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Trade in Services and Trade in Goods: Differences and Complementarities

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Carolina Lennon

Trade in Services and Trade in Goods: Differences and Complementarities

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Abstract

The purpose of this paper is twofold. First, we explore empirically to what extent the determinants of trade in services differ from those of trade in goods. Second, by the use of instrumental variables, we explore potential complementarities between bilateral trade in goods and bilateral trade in services. Using a gravity framework, the main results show that bilateral trust and contract enforcement environment, networks, labour market regulations and variables denoting technology of communication have a higher impact on services trade than on goods trade. Finally, after using instrumental variables, we find that bilateral trade in goods explains bilateral trade in services: the resulting estimated elasticity is close to 1. Reciprocally, bilateral trade in services also affects bilateral trade in goods, though to a lesser extent: we find an estimated (positive) elasticity of 0.46.

Keywords: *international trade in services, trade in goods, gravity equations*

JEL classification: *F12, F15, L8*

Carolina Lennon[*]

Trade in Services and Trade in Goods: Differences and Complementarities

1. Introduction

The services sector is the largest contributor to a country's economy. The size of its contribution correlates with a country's level of development, ranging from 47 percent of GDP in the case of low income countries to 70 percent in the case of high income countries (see Figure 1). In addition, as measured by balance of payments (BOP) statistics, over the past two decades the growth of trade in services has surpassed the growth of trade in goods: trade in goods increased by a factor of 3.5 while trade in services increased by a factor of 5 (see Figure 2). The growing importance of services in national economies and in international trade is largely due to an increase in the production of intermediate services (i.e. outsourcing). Firms increasingly delegate costly knowledge-intensive intermediate-stage processing activities to specialized suppliers in order to benefit from lower factor costs. To illustrate this phenomenon we can observe in Figure 2 that trade in 'Other Commercial Services', which consists mainly of business-to-business services, has experienced a seven-fold increase in value terms over the last twenty years[1]. Besides the economic importance of services activity in general, and services outsourcing in particular, this phenomenon has received a huge amount of attention in the media and in political circles[2] and the sector has increasingly been included in the framework of multilateral negotiations (GATS) and regional agreements.

Notwithstanding the economic importance of the services sector in national economies and in the globalization process, it is not clear whether the specificities of trade in services require a distinctive trade theory. Bhagwati et al. (2004) argue that outsourcing is fundamentally a trade phenomenon, so that there is no need to use a different approach to analyse trade liberalization outcomes in the services sector. By contrast Lennon et al. (2008) develop a theoretical model that incorporates special features for services trade, based on the fact that trade in some services can only occur if inputs from both trading countries are jointly used in the transaction process.

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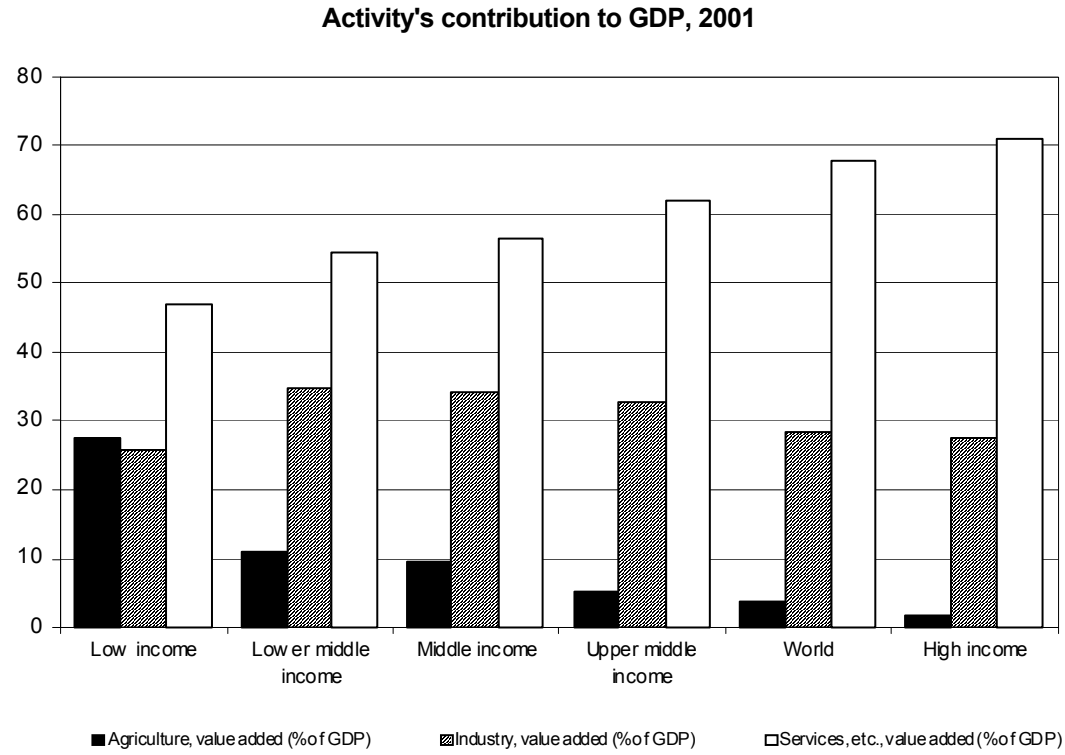
[1] Other interesting figures have been showed by Amiti and Wei (2004). Using input and output data for the United States and the UK they showed that service outsourcing is much lower than material outsourcing, but the first is increasing at a faster pace.

[2] For example: the reactions in France against 'Bolkestein' directive (Directive on services in the internal market) at the time of European Referendum.

Figure 1



Source: World Bank (WDI)

Some empirical research on the determinants of bilateral trade in services has been already carried out. Grünfeld and Moxnes (2003), Lennon et al. (2008), and Kimura and Lee (2003) analyse the determinants of bilateral trade in services using a gravity framework, though contrary to the approach used in this paper they rely on aggregate data[3]. Freund and Weinhold (2002) also use a gravity framework but focus only on the U.S. case and mainly on the impact of new communication technologies on traded services. Aviat and Coeurdacier (2005) apply also a gravitational framework to explain bilateral trade in financial assets. To control for endogeneity and to check for the direction of the causal relationship, they jointly study trade in goods and trade in banking assets in simultaneous gravity equations. The work of Kimura and Lee (2003) is the closest to our analysis as they also investigate differences[4] and complementarities between trade in services and trade in goods[5].

The purpose of this paper is twofold. First, we empirically explore to what extent the determinants of trade in services differ from those of trade in goods and, second, through the use of instrumental variables, we analyse the potential complementarities between

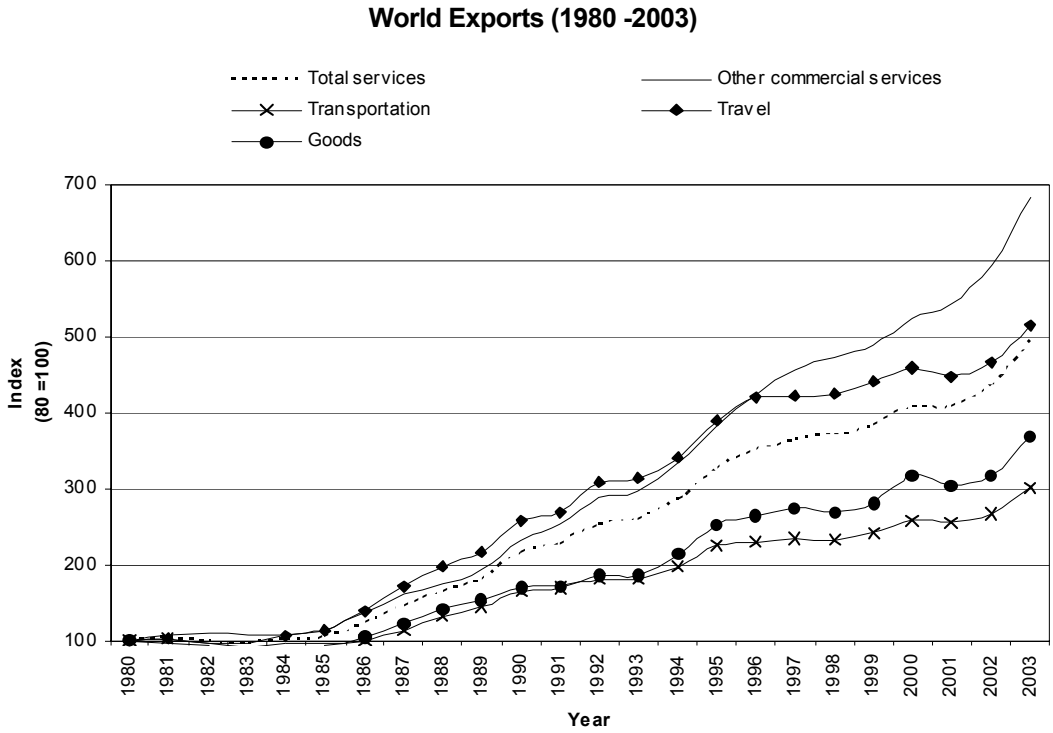
[3] Grünfeld and Moxnes (2003) also explore for factors explaining FDI in services.

