ENTRY BARRIERS AND THE EXTENSIVE MARGIN: ESTIMATING TRADE RESTRICTIVENESS FROM TRADE FLOWS AND LACK THEREOF

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Abstract

This paper provides a first attempt to estimate services trade costs directly from trade data. It builds on two recent papers, the first by Helpman, Melitz and Rubinstein (2008) (HMR), and the second by Novy (2008). Both papers provide innovative ways of assessing overall trade restrictiveness. The beauty of the HMR paper is that the only trade data needed is information on whether or not a country pair trades with each other in the sector in question. In a situation where bilateral services trade data are not as readily available as one might wish for, this seems like a great advantage. In order to check whether it is the methodology or the data that creates problems, the HMR probit methodology is applied to goods trade as well. Here the results are more plausible and it thus appears that the problem is mainly on the data side. The Novy methodology is both simple and produces plausible results. Here trade costs can be estimated based on information on two-way bilateral trade and internal trade in the sector of interest. The paper concludes that at this stage the Novy methodology can be used as a supplement to other sources of information on trade costs.

[1] The views expressed in this paper are personal and should not be attributed to the OECD or its Members.

> "Trade costs should intuitively have a big impact on productivity and the pattern of production and trade. Differential access to market should alter the pattern of returns to countries' factors of production. Differential trade costs across products should tilt the pattern of production. The impacts should be big because trade costs are big" [Anderson, 2007, p.1].

1. Introduction

Services account for more than two thirds of world GDP but only about 20 percent of world trade. Many observers have therefore argued that the largest potential gains from the Doha round in the WTO come from services trade liberalization (Hoekman and Mattoo, 2006). But in fact little is known about the nature and level of services trade costs, let alone how much trade liberalization would reduce them. There is a small literature on composite indices for services trade costs (Heokman 2006), but no readily available data on services trade costs that could be used for trade policy analysis. Lack of information on the level of trade barriers is obviously a problem when setting priorities for the trade policy agenda. This paper contributes to filling this gap by applying insights from the most recent research on the gravity model.

The gravity model explains the distribution of trade among trading partners given total output and expenditure. Gravity is a phenomenon borrowed from Newton's laws where the attraction between two bodies depends on their mass and inversely on the distance between them. Pursuing the parallel to physics, Ohms law states that a current is stronger the lower the resistance and it will take the route of lowest resistance. Hence, combining these insights trade flows should be bigger between large markets that are close to each other and where trade costs are relatively low.

Recent research on the gravity model has been concerned with how to take resistance and the extensive margin into account. Resistance has been introduced in the gravity equation in the form of price indices for the importing and exporting countries. These are CES aggregates of the prices of all goods consumed in the country in question, both imported and locally produced. It differs from a true trade restrictiveness index as defined by Anderson and Neary (2005) in that it uses domestic rather than international prices and it includes internal trade. However, for services international prices hardly exist and commercial presence is the most important mode of supply. However, since import penetration is relatively low in services markets, domestic prices dominate the price index.

In recent research it has been noted that a significant number of country pairs in the world do not trade with each other, an observation that is difficult to explain within the framework of standard gravity models. The absence of trade represents evidence of significant entry barriers, which implies that only the most productive firms can absorb the fixed costs associated with entering foreign markets. This gives rise to

changes in trade flows at the extensive margin; i.e. as trade costs come down, new firms enter the market. Fixed costs and changes at the extensive margin are particularly relevant for services as services trade barriers are mainly behind the border and related to compliance with regulation. Such costs are usually independent of subsequent export flows and must therefore be considered as fixed. Professional services providers, for instance, typically need a license to operate and local qualification requirements need to be fulfilled and documented.

The gravity model provides a framework for inferring trade costs, both variable and fixed, from observed trade flows. Since neither international prices nor trade costs can be directly observed for services, this is a useful first step at quantifying barriers to services trade, to which this paper contributes. Services trade data is, however, less comprehensive and accurate than merchandise trade data, and estimates are subject to considerable uncertainty. For robustness we therefore apply several methodologies suggested in recent literature and compare and contrast the results. As will be shown in the paper, the ranking of countries is quite robust to the different methodologies applied. Moreover, ranking is often of great interest for trade policy analysis and benchmarking purposes, and our estimates can provide useful inputs to such analysis.

