by focusing increasingly on the production of services. One can see this as the intensive margin of deindustrialization.

A rapid overview of the data shows that the production of services by manufacturing firms is not an anecdotal phenomenon. Simple counting for the year 2007 tells us that, in our sample of French manufacturing firms, services accounted for 11.4% of aggregate sales. About 83% of French manufacturing firms sold some services, 40% sold more services than goods, and 26% did not even produce goods. The average firm-level share of services in total sales was close to 35% of the total production sold in 2007.

The existing literature on the servitization of manufacturing identifies three main reasons which encourage manufacturing firms to engage in service activities Gebauer et al. (2005). First, by producing both goods and services, firms can expect

[4] The term "servitization" was first defined by Vandermerwe and Rada (1988). See Baines et al. (2009) for a review of this literature and a detailed definition.

[5] For references on the importance of services in the production process, see Francois (1990); Francois and Woerz (2008); Jones and Kierzkowski (1988); Katouzian (1970); Markusen (1989).

marketing advantages. The provision of services may increase the consumer's loyalty and provide a faster and more appropriate response to the consumer's needs. The service provision can also improve the firm's corporate image. Second, the production of services may offer a strategic benefit since the firm is making a product-service bundle which is harder to imitate, and perceived as less substitutable by consumers. Third, firms may expect financial benefits because services make up an additional source of revenue, and may generate higher profit margins. In some cases, services also provide more stable revenues over time. While the sale of a product can be a one-time operation for a firm, the sales of related services can be spread over time. Rolls-Royce is an example of such a successful strategy of mixing the supply of goods and services, as mentioned in The Economist (Jan. 8th, 2009): "Rolls-Royce earns its keep not just by making world-class engines, but by selling "power by the hour" – a complex of services and manufacturing that keeps its customers' engines burning. If it did not sell services, Rolls-Royce could not earn enough money from selling engines". Similarly, Apple's iPod/iTunes combines a physical product with online services where the customer can purchase and download music and movies. Between 2002 and 2010, Apple sold over 206 million iPods, and over one billion songs from the iTunes music store (Benedettini et al., 2010).[6]

The aim of this paper is to document the extent of the production of services by French manufacturing firms between 1997 and 2007. The main indicator of interest is the share of services in firms' production sales. We will refer to this ratio as the firm-level "service intensity". The "servitization" of French manufacturing firms is the change of this ratio over time. As already mentioned, most manufacturing firms

[6] However, the provision of services can be a risky business, and the expected benefits listed above may not come to fruition. The fact that the firm's performance may be lower after engaging in servitization is known as the "service paradox" (Gebauer et al., 2005): *"most product manufacturers were confronted with the following phenomenon: extended service business leads to increased service offerings and higher costs, but not to the corresponding higher returns"*. When selling services, firms may dilute their resources so that neither business reaches the critical size required to become successful. More details and examples on the benefits and costs of the servitization can be found in Bharadwaj et al. (1993); Brax and Jonsson (2009); Fang et al. (2008); Gebauer et al. (2005); Gebauer (2008); Oliva and Kallenberg (2003); Malleret (2006); Nelly (2007); Windahl and Lakemond (2006, 2010).

have positive sales of services. The share of services in production sales is quite uneven across firms however. On the one hand, for two thirds of the firms, services account for less than 20% of their production sales. On the other hand, for about 30% of French manufacturing firms, services account for more than 80% of their production sales. This pattern is found in each narrowly defined manufacturing industry. A high service intensity is associated with a smaller size, a lower labor productivity or capital intensity, and lower wages on average. Regarding the change in the service intensity of manufacturing firms, we find evidence of a significant trend of servitization over the period. The service intensity increased steadily between 1997 and 2007, in each industry. This aggregate change is mainly driven by a within-firm servitization. This increase is quite moderate, however. Very few firms radically change their production mix, either toward a specialization in the production of services, or toward the production of manufacturing products. Finally, we propose a first look into a within-firm process of deindustrialization, which contributes to the global trend of deindustrialization of the French economy, but which is absent from studies focusing on sectoral classifications rather than on the actual production of the firms. We find that taking the firms' servitization into account provides a harsher diagnosis about the deindustrialisation of the French economy. We estimate that the decline in the proportion of workers involved in the production of goods has been up to 8% higher than the usual measures of deindustrialization based on the proportion of workers employed in manufacturing firms.

The rest of the paper is organized as follows. Section 1 presents and describes the data. In Section 2, we take a first look at the extent of the service intensity of French manufacturing firms. In Section 3, we then look at the servitization of French firms between 1997 and 2007. We propose another view of the deindustrialization process in Section 4. Section 5 concludes and proposes questions for future research.

1 Data

We use firm-level information from the BRN (Bénéfice Réels Normaux) dataset. It is collected by the French fiscal authority (Direction Générale des Impôts) and provides exhaustive information on the balance sheet of French firms. It includes about 635,000 firms from the private non-financial, nonagricultural sectors. We have information on a firm's main activity (identified by a 4-digit level NACE code), employment, value added, purchase of intermediate inputs, total cost, exports of goods, production and total sales. What is of particular interest to us is the distinction between the sales of services and the sales of goods produced by the firm.[7] This distinction allows us to compute the share of services in the total production sold by each firm. We call this ratio the service intensity of the firm. Note that we do *not* look at the importance of services activities in the production process of the firm. We are interested in the services that the firm is producing and *selling* to a third party. The services that a firm produces for its own consumption are *not* included in our analysis. Because of changes in the industry classification and incomplete data for the year 2002, we split our sample into two periods: 1997-2001 and 2003-2007.

Figure IV.1 presents a visual description of the importance of the service intensity in different industries in both periods. It reports the average share of services in the total production sold by each 2-digit industry. Unsurprisingly, services account for most of the sales in the service sectors, as well as in the wholesale and retail industries.[8] In the manufacturing industries, the share of services in the total production sold is unsurprisingly much smaller. However, the sales of services by manufacturing firms are not confined to specific industries. The service intensity ranges from 5% in food production or in the manufacturing of basic metals, to over 20% in industries such as the manufacturing of fabricated metal products,

[7] Total sales also include the sales of merchandise, i.e. sales of products that have been bought and sold without transformation. We discard this information as we focus on the production of the firm only.

[8] Note that we do not consider the total sales in each industry, but only the production sales. In the wholesale-retail sector, most of the revenues stem from the sales of merchandise.

the manufacturing of computer, electronic and optical products, or the repair and installation of machinery and equipment. Figure IV.1 also suggests that the manufacturing industries are selling relatively more services over time. We formally investigate this question in Section 3.

Figure IV.1: Service Intensity: Share of Services in Production Sold

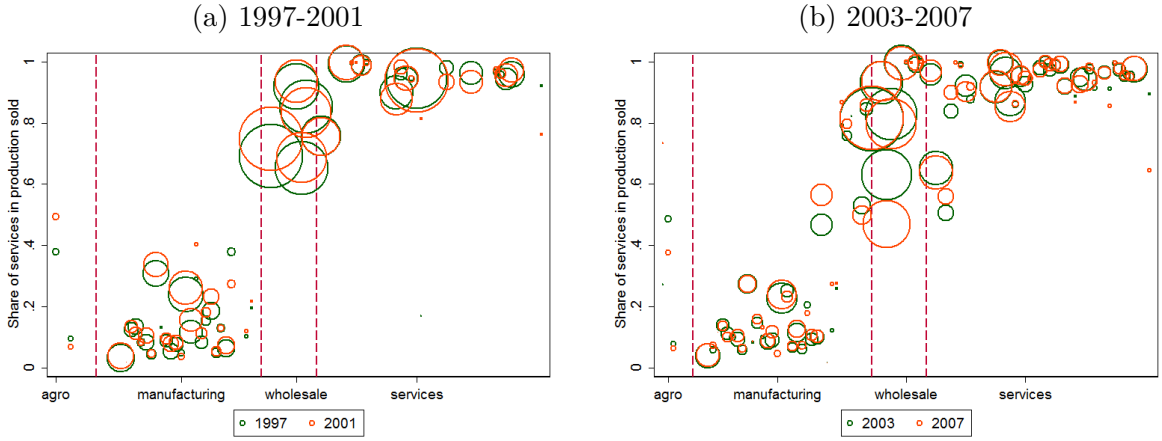


Table IV.1: Number of Firms, Employment and Value Added in Manufacturing

	1997	2001	Δ	2003	2007	Δ
Number of Firms	68,634	65,078	-1.3%	55,847	50,721	-2.4%
	(0.21)	(0.19)		(0.16)	(0.14)	
Employment (thousands)	3,136	3,120	-0.1%	2,738	2,438	-2.9%
	(0.34)	(0.30)		(0.28)	(0.23)	
Value Added (thousands)	198,650	212,379	+1.7%	194,455	194,730	0%
	(0.39)	(0.35)		(0.32)	(0.27)	

Δ = Annualized growth rate. Share of manufacturing in our total sample of firms in parenthesis. Sources: BRN database, authors' calculations.

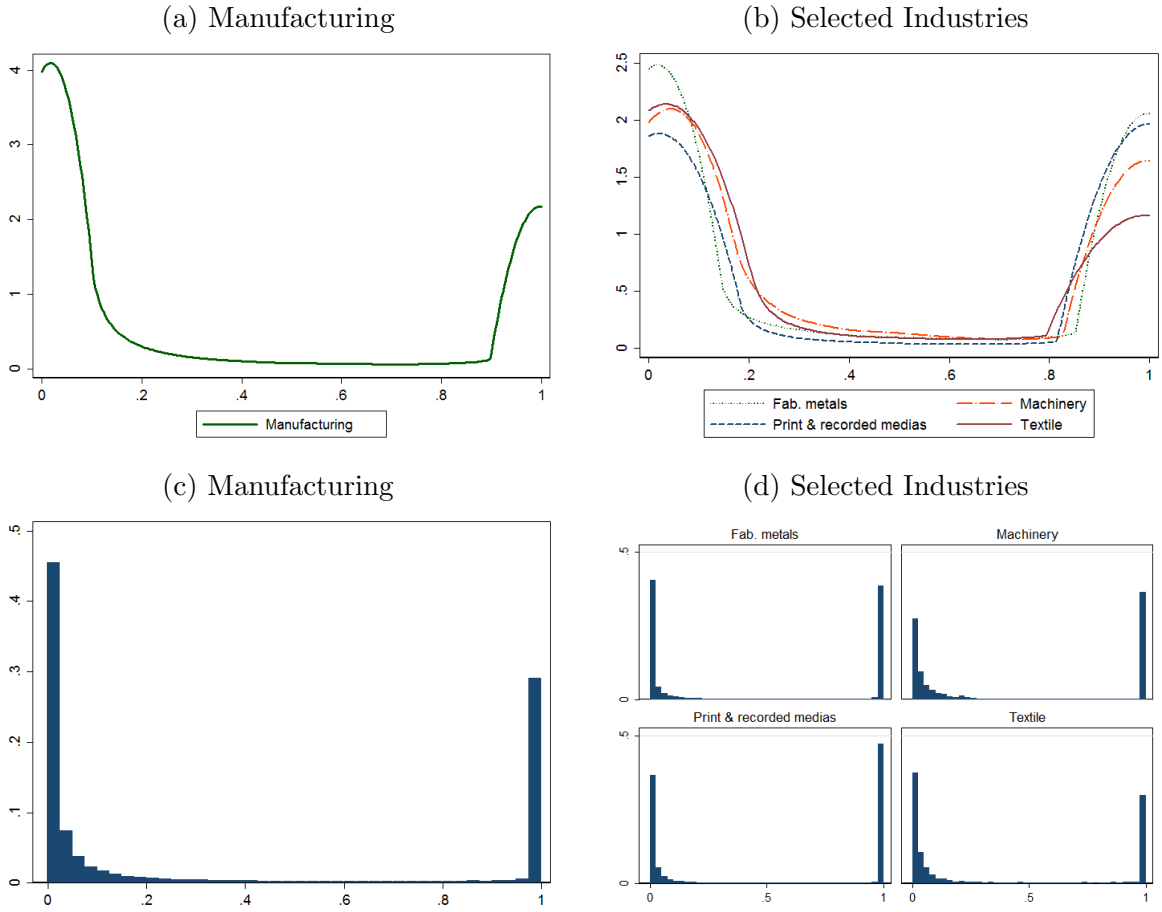
In the rest of the paper, we focus on manufacturing firms only, i.e. the ones reporting a manufacturing NACE code as their main activity. Table IV.1 gives detailed information on the change in the number of firms, employment and value added in the manufacturing sector during the two periods. Our sample consists of 68,634 manufacturing firms in 1997, which represent 21% of the firms in the full

sample. Table IV.1 also shows the extent of the deindustrialization of the French economy. Between 1997 and 2001, the number of manufacturing firms decreased by 1.3% on average each year. In 2001, the manufacturing sector accounted for 19% of the firm population. This decline was more pronounced between 2003 and 2007, when the number of manufacturing firms decreased on average by 2.4% per year. The figures for employment also reveal the shrinking importance of the manufacturing sector in terms of jobs. During the first period, the number of jobs in manufacturing remained quite stable despite a 1.3% yearly decrease in the number of firms. In the second period however, employment decreased by almost 3% per year. By 2007, the workers employed in the manufacturing sector accounted for 23% of the workforce in the whole BRN database. Figures for employment and the firm population suggest that the manufacturing sector declined in both absolute and relative terms. Nevertheless, the manufacturing sector benefitted from positive growth in terms of value added. In the first period, value added grew by 1.7% on average, while growth was much more limited – although still positive – in the second period. In relative terms however, the contribution of the manufacturing sector to total value added declined by about 5 percentage points in both periods. In 2007, the manufacturing sector accounted for 27% of the total value added reported in the BRN database.

2 Service Intensity of French Manufacturing Firms

Figure **??** presents the distribution of service intensity across manufacturing firms in 2007, with the corresponding histogram for each distribution. Panel (a) shows the distribution for all manufacturing firms, and panel (b) presents the distribution for a subset of industries. Panels (c) and (d) show the corresponding histogram. The distribution of service intensity across firms is clearly bimodal, with peaks at both ends of the distribution. The left peak is quite expected and can be easily explained. It merely reflects the fact that most manufacturing firms sell little or no services at all. About two thirds of manufacturing firms have less than 20%

Figure IV.2: Distribution of the Share of Services in Production



of their production sales in services. The distribution then approaches zero as the service intensity increases. This monotonic trend breaks at about 90%, where we encounter the second peak. 30% of French manufacturing firms are gathered in this second part of the distribution. This bimodal shape is found in each manufacturing industry. The intermediate section of the distribution, where firms have a service intensity between 20% and 90% is very small, although non-empty. A mere 7% of the firms is to be found there.[9] Panel (b) of Figure **??** shows the distribution of service intensity in four different manufacturing industries: Textile, Metal Products, Machinery and Printing and Recorded Media. All these industries exhibit a very

[9] The share of firms with an intermediate level of service intensity ranges from 2% in the food or in the tobacco industry to 13% in the manufacture of compute, electronic and optical products.

similar distribution.[10] Firms which have a very high service intensity are probably firms that have outsourced most of the production of goods to focus on the provision of services. They may also have progressively increased the sales of services that are linked to the goods they produce, but have remained registered in the manufacturing sector. It is important to notice that, in France, firms are not systematically reclassified when their main activity changes over time. This is partly due to the fact that collective labor agreements are defined at the sectoral level, which can make the reclassification very costly and cumbersome for both employers and employees. For example, consider a manufacturing firm that produces and sells windows. When selling the window, it also proposes an installation service. This firm is selling both goods (the window) and services (the installation). Now, for any reason the firm may decide to outsource all the production of windows and solely focus on the installation, while still remaining registered as a manufacturing firm. Since we are only considering the *production* sold, this firm would show up in our data as a firm that is only *producing* and selling services.