[4] They use Chi² to test for differences in impact of variables when explaining trade in services vis-à-vis trade in goods. We use interaction terms instead.

[5] They used a residual approach in order to explore the complementarities, while we use Instrumental Variables (IV) estimation.

bilateral trade in goods and bilateral trade in services. We use a gravity framework throughout our analysis, and make use of two sets of explanatory variables. The first consists in a set of basic gravity variables. The second adds a set of variables that are believed to have an important role in explaining trade in services, notably: the 'bilateral trust and contract enforcement environment', the existence of 'Networks', the regulation and qualification of the 'labour markets' and the adoption of 'technology and new communication technologies'.

Figure 2



Source: World Trade Organization (WTO)

Given the lack of disaggregated data, previous analyses have only studied the determinants of total trade in services. However it is reasonable to expect that the nature of services sub-sectors such as 'Travel' and 'Other commercial services' should be highly different from the average, and therefore that their determinants might also differ from those of total services trade. In this context the present analysis benefits from the recent release of the OECD database on bilateral trade in services. The outstanding advantage of this new database is that trade in services has been classified into four sub-sectors: 'Travel', 'Transportation', 'Other commercial services' and 'Government services'. Moreover focusing on 'Other commercial services', the services sector presenting the highest trade growth rate over the last two decades, we are able to enrich the set of explanatory variables. Finally, as far as we know, this work is the first attempt to explore for potential complementarities between trade in goods and trade in services using bilateral trade data as well as the Instrumental Variable (IV) estimation approach.

The paper is structured as follows. In Section 2 we present a review of some of the special features of the services sector and some potential sources of complementarities between trade in services and trade in goods. In Section 3 we present the gravity model and the data. In Section 4 we discuss our results on the differences between trade in services and trade in goods. In Section 5 we present our results for the instrumental variable estimations. Section 6 concludes.

2. Characteristics of Services and Potential Complementarities

Service Characteristics

The services sector has been considered for a long time as the non-tradable sector of the economy, since a large number of services required physical contact between producers and consumers in order to allow the transaction to occur, rendering trading costs to remote locations prohibitive. New communication technologies in general, and the Internet in particular, have helped to overcome such historical barriers by reducing transaction costs from a previously unaffordable level to close to zero today (e.g. call centres and trade in financial assets)[6].

Services have a highly heterogeneous nature and they have often been considered to be intangible and non-storable[7]. The heterogeneity of services manifests itself in several ways: (1) services often require the suppliers and the consumers to be in the same physical location in order for the transaction to occur, therefore services are differentiated by location[8]; (2) several services are customized in order to fit specific customer needs; they are therefore differentiated by client; (3) services are, in many cases, highly specialized activities, making substitution between two types of services very costly (in terms of time and money); accordingly, services production may require substantial expertise as obtained from education, training or work experience[9]. Finally, (4), services are heterogeneous in terms of quality, as they are labour-intensive and the quality of labour used may vary significantly.

As mentioned in the introduction, 'Other commercial services', which consists mainly in business-to-business services[10], has been the most dynamic sub-sector in trade in services. This sub-sector has been characterized by Jones and Kierzkowski (2005), Markusen (1989) and Markusen et al. (2000 and 2005) as presenting increasing returns to scale. In particular, Markusen has modelled it as being: (1) a knowledge-intensive sub-

6 More details in the article of Freund and Weinhold (2002).

7 There are notable exceptions to the non-storability criterion, e.g. computer software, translation of texts, consulting services (if the output is in written form).

8 As noted by Grünfeld and Moxnes (2003).

9 As noted by Markusen (1989, 2000 and 2005).

10 For composition of OECD exports by type of services, see Figure 3.

sector requiring a high initial investment in human capital (i.e. expertise), (2) a sub-sector that is intensive in skilled labour and (3), a sub-sector whose final products are highly differentiated.

Because of its intangible character and quality variability, services cannot always be identified by their clients before they are purchased or consumed; this phenomenon in turn generates information asymmetries and agency problems. Consequently, the experience of contracting a service can be risky.

Finally the fact that services are highly specialized and differentiated implies: (1) that services do not have reference prices and (2) that the efforts involved in searching for a suitable business partner may be significant.

Complementarities

Some economists have suggested the existence of complementarities between bilateral trade in goods and bilateral trade in services. In Markusen's models, an increase in producer services varieties (varieties of intermediate services) confers a positive technological externality in final goods production. This in turn leads to an increase in total factor productivity[11].

Amiti and Wei (2004) use data on US manufacturing industries and find that services outsourcing is positively correlated with labour productivity[12]. Francois and Wooton (2005) analyse the interaction between trade in goods and the level of competitiveness in the 'export and retail related services sector' (i.e. shipping and logistic services and wholesale and final consumer distribution). They show theoretically and empirically that an uncompetitive domestic services sector can act as an barrier to import of goods. In Feenstra et al. (2004) the authors focus on the importance of services intermediaries in reducing informational barriers to international trade in goods. They elaborate a theoretical model where countries benefit from purchasing goods from a remote country (China) by having access to intermediary services located in a third country (Hong Kong).

3. Empirical Evidence

The Gravity Equation

The empirical success of the gravity model for explaining and predicting bilateral trade patterns is well documented and has a rich history beginning with Tinbergen (1962). The gravity equation is a log-linear specification relating the nominal bilateral trade flow from

[11] The key idea is that a diverse set (or higher quality set) of business services allows downstream users to purchase a quality-adjusted unit of business services at lower costs.

[12] Interestingly they do not find evidence for material inputs.

exporting country *i* to importing country *j*, where bilateral trade is proportional to country's masses (GDPs) and inversely related to their bilateral distance. Typical empirical analyses enrich the model by including an array of variables and dummy variables reflecting, for instance, the presence of Regional Trade Agreements, common languages, or tariff levels.

The basic gravity equation is shown in (1).

$$Trade_{ij} = \beta_0 GDP_i^{\beta_1} GDP_j^{\beta_2} Dist_{ij}^{\beta_3} Z_{ij}^{\beta_4} e^{\beta_5 Dummy_{ij}} \varepsilon_{ij} \quad (1)$$

Where 'e' is the natural logarithm base and 'ε' is a log-normally distributed error term.

Theoretical foundations for the model have already been provided and are now well established (see Baier and Bergstrand, 2001 for more details). In particular, Helpman and Krugman (1985) develop a model of monopolistic competition that especially suits our purposes. Their model is characterized by a large number of firms operating the market, each firm producing a unique variety of a differentiated product. New varieties can be produced only after incurring a fixed cost (therefore firms present internal Increasing Returns to Scale- IRS). Finally, consumer demand incorporates a 'love of variety' approach (i.e. consumers benefit from a greater number and diversity of varieties).

