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**PARIS-JOURDAN SCIENCES ÉCONOMIQUES  
LABORATOIRE D'ÉCONOMIE APPLIQUÉE - INRA**



48, Bd JOURDAN – E.N.S. – 75014 PARIS  
TÉL. : 33(0) 1 43 13 63 00 – FAX : 33 (0) 1 43 13 63 10  
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# Trade in Services: Cross-Border Trade vs. Commercial Presence. Evidence of Complementarity \*

Carolina Lennon<sup>†</sup>

September 2007

## Abstract

One of the main characteristics of trade in services is that a limited number of services can be traded across the border. In fact, a larger number of services require physical contact between consumers and producers in order to allow the transaction to occur. In this respect, trade in services has been classified by four modes of supply: *Mode 1*, cross-border trade; *Mode 2*, consumption abroad; *Mode 3*, commercial presence and *Mode 4*, movement of natural persons. This classification has already been widely recognised by economists, and has been adopted as a framework for current multilateral negotiations under the GATS. However, little research has been conducted regarding the interrelations between these modes of supply.

Furthermore, it is tempting to assert that new communication technologies could exempt services from the need for physical presence, and in this context, they can generate a substitution effect from services originally provided by factor movement (*Mode 3* and *Mode 4*) and consumer movement (*Mode 2*) to trade in services supplied by *Mode 1*. However, new stylized facts on the United State's commercial presence and cross border trade in services contradict this assumption. Not only is commercial presence the main mode of supply of US service exports, but it has also been growing at a faster rate than *Mode 1*. The purpose

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<sup>†</sup>Centre d'Economie de la Sorbonne (TEAM), Université de Paris 1 and Paris-Jourdan Sciences Economiques (PSE), 48 bd Jourdan, 75014, Paris, France. E-mail: carolina.lennon@gmail.com or carolina.lennon-zaninovic@malix.univ-paris1.fr

of this paper is to investigate this puzzle by analyzing the relationship between *Mode 1* and *Mode 3*. We postulate that these two modes of supply facilitate each other, and that, in contrast to the manufacturing sector, this complementarity might occur even at the level of horizontal investment. For the empirical analysis we make use of bilateral data on US majority-owned foreign affiliate operations (MOFAs) for both the services and goods sectors. After using two different estimating techniques results confirm this intuition, not only *Mode 1* and *Mode 3* are complements but also the complementarity relationship is stronger than that found in the case of goods. Moreover, the complementarity between these two modes of supply is also found at the level of horizontal FDI.

*Keywords:* International Trade in Services, Modes of Supply, FDI.

*JEL classification:* F10, F14, F23, L80

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# 1 Introduction

One of the most important phenomena of the process of globalization is the well-known growth of trade in services. Measured by the balance of payments (BOP), over the past two decades, growth of trade in services has surpassed growth of trade in goods. Trade in goods has multiplied by 3,5 while *Total services* has multiplied by around 5. Of particular interest is the trend in *Other Commercial Services* (OCS) which represents mostly cross-border trade in services <sup>1</sup> (*Mode 1*), this sub-sector having experienced a seven-fold increase in its export value over the same period (see Figure 1).

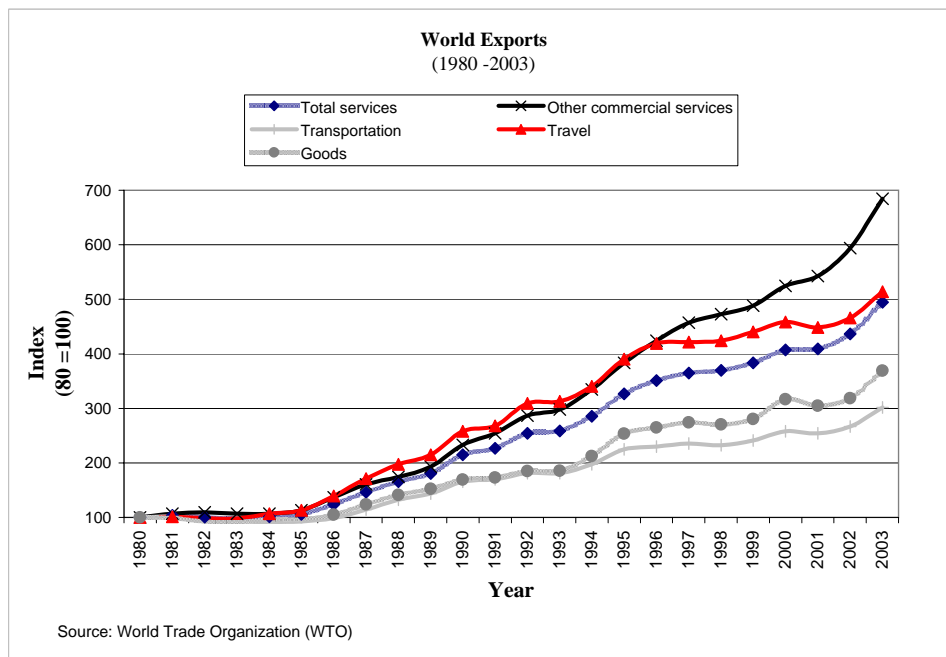


Figure 1: World Totals of Cross border exports of services and goods

There exists a consensus in the services field that one of the driving forces behind this trend might be advances in information and communication technologies<sup>2</sup>. These technological breakthroughs are increasingly

<sup>1</sup>As indicated in the Trading module of *Measuring Trade in Services* (WTO (2006)), not all services comprised in OCS can be considered cross-border trade in services. For instance, a part of *construction services* included in BOP statistics should instead be considered as Mode 3. In any event *construction services* in 2003 represented only 4 % of total world exports of OCS.