Table IV.2 provides additional information on the firms that form the second peak of the distribution. For each 2-digit manufacturing industry, it describes the share of firms with at least 50% of their production sales in services. Their corresponding share in industry employment and value added is shown in the last two columns of the table. Across the different industries, the share of firms with a high service intensity ranges from 50% (Other transport equipment) to less than 15% (Food production). However, these firms represent a much smaller share of employment and value added in their industry. Taken altogether, they make up as much as a third of the firms in the manufacturing sector, but only 14% of the employment and 12% of the value added. This pattern is constant across industries and quite stable over time.

As mentioned in the introduction, selling a product-service bundle instead of just a product is a way for manufacturing firms to differentiated themselves from

[10] Figure **??** uses the 2-digit industry classification. The bimodal shape remains intact whether we look at 3-digit or 4-digit industries.

Table IV.2: Share of Firms With at Least 50% of Services in Production Sales, in 2007

Industry	Nb Firms	Nb Firms (%)	L (%)	VA (%)
Other transport equipment	269	51.34	9.05	5.63
Recorded Media	2,012	49.81	31.37	30.79
Fabricated metal products	4,910	43.92	27.23	25.24
Machinery	1,703	41.46	14.48	11.9
Computer, electronic products	673	39.82	14.68	12.88
Motor vehicles	408	37.81	7.63	6.7
Other manufacturing	860	36.75	15.63	13.14
Furniture	703	35.85	11.41	11.54
Wearing Apparel	510	34.91	23.49	24.79
Textiles	550	34.9	22.87	18.26
Coke, petroleum	19	33.93	25.22	4.29
Electrical equipment	412	32.16	5.42	4.03
Leather	155	31.63	22.73	14.31
Other non-metallic mineral products	646	27.42	10.97	7.65
Wood products	546	22.11	12.61	11.37
Pharmaceutical products	63	21.72	18.64	19.98
Beverage	152	20.13	5.2	3.55
Tobacco	1	20	3.97	0.16
Paper products	204	19.63	6.92	7.28
Chemical products	266	18.95	13.95	30.77
Plastic products	477	16.33	6.15	6.04
Basic metals	95	14.91	4.15	4.29
Food Products	1,036	14.67	9.31	7.48
Total	16,670	32.86	14.01	12.64

their competitors. We can expect firms producing more differentiated products to sell relatively more services. We do not have direct information on the nature of the good produced and sold by the manufacturing firms in our sample. However, an indirect way of knowing whether firms produce differentiated products is to use Rauch's classification of international traded goods. Rauch (1999) classifies goods into three categories: goods with a reference price (either in an organized market or with a price listed in trade publications), and goods without a reference price. The former is referred to as homogenous products, and the latter constitutes the group of differentiated products. Using data from the French Custom, we compute for each industry, the share of differentiated products in the industry exports. The greater this share, the more differentiated the industry exports are. We use

this as a measure of the product differentiation in each industry and link this to the service intensity of each industry. We cross these two piece of information in figure IV.3, using data for the year 2005. Perhaps unsurprisingly, we observe a positive correlation between the share of differentiated products in an industry exports and the service intensity of that industry. Some cross-industry differences are worth noticing. Industries in the bottom left corner of the figure export mainly homogenous products and have a low service intensity. These industries include the manufacture of food products, beverage or tobacco (Nace 10, 11 and 12 resp.) and the manufacture of basic metals, paper products and refined petroleum products (Nace 24, 17 and 19 resp.). On the top right corner of the figure, we find industries with a high service intensity which export mainly differentiated products. These are the manufacture of fabricated metal products (Nace 25), the manufacture of computer, electronics and optical products (Nace 26), and the manufacture of other transport equipments such as ships, railways, motorcycles etc. (Nace 30). The industry of printing and reproduction of recorded media also shows a high service intensity with mostly exports of differentiated products (Nace 18). The figure also suggest that there is some heterogeneity in the service intensity of industries that mainly export differentiated products. Considering industries where at least 80% of the exports consist of differentiated products, the service intensity ranges from 6% (manufacture of electrical equipment – Nace 27) to 24%(manufacture of computer, electronics and optical products – Nace 26) or to 28% (printing and recorded media – Nace 18). Firms in the Manufacture of chemicals and chemical products (Nace 20) constitute an outlier in this relationship. The average service intensity of the firms in this industry is 17%, and the exports of differentiated products constitute only 23% of the total industry exports. According to the figure, we would expect this export share to be at least of 60%.

We now examine the characteristics of manufacturing firms with different service intensities. We classify firms into three categories: firms with a low service intensity (less than 20% of services in total production sold), firms with

Figure IV.3: Exports of Differentiated Products and Service Intensity

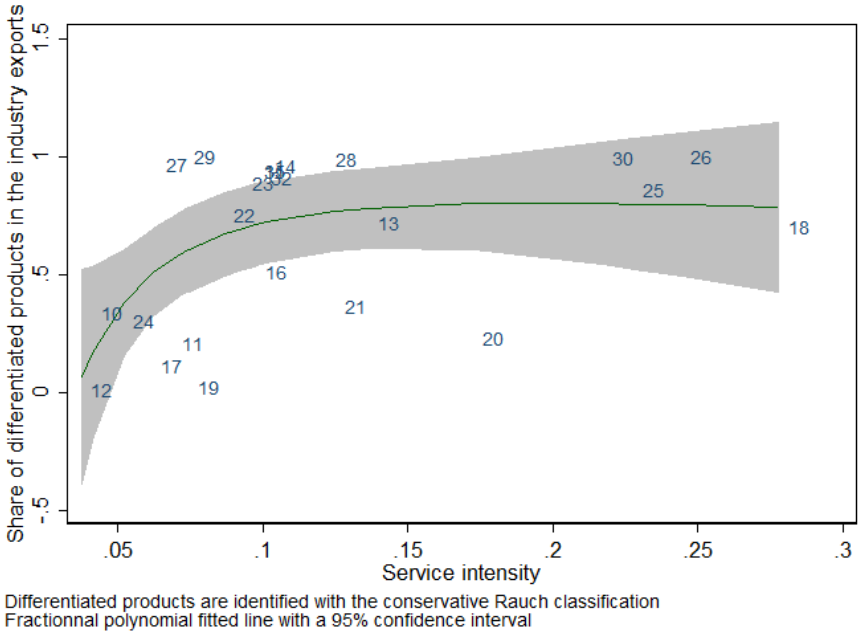
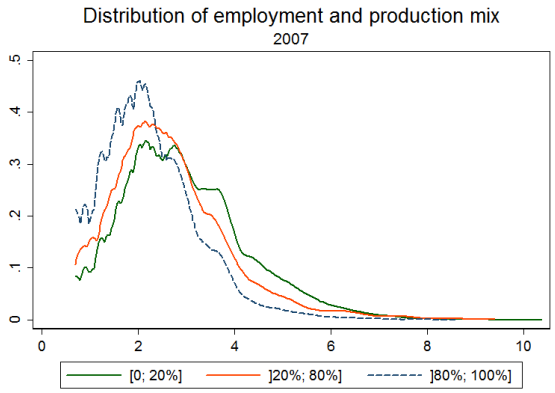
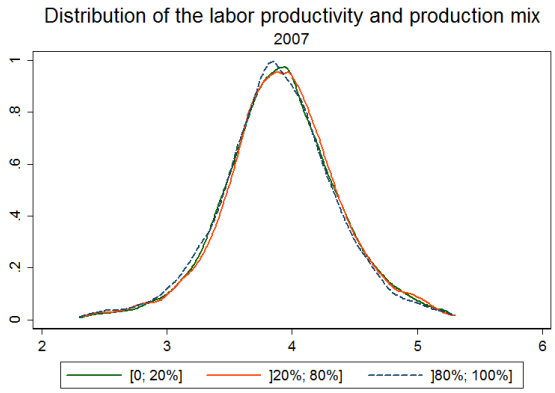


Figure IV.4: Firm Performance and Service Intensity in 2007

(a) Employment



(b) Labor productivity



an intermediate intensity (between 20% and 80%), and firms with a high service intensity (over 80%). In Figure IV.4, we look at the distribution of employment and labor productivity for these three categories of firms. Panel (a) shows a clear negative relationship between a firm's service intensity and its number of employees. Firms with low service intensity are larger on average than firms with intermediate or high intensities. Regarding labor productivity (measured as value added per

worker), shown in panel (b) of Figure IV.4, the differences are much smaller.

Table IV.3 shows more detailed and robust evidence on the relationships between firms' service intensity and firms' characteristics. In the first three columns, the dependent variable is the firm's service intensity, i.e. the share of services in the production sold. In the last column, the dependent variable is a dummy variable which takes the value 1 if the share of services in the production sold is 100%. The regression reported in Column (1) shows that, controlling for industry×year fixed effects, a higher service intensity is associated with a smaller number of workers, lower labor productivity, lower capital intensity and lower wages. These results are confirmed by those reported in the third column of Table IV.3, where we retain firms that are continuously observed in our sample between 1997 and 2007. In Column (2), the sample of firms is restricted to those which primarily produce manufactured goods (we thus eliminate all firms in the right-hand peak of the bimodal distribution shown in Figure **??**). For these firms, a higher service intensity is still associated with a smaller size and smaller capital intensity, but with higher average wages. These econometric results suggest that the production of services by manufacturing firms is on average less capital-intensive and more skill-intensive than the production of goods. Finally, we look in Column (4) at the characteristics of firms whose service intensity is equal to 1, i.e. firms whose production sales only consist of services. We find that manufacturing firms that specialize in the production of services are smaller, less capital intensive, have a lower value added per employee and pay on average higher wages.

3 The Servitization of French Manufacturing: 1997-2007

In this section, we look at the servitization of French manufacturing firms, i.e. at how the service intensity of manufacturing firms has changed over time. In Figure IV.5, we look at the aggregate servitization between 1997 and 2001, and between 2003 and

Table IV.3: Firm-Level Determinants of Service Intensity

Dep. Var.	Service Intensity			dummy: Service Intensity=1
	All Firms	Firms with Serv. Intens. < 50%	Continuing firms	All Firms
	(1)	(2)	(3)	(4)
Ln Employment	-0.090^a	-0.001^a	-0.078^a	-0.385^a
	(0.005)	(0.000)	(0.004)	(0.002)
Ln Lab. prod.	-0.092^a	-0.000	-0.100^a	-0.043^a
	(0.007)	(0.001)	(0.008)	(0.005)
Ln K/L	-0.068^a	-0.001^b	-0.072^a	-0.183^a
	(0.003)	(0.000)	(0.003)	(0.002)
Ln av. wage	-0.042^a	0.004^a	-0.024^a	0.102^a
	(0.007)	(0.001)	(0.007)	(0.008)
Observations	605,509	388,964	290,790	592,368

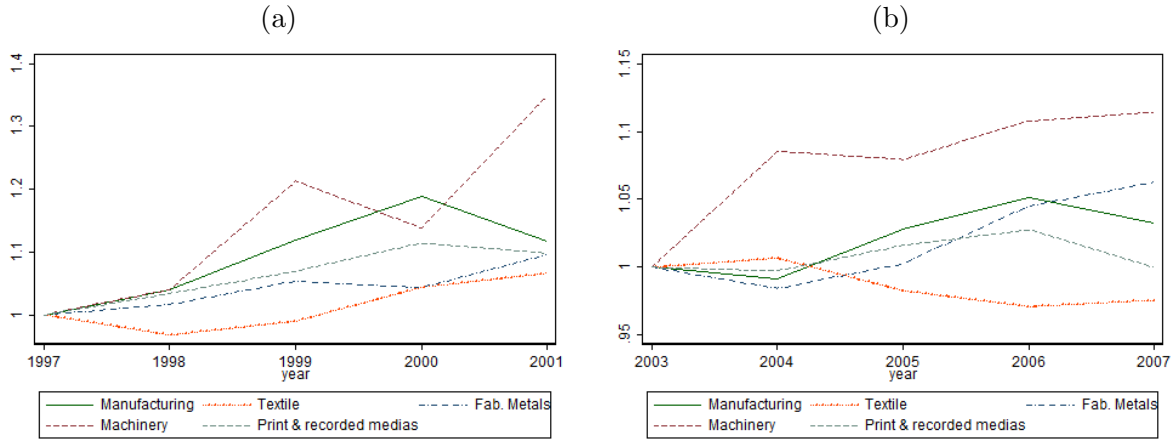
Robust standard errors in parentheses, clustered at the NACE2×year level (^{b}: p<0.05, ^{a}: p<0.01). The sample includes manufacturing firms only. NACE2×year fixed effects included. The dependent variable in Columns (1)-(3) is the share of services in the production sold. The estimation is carried with OLS. In column (4), the dependent variable is a dummy variable which takes the value 1 if the firm's service intensity is equal to one. We report the marginal effects of a probit estimation.

2007. The plain line denotes the manufacturing sector as a whole, and the dashed lines represent selected industries. Between 1997 and 2001, the aggregate service intensity of manufacturing firms increased by more than 10%, going up from 10.8% in 1997 to 12% four years later. This is equivalent to a 2.8% average yearly growth rate over the period.[11] This servitization is seen in most industries. Between 1997 and 2001, the service intensity declined by 17% in the wearing apparel, and by 25% in the manufacturing of basic metal products, but it increased by more than 30% in the fabricated machinery industry. The service intensity declined in the textile industry until 1998 but, in 2001, this industry was 6% more servitized than what it was four years earlier. The trend of service intensity is rather similar after 2003. At the beginning of the period, the aggregate share of services in production sold was 11.1% only, and reached 11.4% four years later.

Three margins of adjustment can explain the change in the aggregate service

[11] The simple (unweighted) average of the share of services in production sold across all firms in the manufacturing sector produces much higher shares. The unweighted share was 36.5% in 1997, and 38% in 2001. This means that small firms increased their service intensity more than larger ones.