The rest of the paper is organized as follows: Section 2 relates the approach and methodology applied in the study to the literature. The three next sections present methodology and results, Section 3 on a probit estimate based on HMR, Section 4 on calculations using the Novy framework while Section 5 discusses how the methodology explored in the paper can contribute to the estimation of a services trade restrictiveness index.

2. Relation to previous research

Since the seminal paper by Anderson and van Wincoop (2003), the gravity model has become a workhorse model for analysing the relationship between trade costs and trade flows. It has been applied to services in a number of papers and the regularities observed for goods largely apply to services as well (e.g Walsh, 2008; Kox and Nordås, 2007; 2008). The vast majority of existing studies apply the gravity model for analysing how a particular trade cost of interest affects bilateral trade flows. One exception is Anderson and Neary (2005 Chapter 10) who discuss inference of trade costs from the gravity model, but they do not actually do so.

The only study that we have come across that uses the gravity model for inferring trade costs is Anderson and Yotov (2008). They use the gravity model to estimate bilateral variable trade costs which are next entered into a non-linear equation system of multilateral resistance terms and solve the system. The study uses data for Canadian provinces and their trade among themselves, with the US, and the rest of the world.

Novy (2008) and Chen and Novy (2008) use the gravity model to calculate bilateral trade costs relative to internal trade costs. Their innovation is to eliminate the multilateral resistance terms by combining the Anderson and van Wincoop (2003) gravity equations for external trade between country pairs *ij*, *ji*, and internal trade denoted *ii* and *jj*. We explore this approach to *calculating* trade costs for services sectors in this paper. Although strong assumptions have to be imposed, the methodology can be applied to any country pair for which information on bilateral trade and internal trade is available. Given the scarcity of services trade data, this is a great practical advantage and we argue that the ranking of countries according to relative trade costs using the formula looks reasonable.

The methodologies discussed above does, however, not address the issue of zero trade flows, the extensive margin and fixed trade costs. As we argued in the introduction, services trade barriers are largely in the form of behind the border regulation and most of them can probably be considered as fixed costs. Melitz (2003) introduced fixed costs and heterogeneous firms in a trade model in which firms self-select into exports based on their productivity levels. Helpman, Melitz and Rubinstein (2008), hereafter HMR, embedded this model in the gravity equation, which they estimated in two steps, starting with a probit regression that explains self-selection of firms into export markets and next the determinants of export volumes, given that market entry has occurred. The second step adjusts both for a selection bias into export markets (which was found to be small) and an omitted variable bias due to heterogeneous firms (which was found to be significant).

Chaney (2008) incorporates the extensive margin in the gravity model in a way that sheds further light on the role of fixed and variable trade costs in defining trade value and product variety. He shows that fixed costs affect the extensive margin only, while variable trade costs affect both margins. Furthermore, the extensive margin is more sensitive to changes in trade costs the lower the elasticity of substitution between any two products. Since services are thought to be more heterogeneous, and thus have a lower elasticity of substitution than goods, fixed costs are not only likely to be relatively more important than variable trade costs, they also have a larger impact on the extensive margin for services trade. For this reason providing estimates of fixed trade costs is particularly important for services trade policy analysis.

To our knowledge no studies have used the HMR framework for inferring fixed trade costs. This paper provides a first attempt at doing so. However, inferring fixed trade costs from observed trade flows and lack thereof is fraught with a number of difficulties, both conceptual and practical. First, if the variable trade costs are higher than the price at which demand falls to zero, zero trade flows would be observed even in the absence of fixed costs. CES preferences rule out this possibility in the model, but it may still be an empirical possibility. Conversely, if fixed costs are small enough that all firms in a partner country

are able to break even from exporting, there will be no observable extensive margin even in the presence of fixed costs.[2]

From a practical point of view, it can be difficult to distinguish between true zeros and missing data in available services trade statistics. Furthermore, data quality for services trade leaves a lot to be desired. Data on total services trade by country is reasonably accurate, but when breaking services trade flows down on more detailed sectors, sources and destinations, a number of problems arise (Cave and Fuchs, 2008; Lanz and Miroudot, 2008). With these caveats in mind we now proceed with presenting the models.