<sup>2</sup>Another force commonly cited as being behind this phenomenon has been the frag-

permitting cross-border “disembodied” trade in services<sup>3</sup>.

Additionally, based on the Heckscher-Ohlin trade theory we know that the freeing up of international factor movement (labor and/or capital) and the resulting increase of international factor flows can act as a substitute for trade in final goods. Similarly, the firms theory indicates that Multinational Corporations (MNCs) recurrently face the choice of whether to supply a foreign market by exporting into that market (cross-border trade) or by investing in it (factor movement). Accordingly, facing the new trends in cross-border trade in services and considering the theoretical models described above, it is tempting to assume that new communication technologies could exempt services from the need for physical presence, generating a substitution effect from services originally provided by factor movement (Mode 3 and Mode 4) and consumer movement (Mode 2) to trade in services supplied by Mode 1. Given the recent impressive pace of cross-border trade in services we should expect that growth in factor movement has been decreasing or at least stagnating at the same time. However, the data on the Foreign Direct Investment (FDI) outward position of OECD countries by industry indicate that just in the last thirteen years, investment in the services sector has multiplied by 7, largely surpassing investment growth in the manufacturing and in the primary sectors (see Figure 2).

The purpose of this paper is to investigate this puzzle by empirically analyzing the relationship between Mode 1 and Mode 3. We use bilateral data on US Majority-Owned Foreign Affiliate operations (MOFAs) both for the services and goods sectors as well as for cross-border trade in services and trade in goods<sup>4</sup>. We analyze this relationship using two estimation techniques, the first is intended to clear the relationship from common factors affecting both flows at the same time, and the second to control for endogenous variables.

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mentation of production and the consequent increase of offshore services, somehow related to new communication technologies, see for instance [Amiti and Wei \(2005\)](#) and [Markusen \(1989\)](#).

<sup>3</sup>Among empirical analysis in this line are those of [Freund and Weinhold \(2002\)](#) and [Lennon \(2006\)](#). Freund and Weinhold demonstrated that internet penetration has increased exports of services to the United States, and Lennon, making use of data on bilateral trade in services and trade in goods for OECD countries, found that variables describing “communication technologies” have more impact on services trade than on trade in goods.

<sup>4</sup>We concentrate our analysis on US transactions since it is the only country compiling commercial presence and cross-border trade in services by partner country (and with interesting further classifications) data, but conclusions must be considered with caution, the case of the United States can hardly be considered as representative.

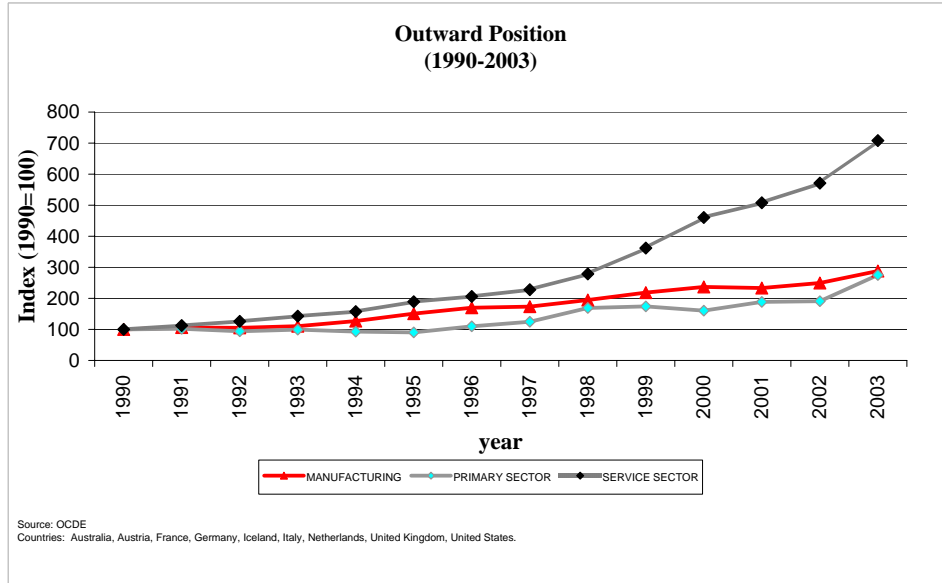


Figure 2: FDI outward position

There is some anecdotal evidence in the services sector supporting the idea that different modes of supply facilitate each other. In the work of *Chanda (2006)* the author considers case studies of services sector firms with overseas operations and concludes that there are strong facilitating relationships across modes. One example described is that of the multinational company *Ernst and Young*. Through subsidiaries and offices in locations such as Boston, Paris and Munich, *Ernst and Young* has a very strong physical overseas presences (Mode 3). The execution of the projects of its clients usually requires staffing with certified accountants, which often involves deployment of employees across the company's worldwide offices (Mode 4). Finally, *Ernst and Young* also provides on-line services such as provision of customized news and information and access to on-line customized data bases (Mode 1).

