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Leo A. Grünfeld
Andreas Moxnes

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Besøksadresse: Grønlandsleiret 25
Addresse: Postboks 8159 Dep.
0033 Oslo
Internett: www.nupi.no
E-post: pub@nupi.no
Fax: [+ 47] 22 17 70 15
Tel: [+ 47] 22 05 65 00

The Intangible Globalization

Explaining the Patterns of International Trade in Services

Leo A. Grünfeld
NUPI (Norwegian Institute of International Affairs)

Andreas Moxnes
Norwegian Ministry of Finance

[Abstract] We identify the determinants of service trade and foreign affiliate sales in a gravity model, using recently collected bilateral data for the OECD countries and their trading partners, as well as new indicators for barriers to service imports and foreign affiliate sales. We emphasize the strong links between service FDI and trade, since a large proportion of trade is facilitated through foreign affiliate sales. Trade barriers and corruption in the importing country have a strong negative impact on service trade and foreign affiliate sales. We find a strong home market effect in service trade, and rich countries do not tend to import more, which may indicate that rich countries have a competitive advantage in service trade. Free trade agreements do not contribute to increased service trade. A full liberalization of international trade in services in our model, lifts exports by as much as 50% for some countries, and no less than 30%.

Keywords Services, International trade, FDI, foreign affiliate sales, gravity models, trade barriers,
JEL classification code: F13, F15, F17, L80

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Corresponding address: NUPI, P.O.Box 8159 Dep. 0033 Oslo, Norway.
Tel: (+47) 22056568. Fax: (+47) 22177015. E-mail: leoa.grunfeld@nupi.no
URL: http://www.nupi.no

1. Introduction

The composition of global production and trade has changed dramatically over the last decades. Primary and secondary sectors account for a declining share, while the relative importance of the tertiary service sectors is growing fast. The rapid development and deployment of new information and communication technology have contributed to strengthen the importance and volume of international service trade. Heavy deregulation of previously state-controlled service sectors, such as telecommunication and land transport, has enabled companies to enter new markets outside their home country. Also, multilateral efforts to liberalize service trade are now catching speed through the GATS and other extensive regional agreements like NATFA and the EU.

Although international trade in services clearly plays an ever more important role in the global economy, there is a lack of empirical studies that map the determinants driving such trade. This comes as no surprise since data availability has been strongly limited. However, the problem has recently been alleviated as the OECD has started to publish bilateral service trade figures for its member countries, see OECD (2002). A second problem that has strong relevance for the empirical study of cross border service trade is the fact that a large proportion of such trade is mediated through foreign affiliate sales. According to Karsenty (2000), approximately 40% of all service trade relates to the activities of foreign subsidiaries, which again requires some form of service sector FDI. Consequently, the traditional methods for collection of data on cross border trade in goods are not well suited for mapping trade in services. To deal with this problem, the UN in cooperation with the EU, IMF, WTO and the OECD has now published a manual on statistics of international trade in services (United Nations, 2002), which describes in detail how countries should collect service trade data. Unfortunately, only a few have initiated programs to follow up the procedures outlined in the manual.

Impediments to international commodity trade can easily be measured in terms of trade barriers like tariffs and quotas, but impediments to international trade in services are more complex and harder to quantify. Here, more diffuse measures like license requirements, national contents requirements, policies that hinder the movement of core personnel or the repatriation of profits earned by foreign companies, are all examples of impediments that are hard to quantify, yet strongly relevant for the service sectors. Nevertheless, a few institutions have recently constructed databases that contain quantitative indicators mapping impediments to service trade in a large number of countries. An excellent example is the project administered by the Australian Productivity Commission[1], which is documented by Findlay and Warren (2000). Furthermore, the World Bank is now finalizing a database on measures affecting trade in services.

In this paper, we estimate a gravity model that identifies the determinants of international trade and foreign affiliate sales in services. We employ

[1] http://www.pc.gov.au/research/memoranda/servicesrestriction/index.html#book

recently released data on international trade and FDI in services between the OECD countries to their trading partners, as well as data on the impediments to such trade. We find a clear home market effect in service trade, as the GDP of the exporting country has a stronger impact than the GDP of the importing country. This is in line with Feenstra, Markusen and Rose (2001) and is consistent with the idea that services are of a highly heterogeneous nature. Our results show that trade barriers are detrimental to trade, but even more to service foreign affiliate sales. Corruption in the importing country tends to discourage service trade, whereas a common membership in a regional free trade agreement has no significant effect. This may reflect that many regional free trade agreements, as of today, do not emphasize the liberalization of service trade. Geographical distance is consistently more important for traditional service exports than for service foreign affiliate sales. Furthermore, we find clear signs of a competitive advantage in service production and exports in rich countries (measured in terms of GDP per capita), as rich countries tend to be more service export intensive, but do not tend to import more services.

Our study shows that a full removal of barriers to international service trade and foreign affiliate sales may increase trade by as much as 50%. Spain, Japan, Korea and Ireland will be the largest winners, while France, Germany and the Nordic countries like Sweden, Norway and Denmark will experience more moderate gains from liberalization (closer to 30%). However, when it comes to exports, there are no losers from service liberalization in our study. A simple causality test reveals that service exports and FDI are complements and not substitutes, but here we face large aggregation problems.

The paper is organized as follows. Section 2 gives a brief introduction to the size, composition and importance of international trade in services. In section 3, we discuss the gravity model and its relevance for service trade. Here, we briefly review the earlier literature using gravity models and relate this work to theoretical contributions. Section 4 presents data and the model specifications. In section 5 we discuss the results, while section 6 concludes.

2. Characteristics and patterns of service trade and FDI

There are two important characteristics of services that clearly distinguish trade in services from trade in goods. First, production and consumption of a service must often appear simultaneously. Communication services serves as a good example. Once you call someone, the telephone company must instantaneously respond by producing the requested line connection.[2] Second, services have an intangible or non-material nature. That is, services cannot be measured in traditional volume or metric terms. In his seminal

[2] One may claim that such services are non-storable. However, a considerable amount of services, like R&D, business consulting, literature, film and video services are easily stored and do not demand the outlined production-consumption simultaneity. Hence, the simultaneity condition is not a necessary condition for an activity to be characterized as a service.

paper «On goods and services», Hill (1977) defined services as the transformation of already existing goods and consumers. Here, the production of a movie may serve as a good example. In physical terms, a movie is only a transformation of an existing, yet empty roll of film. Also, health services clearly contribute to transform a consumer (patient) by improving her health condition. Both the simultaneity condition and the intangible nature of services often require that suppliers and consumers are physically located at the same place. Furthermore, due to the intangible nature, the simultaneity condition and the question of geographic proximity, services are easily differentiable. The same service provided in Madrid and Tokyo is still different due to location.

According to Tirole (1988), the quality or properties of a good cannot always be identified before it is purchased or consumed. Tirole labels such goods as *experience goods* or *credence goods*. Apparently, most services are experience goods, both because production and consumption is performed simultaneously and because services often are highly differentiated. Consequently, consumers face a problem of asymmetric information and become the uninformed principal in a *moral hazard* situation. In such situations, the service supplier has less incentive to provide a high quality product. However, if the supplier operates in a market where *repeated* purchases are common, the consumer can monitor the service quality over time. Alternatively, to avoid some of the information disadvantages, consumers can co-operate by generating systems of *reputation* regarding service providers. Hence, reputation becomes one of the most important factors of competition in the service segment. As Sapir (1991) points out, service producers often become multinational to be able to follow consumers wherever they have a reputation advantage.

The WTO/GATS classification of service trade modes has now become the ruling approach to the analysis of international service trade. Four possible modes are identified:

Mode 1: Cross-border supply of services. Buyer and seller are separated geographically. Transportation of the service occurs through an electronic network, for example via phone or email, or, if the service can be embodied in a physical good, via traditional means of transportation.