As discussed above, trade in services has some unique properties that make the gravity model appealing. First, service products are often differentiated by quality, by location and also by the fact that most of them are tailored in order to fulfil client firm needs. Second, and as mentioned by Jones and Kierzkowski (2005), Markusen (1989) and Markusen et al. (2000 and 2005), services must exhibit strong increasing returns to scale. Third, client firms improve their productivity more if a larger number of varieties of services are supplied ('love of variety'). Finally, this type of model incorporates transaction costs, also present in services trade.

Taking the natural logarithm of (1) yields the empirical model we will apply (2).

$$Ln(Trade_{ij}) = \beta_0 + \beta_1 Ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(Dist_{ij}) + \beta_z Z + \mu_{ij} \quad (2)$$

Data

Data on bilateral trade in services are drawn from the OECD's Statistics on International Trade in Services. The period covered is from 1999 to 2002. Our estimations concern 28 OECD countries and their partners. Four services sectors are included: 'Travel', 'Transportation', 'Other commercial services' and 'Government services'. We collected data on bilateral trade in goods for the same period and the same countries, also from the OECD.

Basic Gravitational Variables

We use Gross Domestic Product (GDP) and GDP per capita. As a proxy for transaction costs we use: the distance between capital cities[13], a dummy which takes the value 1 if the pair of countries share a common border and 0 otherwise (contiguity or adjacency). Similarly, we include a dummy for a common language between trading partners (if the common language is spoken by at least 9% of the population in both countries) as well as a dummy variable indicating if at least one of the two countries is landlocked. In an alternative specification we substitute the common language variable with dummy variables representing whether the languages are linguistically related, by main family of languages (e.g. French and English are both Indo-European languages) and 'sub-families' (e.g. French belongs to the Latin group of languages while English belongs to the Germanic group). Finally, we include a dummy variable for common membership in regional/bilateral free trade agreements (RTA).[14]

Variables for Further Analysis

In order to capture the specificities of services trade we collect data on four thematic groups:

1. *Trust and contract enforcement,* as contracting a service could be a risky experience due to its variable nature.
2. *Networks,* because informational needs of searching for a suitable partner may be considerable in the case of services[15].
3. *Labour markets*; as services are labour-intensive (specifically in skilled labour).
4. *Technology and technology of communication,* as the latter have enabled initially non-tradable services to become tradable.

For the *Trust and contract enforcement* group we use Transparency International's Corruption Perception Index - CPI[16]. We also include an overall index of procedural complexity in commercial dispute resolution issued by the World Bank (Procedural

[13] While the role of geographical distance is intuitive for trade in goods, distance may also affect the costs inherent to trade in services. In particular, using distance may reflect the fact that some types of services require personal contact between providers and customers. Distance can also be related to matching costs or searching costs for new commercial partners. Finally, distance can be related to higher coordination and contract enforcement costs.

[14] The dummy for regional trade agreements includes all agreements listed in Baier and Bergstrand (2004).

[15] As noted by Rauch (2001), social and business networks can facilitate matching of buyers and sellers through provision of market information. For example, the existence of communities of migrant Indian engineers has facilitated the outsourcing of software development from Silicon Valley to regions like Bangalore and Hyderabad. Additionally networks can act as a substitute for trust when contract enforcement is weak to nonexistent.

[16] http://www.transparency.org. The score ranges from 0 to 10, 10 meaning a corruption-free country.

Complex Index). Finally we incorporate the relative trust variable elaborated by Guiso et al. (2005)[17].

For the *Networks* group of variables we use data from the OECD's database on immigrants and expatriates. In particular we use the size of a country's foreign-born population, differentiated by country of origin and by level of educational attainment[18]. Additionally, we incorporate a dummy variable, labelled *colony*, which takes the value 1 if the pair of countries has ever been in a colonial relationship.

For the *Labour markets* group, we account for the educational level of the adult population (above 25 years of age) using indicators from the CID database[19]. Specifically we consider from this database four variables: average years of schooling of the population; the percentage of 'primary school attainment' (*prim_edu*); 'secondary school attainment' (*second_edu*) and; 'higher school attainment' (*high_edu*). Finally, we also include an index covering rigidities in countries' labour markets (*Empl_Laws_Index*) from the World Bank's Doing Business indicators. This variable accounts for rigidities with respect to hiring-and-firing as well as to the minimum labour conditions imposed by law.

Finally, for the *Technology and technology of communication* group, data are drawn from the World Bank Development Indicators (WDI). We consider variables indicating the number of: Personal computers (*Ln_PCs*), Internet users (*Ln_Internet_users)*, Telephone mainlines (*Ln_Tele_mainlines*) and Internet hosts (*Ln_internet_hosts*). All these variables are computed per 1,000 people. We additionally incorporate the level of research and development expenditure as the share of country GDP (*R&D*).

4. Econometric Results

The econometric results are presented in three sections. In the first two sections, we analyse to what extent trade in services differs from trade in goods. In section 4.1 we regress trade by services sectors[20] on basic gravitational variables. In section 4.2 we focus on the impact of the additional variables on trade in 'Other Commercial Services'

[17] This variable represents the trust of people in importing country to people in exporting country (*Trust in i from j*). Guiso et al. (2005) construct the variable based on data from Eurobarometer surveys, namely responses to the question: 'how much trust you have in people from various countries. For each [country], please tell me whether you have a lot of trust, some trust, not very much trust or no trust at all'

[18] Variables *Ln_mig_L, Ln_mig_M and Ln_mig_H*, corresponding, respectively, to migrants with less than upper secondary education (Low, L); migrants with upper secondary and post-secondary non-tertiary education (Medium, M); and migrants with tertiary education (High, H).

[19] The database was developed by Barro et al. (2000). http://www.cid.harvard.edu/ciddata/ciddata.html .

[20] i.e. Total Services, Other Commercial Services, Travel, Transportation, and Government Services.

(henceforth OCS) [21]. Finally, in section 5, we explore for potential complementarities between bilateral trade in goods and bilateral trade in OCS using instrumental variables.

In order to test whether the explanatory variables affect trade in services and trade in goods in a different way, we use interaction terms. Each explanatory variable is multiplied by a dummy variable taking the value 1 in the cases of services trade observations and 0 otherwise. In this way, we allow the explanatory variables to have differences in slope when explaining trade in services with respect to trade in goods.

Then the estimated model with interaction terms is the following:

$$Ln(Trade_{ij}) = \beta_0 + \beta_h dum\ services_h + \sum_1^L \beta_l Z_l + \sum_1^L \beta_{l_inter} Z_l * dum\ services_h + \mu_{ij}$$

Where:

h refers to the four services sub-sectors (Other Commercial Services, Travel, Transportation, Government services) as well as the aggregate data.

Z is the set of *L* explanatory variables

β_0= is the intercept for trade in goods

Since $\Delta Ln(Trade_{ij}) / \Delta Z_l = \beta_l + \beta_{l_inter} * dum\ services_h$, then β_l can be interpreted as the impact of the explanatory variable Z_l on trade in goods (when $dum\ services$ = 0), β_{l_inter} as the variable´s differential effect on services with respect to trade in goods, and $\beta_l + \beta_{l_inter}$ as the net effect of the explanatory variable Z_l on trade in services.

4.1 Regressions on Basic Gravitational Variables

Regressions are estimated using OLS and inferences are based on robust standard errors. In Tables 1 to 5 we report results using the basic gravitational explanatory variables and their respective interaction terms (denoted by the suffix term '*_inter*'). Each table presents the results of a different services sector. Even though we will refer to some findings related to the travel and transport services, we will centre the analysis on the results obtained from the OCS sample (Table 1). The reason for doing so is that, as indicated in the introduction, the OCS sector has been the most dynamic sector in services trade over the past two decades. Moreover, it accounted for the bulk of services exports of the OECD countries in 2002 (Figure 3). The estimations for the remaining services sectors are presented in the appendix.