The reason for studying the relationship between cross-border trade and commercial presence is not only to have a better understanding of the determinants and pattern of trade in services but also to be aware of the effects of commercial policies. This is of particular importance because the proposal of liberalization by member countries under GATS and by regional agreements are categorized by services sector and mode of supply. Accordingly, where different modes of supply complement or substitute each other, trade

policy measures taken in one mode may affect the supply of services traded in another mode. However, little research has been conducted on the interrelations between these modes of supply. The only attempt to empirically assess these interrelations is that of *Grünfeld and Moxnes (2003)*. In their work they analyze the relationship between Mode 1 and Mode 3 for the OECD countries finding evidence of complementarity. One caveat of their work is due to the lack of bilateral data on Mode 3, hence they conducted the analysis relying on estimations of bilateral FDI stocks in services.

This paper is organized as follows: in Section 2 we review the literature on the relationship between trade and foreign investment. Given the lack of services research we review the manufacturing literature on this topic; in Section 3 we present some stylized facts on the US data and we present the data on Mode 3 and Mode 1; Section 4 discusses our results and finally, Section 5 concludes.

## 2 Literature review

### 2.1 Theoretical relationship between trade and Foreign Direct Investment (FDI)

Once the theory of the firm allows for different stages of production to be geographically dispersed<sup>5</sup> two distinctive types of foreign investment arise; horizontal and vertical FDI. In a horizontal FDI the firm duplicates just a subset of its activities setting up a same (horizontal) stage of the production process. One example of that is when a firm develops a new production plant in a foreign (host) country intended to locally serve that market. When a firm decides to put all of its production of a particular component part in a separate foreign plant, this type of split is called a vertical division and refers to the breaking of the value-added chain (i.e. Vertical FDI).

For each type of FDI there is a distinct reason for a firm to invest abroad. In the case of horizontal FDI, it may want to avoid costs associated with cross-border trade by supplying a market directly through an affiliate (the horizontal investment then is mainly driven by final product market size and transport cost of final products)<sup>6</sup>. Second, it may want to exploit differences in factor prices among different countries by splitting its production process geographically through vertical investment (the investment is mainly driven

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<sup>5</sup>See for instance the theoretical works of *Brainard (1993)* and *Grossman et al. (2006)*.

<sup>6</sup>Another factor commonly cited as determinant of horizontal FDI are firms scales economies.



by factor and input market considerations)<sup>7</sup>.

Moreover, theory expects for each type of investment to have a different effect on trade. From the perspective of the horizontal investment, FDI can be seen as a substitute of trade, as exports are replaced by local sales on foreign markets. In the case of vertical investment, FDI and trade can be seen as complements since investing abroad leads to greater trade in intermediate goods (inputs) to the affiliate.

As indicated by *Navaretti and Venables (2004)*, at least until recent years, there has been a consensus that the overwhelming proportion of FDI has been horizontal rather than vertical, since FDI originates and goes predominantly to developed countries (it appears that FDI flows seek market access instead of differentials on factor costs, a behavior rather associated to horizontal Investment). Hence one should expect from the empirical evidence to find a substitution relationship between FDI and trade<sup>8</sup>.

## 2.2 Empirical relationship between trade and FDI

However, empirical studies usually find a complementarity relationship<sup>9</sup>. Foreign markets are served through both exports and FDI, countries receiving high levels of exports also host large amounts of foreign direct investment<sup>10</sup>. Exceptions to these findings exist when more disaggregated data or product-level data are used instead, which allows to separately identify each type of investment, and then to analyze the complementarity and substitutability relationship where the firms theory applies. Accordingly, *Blonigen (2001)* found that Japanese affiliate employment in US plants producing specific auto parts was negatively related to Japanese exports of those same products (exports vs. horizontal FDI). Conversely, he also found a complementary relationship when analyzing the location of Japanese automobile parts production in the United States and Japanese exports of automobile parts to the United States (exports vs. vertical FDI).

Similarly, *Head and Ries (2001)*, using firm-level data on Japanese manufacturers from 1965 to 1989, found that FDI substitutes the exports of 19

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<sup>7</sup>Another factor commonly cited as determinant of vertical FDI are the plant scales economies.

<sup>8</sup>Similarly in *Brainard (1997)* the author also finds that multinational activity is more likely the more similar are the home and foreign markets.

<sup>9</sup>Some articles finding a complementarity relationship are those of *Lipsey and Weiss (1981)* and *Clausing K. A. (2000)*.

<sup>10</sup>For a complete review of the empirical literature on FDI and Trade see *Head and Ries (2004)*.

large Japanese electronic and automobile assemblers, which are not vertically integrated and, therefore, typically do not supply overseas affiliates.

### **3 Stylized Facts and data on cross-border trade (Mode 1) and sales by affiliates (Mode 3)**

#### **3.1 Sales by affiliates data**

In order to describe the commercial presence for both goods and services, we make use of the US Foreign Affiliates Trade Statistics (FATS). These data are published by the US Bureau of Economic Analysis (BEA) and they are drawn from benchmark and annual sample surveys of US direct investment abroad. The survey collects operating and financial data of US companies and their foreign affiliates, such as balance sheets, income statements, employment and compensation of employees, trade in goods, and sales of goods and services.