Mode 2: Consumers travelling abroad. Here, international tourism and education services may serve as good examples.

Mode 3: Firms establish a foreign affiliate. This is the traditional way of supplying business consulting services and financial services. Such trade requires some form of foreign direct investment (FDI).

Mode 4: The presence of natural persons. In other words, producers travel abroad to provide the service.

According to Karsenty (2000), mode 1 and mode 3 trade dominate the pattern of international service trade, where each category represents approximately 40% of total service trade (see Table 1). Mode 4 trade plays a marginal role and according to the schedules of the GATS, it is also here we find the strongest barriers to trade.

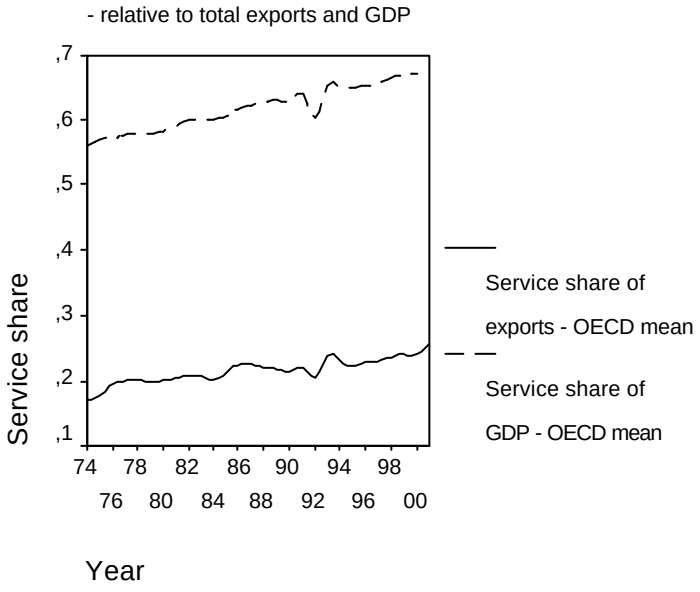
Table 1: International trade in services by GATS mode classification: 1997

Mode	BnUSD	%
Mode 1	890	41.0%
Mode 2	430	19.8%
Mode 3	820	37.8%
Mode 4	30	1.4%
Total	2170	100%

Source: Karsenty (2000)

In Figure 1, we plot the service share of GDP and the share of service exports in total exports for the OECD countries over the period 1974 to 2000. The share of services in GDP has increased steadily over the whole period and now represents 2/3 of all economic activity in the OECD area. For the world as a whole, the World Bank (2001) estimates that service industries contribute to 60 per cent of value added. The share of services in total OECD export rose from 17% in 1974 to 26% in 2001.

Fig. 1. Service exports and GDP



Source: OECD STAN database and OECD annual national accounts

It is important to recognize that these figures miss a crucial element of overall service trade, since they only to a limited extent include mode 3 trade through foreign affiliate sales. Thus, there is reason to claim that that the share of services in total exports is considerably higher than what is reported in the official statistics. One way to approach this deficiency is to use the outward FDI stock as a proxy for foreign affiliate sales. There have been several studies measuring the aggregate relationship between FDI stocks and affiliate sales. UNCTAD (1996) estimates that a $1 FDI stock produced $3 in goods and services in 1993. Petri (97) finds that $1 FDI stock invested in the service sector generates $1 in service production. USITC (95), which has the most extensive database on US affiliate sales, finds that, on aggregate, $1 FDI stock in the US service sector generated $0.6 in sales in the US domestic service market in 1992, however, their numbers vary considerably when examining the relationship sector by sector. The service share in outward FDI stocks for OECD countries in 1999 was almost 60% (OECD International Direct Investment Statistics Yearbook). This indicates that mode 3 trade plays a central role in the overall trade in services and that its role is becoming ever more important.

International statistics clearly show that rich countries both have a larger service sector and a higher share of services in overall exports. This pattern is illustrated in Figure 2. The pattern described in Figure 3 is more surprising, however. Here, we depict the share of services in overall imports on services as percent of GDP. The negative relationship illustrates that richer countries may have a competitive advantage in service production and trade, i.e. they export more and import less. The pattern could be a direct consequence of the fact that these countries have a larger and more developed service sector, providing services of higher quality. We will return to this pattern in our empirical analysis in Section 4, but only note that the wealth of an importing country does not seam to foster service trade in our analysis.

Figure 2. GDP, service value added and service exports

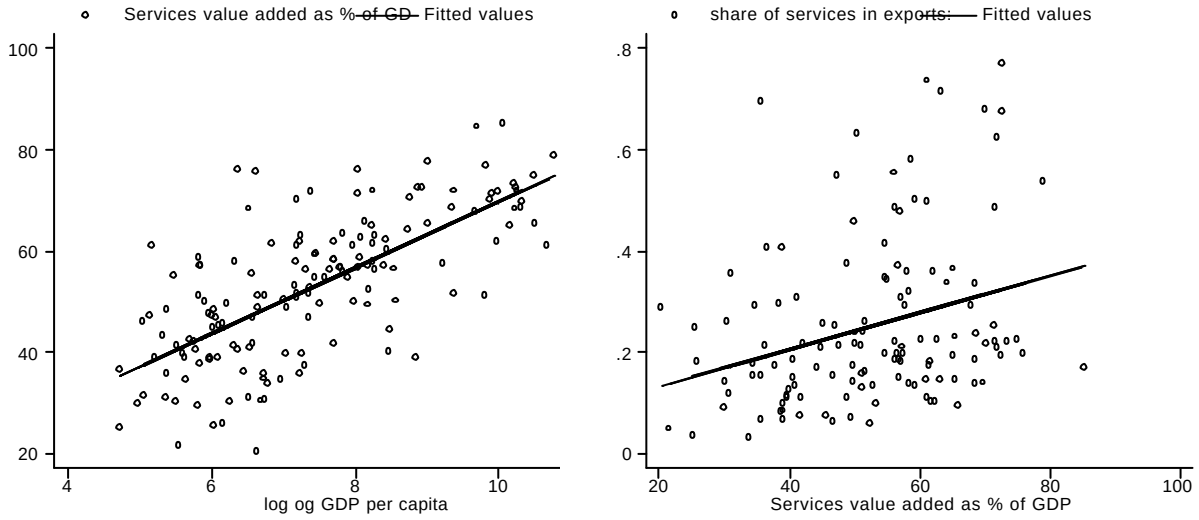
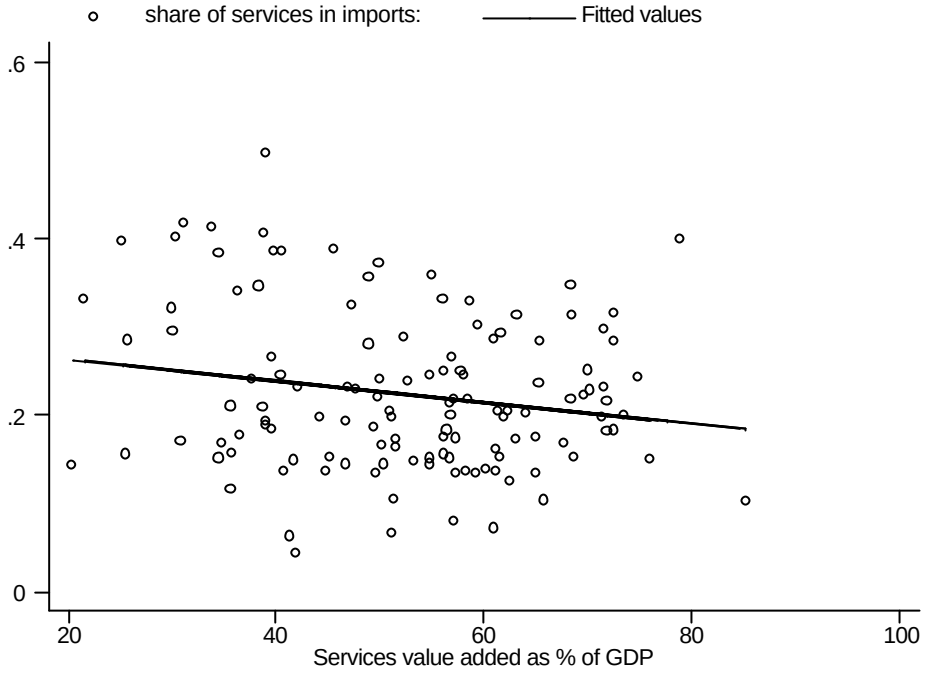