Figure IV.5: The Servitization of Manufacturing: Aggregate Trends



intensity in each manufacturing industry. The first margin is due to entries and exists of firms with different service intensities. Then, considering a constant sample of firms, aggregate changes can be decomposed into a "between-firms" margin and a "within-firms" margin. The "between-firms" margin refers to the shift of market shares between firms with different service intensities. The "within-firms" margin refers to the average change in the share of services in firms' total output. In order to assess the importance of firm-level servitization, for each industry we decompose the changes in aggregate service intensity into the between and the within margin for the 1997-2001 and 2003-2007 periods respectively. Here, we consider a constant sample of firms for each period, thus ignoring the first margin due to entries and exits. A standard way of decomposing an aggregate change into terms reflecting the reallocation between and within firms is as follows:

$$\Delta S_j = \sum_i \Delta Y_{i,j} \overline{S}_{i,j} + \sum_i \Delta S_{i,j} \overline{Y}_{i,j}, \qquad \text{(IV.1)}$$

ΔS_j denotes the aggregate change in service intensity in the constant sample of firms in industry j. $\overline{Y}_{i,j}$ is the average share of firm i in the production of industry j,

Table IV.4: Change in Service Intensity Between 1997 and 2001 (Percentage Point Changes)

Industry	Total Change	Within	Between
All Manufacturing	0.95	1.62	-0.67
Office machinery	17.52	19.07	-1.55
Machinery, n.e.c.	4.03	2.67	1.36
Radio, TV	4.01	5.19	-1.18
Medical, optical instruments	3.61	3.31	0.3
Electrical machinery	3.25	2.07	1.18
Publishing	2.32	2.56	-0.24
Plastic products	2.3	2.29	0.01
Wood products	1.19	0.28	0.92
Non-metallic products	1.11	0.69	0.41
Fabricated metals	1.03	1.1	-0.08
Textile	0.99	1.65	-0.66
Motor vehicles	0.93	1.66	-0.74
Manufacturing, n.e.c.	0.91	0.83	0.08
Tobacco	0.89	0.9	-0.02
Food products	0.81	0.74	0.07
Paper products	0.31	0.8	-0.5
Other transport equipment	0.09	0.9	-0.81
Basic metals	-0.03	0.18	-0.21
Chemical products	-0.24	2.71	-2.94
Leather	-0.4	-0.7	0.3
Wearing apparel	-0.51	2.18	-2.68
Petroleum	-5.13	-2.01	-3.12

$\Delta Y_{i,j}$ is its change. $\overline{S}_{i,j}$ is the average service intensity of firm i in industry j, $\Delta S_{i,j}$ is its change (i.e. the servitization whenever this is positive). The first term on the right-hand side of Equation IV.1 captures the aggregate change in service intensity due to shifts in market shares between firms with different service intensities (the between margin). The second term captures the within margin, i.e. the aggregate evolution of service intensity attributable to changes in individual firms' shares of services in total production sold (the within margin). The results for the 1997-2001 and 2003-2007 periods are displayed in Tables IV.4 and IV.5 respectively.[12] Taking the manufacturing sector as a whole, the share of services in production sales increased by almost one percentage point between 1997 and 2001, and by

[12] Results remain very similar if we exclude firms that are fully specialized in the production of either goods or services over the period.

Table IV.5: Change in Service Intensity Between 2003 and 2007 (Percentage Point Changes)

Industry	Total Change	Within	Between
All Manufacturing	0.65	1.77	-1.12
Tobacco	9.19	9.33	-0.13
Pharmaceutical products	5.22	9.22	-4
Other non-metallic mineral products	2.68	3.53	-0.85
Chemical products	1.82	5.48	-3.66
Motor vehicles	1.51	1.66	-0.15
Recorded Media	1.43	-0.1	1.53
Beverage	1.35	0.93	0.42
Electrical equipment	1.35	2.21	-0.86
Fabricated metal products	1.32	1.16	0.16
Furniture	1.18	0.6	0.58
Machinery	0.96	2.19	-1.23
Computer, electronic products	0.72	2.95	-2.24
Other manufacturing	0.57	2.26	-1.69
Food Products	0.51	0.51	0
Wearing Apparel	0.41	4.64	-4.23
Plastic products	0.39	0.56	-0.17
Wood products	0.18	0.26	-0.08
Paper products	0.17	0.24	-0.07
Textiles	-0.29	1.05	-1.34
Basic metals	-0.39	0.55	-0.94
Leather	-0.51	0.53	-1.04
Coke, petroleum	-0.79	0.08	-0.87
Other transport equipment	-2.98	-3.43	0.44

0.65 percentage point between 2003 and 2007 (these results differ from those in Figure IV.5 as we focus here on a constant sample of firms). In both periods, the between-firms component contributed negatively to the shift toward services. This indicates that firms with low service intensity grew faster than firms with high service intensity, thus pulling the overall change down. But these between-firms effects are more than compensated for by the within-firm changes. The increase in the average firm-level service intensity accounts for 170% of the aggregate servitization in the first period, and for 272% in the second period. Looking at the details industry by industry, we observe that the within-firm component contributes positively to the overall servitization and dominates the between effect in almost each industry. The exceptions are the leather and petroleum industries in the first period, and recorded

media and other transport equipments in the second period. The findings presented in Tables IV.4 and IV.5 suggest that the main driver behind the servitization of the French manufacturing sector is not that highly servitized firms performed better than less servitized ones. It is that each manufacturing firm, on average, shifted away from the production of goods and toward the production of services. We now further describe this firm-level shift toward servitization

Figure **??** has highlighted the bimodal shape of the distribution of firms' service intensity, and the decomposition exercise shown in Tables IV.4 and IV.5 suggests that, on average, firms have increased this intensity. We now want to look at how the distribution of service intensity has shifted over time. Do firms become extremely specialized in the provision of services (moving to the right peak of the distribution), or do they only marginally change their service intensity? To answer this question, we consider a sample of firms continuously present over the period 1997-2007 (32,053 manufacturing firms). We divide firms into ten bins, according to their initial service intensity in 1997. Firms in the first bin (d1) have a service intensity below 10% (and strictly positive). Firms in the second bin (b2) have a service intensity between 10% and 20%, and so on. Additionally, we consider firms that do not sell services (0%), and firms that only sell services (100%). We then look at the position of these firms in the classification ten years later. Each cell of the transition matrix below indicates the share of firms that moved from one bin to another during the period.

Table IV.6: Transition Matrix - Between 1997 and 2007 - 32,053 firms

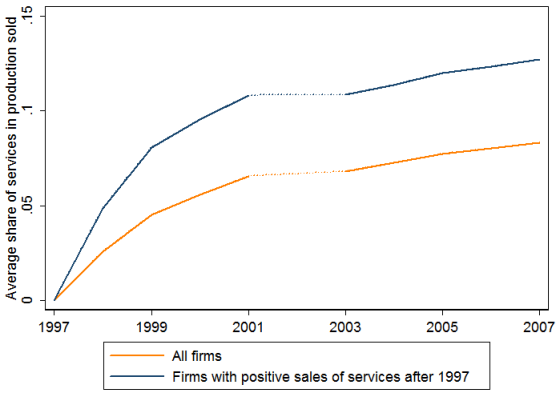
from\to	0%	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	100%
0%	**10.00**	**6.67**	0.35	0.15	0.07	0.05	0.04	0.05	0.04	0.03	**0.20**	**1.00**
d1	**4.98**	**36.07**	2.56	0.68	0.34	0.15	0.11	0.09	0.05	0.08	**0.41**	**1.75**
d2	0.17	1.55	**1.02**	0.41	0.16	0.08	0.04	0.04	0.01	0.03	0.04	0.18
d3	0.06	0.51	0.39	**0.34**	0.19	0.11	0.04	0.02	0.03	0.03	0.04	0.12
d4	0.04	0.22	0.12	0.16	**0.14**	0.08	0.09	0.05	0.01	0.01	0.03	0.11
d5	0.03	0.12	0.07	0.08	0.10	**0.13**	0.04	0.05	0.04	0.01	0.04	0.07
d6	0.01	0.10	0.04	0.04	0.04	0.06	**0.08**	0.06	0.03	0.02	0.03	0.08
d7	0.01	0.05	0.03	0.04	0.04	0.04	0.05	**0.07**	0.04	0.07	0.04	0.07
d8	0.02	0.07	0.01	0.02	0.02	0.02	0.03	0.04	**0.07**	0.07	0.09	0.10
d9	0.02	0.06	0.01	0.01	0.01	0.02	0.02	0.02	0.05	**0.12**	0.17	0.18
d10	**0.07**	**0.28**	0.04	0.02	0.02	0.02	0.02	0.04	**0.05**	0.11	**1.76**	**1.39**
100%	**0.69**	**1.34**	0.21	0.15	0.08	0.07	0.07	0.11	0.09	0.14	**1.14**	**16.25**

Several key features of the matrix have to be emphasized. First, most of the firms are in the diagonal of this matrix. Between 1997 and 2007, two thirds of the firms did not change their service intensity much. Second, most of the changes happen in the top left corner, and in the bottom right corner. The four cells in the top left corner account for 58% of firms, while the four cells in the bottom right corner account for 21% of firms. Looking at the top left corner, we see that 4.98% of the firms that had a service intensity in the first bin (i.e. below 10%) in 1997 stopped their production of services ten years later. Conversely, 6.67% of the firms that did not sell services in 1997 sold some services in 2007 (they accounted for less than 10% of their production sold). Regarding the bottom right corner, the same kind of pattern emerges. If firms were to increase their service intensity substantially (enough to move to another bin over time), then we should see higher figures above the diagonal rather than below it. We find that 21% of firms are strictly above the diagonal, and 13% below. On average, more firms have increased their service intensity than decreased it. We also observe a substantial share of firms in the top right and bottom left corners of the matrix. These are firms that switch from one peak of the distribution to another. In the top right corner, we find firms that produced little or no services in 1997 and that were almost entirely servitized ten years later. The four cells in the top right corner of Table IV.6 account for 3.4% of firms, and for 16% of the firms above the diagonal. Conversely, the four cells in the bottom left corner account for 2.4% of firms (or 18% of the firms below the diagonal). These firms were highly servitized in 1997 and almost stopped selling services in 2007.

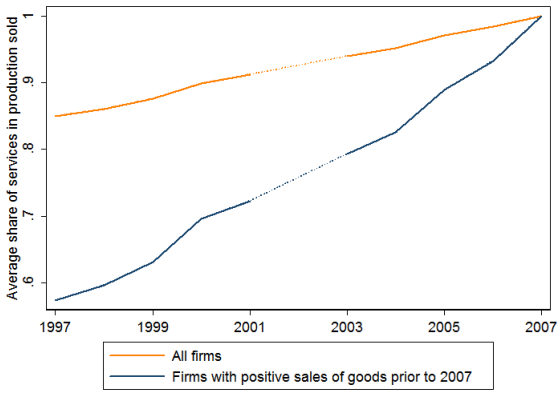
Figure **??** revealed that most of the manufacturing firms in our sample either do not sell much services, or are almost fully specialized in the production of services for third parties. Additionally, Table IV.6 showed that very few firms changed drastically their output mix, and there is very few firms moving from one end of the distribution to the other. In Figure IV.6, we take a closer look at the firms that start selling services, and at the firms that fully specialize in the production and sales of services. In panel (a), we consider the firms that were not selling services in 1997,

Figure IV.6: Dynamics of Servitization

(a) Diversification in Services



(b) Full Specialization in Services



and look at how their sale of services evolved over time. The orange line shows the share of services in the production sold for all the firms that were not selling services in 1997. The blue line excludes the firms that never sell services over the period.[13] Focusing on these firms, we see that the average share of services in the production sold steadily increased until 2001, where it reached almost 11% on average. It then slowly kept increasing to reach 12.7% by the end of the period. In panel (b), we focus on the firms that constitute the second hump in the distribution shown in Figure **??**. We focus on firms that are entirely servitized by the end of the period, i.e. firms that only produce and sell services in 2007. The orange line represents the evolution of the service intensity for all firms that are fully specialized by 2007. The blue line excludes firms that are always specialized in the sales of services over the period 1997-2007.[14] We see that for firms that were not entirely specialized in services prior to 2007, the service intensity steadily increased over time, starting from 57% on average, and reaching 100% ten years later.

Tables IV.6 and FigureIV.6 suggest that there is no radical change in service

[13] There were 12,223 manufacturing firms firms in 1997 that were not selling services. Firms that never sell sell services over the period 1997-2007 account for 40% of them. Note that firms may cease existing during the period.

[14] Manufacturing firms that only sell services over the period 1997-2007 account for 70% of the 13,316 manufacturing firms fully specialized in services in 20073

intensity. Instead, we find a slow and steady trend toward a greater share of services in production for a substantial number of firms. To evaluate the statistical significance of this trend, we estimate the following equation:

$$ServiceIntensity_{it} = \alpha_i + \gamma_t + \epsilon_{it}, \tag{IV.2}$$

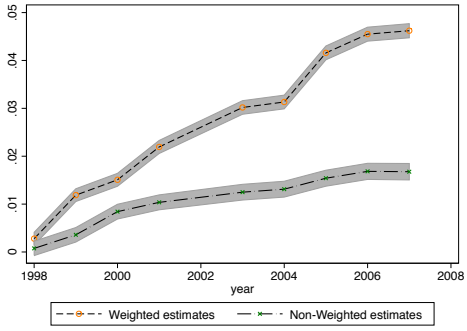
where $ServiceIntensity_{it}$ is the service intensity of firm i at date t, α_i is a firm fixed effect, γ_t is a set of year dummies and ϵ_{it} is the error term. The firm fixed effect control for any observable or unobservable factor which is firm-specific and constant over time. This means that the time dummies, γ_t, measure the average yearly change in service intensity within firms. Figure IV.7 displays these time dummies graphically, along with a 95% confidence interval. The year 1997 is taken as reference. A positive coefficient means that, on average, each firm has increased its service intensity with respect to its initial level in 1997. In panel (a), we use the full sample of firms, allowing for the entry and exit of firms. Instead, panel (b) shows the estimates obtained with a sample of firms that were continuously active between 1997 and 2007. In each panel, the dashed line shows unweighted estimates, while the dotted line shows estimates obtained from regressions weighted by the firm size (i.e. average firms' employment over the period).

The results confirm that on average, after controlling for firm-specific factors, each firm increased its service intensity between 1997 and 2007. The unweighed regression indicates that the service intensity of each firm increased by 1.7 percentage point on average in panel (a), and 1.4 percentage point on average in panel (b). These results hide strong heterogeneity among firms, especially regarding their size. In both panels, the estimated coefficients obtained from the weighted regressions are systematically above the unweighed ones. This suggests that larger firms increased their service intensity more than smaller firms. Comparing panels (a) and (b), we see that service intensity increased at a slower pace when considering a constant sample of firms. This means that firms entering during the period increased their service intensity faster than incumbent firms, and exiting firms increased their

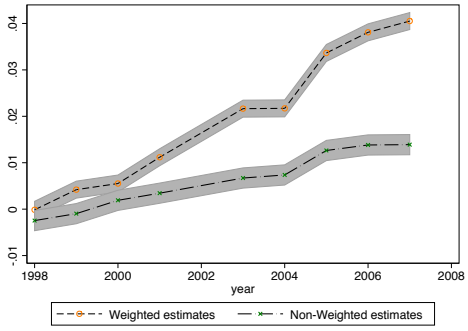
service intensity less than incumbent firms. In other words, the net entry of firms contributed positively to the servitization of the manufacturing sector.

Figure IV.7: Firm-Level Trend in Service Intensity

(a) With entries and exits



(b) Constant sample



4 The Hidden Deindustrialization

The usual assessments of the deindustrialization such as the one shown in Table IV.1 are based on simply counting the relative importance of the manufacturing sector in the economy. However, the evidence presented in the previous sections suggest that the boundary between manufacturing and service activities is very blurry and that the deindustrialization may also take a more insidious form. If, as shown above, a large proportion of manufacturing firms also supplies services, then deindustrialization is not only a shift of production and employment away from the manufacturing sector, it is also a shift within the manufacturing sector (and within manufacturing firms), toward the production of services.[15] The within-manufacturing shift toward services is invisible to the analyses based on industry

[15] As already mentioned in the introduction, the outsourcing of service activities is an important component of the deindustrialization process. Over time, firms tend to outsource activities that are not perceived as important. These can be distant from the core activity, generate low value added. The outsourcing decision also implies that firms do not have much strategic interest in keeping these activities indoor, and can bear some of the risk of contracting an outside supplier.

classifications. In this section, we try to quantify the importance of this "hidden" deindustrialization process.[16]

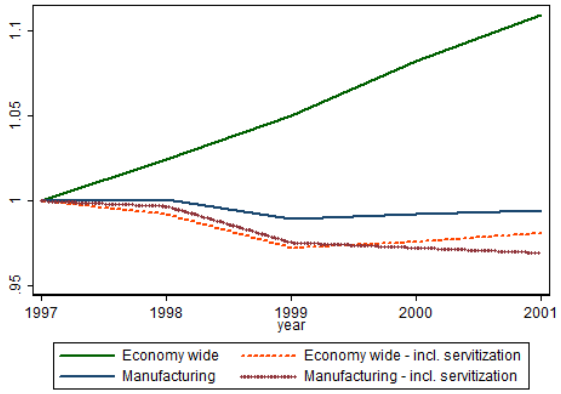
For each firm, we approximate the number of workers employed in the production of goods by multiplying the total employment of the firms by the share of goods in production sold (i.e. one minus our measure of service intensity). Summing over all firms gives us a rough but simple approximation of the number of workers actually employed in the production of manufactured products. The evolution over time of this aggregate employment is a measure of the deindustrialization that accounts for the shift toward services both between firms and sectors (i.e. the net entry rates of firms and their relative growth) and within firms. The same method is applied to firms' value added to obtain a measure of manufacturing value added net of the servitization of manufacturing firms.