Specifically, we gather the information on sales by US majority-owned foreign affiliates (exports of Mode 3 in the case of services). The advantage of using the US data is that sales by affiliates have been classified according to their destination (to local market, export to the United States and export to third countries), to the type of products being sold (goods or services), to the country of residence of the affiliate as well as to whether the sale is being carried inside the firm's boundaries (affiliated or unaffiliated sale).

#### **3.2 Data on cross-border trade in services**

Bilateral US trade in services have been drawn from US Balance of Payment accounts published by BEA with the advantage that data have been classified by type of affiliation and by services sectors.

#### **3.3 US stylize facts**

As mentioned in the abstract, not only is commercial presence the main mode of supply of US service exports, but it has also been growing at a faster rate than Mode 1. Estimations of US Trade in services by modes of supply prepared by *Benassy-Quere et al. (2006)* indicate that in 2000 83 percent of the international trade in services was supplied by Mode 3 and that only 10 percent was supplied by Mode 1 . From Figure 3, which compares US's trends on exports (Mode 1) and sales by affiliates (Mode 3) for both services and goods, two very interesting facts can be gleaned, first,





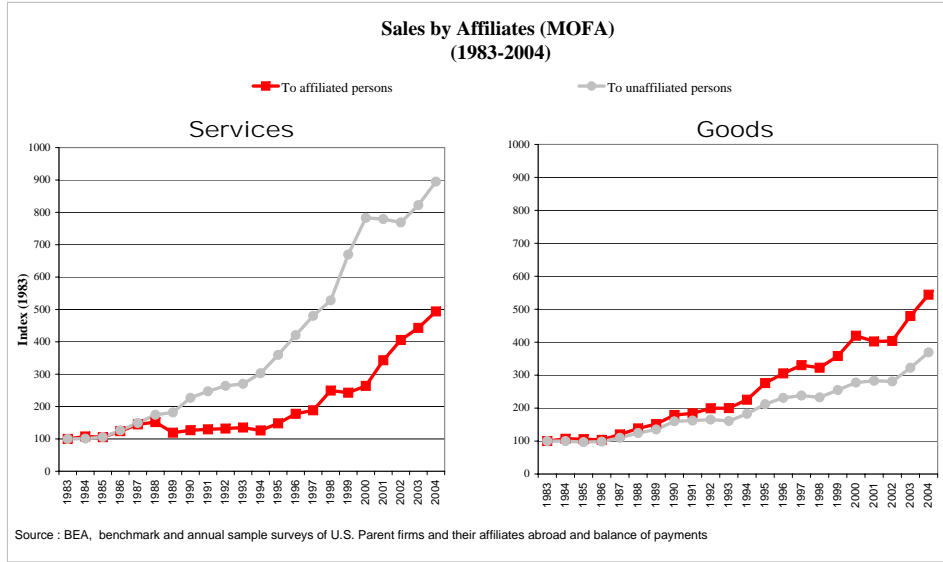


Figure 5: Affiliated vs. Unaffiliated Sales

## 4 Empirical implementation

For the empirical analysis we use a set of gravity equations to explain both bilateral trade and sales by affiliates. The gravity equation is a log-linear specification, relating bilateral flows from country'  $i$  to country  $j$  as being proportional to countrys masses ( $Y$ ) and inversely related to their bilateral distance. Its logarithmic form takes the following specification:

$$\ln(Flow_{ij}) = \beta_0 + \beta_1 \ln(Y_i) + \beta_2 \ln(Y_j) + \beta_3 \ln(Dist_{ij}) + \beta_z Z + \mu_{ij}$$

The empirical success of the gravity model for explaining bilateral trade patterns is well documented and has a rich history beginning with [Tinbergen \(1962\)](#). Furthermore, The model is firmly grounded by economic theory (See [Baier and Bergstrand \(2001\)](#) for more details).

Even though, the empirical implementation of the gravity model for explaining cross-border foreign investment is more recent, the findings indicate that just as trade volumes are deterred by geographical distance and

boosted by market size, so are volumes of FDI<sup>12</sup>. Indeed, this model explains around 70-80 percent of cross-country variation in FDI and multinational activities<sup>13</sup>.

Our empirical analysis is divided into two sections. The first section consists of a set of regression where trade is explained by affiliates' sales. In order to shed some light on the differences between trade in goods and trade in services, the same exercise is conducted for both types of products, we will name this set of regressions, for the reasons that we will explain hereafter, the naive regressions. In the second section we use a cross-price elasticity approach, which is deemed to overcome some caveats of the first set of regressions.

All regressions are estimated using Ordinary Least Square (OLS) and inferences are based on robust standard errors<sup>14</sup>. Additionally, all estimations include the same set of gravity explanatory variables namely: we include the GDP of partner country (as indicator of market size) and a set of variables depicting bilateral transaction costs between the US and their partners. The variables included in this set are: the bilateral distance between Washington and each partner's capital cities, a dummy variable indicating if a language is spoken by at least 9 percent of the population in both countries, another indicating if the partner share a border with the US (Mexico and Canada), and finally a dummy variable to indicate if the partner does not have a sea share (landlocked). Additionally, all regressions include dummy year variables.