3. Importer fixed trade costs: an approach based on Helpman, Melitz and Rubinstein (2008)

In this section, we make a first attempt at applying the HMR framework for estimating the fixed entry cost imposed by the importing country on all imports. Such fixed costs or entry barriers are associated with policies and regulations in place in importing country *i* such as licences and standard requirements, but also to economic barriers such as search costs for a local partner or the building up of local distribution channels. The fixed costs are inferred from their effect on the extensive margin of trade, i.e. they determine the number of firms and ultimately the number of countries j, country i will import from.

Two-step estimation procedure: Probit and OLS

Building on the heterogeneous firm model developed by Melitz (2003), HMR derive a theoretically founded probit equation that determines the selection of firms into exports. They show that this selection depends on the productivity of the firm, while all other determinants are country or country-pair specific. Therefore, assuming that firms' productivities are distributed according to a Pareto distribution, the probit equation can be estimated on aggregate data.

We adopt this first part of their empirical specification and use obtained results in a second step in order to identify importer fixed trade costs. In what follows, we summarise our estimation strategy. We describe both theoretical and empirical implementation in more detail in the Annex.

We proceed in two steps. First the probit equation suggested by HMR is estimated deriving the predicted probability whether two countries trade with each other or not. The probit estimation also delivers coefficients for importer fixed effects, which entails income, the price level and the importer specific fixed costs that firms have to incur when entering the market. It is these fixed costs specific to the importing country that we are interested in. Hence, in a second step, we regress the importer fixed effects on incomes

2 . Since it is highly unlikely that there exists a country in which all firms in an exporting sector export, this is more of a conceptual possibility than a practical problem.

and price levels of countries, using OLS. The unobservable importer fixed trade cost should then be captured by the residual of the regression. Hence, the ranking of residuals should reflect the ranking of fixed trade costs of importing countries.

Before using the methodology for estimating importer specific trade costs with services trade data, we first apply it to goods trade. Bilateral data on goods trade is far more extensive in coverage and more reliable than services trade data. Hence, estimates obtained for trade costs regarding goods imports allow us to assess the appropriateness of our methodology. Afterwards, we apply the estimation strategy to services trade.

Trade costs in goods trade

We estimate fixed trade costs associated to the importing country for the period 2000 to 2005 by applying the methodology described above to total goods exports.[3] Table 1 shows the ranking of importer fixed costs for total goods trade with countries having the lowest fixed costs ranked at the top. While the first three columns provide rankings for the years 2003, 2004 and 2005, the fourth column gives the ranking of importer fixed costs for the period 2000-2005.

Results confirm expectations for some countries, but do not so for others. While it is unsurprising to find countries such as Belgium and Netherlands having low entry barriers, it is rather surprising that for instance Estonia and South Africa take a high rank but the United States are found in the lower midfield. A positive characteristic of Table 1 is that rankings differ not too much between years, i.e. countries experience no big jumps in their position from year to year. For instance, New Zealand and Israel are ranked in the upper midfield and near the bottom respectively in all three years.

3 . Export data are taken from the UN Comtrade database.