Regarding the dyadic explanatory variables in Table 1 (OCS sample), for all specifications, the effects of the variables related to physical geography (distance, contiguity and

[21] We focus on trade in OCS since: (1) it has been the most dynamic sector in service trade (2) and also because theoretical models have focused on intermediate services (included in Other Commercial Services).

landlocked status)[22] are significantly lower when explaining trade in OCS. In contrast, the coefficient on the language variables, which can be considered as a cultural and/or informational proxy, is significantly higher in the case of services.

Table 1

Regressions on basic gravitational variables. Total goods & other commercial services

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln (trade), Total Goods & Other commercial services.					
	Exports, OLS, dummy year					
Ln_dist_cap	-0.840***	-0.782***	-0.750***	-0.806***	-0.797***	-0.793***
	[0.015]	*[0.018]*	*[0.017]*	*[0.018]*	*[0.019]*	*[0.019]*
Ln_dist_cap_inter	0.130***	0.079***	0.087***	0.102***	0.045	0.054*
	[0.027]	*[0.031]*	*[0.028]*	*[0.031]*	*[0.032]*	*[0.031]*
1 for contiguity		0.752***	0.860***	0.764***	0.679***	0.691***
		[0.069]	*[0.057]*	*[0.070]*	*[0.059]*	*[0.061]*
contig_inter		-0.283**	-0.268***	-0.294**	-0.365***	-0.338***
		[0.125]	*[0.103]*	*[0.126]*	*[0.109]*	*[0.106]*
1 if a language is spoken by at least 9% of the population in both countries		0.598***		0.588***	0.560***	0.548***
		[0.061]		*[0.060]*	*[0.059]*	*[0.059]*
comlang_ethno_inter		0.581***		0.590***	0.646***	0.620***
		[0.092]		*[0.091]*	*[0.089]*	*[0.085]*
Index of similarity for language - Tree			-0.206**			
			[0.098]			
tree_lang_ind_inter			1.333***			
			[0.159]			
At_least_one_landlock				-0.277***	-0.269***	-0.251***
				[0.042]	*[0.042]*	*[0.042]*
At_least_one_landlock_inter				0.253***	0.141*	0.190***
				[0.075]	*[0.074]*	*[0.073]*
Regional Trade Agreement					0.094**	0.028
					[0.038]	*[0.040]*
RTA_inter					0.152**	-0.003
					[0.070]	*[0.072]*
Ln_GDPi	0.917***	0.895***	0.893***	0.856***	0.837***	0.811***
	[0.012]	*[0.012]*	*[0.012]*	*[0.013]*	*[0.014]*	*[0.015]*
Ln_GDPi_inter	0.091***	0.076***	0.180***	0.112***	0.186***	0.119***
	[0.021]	*[0.020]*	*[0.019]*	*[0.022]*	*[0.021]*	*[0.025]*
Ln_GDPj	0.780***	0.770***	0.768***	0.766***	0.763***	0.746***
	[0.012]	*[0.012]*	*[0.012]*	*[0.012]*	*[0.012]*	*[0.012]*
Ln_GDPj_inter	-0.054**	-0.047**	0.006	-0.043**	0.022	-0.017
	[0.022]	*[0.020]*	*[0.019]*	*[0.020]*	*[0.019]*	*[0.020]*
Ln_GDP_CAPi						0.128***
						[0.040]
Ln_GDP_CAPi_inter						0.314***
						[0.068]
Ln_GDP_CAPj						0.062***
						[0.016]
Ln_GDP_CAPj_inter						0.141***
						[0.025]
Observations	5832	5832	5606	5832	5606	5606
Adjusted R-squared	0.95	0.96	0.96	0.96	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1% constant estimated but not reported

[22] With the sole exception of the distance coefficient in column (5).

Concerning trade in transportation (Table 3) and travel services (Table 4), it is not surprising that the results obtained for the OCS case do not necessarily apply to these two sectors. For instance, the impact of the landlocked status variable is more important in the case of transportation services than in the case of trade in goods, probably because countries without sea access simply could not offer maritime transport services[23]. Finally, the variable contiguity does not seem to have a different effect on travel with respect to trade in goods.

Figure 3

2002 OECD Total Service Exports

(Millions of US dollars)

		Share in OECD Total Trade
TOTAL SERVICES	1,250,067	22%
		Share in Total Services
Other Commercial Services	600,564	48%
Travel	345,082	28%
Transportation	267,520	21%
Government	36,901	3%
		Share in Other Commercial Services
268: Other business services	278,629	46%
266: Royalties and license fees	81,570	14%
260: Financial services	80,579	13%
262: Computer and information services	43,631	7%
253: Insurance services	41,402	7%
245: Communication services	27,473	5%
249: Construction services	24,672	4%
287: Personal, cultural and recreational services	22,609	4%

Source: OECD Statistics on International Trade in Services

With respect to the importing and exporting country characteristics in the case of the OCS sample, we find that the differential effect of the GDP per capita variable is positive and significant for both the exporting and importing country. In the case of the exporting country, this is not surprising since, as indicated in the introduction, the contribution of services activity increases with a country's level of development[24]. However this relationship is less straightforward for the case of the importing country. Two possible trade in services can only occur if inputs from both the importing and exporting country are jointly used in the process[25]. This second argument also applies to transport

[23] By contrast, in the case of trade in goods when at least one of partner countries has a landlocked status the transportation costs of trading goods increase but not to the point to become prohibitive.

[24] That is not the case for Industry and Agricultural sectors as we show in the Figure 1.

[25] One example is exports of complex software packages (e.g. Oracle and SAP) which are commercialised by a consulting firm in the importing country. In such a case, specialised computer skills are required in both the exporting and importing country in order for the transaction to occur.

services, explanations can arise: (1) specialized OCS might require a more sophisticated target market able to consume complex services and (2), as suggested by Lennon et al. (2008), where coefficients on the GDP per capita variable are positive and significant. The latter might indicate that the importing as well as exporting GDPs per capita reflect transport infrastructure at both ends of the transaction, thus increasing transport services between countries that have better infrastructure. For travel services, on the other hand, the coefficient on the exporting country's GDP per capita is negative, which might reflect cost advantages for developing countries in offering low-cost travel destinations.

Concerning the incremental effect of GDP on OCS for the exporting country case[26], it is always positive and significant. In the case of the importing country, there is no clear pattern.

Participation in a Regional Trade Agreement shows up to be more important for trade in OCS than for trade in goods (column 5) but its impact becomes insignificant when the GDP per capita variable is included (column 6). Finally, the incremental impact of this variable performs differently in the travel services sample with respect to the transport services sample: it is positive and significant for the first and negative for the second.

4.2 Testing Particular Aspects of Trade in Other Commercial Services

Tables 6 to 9 report the results of the impact of our four explanatory variables groups on trade in OCS. Trust and contract enforcement variable results are presented in Table 6; Networks, in Table 7; Labour markets in Table 8; and Technology and technology of communication in Table 9.

The results in Table 6 suggest that the variables explaining trust and contract enforcement environments are consistently more important in the case of OCS. This is in line with the hypothesis that services consumption is a risky experience and that the existence of secure environments might have a higher impact on the business services sector than on the manufacturing sector.

Table 7 reports results on the effect of networks; at the bottom of the table, we additionally report the net effect of the explanatory variables for the services sample. As expected, the existence of a colonial relationship has a higher impact on trade in services than on trade in goods.

[26] This may be a reflection of IRS. Service firms in big domestic markets might benefit from scale economies at home, which, in turn, might generate a comparative advantage with respect to small economies.