Figure 3. The service economy and imports



3. The gravity model and its relevance for service trade

The gravity equation first appeared in the empirical literature with the contributions of Tinbergen (1962) and Pöyhönen (1963). The standard model is usually specified as follows:

$$T_{ij} = D_{ij}^{b_1} Y_i^{b_2} Y_j^{b_3} \mathrm{E}_{ij},$$

where T_{ij} is trade between country i to j, Y_i is GDP in country i, D_{ij} represents distance between the two countries and E_{ij} is a standard error term. Distance is usually interpreted as a proxy for transaction costs. The income elasticities are usually found to be in the area around one, while the distance elasticity is found to be somewhere between –0.9 and –1.5, see e.g. Frankel (1991) and Learner (1993).

The gravity model for international trade has long been criticized for not having a clear theoretical basis. Although the model first appeared as a pure empirical relationship, several theoretical explanations have later appeared in the literature. Helpman (1987) used the good fit from gravity models as an argument supporting the new trade theory. Deardorff (1995) showed that the model is consistent with standard Heckscher-Ohlin-Samuelson theory of international trade. Moreover, Anderson (1979) developed a general equilibrium model, assuming differentiated products and CES preferences,

where a reduced-form gravity relationship appears. Thus, economic theory justifies the gravity model from a multitude of model perspectives.

On the other hand, there have been no formal attempts to provide a theory that justify the use of gravity models to predict foreign affiliate sales. Markusen & Venables (1998) however, have constructed a theory explaining national and foreign affiliate activity as a function of country income and transport costs. Their results are in line with the predictions of the gravity model.[3]

As discussed above, international service trade has some unique properties that make the gravity model appealing. First, the importance of physical proximity between producer and consumer should give the distance effect a strong boost. For instance, Marshall (1987) examines three geographical regions in the UK and finds that local manufacturers purchase 80% of their services by firms located in the same region.

Second, service products are often differentiated by quality and location, which may give rise to monopolistic competition. In a Helpman Krugman - style "new trade theory" model (NTT), these attributes are the driving force behind intra-industry trade. In the gravity model trade is maximized when $Y_i = Y_j$ which is highly consistent with the predictions of the NTT-model. Helpman (1987) constructed an econometric specification of the NTT model, quite similar to a gravity specification. His results gave support for the NTT model. Notice also that other models such as a HOS-style model or any model with an "Armington" demand side are compatible with the fact that large income differences produce low trade (Leamer and Levinsohn, 1995).

Third, we know that the market for services is often characterized by asymmetric information where reputation and signaling e.g. through marketing play a central role. Melchior (2002) has expanded the traditional intra industry trade model to include a mechanism which links market investments (advertising, etc) to trade. He assumes that each firm can invest in endogenous sunk costs that will increase demand for their product. The model predicts that firms will be more export-oriented if their market investments are not very efficient (does not increase demand much) and if trade costs are low. If investments are efficient, the presence of transport costs will increase the total payoff to local investments relative to foreign investments and trade will decline. In other words, firms become more home market oriented when the efficiency of the sunk costs increase. How does this result affect the gravity model? If trade costs increase with distance, the elasticity of exports with respect to distance will be higher in sectors in which fixed market investments are important, such as service sectors.

[3] The model only considers horizontal FDI. This feature of the model makes it appealing in relationship to service trade: Vertical FDI is probably not important in the service segment. In later papers (Carr, Markusen and Maskus, 2001 and Blonigen, 2002), the theories of horizontal and vertical FDI and the knowledge-capital theory are tested empirically, and their results give strong support for the horizontal model.

Other gravity studies of service trade

As far as we know, there have been no direct attempts to use the gravity framework to estimate the determinants of service trade and FDI. However, a recent paper by Mirza and Nicoletti (2004) develops a model that allows them to map whether service trade deviates from trade in goods, since service trade requires inputs both from the exporting and importing country. The empirical specification of the model is in fact an extended gravity model, and they too employ the newly developed OECD data on bilateral trade in services, yet they do not look at FDI and foreign affiliate sales, and devote less attention to service trade barriers. Their results give strong support to the outlined hypothesis. We will discuss their conclusions further in section 5, since the study actually presents an alternative interpretation to some of our results.

There exist studies that examine total trade and FDI within a gravity framework. Brenton, Di Mauro and Lücke (1998) assess the impact on bilateral trade and FDI of the deepening integration between the EU and the CEECs. Using a fixed effects specification, they find that income growth and business-friendly government policies are key determinants of both FDI and trade. However, they do not find evidence supporting the hypothesis that the CEECs may increase their trade volume by further integration with the EU.[4]

[4] See also Di Mauro (2000) for studies on how economic integration affects trade and FDI in a gravity framework.

4. Data and model specification

4.1. The service trade models

A main problem affecting all econometric research in the field of service trade is the lack of relevant data. However, the surge of interest in service trade in recent years has improved the conditions and our study takes advantage of newly available data on service trade flows as well as relevant statistics on barriers to such trade. We estimate the following baseline gravity equations:

$$\left.\begin{matrix} t_{ij} \\ fdi_{ij} \end{matrix}\right\} = a + b_1 d_{ij} + b_2 y_i + b_3 y_j + b_4 yc_i + b_5 yc_j + b_6 cpi_j + b_7 FTA_{ij} + b_8 tri_j + e_{ij} \quad (1)$$

where we use lower case letters as variables are expressed in logs. The variables t_{ij} and fdi_{ij} represent bilateral service exports and outgoing FDI stocks from country i to country j in 1999, respectively. Once again, FDI here serves as a proxy for foreign affiliate sales. One may claim that what we actually do is to conduct separate regressions for mode 1 and 2 trade (t_{ij}) and mode 3 trade (fdi_{ij}). However, this is not completely correct since the two specifications may capture some activity that sorts under other modes.

Data on bilateral service exports is taken from the recently published OECD statistics on international trade in services, OECD (2002), which covers service exports from 22 OECD countries to their trading partners (including non-OECD countries).[5] Data on bilateral outward FDI stocks are taken from the OECD International Direct Investment Statistics Yearbook (2002), covering approximately the same countries. Both variables constitute what is regarded as service trade by the WTO. The OECD database on FDI stocks does not include bilateral data on service FDI. Hence we are forced to assume that the ratio of service FDI inflows to total FDI inflows to a particular host country is identical with respect to every parent country.

The explanatory variables in (1) are as follows: d_{ij} represents the geographical distance between the capital of the exporting and the importing country, y_i is GDP in country i in 1999, yc_i is GDP per capita in 1999, cpi_j is a measure of the level of corruption in country j, based on the index developed by Transparency International.[6] FTA_{ij} is a dummy variable taking 1 if the two countries i and j are linked through a regional free trade

[5] The data sources are described in detail in the appendix (A.2).
[6] For more information on this index, see www.transparency.org

agreement. The trade restrictiveness variable tri_j is a measure of the barriers to service trade and FDI in country j.