## 4.1 Naive regressions

As indicated this set of regressions explain cross border exports of services (exports of Mode 1) by sales of services by affiliates (export of Mode 3). We also conduct the same exercise for the case of goods, that is, we explain exports of goods by sales of goods by affiliates<sup>15</sup>.

Using this estimation approach gives rise to two statistical concerns.

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<sup>12</sup>Even though, from the firms theory, trade costs (proxied by distance) should affect the decision to undertake investment abroad, there are no theoretical foundations why distance should negatively matter for the volume of sales by affiliates.

<sup>13</sup>See for instance the work of *Brainard (1997)*, *Shatz and Venables (2000)* and *Clausing K. A. (2000)*.

<sup>14</sup>The presence of heteroskedasticity has been largely recognized in the works estimating gravity equations ( see *Silva and Tenreyro (2005)*).

<sup>15</sup>Some authors have already carried this type of analysis for the case of the manufacturing sector. Lipsey-Weiss-1981 and Clausing-2000 found a positive relationship using local production and sales by US affiliates.

Firstly, the positive relationship could be spurious, which means that it could be due to other factors not included in the regressions which simultaneously affect trade and sales in a similar direction. The second statistical concern is related to the use of endogenous explanatory variables. From the firms theory, a firm decides whether to serve a foreign market by exporting goods or by locating a plant guided by a third factor, this trade-off means that exports and FDI are simultaneously determined, in this respect both exports and FDI are endogenous variables. Additionally, the model could suffer from inverse causality. For instance, it would be reasonable to think that firms locate in markets that firms already know through exporting.

The use of the gravity variables in our regressions intends to solve the first statistical problem. It has been proven that these variables explain more than 70 percent of the variance in FDI and in Trade, hence their inclusion in our estimations would serve to control for factors affecting both flows at the same time. With respect to the endogeneity problem, we address it in the second part of the empirical analysis using a cross-price elasticity approach.

For the reasons indicated above the results presented in this first part must be considered with caution, they are not evidence of causality but (rather) they depict the relationship<sup>16</sup> between trade and FDI after controlling for common factors affecting these two flows. Nonetheless, we estimate that the comparative exercise between the case of goods and that of services is worth carrying, since *a priori*<sup>17</sup> there are no reasons to think that endogeneity concerns are acting differently in each case, accordingly, the comparison might not lose its validity.

Figure 6 presents the results when total sales by affiliates is used as an explanatory variable. The dependent variable in columns 1, 2 and 5 are exports of goods<sup>18</sup> and in columns 3 and 4 are services exports of Mode 1<sup>19</sup>. Following the indications of WTO (2006) on the allocation of services statistics from the balance of payments to modes of supply, we construct Mode 1 by subtracting travel and construction services from services exports<sup>20</sup>.

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<sup>16</sup>Better than simply estimating their correlations.

<sup>17</sup>There is no different firm theory for the services sector nor research analyses looking for differences between these two sectors with respect to the relationship between exports and FDI.

<sup>18</sup>Data on trade in goods are drawn from Comtrade.

<sup>19</sup>Variables in natural logarithm are prefixed by Ln.

<sup>20</sup>Travel services should be allocated as Mode 2 (i.e. consumption abroad). Even if BOP construction statistics include some components that should be allocated as Mode 1, they also count for components that should be allocated as Mode 3. Unfortunately the level of aggregation of our data does not allow us to extract those components, hence their inclusion in our estimations should generate a positive bias in the coefficients of interest.

	1	2	3	4	5
	Exports				
	Ln (Goods)		Ln (Mode 1)		Ln (Goods)
Ln_distance	-0.056 <i>[0.041]</i>	0.087** <i>[0.037]</i>	-0.436*** <i>[0.073]</i>	0.002 <i>[0.048]</i>	0.235*** <i>[0.057]</i>
Language	0.597*** <i>[0.054]</i>	0.532*** <i>[0.048]</i>	0.276*** <i>[0.059]</i>	0.190*** <i>[0.039]</i>	0.180** <i>[0.074]</i>
Contiguity	1.727*** <i>[0.098]</i>	1.657*** <i>[0.084]</i>	0.112 <i>[0.141]</i>	0.689*** <i>[0.095]</i>	2.095*** <i>[0.122]</i>
Landlocked	-0.453*** <i>[0.094]</i>	-0.588*** <i>[0.073]</i>	0.569*** <i>[0.107]</i>	0.445*** <i>[0.107]</i>	-0.134* <i>[0.080]</i>
Ln_GDPj	0.657*** <i>[0.015]</i>	0.462*** <i>[0.024]</i>	0.673*** <i>[0.032]</i>	0.427*** <i>[0.027]</i>	0.458*** <i>[0.035]</i>
Ln (Sales by Affiliates)		0.253*** <i>[0.025]</i>		0.379*** <i>[0.022]</i>	0.206*** <i>[0.038]</i>
Constant	-8.730*** <i>[0.405]</i>	-7.278*** <i>[0.427]</i>	-6.624*** <i>[1.298]</i>	-6.946*** <i>[0.691]</i>	-7.705*** <i>[0.788]</i>
Observations	1116	1116	426	426	426
Adjusted R-squared	0.77	0.8	0.76	0.89	0.76

All estimations regressed using dummy year.