The results are presented in Figure **??**. It compares the evolution of the different measures of employment and value added for the two periods (1997-2001 and 2003-2007). For each period, figures are taken in reference to the initial year of the period. Panels (a) and (b) present the evolution of employment and value added in the first period respectively. Let us start with the description of Panel (a). The top solid line represents the change over time in the total number of workers in our sample of firms, with no distinction between sectors. Between 1997 and 2001, the total employment recorded in our database increased steadily by about 2.5% per year. The bottom solid line shows the evolution of the number of workers in manufacturing firms (classified according to their main activity). Unsurprisingly, this line is declining, supporting the abundant evidence of the deindustrialization of the French economy. The decline is moderate, but considering that total employment

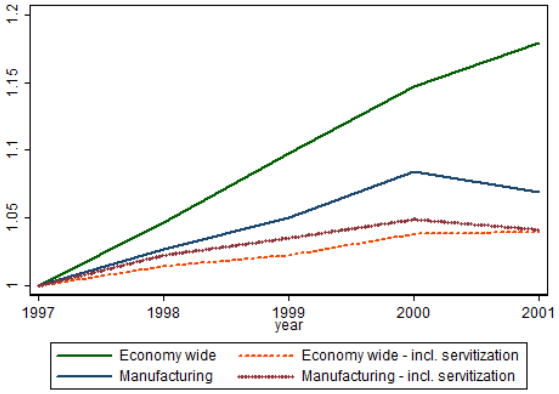
[16] It is worth mentioning that other points of view can be expressed. While we are using the lens of deindustrialization, one could see the servitization of the manufacturing industry as a manifestation of the change in the essence of the manufacturing industry itself. With increased competition, both domestically and internationally, manufacturing firms need to attract and keep customers. Proposing services along with the product, firms hope to make their product *perceived* as more differentiated by the consumer. For instance, one could say that Nespresso is selling more than just coffee, it is selling *"the perfect coffee experience"*. In this regard, the "hidden" deindustrialization can be seen as a mutation of the industry, rather than simply as a loss of industrial jobs.

Figure IV.8: Evolutions of Employment and Value Added Using the Share of Services in Production Sold as Weights

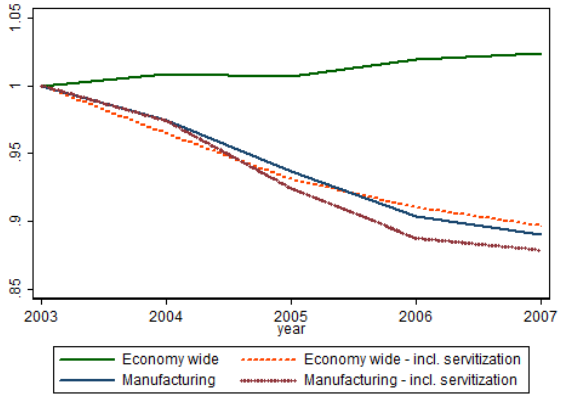
(a) Employment: 1997-2001



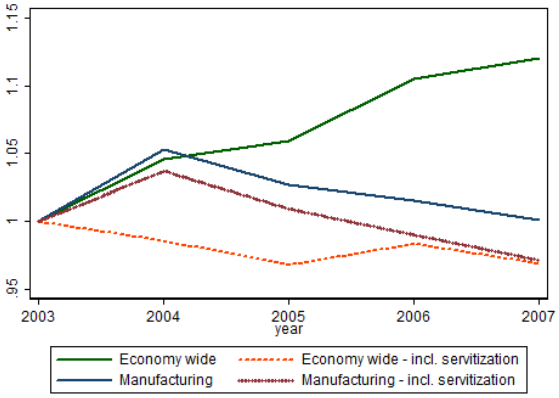
(b) Value Added: 1997-2001



(c) Employment: 2003-2007



(d) Value Added: 2003-2007



grew over the period, this trend denotes a sharp decrease in the share of workers employed by manufacturing firms, by about 12% between 1997 and 2001. The dotted line incorporates the within-firm shift toward services obtained by using the information on the service intensity of manufacturing firms. It represents the change over time of the estimated number of workers in manufacturing firms employed in the production of goods. The previous sections have shown that service intensity increased over the period. It is not a surprise then to observe that taking this dimension into account provides a harsher diagnosis about the deindustrialization of the French economy. The share of workers employed in the production of goods in manufacturing firms decreased by 3% between 1997 and 2001. This figure is to be

added to the 12% decrease obtained when the firms' servitization is not considered. However, to have a comprehensive assessment of the evolution of the share of workers involved in the production of manufacturing goods, the production of goods in firms registered in the service sector must be taken into account. This is what the dashed line shows. Here, we ignore the information on firms' main activity. For each firm in our sample, we simply compute the total number of workers presumably involved in the production of goods, and sum these numbers over all the firms in our sample. The results suggest that firms in the service sector decreased their own service intensity, producing relatively more goods over time. All in all, the estimated share of workers employed in the production of goods decreased by 13% between 1997 and 2001. This number is higher than the 12% decrease provided by the usual measures of deindustrialization based on the observation of total employment by firms registered in the manufacturing sector. This simple counting exercise suggests that there is indeed a "hidden" deindustrialization which occurs within firms, and that the usual assessment of the deindustrialization process, which is simply based on sectoral classification, underestimates the shift of employment toward services by more than 8% (=13/12).

Panel (b) confirms this conclusion by showing similar evidence based on value added rather than employment. Accounting based on sectoral classifications (represented by the spread between the two solid lines) reveals that the share of manufacturing firms' value added in total value added declined by 10% between 1997 and 2001. But our measure of deindustrialization based on firms' actual production of goods suggests that the share of manufacturing value added declined by almost 12% during this period, i.e. 20% more than the usual measure.

Panels (c) and (d) of Figure **??** replicate the same counting exercise for the 2003-2007 period. During these five years, the total employment registered in the BRN database remained roughly unchanged. However, the employment in manufacturing firms decreased by 10% (the bottom solid line in panel (c). Using our measure of the total number of workers employed in manufacturing firms for

the production of goods, we find a decline of 12%, due to the growing servitization of manufacturing firms. However, this effect is almost entirely compensated for by the increase in the production of goods in service firms (or by the fact that service firms which also produce goods grew faster than others). In terms of value added, however, the growth of the production of goods in service firms has almost no impact on our measure of deindustrialization. The share of value added associated with the production of goods in total value added decreased by 3%. This figure is to be compared with the fact that there was virtually no change in the share of manufacturing firms in total value added.

5 Concluding Remarks

During the last decades, the importance of the manufacturing sector has been declining steadily in most developed economies. These profound changes in the economic structure of developed countries, in a context of relatively slow growth and/or persistent unemployment, is a very serious concern for policymakers.

A vast literature has discussed the possible causes for the shift of employment and value added away from manufacturing and toward services. Factors such as differences in productivity growth between the manufacturing and the service sector, changes in consumer preferences, international competition or outsourcing strategies have been put forward to explain the decline of the manufacturing sector. In this paper, we argue that deindustrialization is not only a shift of resources between industries, but also a phenomenon that occurs within the manufacturing sector and within manufacturing firms. Our investigation of the production of services by manufacturing firms, based on a very large sample of more than 635,000 French manufacturing firms, suggests that this within margin of the deindustrialization process is not negligible. French manufacturing produces many services and tends to produce more and more. On average over the 1997-2007 period, services accounted for more than 11% of the total production sold by manufacturing firms. This

proportion increased steadily over the period, by more than 10% between 1997 and 2001 and by almost 3% between 2003 and 2007. The main driver behind this servitization of the French manufacturing sector is a dynamic that occurred within firms. Even if few firms radically changed their production mix toward services, changes in the individual share of services in total production is non-negligible. During the 1997-2007 decade, the share of services in the total sales of each firm increased by 1.7 percentage point on average.

This within-firm shift toward services is an additional margin of the deindustrialization process that has been ignored by studies that rely on the sectoral classification of firms. The slow but steady servitization of manufacturing firms suggests that deindustrialization is in fact more severe than usually reported. However, beyond the simple evidence provided by the basic counting exercises presented in this paper, further research would be necessary to explore the causes and consequences of the servitization of manufacturing firms in terms of firm performance and economic growth.

General Conclusion

Most of today's economies are characterized by a large and growing service sector. Services generate more than two thirds of the value added and employ as much workers in the oecd economies. Despite the predominance of services, they account for only one fifth of world trade. For a long time, services have been considered as non-tradable. The ICT revolution of the 1990s and early 2000s has considerably contributed to the growth of trade in services. While barriers to trade in manufacturing products such as tariffs and quotas have been reduced gradually, notably via the World Trade Organization, international trade in services is still subject to many restrictions.

In the **first chapter** of this dissertation, I looked at how domestic regulations can constitute barriers to trade in services. Domestic regulations are the set of rules under which firms operate, and constitute a major impediment of trade in services. The General Agreement on Trade in Services aims at reducing the regulations that discriminate against foreign firms. In this chapter, I focused on the regulations that apply to all firms alike and ask whether they can be used to discriminate in practice against the foreign suppliers of services. I empirically investigated this using data on the French exporters of professional services. I found that domestic regulations reduce both the export probability and the individual export sales of French exporters of services. According to the simple trade model I used, this is consistent with domestic regulations acting in practice as discriminatory barriers. Foreign suppliers of services are more affected by the local regulations in a foreign market than the local firms from this market. The main message of this chapter is

that, as far as the promotion of world trade in services is concerned, more attention should be devoted to domestic regulations. This work could be extended in several directions. First, it would be interesting to obtain data for a greater set of countries and consider countries outside the OECD. Second, data at the sectoral level would be particularly interesting, as it would allow me to control for the unobserved characteristics of the countries.

A salient feature of trade in services data is that very few firms export services. In the **second chapter**, I looked at how firms expand their networks of foreign contacts. Recent studies have looked at how manufacturing firms choose their next export destination (Albornoz et al., 2012; Defever et al., 2011; Chaney, 2014). All these studies highlight a strong geographical bias in the export pattern. Manufacturing firms tend to export to countries that are geographically close to the countries they are already exporting to. In this **second chapter**, I argued that besides geographic proximity, linguistic proximity should play a role too. Services rely heavily on communication, both verbal and non-verbal, and the cultural proximity of two individuals with close languages is likely to affect the success of service transactions. I investigated this question by looking at whether the exporters of differentiated products and the exporters of services exhibit a linguistic bias in their export decision. Controlling for the geographic bias, I found that linguistic proximity matters for both the exporters of differentiated goods and services. The exporters of manufacturing products are more sensitive to geographic proximity than to linguistic proximity, while the exporters of services seem to be equally affected by both. This chapter could be extended in many directions. First, it would be very interesting to have information on the overseas clients of the firms. Second, linking this with measures of trust across countries should raise interesting questions. Third, several aspects such as the length of the trade relationship or the nature of the goods exchanged could be considered to further describe how the linguistic proximity affects the exporters' behavior. Finally, information on the nationality of the workers employed by exporting firms could explain why firms choose to export

to some countries and not others in the first place.

In the second part of this dissertation, I focused on the importance of services for manufacturing firms. In the **third chapter**, I looked at how services are correlated with the occupation structure of French firms. Services are important inputs in the production process and traditionally performed by workers with a certain level of qualification. The international trade literature has mainly focused on the impact of imported material inputs on wage inequalities and occupation structure. In this paper, I looked at how imported services correlate with the firm's skill structure. The results suggest that service imports are correlated with a skill polarization, while the imports of intermediate inputs are correlated with a general skill upgrading. This correlation is only significant in the manufacturing sector, however. In the service and wholesale-retail sectors, the imports of services do not seem to be correlated with any kind of change in the skill structure. This chapter merely establishes a robust correlation, and not a causality, and could be extended in several directions. First, it seems a natural step to find a suitable instrument to control for the possible reverse causality. Second, it would be interesting to dig deeper into the occupation structure of firms and investigate whether the correlation holds for all workers or only for a subset of them, and, if so, why. A measure of the "routineness" of the tasks performed by workers would be interesting to use, as more "routine" tasks are possible candidates for offshoring (Levy and Murane, 2004; Jensen, 2011).

The **last chapter** of this dissertation looked at the supply of services by manufacturing firms. The fact that manufacturing firms are increasingly supplying services has been called "servitization" by scholars from the business and marketing literature. I first showed that the supply of services is a wide spread activity among manufacturing firms. The vast majority of the manufacturing firms in our sample sell services, and about quarter of them do not even produce goods. Firms that supply services tend to be smaller, less productive and capital intensive but more skill-intensive than other firms. I then showed that the servitization of the manufacturing firms is happening within each industry, and within each firm on average. The speed

of the shift toward services is rather slow. The results of this chapter provide some insights for new research questions. First, it would be interesting to extend the analysis to firms registered in the service sector. Preliminary evidence suggests that these firms are selling more products over time. Second, a special focus on multinational firms would be interesting. The relocation of activities across the different plants could be, to an extent, responsible for some of the servitization of the manufacturing firms. Third, the performance of the manufacturing firms that sell services deserves particular attention. The management literature highlights the risks and the benefits for manufacturing firms of engaging in the supply of services. A deeper investigation of the firms' performances could provide some clues on which firms' characteristics are correlated with a successful servitization for instance.

This dissertation was motivated by the overwhelming role of services in today's economies. Services are used as inputs by all firms, and are even produced by manufacturing firms. International trade in services is growing and is largely dominated by developed economies. After all, these economies have a comparative advantage in high skilled services. The deindustrialization of most developed nations has created a need for investigation into the possible role of services as the new engine for economic growth.