Table 6

Trust and contract enforcement

	(1)	(2)	(3)
	Ln (trade), Total Goods and Other commercial services, Exports, OLS, dummy year		
Trust in i from j	0.237*		
	[0.141]		
Trust_in_i_from_j_inter	0.545**		
	[0.264]		
i_Corruption Perceptions Index		0.042***	
		[0.010]	
CPI_score_i_inter		0.165***	
		[0.016]	
j_Corruption Perceptions Index		0.047***	
		[0.007]	
CPI_score_j_inter		0.068***	
		[0.011]	
Procedural_Complex_Index_i			-0.003**
			[0.001]
procedural_complex_index_i_inter			-0.017***
			[0.002]
Procedural_Complex_Index_j			-0.005***
			[0.001]
procedural_complex_index_j_inter			-0.006***
			[0.002]
Ln_dist_cap	-0.834***	-0.795***	-0.784***
	[0.036]	*[0.017]*	*[0.017]*
Ln_dist_cap_inter	-0.240***	-0.006	-0.055**
	[0.064]	*[0.027]*	*[0.028]*
1 if a language is spoken by at least 9% of the population in both countries	0.206**	0.516***	0.504***
	[0.102]	*[0.057]*	*[0.059]*
comlang_ethno_inter	0.545***	0.350***	0.304***
	[0.179]	*[0.081]*	*[0.087]*
1 for contiguity	0.459***	0.686***	0.683***
	[0.059]	*[0.063]*	*[0.062]*
contig_inter	-0.521***	-0.274**	-0.287***
	[0.141]	*[0.109]*	*[0.109]*
Ln_GDPi	0.817***	0.902***	0.893***
	[0.017]	*[0.012]*	*[0.013]*
Ln_GDPi_inter	0.198***	0.071***	0.214***
	[0.036]	*[0.019]*	*[0.019]*
Ln_GDPj	0.872***	0.757***	0.775***
	[0.020]	*[0.011]*	*[0.012]*
Ln_GDPj_inter	-0.119***	0.044**	0.080***
	[0.041]	*[0.018]*	*[0.018]*
Observations	1300	5436	5122
Adjusted R-squared	0.97	0.97	0.97

Robust standard errors in brackets

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

Additionally, as the literature suggests, networks can promote trade through two main economic mechanisms: first, networks can reduce information costs, as immigrants know the characteristics of many domestic buyers and sellers and carry this knowledge abroad (Rauch 2001) and second, networks can act as a diffusion agent of preferences. Presence of foreigners can raise imports from countries of origin both because migrants bring their

Table 7

Networks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Ln (trade), Total Goods and Other commercial services, Exports, OLS, dummy year					**Ln (trade), Total Goods and Other commercial services,** Imports, OLS, dummy year		
colonial relationship	0.180**								
	[0.073]								
colony_inter	0.415***								
	[0.121]								
Ln_mig_H		0.093***				0.121***			
		[0.013]				*[0.015]*			
Ln_mig_H_inter		0.052**				-0.055**			
		[0.021]				*[0.023]*			
Ln_mig_M			0.091***				0.109***		
			[0.011]				*[0.013]*		
Ln_mig_M_inter			0.006				-0.062***		
			[0.019]				*[0.020]*		
Ln_mig_L				0.067***				0.099***	
				[0.010]				*[0.011]*	
Ln_mig_L_inter				-0.025				-0.098***	
				[0.016]				*[0.017]*	
Ln_migration					0.094***				0.107***
					[0.012]				*[0.013]*
Ln_migration_inter					-0.01				-0.083***
					[0.019]				*[0.021]*
Observations	5760	5038	5050	5016	5072	5222	5240	5206	5264
Adjusted R-squared	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95

	(10)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		Ln (trade), Other commercial services, Exports, OLS, dummy year					**Ln (trade), Other commercial services,** Imports, OLS, dummy year		
1 for pairs ever in colonial relationship	0.595***								
	[0.096]								
Ln_mig_H		0.147***				0.068***			
		[0.017]				*[0.018]*			
Ln_mig_M			0.099***				0.048***		
			[0.015]				*[0.015]*		
Ln_mig_L				0.043***				0.001	
				[0.012]				*[0.013]*	
Ln_migration					0.085***				0.024
					[0.015]				*[0.016]*
Ln_dist_cap	-0.757***	-0.756***	-0.749***	-0.768***	-0.744***	-0.813***	-0.804***	-0.815***	-0.797***
	[0.023]	*[0.025]*	*[0.026]*	*[0.026]*	*[0.026]*	*[0.026]*	*[0.026]*	*[0.027]*	*[0.026]*
Common language	1.040***	1.020***	1.156***	1.259***	1.170***	1.103***	1.163***	1.240***	1.192***
	[0.070]	*[0.075]*	*[0.075]*	*[0.071]*	*[0.075]*	*[0.090]*	*[0.088]*	*[0.085]*	*[0.088]*
1 for contiguity	0.249***	0.238**	0.227**	0.308***	0.273**	0.344***	0.338***	0.427***	0.397***
	[0.095]	*[0.114]*	*[0.114]*	*[0.113]*	*[0.113]*	*[0.110]*	*[0.109]*	*[0.109]*	*[0.108]*
Ln_GDPi	0.989***	0.828***	0.874***	0.925***	0.876***	0.766***	0.778***	0.817***	0.790***
	[0.016]	*[0.024]*	*[0.022]*	*[0.021]*	*[0.022]*	*[0.025]*	*[0.023]*	*[0.022]*	*[0.024]*
Ln_GDPj	0.787***	0.689***	0.706***	0.737***	0.696***	0.774***	0.770***	0.789***	0.761***
	[0.015]	*[0.017]*	*[0.017]*	*[0.018]*	*[0.017]*	*[0.020]*	*[0.020]*	*[0.021]*	*[0.020]*
Observations	2880	2519	2525	2508	2536	2611	2620	2603	2632
Adjusted R-squared	0.74	0.75	0.74	0.74	0.74	0.71	0.71	0.7	0.7

Gavity variables also included but not reported

Robust standard errors in brackets

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

tastes for home goods and because nationals partly could acquire a taste for those new varieties (Combes et al., 2005). Presumably, the informational channel acts mainly through the impact of immigrants on exports since they may influence creation of new business between their host country and their country of origin. By contrast, the preference effect mainly takes place through the impact of immigrants on imports, as immigrants stimulate consumption of goods from their home countries. We expect that in the case of more differentiated products (i.e. OCS) the networks, as an information mechanism, should prevail, while in the case of products having reference prices (i.e. goods), the preference mechanism should be more important. Therefore, immigrants must have a higher impact on exports in the case of OCS than in the case of goods (and a relatively lower impact in the case of imports). Our findings seem to follow this pattern. For all migration variables, the impact of migration on trade in OCS is more important for the exports regressions (column 2-5, bottom, Table 7) than for the imports regressions (column 6-9). The reverse occurs in the case of trade in goods.

It is interesting to remark that the positive effect of migration on trade increases with the level of education of migrants for both cases, trade in goods and trade in OCS, but it is in the latter case that the impact increases the most. Doubling the number of highly qualified migrants increases services exports by 14.7 percent, and goods exports by 9.3 percent. When considering migrants with low level of education the effects are 4.3 percent and 6.7 percent respectively[27]. In the same vein, and for the export case, the differential effect is positive and significant for highly educated migrants. As the level of education decreases, the differential effect also decreases; it becomes non-significant for migrants with low levels of education. For the case of the imports regressions, the differential effect is always negative and significant, but the magnitude of this negative effect decreases with the level of education.

The results shown in Table 8 suggest that educational attainment and freedom in labour markets have a higher impact on trade in OCS than on trade in goods. The average schooling years variable, for both exporting and importing countries, has a significantly higher impact on OCS than on trade in goods. Attaining an additional schooling year in the exporting country leads to an increase in exports of OCS by 17.4 percent and to an increase in exported goods by 7.4 percent[28].