Robust standard errors in brackets

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Figure 6: Naive regressions 1

Regressions 1 to 4 are estimated using the full set of available observations for each type of product (services and goods), in regression 5 the goods sample is restricted to the countries and the years for which data on services are available<sup>21</sup>. For both unrestricted and restricted samples as well as for both type of products the coefficients on total sales by affiliates are positive and highly significant. However, in the case of services this coefficient is of a larger magnitude. Taking columns 4 and 6, we test using interaction terms if this difference in coefficients is statistically significant; the result indicates that, with 1 percent confidence, the impact of sales in services on Mode 1 is 0.173 higher than the impact of affiliates sales of goods on exports of goods<sup>22</sup>.

In the next set of regressions presented in Figure 7 we take advantage of the further classification of the data on sales. In the first two columns

<sup>21</sup>Data on services include 32 US partner countries and covers the period from 1986 to 2004.

<sup>22</sup>This interaction term analysis has been carried for this and the following comparisons, yet their results are not reported in the article.



	1	2	3	4	5	6
	Exports					
	Ln (Goods)	Ln (Mode 1)	Ln (Goods)	Ln (Mode 1)	Ln (Goods)	Ln (Mode 1)
Ln_distance	0.213*** [0.059]	0.004 [0.040]	0.120* [0.067]	0.068 [0.052]	0.172* [0.101]	0.201*** [0.070]
Language	0.226*** [0.083]	0.204*** [0.038]	0.083 [0.069]	0.098** [0.046]	-0.053 [0.089]	-0.07 [0.063]
Contiguity	2.026*** [0.138]	0.712*** [0.086]	0.731*** [0.164]	0.802*** [0.121]	1.199*** [0.309]	1.096*** [0.180]
Landlocked	-0.122 [0.082]	0.262** [0.113]	0.074 [0.153]	0.323** [0.131]	-0.205 [0.146]	0.299** [0.137]
Ln_GDPj	0.494*** [0.046]	0.412*** [0.021]	0.391*** [0.053]	0.373*** [0.030]	0.389*** [0.063]	0.325*** [0.037]
Ln (Unaffiliated sales)	0.053 [0.067]	0.159*** [0.022]				
Ln (Affiliated sales)	0.110*** [0.042]	0.196*** [0.015]				
Ln (Sales to US)			0.411*** [0.029]	0.154*** [0.018]		
Ln (Sales to local Market)			0.139* [0.077]	0.185*** [0.027]		
Ln (Sales to other foreign country)			-0.205*** [0.038]	0.045** [0.019]		
Ln (Sales to US), Unaffiliated					-0.004 [0.059]	0.049** [0.019]
Ln (Sales to local Market), Unaffiliated					-0.064 [0.089]	0.211*** [0.041]
Ln (Sales to other foreign country), Unaffiliated					0.007 [0.077]	0.022 [0.020]
Ln (Sales to US), Affiliated					0.374*** [0.043]	0.137*** [0.024]
Ln (Sales to local Market), Affiliated					0.149*** [0.049]	0.004 [0.033]
Ln (Sales to other foreign country), Affiliated					-0.102* [0.057]	0.031 [0.024]
Constant	-7.829*** [0.937]	-5.928*** [0.472]	-5.177*** [1.374]	-5.365*** [0.866]	-5.194** [2.190]	-5.527*** [1.016]
Observations	421	421	306	306	224	224
Adjusted R-squared	0.75	0.91	0.83	0.92	0.85	0.88

All estimations regressed using dummy years.

Robust standard errors in brackets

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Figure 7: Naive regressions 2

sales are classified by the type of affiliation (sales to affiliated persons or to unaffiliated persons), in columns 3 and 4 by destination of the sale (going back to the US, serving the local market or serving another foreign country), and in the last two columns by both classifications (by type of affiliation and by destination). The results indicate that, in the case of services, the relationship between commercial presence and trade is always positive and that in 8 out of 11 of the cases this relationship seems to be higher than that found in the case of goods.

Additionally, the positive relationship between commercial presence in services and Mode 1 continues to be significant even in the case of unaffiliated sales (columns 2 and 6). Differently, in the case of goods, this positive relation is only significant for affiliated sales and it is negative (although, non significant) for half of the cases depicting sales of goods to unaffiliated persons (columns 1 and 5). Moreover, regarding the destination of sales, the highest positive relationship in services is observed in the case of sales intended to serve the local market (columns 4 and 6), and for the case of goods, it is observed in the sales going back to the US (columns 3 and 5).

These results are in line with our original intuition presented in the stylized facts section. They tell us that the source of this positive relationship might differ in each case. For the goods case, the positive relationship only shows up in the cases of affiliated sales and mainly in the sales going back to the US. Then this positive relationship must result from the breaking of the value-added chain (i.e. vertical FDI) as predicted by firms theory. By contrast, in the case of services this relationship is always positive but even more, it seems to be mainly associated to the services sales intended to serve the local market (i.e. horizontal FDI) and this last finding challenges the firms theory.