More on the Trade Restrictiveness Index

Our data on barriers to service trade cover all forms of service trade (i.e. mode 1 through mode 4 trade). It is taken from the Trade Restrictiveness Index (TRI) database, developed by the Australian Productivity Commission in cooperation with the Australian National University.[7] The database was originally developed by McGuire and Schuele (2000) for banking services and then applied by Kalirajan (2000), McGuire et al.(2000) and Nguyen-Hong (2000) for other service sectors. Presently, the index covers the following sectors: Banking, telecom, maritime services, distribution (wholesale and retail), education and professional services (engineering, architectural and legal). The TRI is a pseudo-frequency ratio, which measures market regulations (market access both for domestic and foreign firms, in what is labeled the 'domestic index') and protection (exemptions from national treatment, in what is labeled the 'foreign index') for a wide variety of services and countries. The index contains separate measures for barriers affecting ongoing operations and barriers affecting new establishment of activity. Data is gathered from several different sources, not just the GATS schedules. Information is taken from APEC, WTO, ITU, OECD, Tradeport and USTR (Dee, 2001). A TRI listing is constructed as follows: First, all barriers affecting a particular sector are counted, then, the different impediments are assigned weights according to the researchers' assessment of the economic impact of the particular NTB.

There are several features and limitations of the index that are worth noting: First, the TRI is a pseudo-frequency measure, not a tariff equivalent. This means that the index does not provide information about likely impacts on prices, costs or rates of return in the economy. In principle, computable general equilibrium (CGE) models will benefit from using a tariff equivalent, first pioneered by Hockman's "guesstimate" (Hockman, 1995), instead of a frequency index. However, tariff equivalents are difficult to obtain for service trade, since there is a vast amount of NTBs for every country and each of them affects the economy differently for each sector.

Second, the TRI does not measure anti-competitive practices (establishment barriers), like price-fixing, market-sharing arrangements and cartels. These barriers may vary from country to country, for example, a natural monopoly in Norway might not appear in the US, due to market size, variable fixed costs, etc. Fink, Matoo and Neago (2002) argue that private anti-competitive practices in the maritime industry have a stronger influence on prices than public restrictions. These results suggest that the TRI might exclude some important aspects of impediments to trade. As noted by Nguyen-Hong (2000), a higher score may simply reflect a greater availability of information, rather than a more restrictive regime. This bias

[7] For more information on the TRI index, see http://www.pc.gov.au and Findlay and Warren (2001).

may arise when countries do not report all restrictions to relevant institutions. For example, in the GATS, areas and sectors that are left out of the schedules might have severe NTBs associated with them.

Third, the indices have only been computed for six industries, which represent approximately 35 per cent of the 155 service sectors covered by Hockman (1995). This is an important limitation, since our econometric specification examines the effects of *tri* on total service trade, not sector specific trade. In econometric terms, this means that our results might suffer from an omitted variable bias. However, compared to the Hockman index, which is only based on the GATS schedules, the TRI index is much richer and more detailed, based on a large variety of data sources.

Fourth, we calculate the mean TRI for all countries, giving each industry for which a TRI is available equal weight. Obviously, this might generate biased results. Ideally, one should weight each sector specific TRI with an index reflecting the economic importance of imports for that particular sector. Our rationale for choosing the average-TRI approach is first of all that the sectors covered by the TRI are limited, and second, that the sector specific TRIs are highly correlated, i.e. a high telecom TRI is usually accompanied by a high maritime TRI. This means that the average TRI, to a certain extent, captures the general degree of protection in a country.

Alternative model specifications

The simple gravity model outlined in (1) may suffer from omitted variable bias because unobservable or unknown country specific effects are left out of the model. To deal with this problem, we construct an exporting country fixed-effects model. However it is not possible to simply apply such a fixed effects regression to model (1), since the income variables y_i and y_j are perfectly collinear with the fixed effects. We deal with this problem by following Egger (2000) and Di Mauro (2000) who construct the alternative models:

$$\left.\begin{matrix} t_{ij} \\ fdi_{ij} \end{matrix}\right\} = a + n_i + b_1 d_{ij} + b_2 toty_{ij} + b_3 simy_{ij} + b_4 totyc_{ij} + b_5 simyc_{ij} + b_6 cpi_j + b_7 FTA_{ij} + b_8 tri_j + e_{ij} \quad \textbf{(2)}$$

where $toty_{ij} = \ln(Y_i + Y_j)$ and $simy_{ij} = \ln\left[1 - (\frac{Y_i}{Y_i + Y_j})^2 - (\frac{Y_j}{Y_i + Y_j})^2\right]$

The variable $simy_{ij}$ is bounded between 0 (absolute divergence in size) and 0.5 (equal country size).[8] The variables $totyc_{ij}$ and $simyc_{ij}$ are equivalent variables, but we substitute GDP with GDP per capita. We expect that income in both countries have the same impact on trade as in (1), i.e. economy size increases service trade and it is maximized when countries have similar income levels.

5. Econometric results

Tables 2 and 3 report summary statistics and cross correlations respectively. The TRI indexes are bound between 0 and 1 with 1 representing prohibitive barriers. The corruption index varies between 0 and 10, where 10 represents the least possible corrupt regime.

Table 2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Service export (Mill USD): bilateral	655	1099.8	3052.8	0.0	31848.0
Service outward FDI stock (Mill USD): bilateral	748	2674.8	10257.5	0.0	147862.8
GDP Parent (Bn USD)	1140	1066.9	2102.9	8.7	9228.0
GDP Host (Bn USD)	1074	636.2	1529.4	8.7	9228.0
GDP per capita Parent (USD)	1140	23069.6	12391.8	3540.0	45500.0
GDP cer capita Host (USD)	1071	15620.5	13342.9	250.0	45500.0
Distance (miles)	1097	3886.7	3033.5	106.0	12338.9
Trade restrictiveness index [0,1]	994	0.4	0.2	0.1	0.9
Corruption index [0,10]	1047	5.9	2.5	1.6	10.0

Table 3: Cross correlations

	t	*fdi*	*t+fdi*	y_i	y_j	yc_i	yc_j	*toty*	*simy*	*totyc*	*simyc*	*d*	*tri*	*cpi*
t	1.00													
fdi	0.79	1.00												
t+fdi	0.93	0.96	1.00											
y_i	0.53	0.55	0.57	1.00										
y_j	0.50	0.37	0.45	-0.06	1.00									
yc_i	0.03	0.08	0.06	0.01	-0.08	1.00								
yc_j	0.39	0.29	0.35	-0.05	0.34	0.05	1.00							
toty	0.69	0.57	0.66	0.66	0.62	-0.05	0.19	1.00						
simy	-0.12	-0.01	-0.06	-0.38	0.13	-0.02	0.05	**-0.51**	1.00					
totyc	0.40	0.26	0.34	-0.04	0.33	0.46	0.85	0.20	0.02	1.00				
simyc	0.30	0.28	0.31	-0.03	0.24	-0.03	0.94	0.13	0.07	**0.65**	1.00			
d	-0.34	-0.22	-0.29	0.04	0.07	-0.20	-0.27	0.10	-0.05	-0.34	-0.21	1.00		
tri	-0.29	-0.28	-0.30	0.01	-0.24	-0.05	**-0.73**	-0.10	-0.15	**-0.61**	**-0.69**	0.09	1.00	
cpi	0.30	0.24	0.28	-0.06	0.16	0.05	**0.85**	0.06	0.04	**0.74**	**0.79**	-0.27	**-0.64**	1.00

[8] Note what we are not able to include an importing country fixed effect n_j, since this

The cross correlation matrix displays only a few worrisome signs of multicolinearity among explanatory variables. First, one should be concerned about the strong correlation between trade barriers (*tri*) and corruption (*cpi*). We deal with this problem by specifying two separate models where one of them is excluded, and a third model where both variables are represented (models 1 to 3). Second, trade barriers and corruption also correlate strongly with the GDP per capita variables (*yc, totyc, simyc*). Hence, we are forced to run regressions both with and without the GDP per capita variables in order to check for coefficient robustness in our models.