Résumé en Français

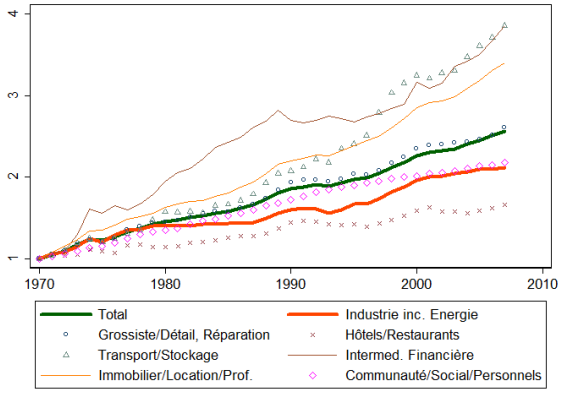
Les nations développées contemporaines sont souvent décrites comme des économies de services[17]. Dans la majorité des pays de l'OCDE (Organisation de Coopération et de Développement Economiques), plus des deux tiers de l'emploi et de la valeur ajoutée sont issus du secteur des services. Les services occupent une place extrêmement importante dans les nations tournées vers l'économie du savoir. Ils sont également un des principaux moteurs de la croissance économique, et participent activement à la compétitivité du secteur industriel (Nordås and Kim, 2013). La figure IV.9 illustre l'importance croissante des services dans l'emploi et la valeur ajoutée de l'économie française entre 1970 et 2007. Les valeurs utilisées sont prises en référence à l'année de base (1970), et renseignent donc sur le taux de croissance de chaque secteur en terme de valeur ajoutée et d'emploi. Le message est clair sans ambiguïté. Les services professionnels (immobilier, location, services aux entreprises et intermédiation financière) contribuent le plus à la croissance de l'économie française. Ces services, aussi appelés "services complémentaires" par Katouzian (1970) car ils complémentent les activités industrielles, ont connu une croissance de leur valeur ajoutée beaucoup plus forte que le secteur industriel et que les autres secteurs de services (grossistes/détaillants, hôtels et restaurants par exemple). En 2007, le secteur des services professionnels comptait pour un tiers

[17] Fuchs (1965) soulignait que *"[Les Etats-Unis sont] maintenant une "économie de service" – c'est-à-dire, nous sommes la première nation de l'histoire dans laquelle plus de la moitié de la population ne travaille pas à la production de nourriture, de vêtements, d'habitats, d'automobiles ou autres biens tangibles." – [The United States is] now a "service economy" –that is, we are the first nation in the history of the world in which more than half of the employed population is not involved in the production of food, clothing, houses, automobiles and other tangible goods."*

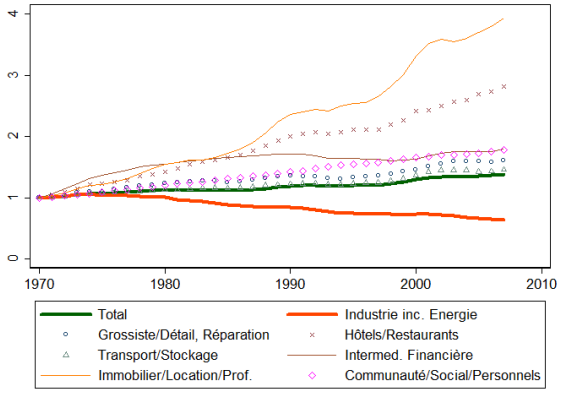
de la valeur ajoutée générée en France, soit deux fois plus que le secteur industriel. Du côté de l'emploi, le constat est encore plus frappant. Les services professionnels contribuent encore une fois fortement à la croissance de l'emploi (avec également les secteurs de l'hôtellerie et de la restauration) alors que le secteur industriel n'a cessé de perdre des emplois sur cette période. En 2007, les services professionnels regroupaient 20% de l'emploi, contre 14% pour le secteur industriel.

Figure IV.9: Evolution de la valeur ajoutée et de l'emploi en France entre 1997 et 2007.

(a) Valeur ajoutée



(b) Emploi



source: Base de données OECD-STAN, calculs de l'auteur.

Avant de poursuivre, il apparaît important de prendre du recul et de considérer la définition même d'un service. Une définition satisfaisante doit permettre de répondre clairement et sans ambiguïté à la question "qu'est-ce qu'un service ?", ou de manière similaire, "quelles sont les différences entre biens et services ?". Une définition adéquate doit aller au-delà de "les services regroupent tout ce qui n'est pas de la production de biens"[18]. L'importance d'une définition claire et précise

[18] Pendant la période mercantiliste, le transport et le commerce étaient considérés comme les activités les plus lucratives. Par la suite, ils furent très souvent considérés comme relevant d'un travail improductif (Adam Smith est célèbre pour avoir défendu cette vision). Plus récemment, les économistes de la première moitié du vingtième siècle décidèrent de classer les activités économiques ne relevant pas de la production manufacturière ou agricole dans un secteur qu'ils nommèrent "secteur des services" (Fischer, 1935; Clark, 1940; Fourastié, 1949), ou un "secteur tertiaire" (Kuznets, 1957). Ces classifications restent assez arbitraires dans la mesure où les services y sont définis par ce qu'ils ne sont pas plutôt que par ce qu'ils sont vraiment.

dépasse la simple tenue des comptes nationaux car elle influence directement les classifications industrielles. Ces classifications sont utilisées pour les collectes de données, pour la mise en place de politiques économiques, et même pour certaines lois du marché du travail en France[19]. Hill (1977) soulignait déjà l'importance d'une définition précise pour des services. *"Les services sont autant importants que les biens dans les économies modernes développées. Il est crucial qu'ils puissent être identifiés clairement et quantifiés rigoureusement pour que les mesures de croissance économique et d'inflation aient du sens*[20]. Une contribution majeure à la recherche d'une définition adéquate pour les services nous vient des travaux de Delaunay and Gadrey (1987) et Gadrey (2000), eux-mêmes inspirés par les travaux de Hill (1977, 1999). Delaunay and Gadrey (1987) proposent la définition suivante : *"Une activité de service est une opération, visant une transformation d'état d'une réalité C, possédée ou utilisée par un consommateur (ou client ou usager) B, réalisée par un prestataire A à la demande de B, et souvent en relation avec lui, mais n'aboutissant pas à la production d'un bien susceptible de circuler économiquement indépendamment du support C (on reviendrait alors à des situations de production agricole, industrielle ou artisanale)".* Le support C, qui peut être un objet, un bien, une personne, un flux ou une organisation, est intimement lié au service. Selon les auteurs, la différence majeure entre biens et services tient au fait qu'aucun droit de propriété ne saurait être associé à un service. Une autre différence importante est l'existence systématique d'une relation entre le producteur et le consommateur d'un service. Ceci fait écho à ce que soulignait Hill (1999) sur la différence entre biens et services : *"Un bien est une entité qui existe indépendamment de son propriétaire"*, tandis que les services n'existent que grâce à la relation producteur-consommateur. Cette particularité des services est très importante car elle souligne l'importance d'une relation de confiance entre le producteur et le consommateur (Guiso et al., 2009), ou encore le rôle crucial de la communication.

[19] Les conventions collectives sont définies au niveau de l'industrie.

[20] *"Services are as important as goods in modern developed economies and they need to be identified and quantified properly if the measurement of economic growth and inflation is to have any meaning for the economy as a whole".*

Malgré une part toujours plus importante des services dans les économies développées, on ne peut s'empêcher de remarquer le manque de recherche académique sur le sujet. Le regain d'intérêt pour les services est apparut dans les années 90. Ce regain a été partiellement influencé par la décision des ministres du commerce signataires de l'accord général sur les tarifs douaniers et le commerce (AGETAC) d'inclure un mandat sur les barrières au commerce de services durant la première réunion du Cycle d'Uruguay en 1986. La fin de ce cycle donnerait lieu à la création de l'Organisation Mondiale du Commerce (OMC) en 1994 à Marrakech. Les ministres du commerce arrivèrent à un premier accord pendant ce cycle : l'Accord Général sur le Commerce de Services (AGCS, ou GATS en anglais pour General Agreement on Trade in Services)[21]. L'Accord établit un cadre pour libéraliser le commerce de services[22]. La vision traditionnelle du commerce international, où un bien est transporté d'un pays à un autre et traverse physiquement une frontière, ne pouvant s'appliquer au commerce international de services, l'AGCS a donc adopté une (assez large) définition pour décrire le commerce de services. L'Accord distingue quatre modes selon lesquels les services peuvent être échangés à l'international. Le mode-1 se réfère aux services transfrontaliers, oú seulement le service traverse le frontière. Le mode-2 se réfère à la consommation de services à l'étranger (via le tourisme par exemple). Le mode-3 concerne la présence commerciale à l'étranger (via l'implantation d'une filiale ou d'une succursale). Le mode-4 se réfère à la présence commerciale de représentants du pays d'origine. Cela concerne par exemple les expatriés, ou les travailleurs migrants qui restent rattachés à leur entreprise dans leur pays d'origine. Dans les deux premiers modes, le fournisseur du service ne se déplace pas à l'étranger. Dans les deux derniers modes, le fournisseur du service se déplace pour rencontrer son client à l'étranger. Il est important de noter ici que, pour les services, la définition de commerce international est beaucoup plus large que

[21] Gaza Feketuky, à l'époque haut fonctionnaire du Bureau du Représentant des États-Unis pour les questions commerciales est considéré comme l'architecte majeur de cet accord. Le texte complet peut être consulté à l'adresse suivante : http://www.wto.org/french/docs_f/legal_f/26-gats_01_f.htm.

[22] La libéralisation de certains secteurs de services est d'ailleurs une des pierres angulaires du cycle de Doha, actuellement en cours à l'Organisation Mondiale du Commerce.

celle traditionnellement utilisée lorsqu'on se réfère au commerce de marchandises. La définition usuelle se réduit à une transaction entre un résident et un non résident, où un bien traverse physiquement une frontière politique. Dans le cas du commerce international de services comme il est définit dans l'AGCS, Il n'est pas clair si les modes 3 et 4 renvoient à des transactions entre résidents et non-résidents. Le mode-3 fait en fait référence aux investissements directs à l'étranger (IDE), et le mode-4 aux flux migratoires temporaires. Dans cette dissertation, je vais m'intéresser au commerce international de services réalisé sous le mode-1. Ce mode est au final très proche de la façon dont s'opère et est comptabilité le commerce international de biens.

Les études sur les échanges internationaux de services (sous le mode-1) ont montré que les services sont sensibles aux mêmes facteurs macroéconomiques que les biens. Les équations de gravité[23] se sont montrées très efficaces pour prédire les échanges bilatéraux de services entre pays (Walsh, 2006; Head et al., 2009). Il est cependant important de mentionner certaines différences notoires entre le commerce international de biens et le commerce international de services. La différence majeure tient au fait que, pour les services, les coûts de transports sont soit nuls, soit prohibitifs. Par exemple, le coût d'envoi par email pour un architecte d'une série de plans ou de croquis à un client à l'étranger est virtuellement zéro. La part du coût de transport dans le prix final facturé au consommateur est quasi nulle. Par contre, faire 1.000 km pour se faire couper les cheveux reviendrait à payer un prix prohibitif (transport inclus) pour ce service. Tandis que la plupart des biens peuvent être échangés et transportés d'un pays à l'autre, il en va autrement pour les services. Lorsque le "coût de transport" du service devient trop élevé (voire prohibitif), on assiste alors au déplacement du consommateur (mode-2), ou du producteur (mode-3 ou mode-4), qui ne sont pas traités dans cette thèse.

Cette thèse s'articule en deux parties. Dans la première partie, je m'intéresse

[23] Les équations de gravités en commerce international sont inspirées de l'équation de gravité de Newton. Elle prédit que les échanges entre pays sont proportionnels à la taille des économies (offre et demande) et inversement proportionnels à la distance géographique les séparant.

aux exportateurs français de services (chapitre 1). J'utilise le cadre empirique des équations de gravités, déjà mentionné précédemment, et m'intéresse à la question des régulations domestiques et à leur effet sur le commerce de services. Dans le chapitre 2, je regarde comment l'expérience des exportateurs français sur différents marchés conditionne leur choix futurs en terme de nouveaux marchés. Dans la seconde partie de cette thèse, je m'intéresse aux services dans l'économie domestique française. Les services sont énormément utilisés dans le processus de production des entreprises (industrielles ou de services). Dans le troisième chapitre, je considère l'effet qu'ont les services importés sur la composition de l'emploi dans les entreprises. le quatrième chapitre de cette dissertation se concentre sur le phénomène de "servicification" des entreprises industrielles, c'est-à-dire au fait que ces entreprises vendent de plus en plus de services[24].

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Malgré la part croissante des services dans les économies développées et les efforts de libéralisation, le commerce international de services ne représente qu'environ 20% du commerce mondial. Tout exercice de quantification de l'effet d'une libéralisation ou d'un accroissement du commerce international de services est rendu difficile par le manque données disponibles. Lipsey (2006) souligne que *"L'évolution de l'importance des exportations et importations de services est encore plus compliquée à mesurer, puisque le nombre de services reportés et le nombre de pays déclarant leurs exportations et importations de services a augmenté, surtout depuis 1975*[25]. La classification usuelle utilisée par le FMI pour comptabiliser les échanges internationaux de services (Classification Elargie des Services de la Balance des Paiements – l'EBOPS[26]) propose une classification des services en 80 catégories. On

[24] Le premier chapitre est le fruit d'une collaboration avec Matthieu Crozet et Daniel Mirza. Le troisième chapitre a été coécrit avec Farid Toubal, et le quatrième chapitre est coécrit avec Matthieu Crozet.

[25] *"The trend in the importance of services trade is even harder to guess, because the number of services measured and hte number of countries measuring service trade has increased, especially since 1975."*

[26] EBOPS signifie "Extended Balance of Payments Services Classification".

y trouve les services de transport, de voyage, les services professionnels, les services à la personne ou encore les services culturels. Pour faire une simple comparaison avec le commerce international de biens, les Nations Unies proposent une classification harmonisée de plus de 5.000 produits dans leur base de donnée COMTRADE. Récemment, Francois and Pindyuk (2013) ont proposé une base de données sur le commerce bilatéral de services à partir de celle mise à disposition par les différentes organisations internationales. Leur base de données est disponible pour 251 pays et couvre la période 1981-2010. Tout en gardant la remarque de Lispey à l'esprit, les données les plus récentes sur le commerce international de services montrent que ce dernier s'est accru plus rapidement que le commerce de biens ces dix dernières années (Mattoo et al., 2009). Malgré les politiques qui poussent vers une plus grande libéralisation, le commerce international de services ne représente qu'un cinquième du commerce mondial de services (WTO, 2008). Pourquoi y a-t-il si peu de commerce de services?

Les études empiriques ont établit une relation négative entre la distance entre pays et les flux bilatéraux de commerce de services. Concernant le commerce de biens, la distance sert à approximer les coûts de transport, mais pour le commerce de services, la distance géographique ne saurait traduire la présence de coûts de transports pour le commerce de services (en mode-1). Comme expliqué précédemment, un coût de transport prohibitif induit le déplacement soit du producteur ou du consommateur, et donc d'un échange de services dans un mode différent du mode-1. Or les études empiriques se basent sur les statistiques du FMI qui regroupent majoritairement des échanges en mode-1. La distance serait donc corrélée à d'autres facteurs explicatifs, tels que les différences culturelles, ou la facilité de communication entre agents, les coûts de communication, etc. Le manque d'échanges internationaux de services peut s'expliquer par le fait que beaucoup d'industries de services ont été historiquement très régulées (télécommunications, finance, transport, services professionnels), et souvent dominées par un monopole étatique. Une régulation contraignante pourrait expliquer la faiblesse des échanges

transfrontaliers de services, mais aussi avoir des conséquences plus globales sur le reste de l'économie. Les services servent d'intrant dans le processus de production de nombreuses entreprises, qu'elles soient industrielles ou du secteur des services. Ces services aux entreprises facilitent les transactions économiques entre agents et peuvent influencer la manière dont les entreprises fixent leur prix (Francois and Hoekman, 2010). le poids de régulations excessives est souvent mentionné par les professionnels du secteur des services comme un frein majeur aux échanges internationaux de services (European Commission, 2001).