Table 1. Ranking of importer fixed costs for total goods trade

Importer	2003	Importer	2004	Importer	2005	Panel 2000-2005	
Belgium	0.114	Belgium	0.043	Belgium	0.053	Belgium	0.059
Portugal	0.238	Portugal	0.238	Netherlands	0.199	Portugal	0.209
Netherlands	0.253	Netherlands	0.250	Portugal	0.203	Netherlands	0.232
Estonia	0.261	Estonia	0.305	Estonia	0.211	Estonia	0.273
Italy	0.290	Switzerland	0.310	South Africa	0.301	South Africa	0.323
Indonesia	0.331	Poland	0.356	Korea, Rep.	0.325	Indonesia	0.345
Greece	0.331	South Africa	0.357	Iceland	0.330	Spain	0.345
South Africa	0.334	Spain	0.377	New Zealand	0.350	France	0.364
France	0.342	Germany	0.380	Spain	0.360	Switzerland	0.364
Switzerland	0.363	Greece	0.392	France	0.366	Greece	0.368
New Zealand	0.379	New Zealand	0.413	Switzerland	0.418	New Zealand	0.373
Spain	0.383	France	0.418	Poland	0.433	Italy	0.409
Canada	0.427	Iceland	0.423	Italy	0.447	Germany	0.432
Poland	0.435	Korea, Rep.	0.454	Greece	0.448	Iceland	0.445
Germany	0.452	Italy	0.473	Turkey	0.459	Poland	0.450
Slovenia	0.454	Czech Republic	0.473	Australia	0.460	Korea, Rep.	0.455
Turkey	0.460	Slovenia	0.489	Germany	0.500	Australia	0.486
Korea, Rep.	0.498	Indonesia	0.498	Slovak Republic	0.516	Slovenia	0.486
India	0.499	Slovak Republic	0.517	Indonesia	0.523	India	0.495
Czech Republic	0.499	Denmark	0.530	United Kingdom	0.536	Turkey	0.500
Iceland	0.501	Canada	0.533	Canada	0.544	United Kingdom	0.505
China	0.523	China	0.551	Slovenia	0.550	Canada	0.509
Australia	0.530	Turkey	0.557	Denmark	0.550	Czech Republic	0.523
United Kingdom	0.538	Australia	0.562	Ireland	0.561	China	0.541
Hungary	0.547	United Kingdom	0.569	Czech Republic	0.563	Denmark	0.555
Chile	0.549	Japan	0.599	China	0.581	Slovak Republic	0.573
United States	0.559	United States	0.607	Japan	0.609	United States	0.577
Denmark	0.567	Finland	0.614	Sweden	0.611	Chile	0.595
Slovak Republic	0.586	Norway	0.632	United States	0.614	Japan	0.600
Japan	0.599	Mexico	0.639	Austria	0.662	Hungary	0.609
Finland	0.614	Hungary	0.649	Mexico	0.670	Ireland	0.614
Norway	0.638	Ireland	0.657	Finland	0.697	Finland	0.636
Ireland	0.667	Sweden	0.683	Israel	0.700	Norway	0.636
Sweden	0.676	Austria	0.719	Chile	0.733	Austria	0.664
Russia	0.717	Chile	0.722	Norway	0.738	Sweden	0.664
Israel	0.720	Israel	0.731	Hungary	0.756	Mexico	0.691
Austria	0.749	Luxembourg	0.781	Luxembourg	0.922	Russia	0.695
Mexico	0.754	Brazil		Brazil		Israel	0.745
Luxembourg	0.793	India		India		Brazil	0.773
Brazil	0.832	Russia		Russia		Luxembourg	0.864

Notes: Higher ranked countries have lower fixed cost. For shaded countries fixed costs could not be estimated because they are either dropped in the probit regression or no price data are available. Countries are ranked according to the residual obtained from second stage OLS regressions of importer fixed effects on income and price levels. The number of observations in these regressions correspond to the number of countries, i.e., the number of fixed effects obtained from the first stage probit regression. Residuals have been normalised between zero and one with higher values reflecting higher fixed costs. However, since each ranking is based on a different OLS regression, values cannot be compared between years. Missing trade flows and trade flows below 0.5 Mill. US dollar have been set to zero.

Services trade data

For the estimation of fixed costs in services trade, we rely on bilateral data from both the OECD Trade in Services by Partner Country (TiSP) database and the United Nations Service Trade Statistics database. Thereby, the first stage probit estimation requires the information on whether two countries trade with each

other or not. Since the number of partner countries differs in the two datasets, we combine them in order to maximise the number of country pairs for which we have information on trade flows. Starting from reported observations by importing countries in the OECD database, we increase the number of partner countries by adding i) mirrored OECD imports, ii) UN imports and iii) mirrored UN imports. In our analysis we use only the information on whether two countries trade with each other or not. Hence, concerns regarding the comparability of import values between OECD and UN data, and the use of mirror flows do not apply.