Regarding the variables representing education level, a similar pattern is found compared to the case of the migrant variables. For the population with the highest level of education the differential effect is positive and significant. As the level of education decreases, the

[27] These results should be treated with caution because of the potential existence of reverse causality. Migrants may be more attracted to countries that have large services sectors to begin with (and that are therefore potentially strong exporters of services), as a larger service sector may mean greater employment opportunities for prospective migrant workers.

[28] Here the coefficients must again be interpreted with caution because of potential problems of endogeneity. The existence of a dynamic services sector may also act as a private incentive to invest in education.

differential effect also decreases, and becomes significantly negative for the lowest level of education[29].

Table 8

Labor markets

	(1)	(2)	(3)	(4)	(5)
	Ln (trade), Total Goods and Other commercial services, Exports, OLS, dummy year				
years_edu_i	0.071***				
	[0.011]				
years_edu_i_inter	0.089***				
	[0.017]				
years_edu_j	0.039***				
	[0.008]				
years_edu_j_inter	0.055***				
	[0.013]				
high_edu_i		-0.004**			
		[0.002]			
high_edu_i_inter		0.013***			
		[0.003]			
high_edu_j		0.001			
		[0.002]			
high_edu_j_inter		0.010***			
		[0.003]			
second_edu_i			0.019***		
			[0.002]		
second_edu_i_inter			0.004		
			[0.003]		
second_edu_j			0.008***		
			[0.001]		
second_edu_j_inter			0.009***		
			[0.002]		
prim_edu_i				-0.012***	
				[0.002]	
prim_edu_i_inter				-0.007***	
				[0.002]	
prim_edu_j				-0.002	
				[0.001]	
prim_edu_j_inter				-0.013***	
				[0.002]	
Empl_Laws_Index_i					-0.002*
					[0.001]
empl_laws_index_i_inter					-0.013***
					[0.002]
Empl_Laws_Index_j					-0.009***
					[0.001]
empl_laws_index_j_inter					-0.009***
					[0.002]
Observations	4128	4128	4128	4128	5122
Adjusted R-squared	0.97	0.96	0.97	0.97	0.97

Gavity variables also included but not reported

Robust standard errors in brackets

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

[29] See for instance the case of the population with the highest level of education for the trade in goods (column 2). The coefficient for the exporting country is negative (and for the importing country non significant). By contrast they are both positive and highly significant for both countries in the case of services trade (column 7).

Table 9

Technology and technology of communication

	(1)	(2)	(3)	(4)	(5)
	Ln (trade), Total Goods and Other commercial services, Exports, OLS, dummy year				
Ln_PCs_i	0.297***				
	[0.035]				
Ln_PCs_i_inter	0.549***				
	[0.056]				
Ln_PCs_j	0.104***				
	[0.014]				
Ln_PCs_j_inter	0.129***				
	[0.021]				
Ln_Internet_users_i		0.309***			
		[0.039]			
Ln_Internet_users_i_inter		0.272***			
		[0.061]			
Ln_Internet_users_j		0.129***			
		[0.014]			
Ln_Internet_users_j_inter		0.087***			
		[0.023]			
Ln_Tele_mainlines_i			-0.224***		
			[0.085]		
Ln_Tele_mainlines_i_inter			1.943***		
			[0.147]		
Ln_Tele_mainlines_j			0.098***		
			[0.024]		
Ln_Tele_mainlines_j_inter			0.192***		
			[0.038]		
Ln_internet_hosts_1_i				0.170***	
				[0.028]	
Ln_internet_hosts_1_i_inter				0.121***	
				[0.045]	
Ln_internet_hosts_1_j				0.062***	
				[0.011]	
Ln_internet_hosts_1_j_inter				0.041**	
				[0.018]	
R&D_i (% of GDP)					0.202***
					[0.024]
R_D_i_inter					0.076*
					[0.044]
R&D_j (% of GDP)					-0.01
					[0.017]
R_D_j_inter					0.070**
					[0.031]
Observations	5678	5466	5802	2586	3690
Adjusted R-squared	0.97	0.96	0.96	0.96	0.97

Gavity variables also included but not reported

Robust standard errors in brackets

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

We also found that rigidities in a country's labour market, for both exporter and importer countries, have a higher impact on trade in OCS than on trade in goods.

Finally, as shown in Table 9, the incremental effects for the 'technological environment' variables are always positive and statistically significant. This result supports the argument

that technological advances are more influential on services trade, most probably because they have allowed original non-tradable services to become tradable.

5. Instrumental Variables Estimation

For instruments for trade in 'Other commercial services' we use data on regulatory conditions in professional services sectors, as elaborated by the OECD[30]. In particular, we use an indicator which summarizes the rigidities that professionals face in order to exercise their occupations. To instrument trade in goods[31] we use (1) the *average applied import tariff* for non-agricultural and non-fuel products[32] and (2) a variable indicating if at least one of the two countries is landlocked[33].

The First-Stage regressions perform reasonably well, suggesting that we do not have a weak instruments problem. Additionally, the Sargan tests confirm the validity of our instruments: our instruments for trade in goods affect trade in services only through their impact on trade in goods (and vice versa, our instruments for trade in services do not independently affect trade in goods)[34].

Table 10 presents results on the implementation of instrumental variables[35]. The first three columns present the regressions for the trade in goods sample: a simple OLS regression is estimated for comparison in column (1). In column (2) we add trade in OCS as an explanatory variable using OLS. Column (3) presents results where trade in services is instrumented. Columns 4 to 6 repeat the same exercise, this time for regressions explaining trade in 'Other commercial services'.

The coefficients of our instrumental variables are positive and significant at standard levels. Trade in goods strongly affects trade in services: the estimated elasticity is almost 1, indicating that an increase in x percent of trade in goods induces an x percent increase in bilateral trade in services. Reciprocally, trade in OCS affects positively bilateral trade in goods although the effect is less strong (elasticity of around 0.46).

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30 Conway, P. and G. Nicoletti (2006), 'Product market regulation in non-manufacturing sectors: measurement and highlights', OECD Economics Department Working Paper

31 We also use, without success because of endogeneity, (1) the bilateral cost of shipping a tonne of goods between the two main cities of the country pair using UPS services, (2) data on average time in clearing exports and (3) data on average time in claiming imports from Enterprise Surveys from World Bank.

32 Data are drawn from UNCTAD Handbook of Statistics On-line.

33 We use population instead GDP to avoid potential problems of collinearity.

34 The Partial-R^2 is 0.13 for instruments in the case of trade in services; and 0.3 in the case of traded goods. Chi^2 from Sargan tests are 0.73 and 0.22 respectively.

35 In the Appendix we show the first-stage regressions.

Table 10

Instrumental Variables Estimation

	(1) Total Goods, Ln (trade), Exports, OLS , dummy year	(2) Total Goods, Ln (trade), Exports, OLS , dummy year	(3) Total Goods, Ln (trade), Exports, IV , dummy year	(4) Other services , Ln (trade), Exports, OLS, dummy year	(5) Other services , Ln (trade), Exports, OLS, dummy year	(6) Other services , Ln (trade), Exports, IV, dummy year
Ln_dist_cap	-0.826***	-0.410***	-0.344***	-0.695***	0.077**	0.086**
	[0.028]	[0.030]	[0.060]	[0.040]	[0.030]	[0.038]
Common language	0.226**	-0.254***	-0.331***	1.256***	0.640***	0.633***
	[0.097]	[0.082]	[0.102]	[0.123]	[0.082]	[0.084]
1 for contiguity	0.671***	0.675***	0.675***	0.634***	-0.266**	-0.277**
	[0.099]	[0.080]	[0.080]	[0.167]	[0.111]	[0.114]
Ln_pop_i	0.781***	0.400***	0.340***	0.963***	0.047*	0.036
	[0.025]	[0.027]	[0.055]	[0.030]	[0.027]	[0.038]
Ln_pop_j	0.669***	0.443***	0.406***	0.506***	-0.051**	-0.058**
	[0.022]	[0.021]	[0.036]	[0.026]	[0.020]	[0.026]
Ln (Trade in Other Services)		0.395***	0.458***			
		[0.019]	[0.053]			
Ln (Trade in Goods)					0.978***	0.990***
					[0.019]	[0.034]
Constant	6.391***	7.194***	7.322***	-4.902***	-9.592***	-9.649***
	[0.357]	[0.291]	[0.308]	[0.435]	[0.301]	[0.330]
Observations	797	797	797	2101	2101	2101
Adjusted R-squared	0.77	0.85		0.46	0.77	

Standard errors in brackets

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

Regarding the other coefficients it is interesting to remark that: first, once we add trade in services to explain trade in goods, the coefficient on the language variable drastically decreases and even becomes negative (columns (2) and (3)). Second, when we add trade in goods in order to explain trade in OCS, the coefficients on geographical variables (contiguity and distance) decrease even to the extent of changing signs (columns (5) and (6)). These results seem to indicate that the effect of cultural and/or informational variables positively affect trade in goods indirectly through their impact on trade in services. Conversely, the effect of the geographical variables affect (in the traditional way) trade in services indirectly through their impact on trade in goods.