Deux types de régulations doivent être considérées. Tout d'abord les régulations qui sont spécifiquement dirigées vers les entreprises étrangères, dites régulations discriminantes. Les entreprises étrangères doivent s'accommoder d'une régulation plus contraignante lorsqu'elles souhaitent vendre leur services dans un pays étranger. Ces régulations sont des mesures discriminatoires dans le sens où seules les entreprises étrangères y font face (Hoekman et al., 2010). Le principal outil de libéralisation de l'AGCS repose sur l'élimination de ce type de régulations, en garantissant un *"traitement national"* à tous les fournisseurs de services, quelque soit leur nationalité[27] Le second type de régulations s'applique à toutes les entreprises indépendamment de leur nationalité, et constitue le cadre légal général au sein duquel les fournisseurs de services opèrent. j'appellerais ces régulations les "régulations domestiques". l'AGCS discute également de ces régulations puisqu'elles concernent également les entreprises étrangères. Cependant, l'Accord est très élusif sur leur nature ou sur ce qui doit être entrepris à leur propos. L'Accord indique simplement que les membres de l'OMC doivent s'assurer que les régulations "ne constituent pas des obstacles non nécessaires au commerce de services". Ce que constitue dans la pratique un "obstacle non nécessaire" n'est cependant pas définit, et l'interprétation est laissée en grande partie à la discrétion des membres de l'Organisation. Puisque

[27] L'article XVI de l'AGCS stipule : "En ce qui concerne l'accès aux marchés suivant les modes de fourniture identifiés à l'article premier, chaque Membre accordera aux services et fournisseurs de services de tout autre Membre un traitement qui ne sera pas moins favorable que celui qui est prévu en application des modalités, limitations et conditions convenues et spécifiées dans sa Liste".

ces régulations ne sont pas dirigées uniquement vers les entreprises étrangères, elles ne sont pas considérées comme des barrières au commerce. Cependant, les fournisseurs étrangers n'ont pas aussi facilement accès aux informations pour leur permettre de se plier ou d'éviter certaines régulations. Ces fournisseurs sont bien souvent plus sensibles aux régulations que le sont les fournisseurs locaux. Même si le but de ces régulations n'est pas de discriminer entre les fournisseurs de services locaux et étrangers, il peut y avoir une discrimination dans la pratique si certains fournisseurs (ici les fournisseurs étrangers) sont plus sensibles que d'autres (ici les fournisseurs locaux) aux mêmes régulations. Les fournisseurs étrangers sont plus à même d'être exclus du marché étranger. Le but du premier chapitre de cette thèse est d'évaluer l'impact des régulations domestiques, c'est-à-dire les régulations qui s'appliquent à toutes les entreprises, sur les exportateurs français de services. Je souhaite déterminer si les exportateurs Français sont plus affectés par les régulations lorsqu'ils exportent leurs services que les fournisseurs locaux avec qui ils sont en concurrence. Si cela s'avère être le cas, alors les régulations domestiques devraient être considérées comme un instrument de protection commerciale, et traitées comme des "obstacles au commerce de services".

La littérature empirique sur le sujet a établit l'existence d'un effet significatif des régulations sur le commerce international de services. Cette littérature s'est appuyée sur des données de commerce agrégées, et sur un indicateur du niveau moyen de régulations dans le secteur des services des pays de l'OCDE. Kox and Nordås (2007); Lennon (2009) et van der Marel and Shepherd (2011) on montré par exemple que le niveau de régulations dans le pays importateur et dans le pays exportateur a un impact négatif sur le commerce bilatéral de services entre ceux deux pays. Non seulement le niveau moyen des régulations est important, mais également leur structure. Kox and Lejour (2005) ont montré que des pays avec des régulations différentes commercent moins entre eux qu'avec des pays ayant des régulations similaires. Ces auteurs ont estimé qu'une reconnaissance mutuelle des régulations entre les pays de l'Union Européenne pourrait accroitre le commerce

de services de près de 60%. Le fait que ces études trouvent un effet négatif des régulations domestiques sur le commerce de services montre seulement que les fournisseurs étrangers sont pénalisés par ces régulations. Les régulations domestiques peuvent réduire l'offre de services de tous les fournisseurs, domestiques et étrangers, sans pour autant affecter plus ces derniers. Dans ce premier chapitre, j'utilise des données détaillées de la Banque de France sur les exportateurs français de services et quantifie l'effet des régulations domestiques sur leurs volumes d'exports ainsi que sur leur probabilité d'exporter leurs services à l'étranger.

Je développe un modèle théorique pour déterminer comment les régulations domestiques affectent les fournisseurs de services locaux et étrangers. Le modèle est très simple et se caractérise par des consommateurs avec des préférences de type CES (pour Constant Elasticity of Substitution), des entreprises en concurrence monopolistique et des coûts de transport de type iceberg[28]. Les régulations domestiques sont modélisées de la manière suivante : Elles peuvent soit constituer un coût fixe pour les firmes exportatrices, ou se manifester par une taxe à la valeur appliquée à chaque service. La clef du modèle est que j'autorise les fournisseurs locaux et étrangers à présenter une sensibilité différente aux régulations domestiques. L'élasticité des exportations aux régulations se scinde en deux effets. Premièrement on trouve un effet direct, qui est clairement négatif. Deuxièmement, on trouve un effet indirect via l'indice de prix. Ce deuxième effet peut compenser parfaitement le premier dans le cas où les régulations touchent les entreprises de manière non-discriminante. Dans le cas où les régulations sont discriminantes, ce deuxième effet ne compense pas entièrement le premier, et on obtient une élasticité négative. Ce

[28] Ces choix de modélisation imposent des restrictions fortes sur le model. Dans l'appendice de ce chapitre, je relâche l'hypothèse de préférences CES pour utiliser un système de demande quasi-linéaire à la Melitz and Ottaviano (2008). Je modélise ensuite les régulations sous forme de coût additif plutôt qu'iceberg. Ces deux hypothèses alternatives produisent des prédictions moins claires. Cependant, toutes deux prédisent que l'élasticité des exportations aux régulations dépend de la productivité de l'entreprise. Je propose deux tests empiriques pour déterminer si les entreprises les plus productives sont le plus affectées par les régulations (comme cela devrait être le cas avec un coût de transport additif), ou bien si les entreprises les moins productives sont les plus affectées (comme cela est prédit avec un système de préférences quasi-linéaire). Les résultats suggèrent que l'effet est en fait identique quelque soit la productivité de l'entreprise. Cela confirme mes choix initiaux de modélisation.

modèle prédit que si les fournisseurs étrangers sont plus sensibles aux régulations domestiques que les fournisseurs locaux, alors on devrait s'attendre à un signe négatif sur la notre variable de régulation pour la probabilité d'exportation et pour les exportations individuelles de services. Je teste ceci en utilisant des données individuelles sur les exportateurs français de services professionnels, ainsi que les données développées par l'OCDE sur le niveau des régulations dans les secteurs non-industriels des économies développées. L'analyse empirique produit un signe négatif sur la variable de régulations sur la probabilité d'exportation et les valeurs exportées. Ce résultat reste valide lorsque je concentre mon analyse sur les pays européens. La France étant un état membre de l'Union Européenne, aucune discrimination (officielle) ne saurait s'appliquer à ces entreprises lorsqu'elles exportent leur services vers un autre pays de l'Union. Cependant, notre résultat reste robuste, suggérant que les régulations domestiques discriminent dans la pratique, bien qu'elles ne soient pas faites pour cela. L'AGCS a clairement identifié les régulations discriminantes comme constituant des barrières qui commerce qui doivent être supprimées. Les résultats de ce premier chapitre mettent en exergue le fait que les régulations domestiques aussi peuvent constituer des obstacles au commerce de services. En ce qui concerne la promotion du commerce international de services, une plus grande attention devrait être consacrée aux régulations domestiques.

Ce chapitre fait plusieurs contributions à la littérature sur le commerce international de services. Tout d'abord, il s'agit de la première étude empirique liant les régulations domestiques avec des données individuelles sur les exportations de services. Deuxièmement, les résultats suggèrent que des régulations qui n'ont pas vocation à discriminer entre les entreprises peuvent agir de la sorte en pratique. Finalement, l'analyse empirique montre que les équations de gravité constituent un outil adéquat pour étudier les exportations individuelles de services. Les résultats de ce premier chapitre peuvent être étendus dans plusieurs directions. Premièrement, il serait intéressant de pouvoir quantifier les effets directs et indirects induits par les

régulations. L'analyse empirique conduite ici capture l'effet total des régulations. On pourrait s'attendre à ce que les pays pour lesquels les importations de services représentent une part importante de la demande intérieure, l'effet indirect soit plus important. Ces pays devraient pouvoir manipuler moins facilement leur indice de prix et l'effet direct devrait s'en trouver compensé. Il serait également intéressant d'avoir des données couvrant un nombre plus important de pays, ainsi que des données au niveau sectoriel. Cela permettrait d'une part d'élargir le champ de l'étude, et d'autre part l'utilisation de données sectorielles permettrait de contrôler pour les facteurs inobservables spécifiques à chaque pays. L'effet indirect via l'indice de prix serait notamment considéré au niveau sectoriel, et un contrôle plus rigoureux des termes de résistante multilatéraux serait alors possible.

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Le premier chapitre de cette thèse s'est intéressé à l'effet des régulations domestiques sur les exportateurs français de services. La stratégie empirique a reposée sur le fait que la probabilité pour une entreprise d'exporter vers un pays est indépendante de sa décision d'exporter vers un autre pays. Par exemple, le choix d'une entreprise d'exporter en Allemagne ne dépend pas des caractéristiques du marché Autrichien. Le fait que l'Allemagne et l'Autriche soient deux pays frontaliers et culturellement proches n'est pas pris en compte. Dans le deuxième chapitre, je m'intéresse aux caractéristiques partagées par plusieurs pays, et à comment cela peut expliquer la stratégie d'exportations des entreprises françaises. Ce chapitre s'insère dans une littérature qui s'intéresse aux coûts de transport au niveau de l'entreprise. Les régulations domestiques étudiées au chapitre précédent s'appliquent de la même manière à toutes les entreprises. Cependant, le fait qu'une entreprise exporte déjà vers un pays où les régulations sont élevées ou particulièrement contraignantes peut influencer ses choix futurs sur le marché à l'exportation. L'expérience qu'acquièrent les entreprises en exportant peut réduire le coût d'entrée dans certains marchés. Je m'intéresse dans ce deuxième chapitre à la proximité linguistique et à la proximité géographique entre les pays.

Récemment, la littérature empirique sur ce sujet a mis en avant le fait que les entreprises ne choisissent pas au hasard les pays dans lesquelles elles décident d'exporter. Defever et al. (2011) regardent par exemple les nouveaux marchés vers lesquels les entreprises chinoises commencent à exporter suite à la fin de l'Accord Multi-Fibre. Ils trouvent que les exportateurs chinois sont plus à même d'exporter vers un pays voisin des pays dans lesquels ils exportent déjà. En d'autre termes, ces auteurs trouvent que les entreprises exportent vers des nouveaux marchés qui leur sont relativement moins inconnus. Le fait que les pays où une entreprise exporte partagent certaines caractéristiques n'est pas pris en compte dans les modèles traditionnels de commerce international. Ces modèles président un classement des pays dans lesquels les entreprises doivent exporter. Les exportateurs les moins productifs n'exportent que vers les pays les plus facile d'accès depuis leur pays d'origine. Dans le cas de la France, la Belgique ou la Suisse représentent des marchés relativement facile d'accès pour les entreprises françaises car ces deux pays partagent une frontière et une langue commune avec la France par exemple. Ces modèles prédisent que les entreprises les plus productives exportent ensuite vers les pays moins facile d'accès, qui sont plus loin, ne partageant pas de langue commune avec la France par exemple. Les entreprises les plus productives exporteraient, selon ces modèles vers tous les pays, y compris les pays facile d'accès. Cependant les données individuelles de commerce international ne permettent pas d'établir un classement des pays aussi facile (Eaton et al., 2004). Une possible explication pour ce manque de classement est que les entreprises perçoivent différemment le coût d'entrée dans un nouveau marché. Cette différence de perception peut venir de l'expérience qu'ont les entreprises sur les marchés étrangers.

Quand les entreprises décident de pénétrer un nouveau marché, elles doivent chercher de nouveaux contacts (Chaney, 2014). La première façon d'acquérir de nouveaux contacts est de chercher depuis son pays d'origine. Les équations de gravité on été très largement utilisées pour étudier les facteurs qui influencent ce type de recherche (Anderson and van Wincoop, 2003; Head and Mayer, 2013). Les échanges

bilatéraux entre pays sont d'autant plus importants qu'il sont proches ou présentent une offre ou un demande importante. D'autres facteurs comme la présence d'une frontière commune, d'une langue commune ou d'un accord commercial régional permettent également d'expliquer les flux bilatéraux entre pays (Crozet and Koenig, 2010; Berthou and Fontagné, 2013). Dans sa forme traditionnelle, l'équation de gravité ne prend pas en compte l'expérience des entreprises sur le marché à l'exportation. La second façon pour une entreprise d'acquérir de nouveaux contacts est d'utiliser son réseau existant de contacts étrangers. Ces contacts possèdent leur propre connaissance des différents marchés à l'exportation, avec notamment un biais en faveur des pays qui leur sont géographiquement ou culturellement proches. Ces pays sont considérés comme facile d'accès du point de vue des contacts étrangers de l'entreprise exportatrice. L'exportateur peut utiliser ces informations pour exporter vers ces nouveaux pays. Par exemple, si une entreprise française exporte en Thaïlande, elle est plus à même d'exporter ensuite vers le Cambodge que vers le Brésil car la Thaïlande et le Cambodge sont géographiquement et culturellement proches.

Récemment, Albornoz et al. (2012) et Chaney (2014) ont proposé des modèles théoriques pour expliquer la structure en réseau du commerce international. Le terme réseau désigne ici les contacts qu'une entreprise exportatrice établit à l'étranger pour pouvoir y vendre son produit (qu'il soit un bien ou un service). Dans leurs modèles, une entreprise tire des enseignements de son expérience dans les différents pays vers lesquels elle exporte. Cette expérience lui permet d'exporter vers de nouveaux marchés plus facilement qu'une entreprise inexpérimentée. Ces deux articles trouvent que les entreprises sont plus à même d'exporter vers des pays qui partagent une langue ou une frontière avec un des pays vers lequel elles exportent déjà. Dans le modèle d'Albornoz et al. (2012), les entreprises sont ex-ante incertaines au sujet de leur profitabilité sur le marché étranger. En exportant vers un nouveau marché, elles découvrent leur profitabilité. Les profits sont corrélés dans le temps et entre les différents marchés. Au fur et à mesure qu'une entreprise exporte

vers de nouveaux marchés, elle gagne de l'expérience au sujet de sa profitabilité sur d'autre marchés. La corrélation temporelle et spatiale des profits amène l'entreprise à s'engager dans ce que les auteurs qualifient d' "exportation séquentielle". Elle exporte tout d'abord vers un pays, et décide ensuite d'exporter vers un autre pays en tenant compte des informations qu'elle a obtenu sur sa profitabilité dans le premier marché. les auteurs testent leur modèle sur des données individuelles argentines et montrent que leur mécanisme théorique est validé par les données.
Le modèle de Chaney (2014) propose de fonder théoriquement la façon avec laquelle les entreprises trouvent de nouveaux contacts à l'étranger. Comme présenté précédemment, les entreprises cherchent soit depuis leur pas d'origine (la France dans notre cas), soit depuis les pays où elles exportent déjà. L'efficacité de la recherche à distance (lorsque les entreprises utilisent leur réseau de contacts à l'étranger) est fortement liée à la géographie et notamment à la distance entre le contact existant et le futur contact. L'entreprise a plus de chance de trouver des nouveaux clients qui sont géographiquement proches de ses contacts existants.