In Tables 4, 5 and 6 we report the results based on the 7 models representing alternative econometric specifications of the service gravity model. In Table 4, we focus one service exports according to the OECD service trade figures, while Table 5 reports the results from the service FDI regressions which are believed to map the determinants of foreign affiliate sales. Finally, Table 6 reports results when we add service exports and FDI, serving as an overall measure of international trade in services between countries. Using a gravity model, it comes as no surprise that adjusted R^2 is high in most model specifications (normally between 0.6 and 0.8).

Models 1 to 5 are based on OLS regressions where we distinguish between parent (exporting) and host (importing) country GDP. The GDP coefficients are highly significant and show that there is a clear home market effect in both the export, the FDI and the sum of export and FDI regressions (i.e. the parent GDP coefficient is larger than the host country GDP coefficient). Since services are regarded as highly differenciated products, the results are consistent with the predictions made by Feenstra, Markusen and Rose (2001), where they find both theoretical and empirical evidence stating that more heterogeneous products display a stronger home market effect. In our exporting country fixed effects specification (models 6 and 7), both the total GDP and the similarity variables are highly significant for exports, FDI as well as the sum of them. Thus, the patterns of service trade with respect to market size largely mirror the patterns found for trade with heterogeneous commodities.

Service trade barriers have a significant negative effect on service exports if corruption is excluded from the equation (models 1.A, 4.A and 6.A), but the significance disappears when we allow the corruption variable to enter. This is however not the case in our FDI and export + FDI regressions, where trade barriers have the expected and significant sign both with and without corruption. Hence, we believe that slightly insignificant pattern for service exports is driven by problems of multicolinearity. The elasticity of service exports and foreign affiliate sales with respect to corruption is strongly significant in all model versions except for 3.B where the significance level is marginally higher than 10%. We take this as solid evidence for a strong negative effect of corruption on service trade and foreign affiliate sales.

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variable is fully collinear with $\overline{tri}_j$.

Table 4: Dependent variable: Service export

	I.A	II.A	III.A	IV.A	V.A	VI.A	VII.A
GDP_P	1.22 ***	1.20 ***	1.23 ***		1.09 ***		
	(0.04)	(0.04)	(0.04)		(0.04)		
GDP_H	0.80 ***	0.82 ***	0.80 ***		0.79 ***		
	(0.04)	(0.03)	(0.04)		(0.04)		
Distance	-0.90 ***	-0.82 ***	-0.83 ***	-0.52 ***	-0.86 ***	-0.91 ***	-0.84 ***
	(0.05)	(0.06)	(0.06)	(0.07)	(0.06)	(0.04)	(0.05)
Trade barriers H	-0.70 ***		-0.22	-0.46 *	-0.21	-0.74 ***	-0.24 *
	(0.11)		(0.16)	(0.27)	(0.15)	(0.10)	(0.15)
Corruption H		0.76 ***	0.73 ***		0.55 **		0.51 **
		(0.14)	(0.17)		(0.25)		(0.21)
Regional FTA		0.17	0.06		-0.14		0.00
		(0.15)	(0.14)		(0.16)		(0.15)
GDP per cap_P				2.04 ***	0.49 ***		
				(0.14)	(0.13)		
GDP per cap_H				0.44 ***	0.09		
				(0.10)	(0.09)		
Total_GDP						1.59 ***	1.53 ***
						(0.06)	(0.07)
Similar_GDP						0.55 ***	0.61 ***
						(0.06)	(0.06)
Total_GDP per cap							0.59 **
							(0.23)
Similar GDP per cap							-0.14
							(0.09)
Constant	-0.67	-1.73 ***	-2.00 ***	-15.93 ***	-6.14 ***	2.32 ***	-4.55 **
	(0.41)	(0.51)	(0.56)	(1.64)	(1.27)	(0.62)	(2.21)
Number of obs	583	608	569	583	569	583	569
F-stats	347.4	293.56	241.45	95.82	213.55	125.79	113.18
Prob > F	0	0	0	0	0	0	0
Adjusted R^2	0.7705	0.7725	0.7834	0.4209	0.792	0.8396	0.854
Root MSE	1.2024	1.1954	1.1768	1.9103	1.1554	1.0232	0.98583

Heteroskedasticity consistent standard errors in parenthesis
*** = 0.01 sign. level ** = 0.05 sign. level * = 0.1 sign. level

Table 5: Dependent variable: Service outward FDI stock

	I.B	II.B	III.B	IV.B	V.B	VI.B	VII.B
GDP_P	1.40 ***	1.39 ***	1.41 ***		1.23 ***		
	(0.05)	(0.05)	(0.05)		(0.05)		
GDP_H	0.70 ***	0.77 ***	0.73 ***		0.78 ***		
	(0.07)	(0.07)	(0.07)		(0.06)		
Distance	-0.68 ***	-0.51 ***	-0.51 ***	-0.39 ***	-0.71 ***	-0.71 ***	-0.84 ***
	(0.07)	(0.10)	(0.12)	(0.09)	(0.09)	(0.06)	(0.09)
Trade barriers H	-0.88 ***		-0.45 *	-0.63 *	-0.76 ***	-0.64 ***	-0.72 ***
	(0.19)		(0.27)	(0.34)	(0.28)	(0.16)	(0.23)
Corruption H		0.51 ***	0.30		0.95 ***		1.26 ***
		(0.19)	(0.25)		(0.30)		(0.26)
Regional FTA		0.73 ***	0.59 *		-0.09		-0.44 *
		(0.26)	(0.30)		(0.25)		(0.23)
GDP per cap_P				2.25 ***	1.53 ***		
				(0.14)	(0.13)		
GDP per cap_H				0.27 **	-0.33 ***		
				(0.13)	(0.15)		
Total_GDP						1.36 ***	1.65 ***
						(0.11)	(0.12)
Similar_GDP						0.89 ***	1.02 ***
						(0.13)	(0.12)
Total_GDP per cap							-1.94 ***
							(0.38)
Similar GDP per cap							0.21
							(0.14)
Constant	-2.92 ***	-4.57 ***	-4.69 ***	-17.63 ***	-15.88 ***	2.24 **	19.98 ***
	(0.71)	(0.92)	(1.08)	(1.96)	(1.68)	(0.98)	(3.62)
Number of obs	657	686	647	657	647	657	647
F-stats	277.66	241.22	195.86	82.78	187.88	97.7	86.5
Prob > F	0	0	0	0	0	0	0
Adjusted R^2	0.5784	0.5809	0.5844	0.2889	0.6767	0.7371	0.7638
Root MSE	1.9757	1.9508	1.9584	2.5649	1.7298	1.5821	1.4999

Heteroskedasticity consistent standard errors in parenthesis
*** = 0.01 sign. level ** = 0.05 sign. level * = 0.1 sign. level