6. Conclusion

Using disaggregated data on trade in services, we have empirically explored, first, to what extent trade in services differs from trade in goods, and second, the existence of a complementarity relationship between bilateral trade in goods and bilateral trade in services.

We have found that the effects of variables related to physical geography (distance, contiguity and being landlocked) are significantly lower when explaining trade in Other

Commercial Services. By contrast, language variables, which can be considered as cultural and/or informational proxies, impact trade in service more significantly than trade in goods. Additionally results are consistent with the hypotheses that *Trust and contract enforcement, Networks, Countries' level of education, Labour market regulation* and *Technology of communication* are more important when explaining trade in Other Commercial Services than when explaining trade in goods.

Finally, our results using instrumental variables indicate that trade in goods and in Other Commercial Services reinforce each other. Bilateral trade in goods explains bilateral trade in services: the resulting estimated elasticity is close to 1. Reciprocally, bilateral trade in services positively affects bilateral trade in goods: a 10% increase in trade in services raises traded goods by 4.6%.

APPENDIX

Table 2

Regressions on basic gravitational variables. Total goods & total services

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln (trade), Total Goods &Total Services. Exports, OLS, dummy year					
Ln_dist_cap	-0.860***	-0.801***	-0.758***	-0.822***	-0.786***	-0.776***
	[0.016]	*[0.018]*	*[0.016]*	*[0.018]*	*[0.019]*	*[0.018]*
Ln_dist_cap_inter	0.175***	0.149***	0.133***	0.170***	0.092***	0.108***
	[0.026]	*[0.029]*	*[0.026]*	*[0.030]*	*[0.030]*	*[0.028]*
1 for contiguity		0.757***	0.961***	0.774***	0.727***	0.754***
		[0.075]	*[0.065]*	*[0.074]*	*[0.066]*	*[0.071]*
contig_inter		-0.135	-0.241**	-0.151	-0.311***	-0.281**
		[0.126]	*[0.108]*	*[0.125]*	*[0.118]*	*[0.117]*
1 if a language is spoken by at least 9% of the population in both countries		0.749***		0.736***	0.707***	0.699***
		[0.067]		*[0.066]*	*[0.065]*	*[0.064]*
comlang_ethno_inter		0.643***		0.656***	0.726***	0.711***
		[0.092]		*[0.091]*	*[0.090]*	*[0.086]*
Index of similarity for language - Tree			-0.309***			
			[0.100]			
tree_lang_ind_inter			1.675***			
			[0.150]			
At_least_one_landlock				-0.232***	-0.188***	-0.099**
				[0.043]	*[0.042]*	*[0.044]*
At_least_one_landlock_inter				0.229***	0.097	0.151**
				[0.071]	*[0.070]*	*[0.068]*
Regional Trade Agreement					0.133***	0.007
					[0.038]	*[0.041]*
RTA_inter					0.278***	0.119*
					[0.063]	*[0.065]*
Ln_GDPi	0.952***	0.927***	0.914***	0.890***	0.856***	0.786***
	[0.013]	*[0.013]*	*[0.012]*	*[0.014]*	*[0.014]*	*[0.015]*
Ln_GDPi_inter	0.004	-0.013	0.088***	0.024	0.099***	0.046*
	[0.021]	*[0.021]*	*[0.020]*	*[0.023]*	*[0.022]*	*[0.024]*
Ln_GDPj	0.817***	0.802***	0.789***	0.800***	0.779***	0.747***
	[0.012]	*[0.012]*	*[0.011]*	*[0.012]*	*[0.011]*	*[0.012]*
Ln_GDPj_inter	-0.053***	-0.053***	0.034*	-0.051***	0.038**	-0.008
	[0.020]	*[0.019]*	*[0.018]*	*[0.019]*	*[0.017]*	*[0.018]*
Ln_GDP_CAPi						0.325***
						[0.038]
Ln_GDP_CAPi_inter						0.248***
						[0.061]
Ln_GDP_CAPj						0.126***
						[0.015]
Ln_GDP_CAPj_inter						0.166***
						[0.023]
Observations	7164	7164	6844	7164	6844	6844
Adjusted R-squared	0.94	0.95	0.95	0.95	0.95	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%
constant estimated but not reported

Table 3

Regressions on basic gravitational variables. Total goods & transport

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln (trade), Total Goods & Transportation, Exports,OLS,					
	dummy year					
Ln_dist_cap	-0.796***	-0.723***	-0.701***	-0.745***	-0.727***	-0.719***
	[0.015]	*[0.017]*	*[0.017]*	*[0.018]*	*[0.019]*	*[0.019]*
Ln_dist_cap_inter	0.248***	0.207***	0.225***	0.179***	0.115***	0.125***
	[0.027]	*[0.031]*	*[0.030]*	*[0.031]*	*[0.034]*	*[0.033]*
1 for contiguity		0.846***	0.986***	0.857***	0.793***	0.825***
		[0.070]	*[0.064]*	*[0.070]*	*[0.063]*	*[0.067]*
contig_inter		-0.278**	-0.296***	-0.264**	-0.348***	-0.311***
		[0.120]	*[0.110]*	*[0.118]*	*[0.113]*	*[0.113]*
1 if a language is spoken by at least 9% of the population in both countries		0.604***		0.599***	0.575***	0.557***
		[0.066]		*[0.066]*	*[0.065]*	*[0.064]*
comlang_ethno_inter		0.475***		0.468***	0.518***	0.497***
		[0.096]		*[0.095]*	*[0.094]*	*[0.092]*
Index of similarity for language - Tree			-0.316***			
			[0.101]			
tree_lang_ind_inter			1.152***			
			[0.164]			
At_least_one_landlock				-0.231***	-0.224***	-0.172***
				[0.041]	*[0.042]*	*[0.043]*
At_least_one_landlock_inter				-0.287***	-0.332***	-0.267***
				[0.074]	*[0.076]*	*[0.076]*
Regional Trade Agreement					0.131***	0.031
					[0.038]	*[0.040]*
RTA_inter					-0.028	-0.146**
					[0.070]	*[0.071]*
Ln_GDPi	0.888***	0.859***	0.873***	0.830***	0.817***	0.778***
	[0.012]	*[0.012]*	*[0.012]*	*[0.013]*	*[0.014]*	*[0.015]*
Ln_GDPi_inter	-0.038*	-0.052***	-0.018	-0.088***	-0.054**	-0.101***
	[0.020]	*[0.020]*	*[0.020]*	*[0.022]*	*[0.022]*	*[0.026]*
Ln_GDPj	0.774***	0.759***	0.757***	0.757***	0.748***	0.723***
	[0.012]	*[0.011]*	*[0.011]*	*[0.011]*	*[0.011]*	*[0.012]*
Ln_GDPj_inter	-0.052***	-0.047**	-0.011	-0.049***	0.006	-0.023
	[0.020]	*[0.019]*	*[0.019]*	*[0.019]*	*[0.019]*	*[0.020]*
Ln_GDP_CAPi						0.225***
						[0.040]
Ln_GDP_CAPi_inter						0.269***
						[0.073]
Ln_GDP_CAPj						0.103***
						[0.015]
Ln_GDP_CAPj_inter						0.119***
						[0.026]
Observations	6348	6348	6162	6348	6162	6162
Adjusted R-squared	0.95	0.96	0.96	0.96	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%
constant estimated but not reported