La recherche à distance peut aussi être affectée par des facteurs autres que la géographie, comme les différences culturelles ou linguistiques. Dans le deuxième chapitre de cette dissertation, je me focalise sur la recherche à distance de nouveaux contacts, et m'intéresse aux facteurs qui peuvent rendre cette recherche fructueuse. Je regarde plus précisément le rôle du langage, tout en contrôlant pour la proximité géographique entre les différents contacts étrangers de l'entreprise. Pourquoi le langage ou la géographie devraient-ils influencer la recherche à distance de nouveaux contacts ? Le rôle de la géographie dans le commerce international a été établit de longue date. Deux pays proches commercent relativement plus entre eux qu'avec des pays éloignés, surtout s'ils partagent une frontière commune[29]. Les infrastructures de transport sont en général mieux développées entre pays proches qu'entre deux

[29] **?** est connu pour avoir montré que le commerce international n'est qu'une fraction des échanges qui se prennent place au sein d'une économie. Il a utilisé l'exemple des échanges économiques entre les différentes provinces canadiennes et entre les différents états des Etats-Unis pour montrer que la présence d'une frontière entre le Canada et les Etats-Unis est en grand partie responsable pour la faible intensité des échanges transfrontaliers.

pays très éloignés. Ils ont plus de chance d'être situés dans le même fuseau horaire, et les obstacles naturels (montagnes, océans, déserts) sont en moyenne moins nombreux entre deux pays proches qu'entre deux pays éloignés. Dans ce chapitre, je mets en avant le fait que la proximité linguistique peut expliquer la stratégie d'exportations des entreprises françaises. La proximité culturelle est intimement liée à la proximité culturelle entre les pays. Tandis que l'héritage culturel d'un peuple définit sa manière de parler et de s'exprimer, la langue est le véhicule privilégié de la transmission culturelle. Deux individus partageant une langue et une culture similaire vont aussi manifester un degré de confiance plus important à l'égard de l'autre (Guiso et al., 2009). Ils répondent aux même codes et normes sociales, et vont pouvoir communiquer de manière plus efficace. Ainsi que je l'ai déjà exposé précédemment, la nature même des transactions de services (lien entre le producteur et le consommateur) fait de la communication un déterminant très important du succès d'une telle transaction. En ce qui concerne le rôle de la communication dans la commerce, Melitz and Toubal (2012) souligne que *"La capacité de pouvoir communiquer de manière précise et exhaustive est toujours pertinente dans le commerce car les choses peuvent mal se passer. Les livraisons peuvent arriver en retard, ou bien arriver endommagées ; les conditions de contrats peuvent ne pas être honorées ; il serait peut-être nécessaire de pouvoir faire valoir des modalités et conditions qui ont étés insérées lors de la rédaction du contrat."*[30] De plus, la communication orale rapproche les individus d'une manière unique qui ne saurait être atteinte par simple communication écrite.

Pour mesurer la proximité linguistique entre pays, j'utilise les données développées et mise à disposition par Melitz and Toubal (2012). Leur mesure se base sur le travaux entrepris par des ethnologues et ethno-statisticiens au sein du projet "Automatic Similarity Judgement Program" (Brown et al., 2008). La similarité linguistique entre les langues se base sur la comparaison des significations d'environ 40 mots dans

[30] *"The ability to communicate in depth is never irrelevant in trade since things can go wrong. Goods may arrive late or damaged; contracts may not be honored; there may need to be recourse to the small print."*

chacune des langues considérées. Afin de mesurer proprement l'effet de la proximité linguistique, je contrôle pour la proximité géographique en utilisant des informations telles que la distance entre les pays, ou la présence d'une frontière commune. Une des prédictions du modèle de Chaney (2014) est que les entreprises qui possèdent de nombreux contacts à l'étranger utilisent relativement plus la recherche à distance pour trouver de nouveaux clients dans de nouveaux pays. Dans mon analyse empirique, je teste également si la proximité géographique et linguistique deviennent des déterminants plus importants à mesure que les entreprises exportent vers plus de pays. Afin de rendre mes résultats comparables avec la littérature empirique existante, je considère les exportateurs de biens et les exportateurs de services.

Les résultats empiriques montrent que la proximité géographique et la proximité linguistique déterminent où les entreprises décident d'exporter. Je trouve que les exportateurs français tendent à exporter vers des pays qui sont proches les uns des autres, d'un point de vue géographique ou linguistique. Je trouve également une validation empirique pour la prédiction de Chaney (2014). À mesure que les entreprises exportent vers plus de pays, les proximités linguistiques et culturelles deviennent relativement plus importantes. Les résultats suggèrent que la proximité géographique est plus importante que la proximité linguistique pour les entreprises exportant uniquement des biens différenciés, tandis que les deux facteurs semblent être important de manière égale pour les exportateurs de services. Ces résultats tendent à pointer dans la direction d'un rôle relativement plus important de la communication au sens large pour les exportateurs de services que pour les exportateurs de biens.

Ce chapitre contribue de plusieurs façons à la littérature sur les déterminants microéconomiques des coûts de transports auxquels font face les entreprises. Tout d'abord, je m'intéresse à la dynamique des exportations de services professionnels. Ces services représentent une grande part des échanges de services, et revêtent d'une importance cruciale pour beaucoup d'entreprises qui les utilisent dans leur processus de production. Deuxièmement, je me focalise sur l'aspect linguistique

des échanges commerciaux, un facteur qui n'a reçu pour le moment que peu d'attention. Finalement, les résultats suggèrent que la proximité linguistique semble être un facteur relativement plus important que la proximité géographique pour les entreprises de services. Ce dernier résultat mériterait une recherche plus approfondie pour mieux comprendre quelles sont exactement les caractéristiques des services qui les sensible aux questions de communication. Les résultats de ce deuxième chapitre peuvent être étendus dans plusieurs directions. Les résultats obtenus mettent en avant le biais linguistique et géographique des exportateurs de services (et de biens) lors de leur expansion sur de nouveaux marchés étrangers. Le mécanisme sous-jacent reste cependant inexploré. Les exportateurs utilisent-ils leur expérience sur les marchés étrangers pour pénétrer de nouveaux marchés ? Ou possèdent-ils des atouts qui leurs sont propres et qui leur permettent de vendre leur produit dans ? Le premier mécanisme devrait pouvoir être traité sans avoir recours à de nouvelles données. Il est par exemple possible de prendre en compte la durée des relations commerciales de chaque entreprise, ou encore de regarder si l'entreprise exporte de manière continue le même bien ou le même service vers un certain type de pays. La question d'expérience rapprocherait l'analyse empirique du modèle théorique d'Albornoz et al. (2012). Il serait également intéressant de connaitre la nationalité du client des entreprises à l'étranger. Il se peut que les entreprises suivent leurs clients dans de nouveaux pays à l'étranger. Ces deux pistes de recherche permettraient de mieux comprendre comment l'expérience d'une entreprise sur le marché international influence ses choix de nouvelles destinations. Concernant l'atout spécifique des entreprises, la prise en compte de la nationalité des travailleurs de l'entreprise serait extrêmement intéressant. Comme le montrent Parrotta et al. (2014) sur données Danoises, les entreprises ayant des travailleurs de plusieurs nationalités sont plus à même de devenir exportateur, d'exporter vers plus de pays et exportent des volumes plus importants. Cette littérature souligne le fait que ces entreprises évoluent déjà dans un environnement multiculturel, de part la présence de ces travailleurs. Le passage au marché à l'exportation est d'autant plus facile pour ces entreprises que leurs

employés possèdent des compétences linguistiques multiples ainsi que des contacts à l'étranger. Cela pourrait expliquer pour certaines entreprises choisissent en premier lieu certains pays, et le biais géographique et linguistique qui en découle.

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La second partie de cette thèse s'intéresse au lien entre services et biens dans la production des entreprises. Cette partie s'inspire d'une vaste littérature, notamment en management et marketing, sur la distinction entre biens et services. Les classifications industrielles utilisées par les bureaux officiels de statistiques ne rendent pas compte des liens étroits entre biens et services qui peuvent exister *au sein* des entreprises. Cette littérature a mis en doute l'exactitude des classifications industrielles, en soulignant qu'elles séparent de manière arbitraire les entreprises, en les appelant soit entreprises de services ou entreprises industrielles, alors que la réalité est bien plus complexe[31]. Il est trompeur de considérer les entreprises industrielles seulement comme des producteurs de biens, et les entreprises de services comme seulement des producteurs de services. Les classifications industrielles ne rendent pas compte des multiples activités réalisées par les entreprises, ni de l'évolution de leur organisation interne[32]. Levitt (1976) exprime ainsi cette idée : *"En fait, il existe un énorme secteur des services que l'on ne perçoit pas – cette proportion d'industries nominalement "manufacturières", dont les dépenses et revenus représentent des achats de services sous forme de systèmes d'organisation, d'aide aux installations, logiciels, réparations, entretien, livraisons, collectes, comptabilité et autres."*[33]. Ces

[31] Cette littérature est également en lien avec la littérature sur les frontières de l'entreprise (Coase, 1937; Williamson, 1979).

[32] Le critère majeur dans la construction des classifications industrielles a été la nature de la *production* des entreprises. Pour certains économistes, il serait plus judicieux de s'intéresser aux professions des travailleurs plutôt qu'à la production des entreprises si l'on souhaite avoir une vision plus exacte de l'économie. En considérant cette définition, on pourrait par exemple avoir des travailleurs "du tertiaire" employés dans des entreprises "du secteur secondaire". Cela permettrait également de rendre compte des changements d'organisation et de spécialisation des entreprises (Sauvy, 1949).

[33] *"Actually, there is a massive hidden service sector - that proportion of nominally "manufacturing" industries so much of whose expenses and revenues represent pre- and post-purchase servicing in the form of systems planning, pre-installation support, "software," repair, maintenance, delivery, collection, bookkeeping and the like"*

activités de services "caché" sont complètement ignorées dans les classifications industrielles, tout comme la production de biens par les entreprises du secteur des services. Quelques années plus tôt, Levitt déclarait que *"Les industries de services, ça n'existe pas. Il existe seulement des industries avec une part plus ou moins importante de services. Tout le monde fait des services."*[34] (Levitt, 1972). Les deux derniers chapitres de cette thèse ont pour but d'étudier certains aspects des liens complexes qui existent entre biens et services au sein des entreprises industrielles françaises.

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Dans le troisième chapitre, je regarde comment les importations de services, utilisés dans le processus de production, sont corrélées au type de professions que l'on trouve dans les entreprises industrielles. Les inventions et développements dans les Technologies de l'Information et de la Communication (TIC) des dernières décennies ont fortement contribuées à rendre beaucoup de services "échangeables" à distance. Avec des services de la sorte, le consommateur et le producteur du service n'ont pas nécessairement besoin d'être situés au même endroit pour que la transaction puisse avoir lieu. Le producteur peut être situé dans une autre région de celle du consommateur, ou même dans un autre pays. Avec la révolution qu'à connu le secteur des TIC dans les années 90, les entreprises sont de plus en plus capables de localiser certaines parties de leur production dans différents endroits. On désigne traditionnellement par externalisation le fait qu'une entreprise décide de sous-traiter des activités qui étaient auparavant réalisées au sein de l'entreprise. Quand le sous-traitant se situe à l'étranger, on parle de délocalisation. Les services ne font pas exception, et la croissance globale des importations de services a été baptisé la *"nouvelle vague de mondialisation"*, ou la *"nouvelle révolution industrielle"* (Blinder, 2006). La question de la délocalisation d'activités de services a également reçu beaucoup d'attention dans les médias (Times, 2006; Economist, 2006,

[34] *"There are no such things as service industries. There are only industries whose service component are greater or less than that of other industries. Everybody is in services"*

2010) et dans le débat public. Selon l'Eurobaromètre, la peur des délocalisations a été une des raisons pour laquelle les citoyens français ont voté NON lors du référendum pour le projet de constitution européenne en 2005. La première vague de délocalisation a principalement concerné les entreprises manufacturières. Ces dernières ont délocalisé une partie de leur production de composants, ou encore des lignes d'assemblage. Ces activités étaient traditionnellement intensives en travail peu qualifié, et étaient envoyées dans des pays à faible coût de main d'Å“uvre. Les délocalisations de services sont assez différentes à cet égard. Les services délocalisés sont plus intensifs en travail qualifié, et la vaste majorité du commerce de services se déroule entre pays développés. Ces deux observations suggèrent que la délocalisation de services devrait plus concerner les travailleurs avec un niveau de qualification moyen ou élevé que les travailleurs peu qualifiés comme cela était le cas avec les délocalisations d'activités industrielles. Le troisième chapitre de cette dissertation s'intéresse à la corrélation entre la composition de la main d'Å“uvre des entreprises en termes de qualification et les importations de services.

les premières estimations quantitatives de l'effet des délocalisation de services sur l'emploi ont été produites par des entreprises de consultants. L'estimation la plus citée vient de Forrester Research, qui a estimé que 3,3 millions d'emplois américains dans le secteur des services seraient délocalisés d'ici à 2015 (soit environ 300.000 chaque année). De son côté, Blinder (2006) a estimé à qu'entre 30 et 40 millions de travailleurs américains exerceraient un travail éligible à la délocalisation[35]. Ces emplois sont occupés par des travailleurs dit "cols blancs" qui, selon les auteurs mentionnés précédemment, vont perdre leur emploi suite aux délocalisations[36]. Bien qu'elles permettent d'avoir une première approximation quant à l'étendue du phénomène, ces estimations n'apportent pas de réponse satisfaisante ou définitive.

[35] En dépit du fait que les métrologies utilisées ne soient pas très rigoureuses, il est important de mentionner que le marché du travail américain détruit et créé en moyenne un million d'emplois par trimestre. Les 300.000 emplois par an mentionnés précédemment ne représentent qu'une faible part des destructions mensuelles d'emploi aux Etats-Unis

[36] Beaucoup d'économistes, dont Bhagwati et al. (2004) affirment que les délocalisations représentent un gain au commerce. Les Etats-Unis sont un exportateur *net* de services, ce qui coïncide avec leur avantage comparatif dans une production intensive en travailleur qualifiés.