Table 6: Dependent variable: Service export + FDI

	I.C	II.C	III.C	IV.C	V.C	VI.C	VII.C
GDP_P	2.40 ***	2.46 ***	2.43 ***		2.44 ***		
	(0.11)	(0.11)	(0.11)		(0.11)		
GDP_H	1.48 ***	1.52 ***	1.47 ***		1.54 ***		
	(0.10)	(0.11)	(0.10)		(0.11)		
Distance	-1.31 ***	-1.32 ***	-1.47 ***	-0.89 ***	-1.49 ***	-1.35 ***	-1.52 ***
	(0.11)	(0.16)	(0.19)	(0.20)	(0.19)	(0.10)	(0.16)
Trade barriers H	-1.88 ***		-1.44 ***	-1.69 **	-1.75 ***	-1.71 ***	-1.36 ***
	(0.32)		(0.42)	(0.78)	(0.50)	(0.28)	(0.41)
Corruption H		1.63 ***	0.94 **		1.65 ***		2.03 ***
		(0.33)	(0.40)		(0.52)		(0.48)
Regional FTA		-0.20	-0.83 *		-0.81 *		-0.64
		(0.42)	(0.48)		(0.46)		(0.41)
GDP per cap_P				-0.03	0.42		
				(1.15)	(0.63)		
GDP per cap_H				0.62 **	-0.40 (*)		
				(0.27)	(0.25)		
Total_GDP						2.88 ***	3.18 ***
						(0.20)	(0.20)
Similar_GDP						1.61 ***	1.75 ***
						(0.21)	(0.20)
Total_GDP per cap							-2.68 ***
							(0.87)
Similar GDP per cap							0.31
							(0.25)
Constant	-4.14 ***	-5.08 ***	-3.83 **	11.12	-6.42	2.81	27.87 ***
	(1.22)	(1.62)	(1.80)	(12.60)	(7.19)	(1.76)	(8.48)
Number of obs	355	373	353	355	353	355	353
F-stats	246.96	208.52	166.3	24.73	128.27	104.99	83.06
Prob > F	0	0	0	0	0	0	0
Adjusted R^2	0.7148	0.7199	0.7254	0.182	0.7284	0.7886	0.8081
Root MSE	2.335	2.3293	2.2942	3.9545	2.2881	2.0519	1.9636

Heteroskedasticity consistent standard errors in parenthesis
*** = 0.01 sign. level ** = 0.05 sign. level * = 0.1 sign. level

Somewhat surprisingly, common membership in a regional free trade area has no stable and significant impact on service exports, or foreign affiliate sales. This may reflect the fact that many of the free trade agreements fail to include services. Furthermore, those free trade areas that have liberalized service trade, still struggle with strong impediments to service trade through national regulations etc.

The elasticities of service exports and foreign affiliate sales with respect to distance are highly significant. Although there are theoretical arguments supporting both a positive and a negative effect of distance on foreign affiliate sales, earlier evidence shows that distance and trade barriers have a negative, but less dampening effect on foreign affiliate sales than exports (Brainard, 1997, Eaton & Tamura, 1996). These results have an intuitive explanation. Although multinational firms do not have positive variable transport costs, distance may play a key role because it is correlated with the costs of moving personnel to the host country, communication costs, cultural differences, etc. We are also interested in the absolute value of the distance elasticity. According to the endogenous sunk cost model by Melchior (2002) one should expect that distance is more detrimental to service trade than trade in goods (see section 2 for more on this). Compared to the results of Di Mauro (2000), the size of our elasticities is significantly larger. However, Di Mauro operates with a slightly different econometric specification and simple comparison of the estimated coefficients may yield incorrect conclusions.

Finally, we identify a surprising pattern when we look at the effect of GDP per capita on service trade and foreign affiliate sales. In model 4.A and 4.B we find that this wealth variable has the expected signs as long as we leave out the market size variables. However, in models 5 and 7, we see that GDP per capita in the importing country (host) has no significant impact on service trade. If there is any effect, one may actually claim that it is negative (see model 5.B and 5.C). Hence the patterns of service trade depicted in Figure 2 and 3 seams to be supported in regressions where other factors are considered. That is, a rich country will not import more services, ceteris paribus. We believe that this pattern has not been pointed out before, however, Mirza and Nicoletti (2004) find the same pattern, yet they interpret it differently. In their study, it is claimed that service trade requires inputs both from the exporting and the importing country. A rich importing country will have high input costs (wages), driving up the price of services, which has a negative effect on service trade. However, the two stories do not necessarily conflict, since a competitive advantage may coexist with relatively high input cots as long as services are highly differentiated.

5.2 Full service trade liberalization and predicted trade flows

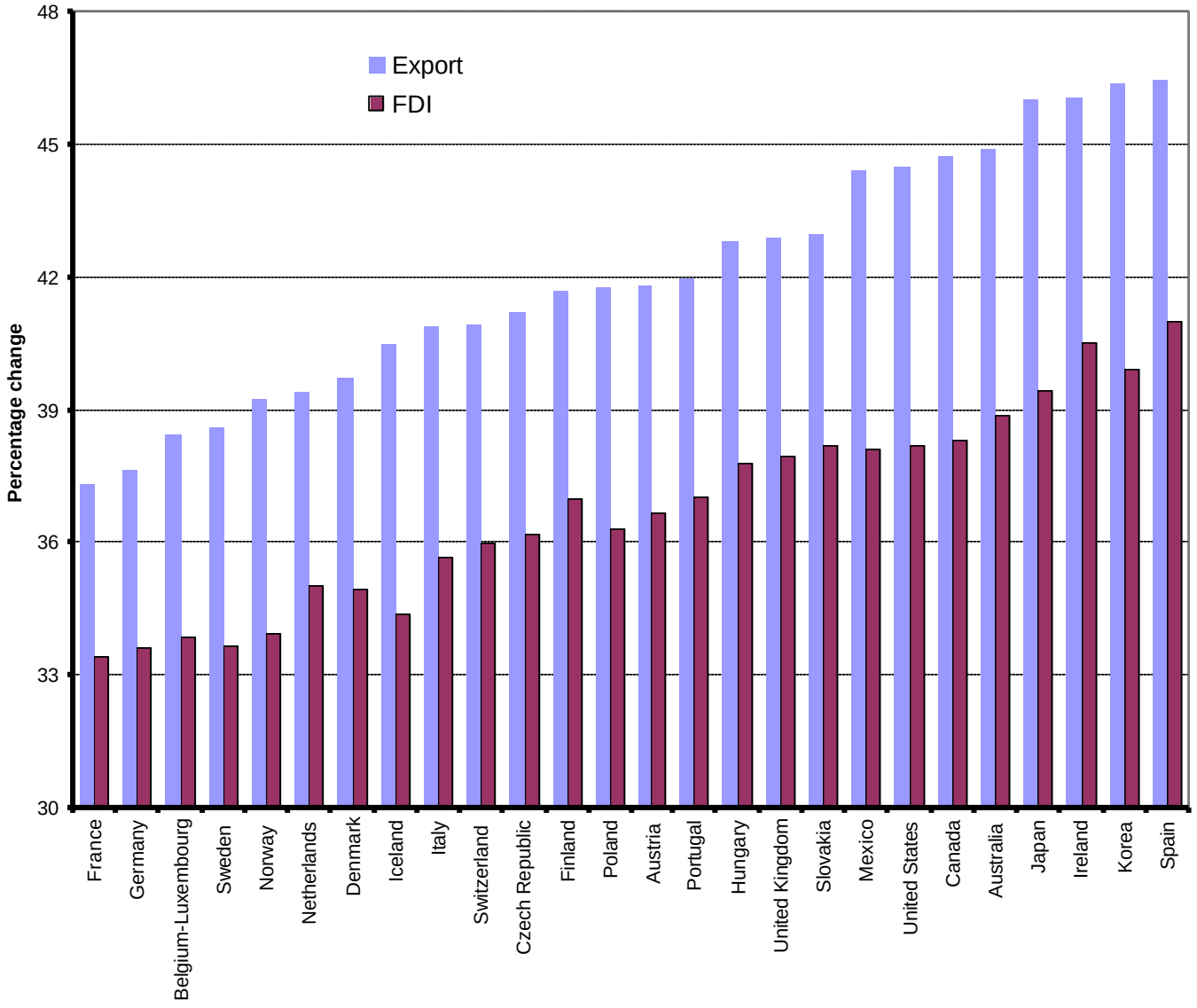
Given that the TRI in fact captures all barriers to trade, we are now able to predict world service trade under a fully liberalized regime. Predicted service exports and foreign affiliate sales under free trade are based on the results from models 6A and 6B. Since it is hard to imagine a case where there are