## 4.2 Cross-price elasticity

However, as indicated above, the positive relationship might be just due to the inclusion of endogenous explanatory variables in the model. In order to solve this problem, this section analyzes the relationship between commercial presence and trade using the cross-price elasticity approach. This approach has been already carried in the works of *Amiti and Wakelin (2003)* and *Clausing K. A. (2000)* for the manufacturing sector. The procedure analyzes trade and commercial presences as being respectively explained by the cost of investing abroad and by the cost of exporting. The substitutive relationships is found when a rise in the cost of FDI raises exports or when an increase in the cost of exporting induces more FDI.

We use restriction measures in order to describe the cost of carrying each type of flows (i.e. exports and investment) as well as for each types of products (i.e. services and goods). Since the measures on services restrictions as well as those related to FDI restrictions are based on frequency indexes to facilitate the comparison, we thus report beta standardized coefficients.

In Figure 8 we describe the cost of exporting and investing in the services sector by using the indicator elaborated by *Langhamme (2005)* on the EU offers (proposals) under the GATS negotiations. The assessment has been

carried by country and by mode of supply <sup>23</sup> and the index score values range from 0 to 100. A score of 100 for a given mode of supply and a given country implies that there is full commitment to liberalization (none in GATS terminology) in all sectors. A score of 0 means that there is no commitment in any sector at all (unbound). Columns 1 to 3 report the results from regressing exports of Mode 1: on the offers under GATS in Mode 3 (col. 1), on the offers in Mode 3 and those in Mode 1 (col. 2), finally on the offers in Mode 3, the offers in Mode 1 and their interaction term (col. 3). We include the last variable as another way to account for the interdependence between modes of supply; if the different modes of supply are in some way interdependent then, the impact of liberalizing one mode of supply must be subordinated to the stage of liberalization in the other mode. For instance, if both modes are complements, the potential benefit of trade liberalization in one mode must be lower than expected when the other mode of supply remains highly restricted, in such a case we expect a positive coefficient on the interaction term (negative if substitutes, and 0 if there are no statistically significant relationship). The analysis implemented in columns 1 to 3 is reversed in columns 4 to 6 in order to explain exports of Mode 3. Finally, columns 7 to 9 are added in order to compare the case of services with that of goods, specifically they compare the impact of the offers in Mode 1 on exports of Mode 3 (col. 7) with that of the applied tariff rates on sales of goods (col. 8 and 9)<sup>24</sup>.

Results confirm the complementarity relationship between modes of supply. The coefficients on the offers in Mode 3 have always a positive and highly significant impact on cross-border trade in services (col. 1 and 2). Similarly, the coefficients on the offers in Mode 1 have a high and significant impact on exports of Mode 3 (col. 4 and 5). Moreover, the interaction terms in both cases are positive and highly significant (col. 3 and 6)<sup>25</sup>. Finally, even if in the case of goods there exists evidence of complementarity between trade

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<sup>23</sup>Which allows us to evaluate the relationship in both directions, trade explained by cost of investing and commercial presence explained by cost of exporting.

<sup>24</sup>Data on tariff for the manufacturing sector and mining products are drawn from UNCTAD Handbook of Statistics.

As we are working with a comparable sample of observations for both types of products in the regressions reported in columns 7 and 8, only the European countries have been included in their estimations. However, given that those countries belong to a same custom union then the variance in external tariff among European countries must be low, this in turn might be lowering the significance of the coefficient on tariff (col. 8). Therefore, in order to increase the variance in this variable we include column 9 which reports the results using the unrestricted sample (i.e. all available observations relating to the goods sector).

<sup>25</sup>For offers in “Mode 1” one standard deviation from the mean, the coefficient on the

	1	2	3	4	5	6	7	8	9
	Mode 1 Trade in Services, Ln (trade), Exports			Mode 3 Sales of Services by Affiliates, Ln (trade), Exports			Sales of Goods by Affiliates, Ln (trade), Exports		
Offers in Mode 3	0.319*** [0.010]	0.191*** [0.007]	-18.392*** [0.194]		0.116*** [0.009]	-3.368*** [0.267]			
Offers in Mode 1		0.396*** [0.008]	-24.57*** [0.268]	0.181*** [0.011]	0.168*** [0.010]	-4.25*** [0.375]	0.209*** [0.012]		
Interaction term			37.047*** [0.003]			6.221*** [0.005]			
Applied average tariff rates								-0.127** [0.049]	-0.165*** [0.008]
Observations	148	148	148	320	320	320	238	238	624
Adjusted R-squared	0.79	0.86	0.98	0.91	0.92	0.93	0.91	0.87	0.75

All estimations regressed using dummy year.  
Constant an gravity variables estimated but not reported  
Robust normalized beta coefficients  
Robust standard errors in brackets  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Figure 8: Cross price elasticity analysis

and FDI, it seems to be lower than that found in the case of services (col. 7 against col. 8 and col. 9)<sup>26</sup>.

In the paragraphs to follow we analyze if the complementarity relationship previously found is also present at the services sectoral level. We regress unaffiliated cross-border trade in services (by sectors) on restrictions on FDI (by sectors)<sup>27</sup>. For the restrictions on FDI we use the FDI regulatory restrictiveness index prepared by *Koyama and Golub (2006)*. This assessment accounts for 42 countries (of which 29 are OECD countries), 8 services sectors and the manufacturing sector. The index aims primarily to measure deviations from national treatment (i.e. discrimination against foreign investment rather than the institutional environment). Specifically it accounts for: limitations on foreign ownership, special screening procedures which

offers in Mode 3 takes the value of 18.655.