We estimate rankings of importer fixed costs for overall 40 countries: the 30 OECD Members, the five accession countries Chile, Israel, Estonia, Russia and Slovenia as well as for the enhanced engagement countries Brazil, China, India, Indonesia and South Africa. In the web version of this paper we give an overview on the number of partner countries observed by each of the 40 importers in the four service categories total, communication, construction and other business.[4]

Countries are generally reluctant to report zeros trade flows, which is especially the case for total services and other business services. For instance, in total services countries such as the United States, Japan, Germany or the United Kingdom report no zero imports at all, while others declare a rather large share of their imports as being zero, e.g., for communication services (2005): Finland (23/34), Greece (19/36) and Slovak Republic (28/34).

Importers vary extensively in the number of reported (observed) partners. For instance, in total services Germany reported only 25 partners to the OECD in 2005, while the Czech Republic, a country of much smaller size, reported 58 partners. Furthermore, importers do not report all partners to the OECD, but information on additional trade relationships can be obtained from UN data and mirrored flows. A third characteristic is that the number of partner countries varies considerably not only across importers, but also across years for a respective importer. For instance, in total services large jumps from one year to another can be observed for France (61 to 163 partners, 01-02), UK (63 to 174, 03-04) Poland (29 to 96, 03-04) Netherlands (62 to 151, 02-03), Russia (86 to 150, 04-05), Estonia (24 to 61, 02-03). These major increases in the number of observed partners between years indicate that changes in reporting patterns of countries might drive partner coverage as much as actual economic expansion at the extensive margin.[5]

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4 Since we have 208 partners in the database, the maximum number of partners an importer could potentially have is 207. Accession and enhanced engagement countries are not included as reporters in the OECD TiSP database. For these countries, observations stem from mirrored OECD data and from the UN Service Trade Statistics Database.

5 . Since we use mirrored flows, the number of observed partners of an importer is also affected indirectly by the reporting pattern of other countries.

The three countries with the highest and lowest number of non-missing partners (lower row) for total services in the year 2005 are France (181), Italy (181), United Kingdom (175)[6] and Iceland (31), Israel (32) and Chile (31). In disaggregated sectors communication, construction and other business, observed partner countries are significantly smaller. While the average number of observed partners is 76 for total services in 2005, it is 32, 25 and 36 for communication, construction and other business respectively. The number of observed partners is of crucial relevance since one set of estimations relies on the assumption that missing observations correspond to zero imports.

Assumptions regarding missing observations

- Setting missing imports to zero

As discussed in the previous section, since the number of reported "hard" zeros in the data is low, we face the problem of how to deal with missing information. Is it appropriate to assume that empty cells in the bilateral trade matrix are zero? After having extracted import flows from two partly overlapping databases and exploited the information contained in mirror flows, we hope that the measurement error introduced by setting remaining empty cells to zero is not too large. For instance, if France does not report imports from Indonesia neither to the UN nor the OECD, and if furthermore Indonesia reports no exports to France, we assume that the two countries do not trade with each other in a given services sector.

By making the assumption that missing imports correspond to zeros, we implicitly make the statement that all 40 importing countries face the same number of potential partner countries. Hence, we keep a partner country in our dataset if it trades (positive or zero) with at least one of the 40 importer countries. Then, our final dataset consists of 40 importers each facing 207 partners.

- Leaving missing imports unchanged

A second possibility is not to consider missing data when running the probit regression, relying on observed zeros only. While this approach has the advantage of relying on "hard" zeros, it also has some drawbacks. First, each importer may have a different number of partner countries. This is a potential problem because the importer fixed effect calculated in the probit regression is determined by the number of observed zero imports relative to the number of positive flows. For instance, assume that for importer A we observe 5 import flows (4 positive, 1 zero), while for importer B we observe 30 flows (10 positive, 20 zeros). Hence, the share of positive trade flows is 80% for A and 33% for B. All else equal, the probit model will assign country A a higher likelihood of being an import destination, i.e., a higher importer fixed

6 . At a later stage of the paper you will see that it is these three countries that are estimated to have the lowest fixed costs in total services in 2005.

effect, than country B, despite trading with fewer countries.[7] A second, more technical drawback stems from the fact that if there are no zero trade flows, importer fixed effects cannot be estimated in the probit regression because the respective country predicts success perfectly.