no barriers to service trade what so ever, we do not apply TRI=0 as the measure of full liberalization. Rather, we use the lowest registered TRI in our sample, which is assigned to Finland (0.12). The percentage change in service trade from liberalization is then given by

$$\Delta EXP_i = \sum_j \left(EXP_{ij}^{FT} - EXP_{ij} \right) / EXP_{ij} = b_{tri} \sum_j e^{\hat{t}_{ij}} (tri^{FT} - tri_j) / \sum_j e^{\hat{t}_{ij}}$$
$$\Delta FDI_i = \sum_j \left(FDI_{ij}^{FT} - FDI_{ij} \right) / FDI_{ij} = b_{tri} \sum_j e^{\hat{fdi}_{ij}} (tri^{FT} - tri_j) / \sum_j e^{\hat{fdi}_{ij}} \quad (6)$$

where all export and FDI figures are based on estimates from models 6A and 6B, so that we take into account unobserved variation in the sample through exporting country fixed effects. Figure 4 displays the percentage change in predicted service exports and FDI if trade is liberalized.

Figure 4: Increase in service export and FDI due to liberalization



The main message based on this exercise is that all countries increase their service exports and foreign affiliate sales considerably in response to service trade liberalization. It is also important to notice that the effect on patterns of trade is rather similar for all exporting countries. Spain, Japan, Korea, and Ireland are the countries with the largest potential increase in exports, while France, Germany and the Nordic countries have less to gain in terms of exports. However, the strongest increase is less than 50% while the smallest increase is more than 35%, so the differences are small. The pattern for service foreign affiliate sales is rather similar to those found in the service exports exercise. Yet, Ireland, the Netherlands and Finland seam to have relatively much to gain in terms of outward FDI.

5.3. Are service exports and foreign affiliate sales complements or substitutes?

Since the late 60s, the issue of whether trade and foreign direct investment are complements or substitutes has received much attention. Early studies of this kind are Reddaway et al. (1967) and Hufbauer & Adler (1968). They found that outward FDI stimulates exports (mostly capital and intermediate goods), without stimulating imports in an equal magnitude. Lipsey and Weiss (1981) used data of US outward FDI and exports, and their results also suggested that the relationship was complementary, even after controlling for firm size, expenditures on R&D, marketing, etc. Fontagné (1999) found that outward FDI stimulates growth of exports from the same country and that each dollar of outward FDI produces about two dollars' worth of increased exports. However, a complementary relationship at the macro level does not necessarily imply complementarity at the firm-, sector- or product-level. Blonigen (2001) examined product-level data for different Japanese automobile parts, and he found evidence for both a substitution and a complementarity effect between exports and affiliate sales for the US market.

Estimating the relationship between service exports and foreign affiliate sales in a regression a la $fdi_{ij} = a + b(t_{ij}) + e_{ij}$ is not very useful, because both variables might respond to a common element, for example income, thereby generating spurious correlations. We will follow the approach of Graham (1996). We assume that the gravity equations from model 7A and 7B remove all factors that might simultaneously determine exports and foreign affiliate sales, and we then examine the relationship between these variables when the source of the simultaneity bias is removed. The model is

$$\hat{v}_{ij} = a + g\hat{u}_{ij} \tag{7}$$

where $\hat{v}_{ij}$ and $\hat{u}_{ij}$ represent the residuals from least squares regression of model 7 when the dependent variable is FDI and exports, respectively. A positive $\hat{g}$ will then signify that unexplained variation in FDI is

accompanied by unexplained variation in exports (in the same direction). In other words, that foreign affiliate sales and exports are complements. Note that this procedure crucially rests on the assumption that the gravity equation from models 7A and 7B actually removed all causal elements from the dependent variables – that the gravity equation is a "true" representation of reality, which is obviously a crude approximation. Hence, we interpret our results with caution.

Ordinary least squares on (7) yields results reported in the first column in Table 7. $\hat{g}$ is positive and highly significant, suggesting that the relationship is complementary – if exports from country i to j are 1 unit above "normal" (above the predicted value), then FDI outstocks are 0.70 units above normal.

Table 7: OLS residual regression

Dependent variable	FDI residual
Constant	0.03
	(0.07)
Exports residual	0.70 ***
	(0.08)
Number of obs	354
F(23, 451)	74.72
Prob > F	0.00
R-squared	0.18
Root MSE	1.3291

Heteroskedasticity robust standard errors in parenthesis.
* = 10% significance level ** = 5% significance level *** = 1 % significance level

6. Conclusions

In this work we have examined aggregate service trade flows, studying both service supply through commercial presence and cross-border supply within the gravity framework. First, we find a strong negative effect of barriers to service trade on service exports and FDI, which we view as a proxy for foreign affiliate sales. Removing these barriers may increase exports as much as 50%, and all exporting countries in our sample will raise exports due to liberalization. Second, distance has a considerable negative impact on exports and foreign affiliate sales. Compared to figures for total trade – not only services - in Di Mauro(2000), distance has a greater impact on service trade, which was predicted in our theoretical discussion. GDP has significant positive effects on service trade and foreign affiliate sales, yet we identify a strong home market effect that probably indicates that services are highly heterogonous in nature. Third, in the fixed-effects model specifications we observe that similar income levels have a much stronger impact on outward FDI stocks (and thus foreign affiliate sales) than exports, which suggest that a "Markusen-effect" is at play – the ratio of affiliate sales to exports is increasing when countries converge in income. Fourth, contrary to the predictions of the horizontal Markusen model, we find that aggregate exports

and foreign affiliate sales from the same parent country are complements. This result does not seem to crucially depend on the exact specification of the gravity model – alternative specifications (OLS and fixed effects) yield the same result. Nevertheless, we interpret this result with caution – if we have left out important variables that affect both export and foreign affiliate sales, we could get spurious results.

The recently published bilateral data on service trade and impediments to trade allows more thorough studies of the drivers behind such trade. Also, the new initiative to coordinate and improve data on international trade in services through the UN and other organizations, will lay the foundation for improved empirical analysis within a field that unquestionably will attract increased attention during the next years. This study should be viewed as only a first attempt to approach the large number of issues on the determinants of international service trade and the effects of service trade liberalization.

References

Anderson, J.E. (1979): "A theoretical foundation for the gravity equation", *The American Economic Review 69* (1), pp.106-116

Blonigen, B. A. (2001): "In search of substitution between foreign production and exports", *Journal of International Economics 53* (1), pp. 81-104

Blonigen, B. A., R. B. Davies and K. Head (2002): "Estimating the knowledge-capital model of the multinational enterprise: Comment", NBER Working Paper 8929

Brainard, S.L. (1997): "An Empirical Assessment of the Proximity-Concentration Trade-off Between Multinational Sales and Trade", *American Economic Review 87* (4), pp. 520-544.

Brenton, Di Mauro and Lücke (1998): "Economic integration and FDI: An empirical analysis of foreign investment in the EU and in Central and Eastern Europe", Kiel Working Paper No. 890

Carr, D. L., J. R. Markusen, and K. E. Maskus (2001): "Estimating the Knowledge-Capital model of the multinational enterprise", *American Economic Review 91* (3), pp. 693-708

Deardorff, A. V. (1995): "Determinants of bilateral trade: Does gravity work in a neoclassical world?", NBER Working Paper 5377.

Dee, P (2001): "Trade in services", Australian Productivity Commission

Di Mauro (2000): "The Impact of Economic Integration on FDI and Exports: A Gravity Approach", CEPS Working Document No. 156

Eaton J. and Tamura A. (1996), "Japanese and US Exports and Investment as Conduits of Growth", NBER Working Paper 5457.