<sup>26</sup>We should keep in mind that the “offers” index must be underestimating the real state of countries’ liberalization (e.g. one country could set a sector and a mode as being “unbounded” while the actual policy practice in that sector and that mode could be quite liberal), therefore the coefficient on our “offer” variable might underestimate the impact of services sector liberalization on services trade, by that it can be underestimating the effect of exporting and investing. In contrast, in the case of goods, we account for a measure that must be closer to the actual policy than that used in the case of services, as we are using the applied tariff rates.

<sup>27</sup>For each regression we conduct the comparative analysis, that is, using the comparable set of observations we regress trade in goods on the FDI regulatory restrictiveness index in manufacturing.

	1	2	3	4	5	6			
								Ln ( Exports)	
	Trade in Goods	Mode 1, Business, professional, and technical services, Unaffiliated	Trade in Goods	Mode 1, Legal Services, Unaffiliated	Trade in Goods	Mode 1, Management, consulting, and public relations services, Unaffiliated			
FDI Reg. Rest., Manufacturing	-0.105*** [0.357]		-0.081*** [0.331]		-0.094*** [0.341]				
FDI Reg. Rest., Business services		-0.184*** [0.106]							
FDI Reg. Rest., Legal				-0.171*** [0.228]					
FDI Reg. Rest., Accounting						-0.134*** [0.168]			
Observations	529	529	481	481	496	496			
Adjusted R-squared	0.85	0.87	0.85	0.8	0.85	0.67			

	7	8	9	10	11	12	13	14		
									Ln ( Exports)	
	Trade in Goods	Mode 1, Insurance, Unaffiliated	Trade in Goods	Mode 1, Financial services , Unaffiliated	Trade in Goods	Mode 1 Telecommunicati ons, unaffiliated	Trade in Goods	Mode 1 Transport		
FDI Reg. Rest., Manufacturing	-0.093*** [0.336]		-0.076*** [0.319]		-0.106*** [0.374]		-0.074*** [0.325]			
FDI Reg. Rest., Insurance		-0.435*** [0.413]								
FDI Reg. Rest., Finance				-0.218*** [0.333]						
FDI Reg. Rest., Telecoms						-0.065* [0.153]				
FDI Reg. Rest., Transport								0.264** [0.270]		
Observations	469	469	462	462	483	483	450	450		
Adjusted R-squared	0.85	0.81	0.84	0.77	0.85	0.73	0.84	0.75		

All estimations regressed using dummy year.  
Constant an gravity variables estimated but not reported  
Robust normalized beta coefficients  
Robust standard errors in brackets  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Figure 9: Cross price elasticity analysis

only apply to foreign investors, as well as post-entry management and other operational restrictions. Restrictiveness is measured on a 0-to-1 scale, with 0 representing full openness<sup>28</sup>.

Results presented in Figure 9 indicate that the magnitude of this complementarity differs among services sectors. The complementarity between trade and FDI is found in 6 out of 7 services sectors<sup>29</sup>. It is worth noting

<sup>28</sup> The negative coefficients on this variable indicate presence of complementarity

<sup>29</sup>The only sector presenting a substitutive relationship is the transport sector. This sector is generally characterized as been highly concentrated and highly monopolized.

that all services sectors presenting this complementarity belong to “other commercial services”, and the last, as indicated in the introduction, has been the most dynamic services sector in cross-border trade in services over the past two decades. Additionally, in 5 out of 7 services sectors this complementarity relationship seems to be higher than that found in the case of goods. Finally, as we are only regressing unaffiliated exports of Mode 1 as dependent variable, this results reinforce the previous findings from the naive regressions section, the complementarity in services sectors is also found at the level of horizontal FDI.

## 5 Conclusion

Using US bilateral data this article analyzes the relationship between commercial presence and trade in the services sector. As a matter of comparison the same analysis is conducted for the case of goods. After controlling for endogeneity using the cross-price elasticity approach we found evidence of complementarity between trade and commercial presences. This positive relationship persists even when we include in the regression unaffiliated data on both sales by affiliates and cross-border trade (i.e. horizontal FDI). Moreover this relation seems to be larger in the case of services than that found in the case of goods. Finally when the analysis is carried at services sectoral level, we found differences in the magnitude of this relationship across services sectors, however this complementarity relationship is found in all the “other commercial services” which has been the most dynamic services sector in cross-border trade in services over the past two decades.

The results have implications for both policy and theory. Regarding the policy implications, this complementarity in services sectors must imply that the potential benefit of trade liberalization in one mode must be lower than expected when the other mode of supply remains highly restricted. Accordingly, policymakers had to consider this interrelationship in order to obtain the desired effects from trade liberalization negotiations. With reference to the firms theory, the results seem to indicate that the source of complementarity could be different for services and for goods. For the goods case, this positive relationship must result from the breaking of the value-added chain (i.e. vertical FDI) as predicted by firms theory. In contrast, in the case of services this relationship seems to be mainly associated to the sales by affiliates intended to serve the local market (i.e. horizontal FDI) which challenges the firms theory.

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Such considerations are not accounted for in the FDI regulatory restrictiveness index.

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