Trade costs in services trade

Tables A1-A4 in the Annex provide estimated rankings of importer fixed costs for total services (200) as well as for communication (245), construction (249) and other business (268). Importers with lowest fixed costs are ranked at the top of the table. Tables are separated into two times four columns each, with the first four columns (A.) being estimated on the assumption that missing partner observations reflect zeros and the next four columns (B.) being estimated only on non-missing partner observations. While the first three columns of A. and B. give rankings by year, the fourth column ranks countries for the period 2000 to 2005 based on time-constant importer fixed effects obtained from a pooled probit estimation.[8]

Comparing rankings in the first four columns (A. Missing values are set to zero) with rankings in the second four columns (B. Missing values are dropped), we see that in B. some countries could not be ranked, because they do not report any zero trade flows. Many countries could not be ranked based on total services trade, but for the individual sectors the problem is less severe. A second observation that can be made is that rankings in A. and B. are broadly similar. Consider the rankings of fixed costs based on panel estimations that might be interpreted as an average over the period 2000-2005. For instance, in the case of communication services, the top three countries according to B., Australia, Germany and New Zealand, rank 3(Germany), 5(Australia) and 12 (New Zealand) in the panel of A, while Mexico, Japan and Ireland are found among the lowest ranked in both panels. Nevertheless, significant differences between the rankings in A. and B. exist because of the different assumptions they have been estimated on.[9]

While small changes in position in rankings between years should be expected, some countries make big jumps from one year to the next. For instance, in total services, Italy, France and the United Kingdom are the three countries with lowest fixed costs in 2004 and 2005 (A.). While Italy and France rank highest in 2003 as well, the United Kingdom drops down to the middle range. Even more striking is the case of

7 . More precisely, also in the case where we assume missing data to be zero, the relative number of positive trade flows is crucial for the fixed effect. But in that case, all observed positive trade flows are relative to the same base, i.e. 207 partners.

8 . For panel estimates, importer fixed effects have been regressed on 2000-2005 averages of income and price data in the second stage OLS regression.

9 . Estimates shown under header A. are based on the assumption that each importer faces 207 potential partner countries and that no trade is happening when a country-pair observation is missing. Differently, estimates in B. assume roughly speaking that the observed relative number of zero trade relationships holds for the (unobserved) population of partner countries.

Poland, which is at the lower end of the rankings in 2003, but in 2004 it can be found in the top 4 in all four services sectors. Unfortunately, such drastic jumps in ranking position are more likely to reflect changes in reporting practices than changes in fixed costs.

Poland's jump can be explained by the increase in observed partner trade flows from 29 in 2003 to 96 in 2004 in total services. Since the number of potential partner countries is 207, the number of zero trade relationships decreases by 67. The first stage probit regression consists of bilateral gravity variables that do not change over time and of importer and exporter fixed effects. If the number of observed trade flows increases from 2003 to 2004, the surge can only be explained by an increased importer fixed effect for Poland.[10] Furthermore, since the higher fixed effect is not matched by a similar increase in income and price level, the second step OLS regression attributes most of the change in the fixed effect to the residual, i.e. to lower fixed costs.

Comparing ranking across sectors (Tables A1-A4 A.), Germany is estimated to have the lowest fixed costs in all three sectors for the year 2005. The opposite is the case for Spain. It ranks at the bottom in all three sectors in 2005. However, other countries are not as stable in their position across sectors. Another indication of how reporting patterns influence estimates can be seen at the example of Germany. While ranking high in all three sectors, Germany finds itself rather at the bottom of the ranking in total services. This outcome is a result from the fact that Germany reports only 25 partner countries in total services, but more than 50 in disaggregated sectors. Next research steps will use the information from disaggregated sectors to confirm whether two countries trade at the aggregate level.