Egger, P. (2000): "A note on the proper econometric specification of the gravity model", *Economics Letters 66* (1), pp. 25-31

Feenstra, Markusen and Rose (2001): "Using the gravity equation to differentiate among alternative theories of trade", *Canadian journal of economics 34* (2).

Findlay, C. and T. Warren (eds) (2000): *Impediments to trade in services*, Routledge, London.

Fink, Matoo and Neago (2002): "Trade in international maritime services: How much does policy matter?", *World Bank Economic Review 16* (1), pp. 81-108

Fontagné, L. (1999): "Foreign Direct Investment and International Trade: Complements or substitutes?", STI Working Papers 1999/3, OECD-DSTI

Frankel, J. (1991): "Is a yen bloc forming in Pacific Asia", *Finance and the International Economy*, pp. 4-20, Oxford University Press.

Graham, E. M. (1996): "On the relationships among direct investment and international trade in the manufacturing sector: Empirical results for the United States and Japan", http://www.ap.harvard.edu/mainsite/papers/recoop/graham/graham.pdf

Helpman, E. (1987): "Imperfect competition and international trade: Evidence from fourteen industrial countries", *Journal of the Japanese and International Economies 1*, pp. 62-81

Hoekman, B. (1995): "Assessing the General Agreement on Trade in Services," *The Uruguay Round and the Developing Economies*, World Bank Discussion Paper No. 307. Washington, D.C.

Hufbauer, G. C., and F. M. Adler (1968), "Overseas Manufacturing Investment and the Balance of Payments", US Treasury Department Tax Policy Research Study No. 1, Washington, DC, US Government Printing Office.

Kalirajan, K. (2000): "Restrictions on Trade in Distribution Services", Productivity Commission Staff Research Paper.

Karsenty, G. (2000):."Assessing trade in services by mode of supply", *GATS 2000: New Directions in Services Trade Liberalisation*, Brookings Institution, Washington DC, pp. 33.56.

Leamer, E. and J. Levinsohn (1995): "International Trade Theory: The Evidence", *Handbook of International Economics*, Vol. 3, Elsevier, Amsterdam.

Lipsey, R. E., and M. Y. Weiss (1981), "Foreign Production and Exports in Manufacturing Industries", *Review of Economics and Statistics 63 (4)*, pp. 488-494.

Markusen, J. R. & A. J. Venables (1998): "Multinational firms and the new trade theory", *Journal of International Economics 46* (1), pp. 183-203.

Marshall, J.N., Wood, P., Daniels, P., McKinnon, A. (1987), "Producer services and uneven development", *Area 19* (1), pp. 35-41

McGuire, G. and Schuele, M. (2000): 'Restrictiveness of international trade in banking services', *Impediments to Trade in Services: Measurement and Policy Implications*, Routledge, London and New York.

Melchior, A. (2002), "Sunk costs in the exporting activity: Implications for international trade and specialization", NUPI Working Paper 634

Mirza, D. and G. Nicoletti (2004): What is so special about trade in services, Research Paper 2004/2, GEP Levehulme Centre, University of Nottingham.

Nguyen-Hong, D. (2000): "Restrictions on trade in professional services", Australian Productivity Commission

OECD (2002): "OECD statistics on international trade in services, partner country data and summary analysis, 1999-2000"

Petri, P. A. (1997): "Foreign direct investment in a computable general equilibrium framework", paper prepared for the conference, "Making APEC work: Economic challenges and policy alternatives", 13-14 March, Keio University, Tokyo.

Pöyhönen, Pentti (1963): "A tentative model for the volume of trade between countries", *Weltwirtschaftliches Archiv 90*, pp. 93-99

Reddaway, W. B., J. O. N. Perkins, S. J. Potter, and C. T. Potter (1967): *Effects of U.K. Direct Investment Overseas*, London, Cambridge University Press

Sapir, A. (1991): "The structure of services in Europe: A conceptual framework", CEPR Discussion Paper 498

Tinbergen, J. (1962*): Shaping the world economy: Suggestions for an international economic policy*, New York: The Twentieth Century Fund

United Nations (2002): *Manual on Statistics of International Trade in Services*, Statistical Papers Series M, No. 86, Department of Economic and Social Affairs, Statisitics Divison, United Nations, Geneve.

UNCTAD (1996): "World investment report, 1996: Investment, trade and international policy arrangements", United Nations, New York and Geneva.

USITC (1995): "General agreement on trade in services: Examination of major trading partners' schedules of commitments", Washington DC.

Appendix 1: Country specific trade restrictiveness index values (TRI)

Table A1: Average trade restrictiveness

Country	TRI	Country	TRI
Finland	0.12	Austria	0.34
United Kingdom	0.14	Mexico	0.35
Netherlands	0.16	India	0.40
Norway	0.17	Thailand	0.41
Denmark	0.19	Turkey	0.44
Argentina	0.20	Philippines	0.46
Hong Kong (China)	0.21	Czech Republic	0.47
Australia	0.22	Indonesia	0.47
Sweden	0.23	Malaysia	0.47
New Zealand	0.24	Iceland	0.50
Ireland	0.24	Romania	0.50
South Africa	0.25	Hungary	0.53
France	0.25	Israel	0.53
Germany	0.26	Pakistan	0.55
Switzerland	0.26	Ukraine	0.60
United States	0.26	Bulgaria	0.62
Singapore	0.26	Egypt	0.63
Chile	0.26	Panama	0.63
Japan	0.28	Poland	0.66
Greece	0.28	Nigeria	0.79
Italy	0.29	China	0.81
Spain	0.30	United Arab Emirate	0.84
Canada	0.31	Algeria	0.87
Portugal	0.32	Saudi Arabia	0.87
Korea	0.33	Iran	0.88
Venezuela	0.33	Morocco	0.90
Brazil	0.34	Costa Rica	0.93
Colombia	0.34		

Appendix 2: Data sources

Mode-1 service trade data is gathered from OECD's Statistics on International Trade in Services (2002), which includes multilateral imports and exports data for parent (22 OECD member countries) and host countries (55 OECD and non-OECD countries). These 22 OECD countries accounted for about 74 per cent of world service exports and 70 percent of world service imports. The data is provided for two years, 1999 and 2000, and is expressed in millions of US dollars. The full publication can be found at http://www.oecd.org/pdf/M00032000/M00032981.pdf.

FDI data is gathered from the OECD International Direct Investment Statistics Yearbook (2002). The database includes measures of multilateral FDI inflows, outflows, inward stock and outward stock, for 30 OECD parent countries as well as a multitude of OECD and non-OECD host countries. As described in Section 4, we have weighed these data with a calculated service share, compiled from OECD's "International direct investment by industrial sector *Vol 2001 release 02"*. We have used 1999 data, expressed in millions of US dollars.

We have used 1999-GDP and the service sector's contribution to 1999-GDP data from the World Bank's World Development Indicators (WDI) database (http://www.worldbank.org/data). GDP figures are provided in billions current US dollars. Service GDP data is provided in billions of 1995 US dollars.

The 'trade restrictiveness index' (TRI), compiled by The Australian Productivity Commission and the Australian National University, measures the degree of impediments to trade in the following sectors: Banking, telecom, maritime services, distribution (wholesale and retail), education and professional services (engineering, architect, legal). The TRI covers all modes of supply and ranges from 0 to 1 (fully protected). The database can be found at http://www.pc.gov.au/research/memoranda/servicesrestriction.

The corruption perceptions index (CPI), 2002 edition, is constructed by Transparency International (http://www.transparency.org). The score is ranging from 0 to 10, 10 signifying a highly clean country. At present, 102 countries are covered.