Table 4

Regressions on basic gravitational variables. Total goods & travel

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln (trade), Total Goods & Travel, Exports,OLS,					
	dummy year					
Ln_dist_cap	-0.880***	-0.833***	-0.776***	-0.852***	-0.815***	-0.819***
	[0.017]	*[0.018]*	*[0.019]*	*[0.019]*	*[0.021]*	*[0.020]*
Ln_dist_cap_inter	0.132***	0.120***	0.215***	0.121***	0.163***	0.221***
	[0.029]	*[0.031]*	*[0.031]*	*[0.032]*	*[0.037]*	*[0.035]*
1 for contiguity		0.627***	0.883***	0.628***	0.634***	0.680***
		[0.070]	*[0.070]*	*[0.069]*	*[0.070]*	*[0.072]*
contig_inter		0.163	0.219*	0.163	0.118	0.08
		[0.121]	*[0.116]*	*[0.120]*	*[0.122]*	*[0.124]*
1 if a language is spoken by at least 9% of the population in both countries		0.738***		0.731***	0.732***	0.708***
		[0.069]		*[0.068]*	*[0.068]*	*[0.066]*
comlang_ethno_inter		0.893***		0.894***	0.933***	0.925***
		[0.094]		*[0.093]*	*[0.094]*	*[0.093]*
Index of similarity for language - Tree			-0.152			
			[0.108]			
tree_lang_ind_inter			1.895***			
			[0.169]			
At_least_one_landlock				-0.199***	-0.166***	-0.164***
				[0.045]	*[0.046]*	*[0.044]*
At_least_one_landlock_inter				0.016	0.07	-0.06
				[0.080]	*[0.082]*	*[0.076]*
Regional Trade Agreement					0.162***	0.048
					[0.039]	*[0.042]*
RTA_inter					0.378***	0.369***
					[0.074]	*[0.075]*
Ln_GDPi	0.950***	0.910***	0.923***	0.887***	0.869***	0.787***
	[0.013]	*[0.013]*	*[0.014]*	*[0.015]*	*[0.016]*	*[0.017]*
Ln_GDPi_inter	-0.123***	-0.165***	-0.124***	-0.163***	-0.155***	0.098***
	[0.023]	*[0.022]*	*[0.024]*	*[0.025]*	*[0.026]*	*[0.028]*
Ln_GDPj	0.804***	0.791***	0.774***	0.789***	0.770***	0.753***
	[0.013]	*[0.012]*	*[0.013]*	*[0.013]*	*[0.013]*	*[0.014]*
Ln_GDPj_inter	-0.019	-0.02	-0.019	-0.02	-0.015	-0.094***
	[0.021]	*[0.019]*	*[0.021]*	*[0.019]*	*[0.020]*	*[0.021]*
Ln_GDP_CAPi						0.342***
						[0.032]
Ln_GDP_CAPi_inter						-0.975***
						[0.051]
Ln_GDP_CAPj						0.075***
						[0.018]
Ln_GDP_CAPj_inter						0.216***
						[0.029]
Observations	5494	5494	5364	5494	5364	5364
Adjusted R-squared	0.95	0.96	0.95	0.96	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%
constant estimated but not reported

Table 5

Regressions on basic gravitational variables. Total goods & government

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln (trade), Total Goods & Government, Exports,OLS,					
	dummy year					
Ln_dist_cap	-0.831***	-0.771***	-0.730***	-0.794***	-0.773***	-0.760***
	[0.019]	*[0.021]*	*[0.022]*	*[0.020]*	*[0.024]*	*[0.024]*
Ln_dist_cap_inter	0.633***	0.515***	0.552***	0.541***	0.481***	0.455***
	[0.031]	*[0.035]*	*[0.037]*	*[0.035]*	*[0.038]*	*[0.038]*
1 for contiguity		0.485***	0.730***	0.527***	0.530***	0.526***
		[0.069]	*[0.062]*	*[0.066]*	*[0.068]*	*[0.070]*
contig_inter		-0.836***	-0.843***	-0.883***	-0.909***	-0.910***
		[0.125]	*[0.116]*	*[0.124]*	*[0.125]*	*[0.125]*
1 if a language is spoken by at least 9% of the population in both countries		0.753***		0.755***	0.755***	0.746***
		[0.076]		*[0.071]*	*[0.071]*	*[0.070]*
comlang_ethno_inter		0.165		0.162	0.167	0.196
		[0.144]		*[0.142]*	*[0.142]*	*[0.141]*
Index of similarity for language - Tree			-0.027			
			[0.121]			
tree_lang_ind_inter			0.679***			
			[0.210]			
At_least_one_landlock				-0.466***	-0.434***	-0.449***
				[0.048]	*[0.049]*	*[0.051]*
At_least_one_landlock_inter				0.514***	0.442***	0.501***
				[0.080]	*[0.081]*	*[0.082]*
Regional Trade Agreement					0.107**	0.054
					[0.042]	*[0.045]*
RTA_inter					-0.304***	-0.238***
					[0.082]	*[0.087]*
Ln_GDPi	0.884***	0.855***	0.874***	0.791***	0.791***	0.782***
	[0.017]	*[0.017]*	*[0.017]*	*[0.018]*	*[0.019]*	*[0.018]*
Ln_GDPi_inter	-0.389***	-0.382***	-0.389***	-0.312***	-0.306***	-0.335***
	[0.029]	*[0.029]*	*[0.029]*	*[0.033]*	*[0.033]*	*[0.035]*
Ln_GDPj	0.747***	0.740***	0.731***	0.728***	0.720***	0.693***
	[0.017]	*[0.015]*	*[0.018]*	*[0.015]*	*[0.015]*	*[0.017]*
Ln_GDPj_inter	-0.247***	-0.230***	-0.237***	-0.216***	-0.190***	-0.141***
	[0.030]	*[0.027]*	*[0.030]*	*[0.027]*	*[0.029]*	*[0.030]*
Ln_GDP_CAPi						0.053
						[0.059]
Ln_GDP_CAPi_inter						0.149*
						[0.087]
Ln_GDP_CAPj						0.073***
						[0.019]
Ln_GDP_CAPj_inter						-0.114***
						[0.032]
Observations	3040	3040	3014	3040	3014	3014
Adjusted R-squared	0.98	0.98	0.98	0.98	0.98	0.98

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%
constant estimated but not reported

Table 11

First-stage regression

	(1)	(2)
	Ln (trade), Exports, OLS	
	Other Commercial services	**Total Goods**
Prof_reg_i	-0.287***	
	[0.034]	
Prof_reg_j	-0.298***	
	[0.041]	
Tariff		-0.117***
		[0.004]
At_least_one_landlock		-0.753***
		[0.063]
Ln_dist_cap	-1.013***	-0.822***
	[0.039]	[0.026]
Common language	1.248***	0.681***
	[0.137]	[0.079]
1 for contiguity	0.171	0.806***
	[0.140]	[0.107]
Ln_pop_i	1.027***	0.873***
	[0.036]	[0.021]
Ln_pop_j	0.667***	0.673***
	[0.034]	[0.017]
Constant	-2.516***	5.408***
	[0.504]	[0.322]
Observations	797	2101
Partial R-squared	0.13	0.3
chi-squared	0.73	0.22
Adjusted R-squared	0.7	0.72

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1% constant estimated but not reported
dummy year included

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