Les premières études empiriques sur le sujet n'ont trouvé qu'un faible effet négatif des délocalisations de services sur l'emploi (Amiti and Wei, 2005; OECD, 2006). A mesure que des données détaillées sur les professions des travailleurs sont devenues de plus en plus disponibles, le débat s'est concentré sur le lien entre les délocalisations de services et la composition de l'emploi, plutôt que sur son niveau général ou son taux de croissance. Crinó (2010) a utilisé des données détaillées sur une centaine de professions aux Etats-Unis sur la période 1997-2006 et a montré que la délocalisation de services a un effet biaisé vers les travailleurs qualifiés. Les entreprises qui délocalisent des activités de services ont *relativement* plus de travailleurs de type col blancs après. De plus, pour un certain niveau de qualification, il trouve que l'effet est plus prononcé pour les travailleurs qui ont une profession classifiée comme "échangeable". Les professions "échangeables" regroupent les emplois qui ne nécessitent pas d'interaction en face-à-face, ou dont la présence physique de la personne n'est pas indispensable. Le terme échangeable fait référence ici à la production de ces travailleurs qui peut être réalisée à distance pour ensuite être renvoyé à l'entreprise. Par exemple, un programmateur informatique n'ayant besoin que d'un ordinateur portable pour pouvoir travailler peut être situé dans un autre endroit que dans les locaux de son entreprise. Une personne à la réception de l'entreprise se doit d'être physiquement présente sur le lieu de travail, son travail n'est donc pas "échangeable". Criscuolo and Garicano (2010) soulignent que les emplois qui requièrent un diplôme ou une habilitation particulière pour être exercés sont relativement protégés des délocalisations. Ils prennent l'exemple des avocats aux Etats-Unis, qui doivent passer le barreau dans les Etats dans lesquels ils veulent exercer. Dans le cas de la France, les diplômes de santé reconnus par l'Etat entrent dans ce type de professions relativement protégé des délocalisations. Afin d'évaluer avec précision l'effet des délocalisation de services sur la composition de l'emploi, il est nécessaire d'avoir des informations détaillées sur le bilan et les diverses activités de l'entreprise (importations, chiffre d'affaire, stock de capital, etc) ainsi que sur les professions des travailleurs de l'entreprise (salaires, niveau de qualification).

Dans le troisième chapitre de cette dissertation, j'utilise des données d'entreprises très détaillées pour étudier la corrélation entre les importations de services et la composition de l'emploi au sein des entreprises françaises. Les données sur les salaires et les professions des travailleurs viennent de la base de données DADS (Déclaration Annuelle Des Salaires). Les données sur le bilan des entreprises sont tirées de la base BRN (Bénéfice Réel Normaux), mise à disposition par la direction du Trésor. Les données sur les importations de biens et de services viennent du Bureau des Douanes et de la Banque de France respectivement. Ces différentes bases de données peuvent être appariées ensemble grâce à un unique numéro d'identification propre à chaque entreprise (numéro SIREN, Système Informatique du Répertoire des Entreprises). La dimension individuelle des données fait que je n'ai pas besoin d'approximer les importations de services par des mesures au niveau industriel, qui pourrait fortement biaiser les résultats[37]. Je me base ensuite sur la littérature existante et utilise une fonction de coût translog pour spécifier la demande relative de chaque type de travailleur. Une description simple des données montre une tendance générale, surtout dans le secteur industriel, vers une utilisation plus importante des travailleurs de type col blancs. Cette tendance est plus forte au sein des entreprises faisant partie d'un groupe, ou dans les entreprises actives sur les marchés internationaux.

Ce chapitre contribue de plusieurs manières à la littérature existante. Premièrement, il s'agit à ma connaissance du premier article utilisant des données individuelles sur les travailleurs *et* les importations de services. Deuxièmement, je trouve que les importations de services et les importations de produits finis et intermédiaires sont corrélées avec une part plus important des travailleurs cols blancs. La "peur" des délocalisations au sein des travailleurs cols blancs, souvent mentionné dans le débat public n'est pas validée dans les données. Les importations de services ont cependant un effet différent des importations de biens en ce qui concerne les autres types de travailleurs dans l'entreprise. Les résultats suggèrent

[37] Winkler and Milberg (2009); Feenstra and Jensen (2012) ont montré que l'hypothèse de proportionnalité utilisée pour répartir les importations agrégées dans les différentes industries peut induire des biais dans l'estimation des coefficients.

en effet que les importations de services sont négativement corrélées à la part de travailleurs moyennement qualifiés, tandis que les importations de biens sont négativement corrélées à la part des travailleurs peu qualifiés. Ce résultat montre que tandis que les importations de biens tendent à être corrélées avec une augmentation générale du niveau des qualifications dans l'entreprise, les importations de services sont corrélées avec une polarisation du niveau de qualification. Les part relative des travailleurs moyennement qualifiés est corrélée négativement. Ces résultats décrivent une corrélation, et non une relation causale cependant. Il se peut que les entreprises qui ont déjà une demande relative élevée pour les travailleurs cols blancs soient aussi les entreprise qui importent le plus de services. Trouver un instrument adéquat représente une tâche ardue. Il est nécessaire que l'instrument soit corrélé aux importations de services, mais pas à la part de col blancs dans la masse salariale de l'entreprise. De plus, l'instrument doit pouvoir s'appliquer aux entreprises importatrices et aux entreprises qui n'importent pas de services[38].

Les résultats de ce troisième chapitre peuvent être étendus dans plusieurs directions. Premièrement, comme mentionné précédemment, l'étape suivante logique est de trouver un instrument adéquat pour pouvoir capturer une relation causale et non une simple corrélation. Cette tâche est compliquée par la dimension fine de nos données. Chacune des variables du bilan des entreprises (obtenues a partir de la base BRN) va être corrélée aux importations de services et à la composition de la main d'Å“uvre. La condition d'orthogonalité de l'instrument avec le résidu a de forte chance de ne pas être satisfaite. De plus, la stratégie empirique utilisée dans ce chapitre nécessite de trouver un instrument qui puisse s'appliquer à la fois aux entreprises importatrices et aux entreprises non importatrices. Deuxièmement, il serait intéressant de conduire l'analyse à un niveau plus fin. Les données sur les travailleurs ont été agrégées en trois catégories: les col blancs, les cols bleus qualifiés et les cols bleus non qualifiés. Il serait pertinent d'utiliser les données

[38] Je ne peux donc pas utiliser la méthode proposée par Hummels et al. (2014) car ils se restreignent aux entreprises qui importent continuellement, tandis que j'utilise l'ensemble des entreprises, y compris les entreprises qui n'importent jamais de service.

désagrégées et de voir si les résultats moyens obtenus se trouvent confirmés à un niveau plus fin. Plus précisément, les corrélations établies sont significatives pour tous les travailleurs, ou seulement pour certains d'entre eux, et si oui pourquoi ? Quelles sont les caractéristiques de ces travailleurs ? Cette dernière question renvoie à une autre extension possible. Il s'agirait ici de distinguer les travailleurs selon le type de "tâche" qu'ils font dans l'entreprise. La littérature empirique et théorique sur le sujet (Levy and Murane, 2004; Jensen, 2011) a souligné le fait que les activités qui sont codifiables, ou routinières sont plus à même d'être remplacées soit par des travailleurs étrangers soit par une machine. Elles font partie des professions "échangeables" décrites précédemment. Il serait donc crucial de s'intéresser aux caractéristiques des travailleurs affectés par les importations de services. Cela permettrait de comprendre pourquoi certaines activités de services sont délocalisées plutôt que d'autres.

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Le chapitre précédent a mis en avant l'importance des services en tant qu'intrant dans le processus de production des entreprises manufacturières. Dans le dernier chapitre de cette thèse, je m'intéresse à la place des services dans les ventes des entreprises industrielles. Le fait que de nombreuses entreprises industrielles produisent et vendent des services est une preuve supplémentaire de la relation forte et croissante qui existe entre biens et services. Cette simple observation permet aussi de voir le début sur la désindustrialisation d'une autre manière. Si les entreprises industrielles vendent des biens et les entreprises de services produisent et vendent des biens, qu'en est-il réellement de la désindustrialisation ? Ce débat est basé sur la vision de l'économie comme une collection de secteurs distincts les uns des autres. Cette vision ne prend pas en compte les liens complexes qui existent entre l'industrie et les services, ainsi que la nature même de la production industrielle. De plus, les classifications officielles séparent d'un coté les entreprises industrielles et de l'autre les entreprises de services, et ce d'une manière quelque peu arbitraire.

La frontière entre industrie et service est en fait assez floue. Comme cela a déjà été mentionné précédemment, Il est trompeur de considérer les entreprises industrielles comme uniquement dédiées à la production de biens, et de considérer les entreprises de services comme des entreprises produisant uniquement des services.

Dans ce dernier chapitre, je documente l'augmentation de la production et des ventes de services par les entreprises industrielles. Ce phénomène a été baptisé la "servicification" des entreprises industrielles par les chercheurs en management et marketing. Un simple calcul à partir de la base de données BRN révèle que pour un tiers des entreprises industrielles présentes dans la base de données, les services représentaient plus de la moitié de leurs ventes en 2007. De plus, un quart des entreprises industrielles ne produisaient même pas de biens cette même année[39]! Plusieurs raisons ont été mises en avant pour expliquer la vente de services par les entreprises industrielles (Gebauer et al., 2005). Premièrement, en proposant un paquet bien-service, les entreprises industrielles proposent un produit qui est plus difficile à imiter, et est perçu comme moins substituable par le consommateur. Cela peut accroitre la fidélité du consommateur, et accroitre l'image de marque de l'entreprise. Deuxièmement, des bénéfices financiers sont espérés. La vente de service représente une source de revenus plus stable pour l'entreprise. Tandis que la vente d'un bien peut être une opération unique, la vente de services peut s'étaler dans le temps de manière régulière.[40].

[39] Il est important de rappeler que les entreprises ne changent que rarement de classification industrielle en France. La classification industrielle est décidée lors de la création de l'entreprise et de son enregistrement à la chambre de commerce de l'industrie. Il est bien souvent coûteux pour les entreprises de changer de classification industrielles. les conventions collectives, qui confèrent aux travailleurs des droits additionnels sont basées sur ces mêmes classifications

[40] L'offre de services peut également s'avérer risquée, et les bénéfices attendus peuvent ne pas se matérialiser. Ce "paradoxe des services" est décrit de la manière suivante par Gebauer et al. (2005): *"La plupart des fabricants de produits ont fait face au phénomène suivant: une offre plus grande de services se traduit par une augmentation des coûts, mais pas par une augmentation des profits attendus."*[41]. Plusieurs explications ont été mises en avant. Par exemple, les entreprises peuvent allouer de manière non efficace leur ressources de sorte que ni production de biens ni la production de service n'atteigne une taille suffisante pour devenir rentable. Ces deux activités étant très différentes, la décision par une entreprise industrielle de vendre des services peut ne pas s'avérer un échec (Bharadwaj et al., 1993). La fixation du prix du service peut également être plus complexe que pour un bien, dans la mesure où les coûts associés à la production du service sont plus difficiles à évaluer car supportés par de nombreuses unités dans l'entreprise.

L'utilisation des données de la base BRN révèle que la part des services dans les ventes totales des entreprises industrielles s'est régulièrement accrue entre 1997 et 2007. Cette tendance se voit dans chaque industrie, et est le résultat d'une augmentation de la vente de services de chaque entreprise. Cela signifie qu'en moyenne, chaque entreprise industrielle française vendait relativement plus de services en 2007 que dix ans auparavant. Cette augmentation est assez faible cependant, et peu d'entreprises industrielles ont complètement migré vers une spécialisation complète dans la vente de services, ou dans la vente de biens. En moyenne, les entreprises industrielles sont de moins en moins des "industriels purs", et de plus en plus des fournisseurs de services. Les données révèlent également que la vente de services par les entreprises industrielles est associée avec une taille de l'entreprise plus faible, une intensité moindre en capital, une productivité plus faible, et avec une utilisation plus intensive des travailleurs qualifiés. Prendre en compte la vente de services par les entreprises industrielles nous fournit un nouvel outil avec lequel appréhender la désindustrialisation de l'économie française. Nous savons que le nombre d'entreprises industrielles décline chaque année. Les résultats présentés dans ce chapitre suggère que la désindustrialisation pourrait être plus importante qu'il n'y parait. En effet, il y a de moins en moins d'entreprises industrielles, et celles qui sont toujours présentes sont de moins en moins spécialisées dans la production et la vente de biens. Nous nous trouvons devant une "désindustrialisation cachée", qui se déroule au sein du secteur industriel. Les données BRN me permettent d'estimer que la part de l'emploi dédiée à la production de biens dans le secteur industriel est inférieur de 8% à ce que les estimations traditionnelles (basés sur l'emploi total des entreprises industrielles) suggèrent.

Ce dernier chapitre est de nature très descriptive et ouvre la porte à de nombreuses questions de recherches. Premièrement il serait intéressant d'étendre l'analyse aux entreprises du secteur des services. Les résultats suggèrent en effet que, si les entreprises industrielles produisent de plus en plus de services, les entreprises de services produisent de plus en plus de biens. En d'autre termes, on s'éloigne dans

chaque secteur du paradigme classique de spécialisation complète dans la production de services ou dans la production de biens. Deuxièmement, il serait pertinent de prendre en compte les entreprises faisant parti d'un groupe, qui peut être étranger ou français. Il se peut que la réorganisation de l'appareil productif d'un groupe entraine la spécialisation de ses filiales ou succursales dans la vente de services ou dans la vente de biens. Si la classification industrielle reste la même (et les données suggèrent que c'est le cas), on peut donc assister à l'émergence d'unités spécialisées dans un certain type de production au sein d'un même groupe. Cela est quelque peu différent de la tendance générale décrite dans ce chapitre. Cependant, si les groupes réorganisent de telle façon leur production, il serait intéressant de voir si les entreprises *indépendantes* se spécialisent plus ou moins dans les services. Troisièmement, il est important de lier la spécialisation dans les services à la performance des entreprises. La littérature en management et marketing a principalement fonctionné avec des études de cas pour voir si les entreprises qui se spécialisent dans les services atteignent de meilleurs performances que les autres. L'utilisation des données exhaustives des BRN permettrait de dégager des tendances globales. Cependant, comme le "paradoxe des services" le souligne, la spécialisation des services n'est pas forcément synonyme de performance élevée. L'effet attendu étant ambigu, il est crucial de mener une analyse empirique afin de déterminer si, en moyenne, la spécialisation dans les services est bénéfique ou non pour les entreprises industrielles.

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Cette thèse est partie du constat que les économies des nations développées sont spécialisées, et continuent à se spécialiser, dans les services. La part grandissante des services dans la valeur ajoutée, dans l'emploi, et même dans le commerce soulève de nombreuses questions. La première partie de cette thèse s'est intéressée à la question des échanges internationaux de services. De nombreux obstacles freinent l'expansion du commerce international de services. Les négociations en cours à l'Organisation Mondiale du Commerce veulent réduire les mesures protectionnistes

qui entravent le commerce. Le premier chapitre de cette thèse souligne que même des mesures qui n'apparaissent pas comme des instruments de protection commerciale peuvent, dans la pratique, se comporter comme tel. Le second chapitre de cette thèse s'est intéressé aux facteurs qui expliquent comment les entreprises choisissent leur marché d'exportation. La capacité à communiquer apparait comme un déterminant primordial du commerce international de services. La seconde partie de cette thèse s'est penchée sur le lien complexe entre biens et services. Dans le troisième chapitre, la question des importations de services a été soulevée. Il apparait de l'analyse empirique que, contrairement aux importations de biens manufacturés, les importations de services sont corrélées à une polarisation (en terme de qualifications) de la demande de travailleurs. Le rôle des services comme moteur de la croissance continue à soulever des interrogations, et la désindustrialisation est largement perçue comme un phénomène néfaste pour les économies développées. Le quatrième chapitre a décrit le phénomène de servicification des entreprises industrielles. Les ventes de services par ces entreprises est un phénomène encore relativement naissant, mais qui se renforce d'années en années. La frontière entre industrie et tertiaire, entre biens et services devient de plus en plus ténue. Des termes comme "économie du savoir" ou "économie de l'information" sont ancrés dans le débat public et décrivent assez bien ce que Théodore Levitt disant en 1972: "tout le monde fait des services".

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