Summarising, estimated rankings of fixed importer costs are rather unstable across years and depend on assumptions made about missing observations (A. versus B.). Country specific reporting patterns tend to influence results to a large extent. Especially, sudden and large changes in the number of reporting countries seems to be more important for the heterogeneity of rankings across years than actual underlying developments in income, prices and fixed costs. Nevertheless, quite a few countries rank similar across years in disaggregated sectors and their positions seem to make sense. However, when interpreting results, it is crucial that one is conscious about bilateral reporting patterns of countries as discussed previously and as shown in Tables 5-9 in order to understand implausible results or jumps of certain countries.

Apart from data issues, next steps will concentrate on investigating whether methodological issues might be responsible for surprising results. For instance, the residual in the second stage OLS regression captures

10 . Coefficients of gravity variables are of course different in year-by-year estimations. However, coefficients should be rather similar, because the role of distance will not change tremendously and it reflects trade relationships of all country pairs.

not only fixed costs but might also be influenced to some extent by country specific shocks that affect the probability of being an import destination. Also, although in theory the importer fixed effect is fully explained by income, prices and fixed costs, in practice other country specific variables such as uniform tariffs might play a role as well.

4. Country-specific trade costs: an approach based on Novy (2008) and Waugh (2007)

In this section, we use a second methodology in order to assess the costs faced by exporters in the destination market. The empirical strategy is the following: we first calculate bilateral trade costs for 29 countries using the formula developed by Novy (2008). We then regress the values obtained on a set of bilateral variables (distance, common border, common language and past colonial relationship) and a country specific fixed effect that should capture the impact of any domestic policy that raises costs for all exporters.

The trade data are the same than in Section 4 and it will allow us to do some comparison. We have both aggregated data (for goods and services) and data disaggregated by sector. However, for this part of the analysis, we use the ISIC classification (including for services) as some of the data needed come from national accounts. The formula to calculate trade costs follows Novy (2008):

$$\tau_{ij} = \left(\frac{x_{ii} x_{jj}}{x_{ij} x_{ji}} \right)^{\frac{1}{2(\sigma-1)}} - 1$$

where τ_{ij} is the bilateral trade cost between country *i* and country *j*, x_{ii} and x_{jj} denote *intranational* trade flows in country *i* and country *j*, x_{ij} and x_{ji} are *international* trade flows (in both directions) and σ is the elasticity of substitution.

As described in Novy (2008), this is a "micro-founded" measure of trade costs derived from the Anderson and van Wincoop general equilibrium model for bilateral trade. The intuition behind the formula is straightforward. An increase in trade costs reduces international trade relatively to domestic trade flows while a decrease in trade costs is associated with an increase of bilateral trade flows relative to domestic trade flows. The minus one in the formula is there to provide a tariff equivalent for the trade costs.

By construction, trade costs are symmetric in this formula (it is as costly to export from *i* to *j* as to export from *j* to *i*). τ_{ij} can be understood as the geometric average of bilateral trade barriers in both directions (Novy, 2008). The underlying barriers can however still be asymmetric and the model does not imply that

bilateral trade flows are balanced. In the second part of this section, we try to capture the asymmetric part of τ_{ij} through a regression with country-specific fixed effects.

The elasticity of substitution σ is assumed to be the same across all countries and goods (including domestic goods). This assumption –which is strong– comes from Anderson and van Wincoop. At the industry level, we can assume a sector-specific σ. The sector specific measure of τ_{ij} is provided in Chen and Novy (2008). With *k* being the industry subscript, the formula becomes:

$$\tau_{ijk} = \left(\frac{x_{iik} x_{jjk}}{x_{ijk} x_{jik}} \right)^{\frac{1}{2(\sigma_k - 1)}} - 1$$

One advantage of the Novy calculation of trade costs is that it requires very few data. We have from the previous section bilateral exports (at the industry level). Only pairs of countries for which trade flows are known in both directions can be included in the dataset. As we have assumed zeros when data were missing, the same balanced panel of data can be used.

In order to assess *domestic* trade flows, we follow Novy (2008) and define x_{ii} as the difference between production and exports. We use national accounts data from the EU KLEMS database where 29 countries are covered and data are disaggregated in a classification compatible with ISIC categories. The variable used for production is Gross Output at Current Prices (in millions of local currency). We convert the data to US dollars before subtracting exports (which are also expressed in millions of US dollars)[11]. Initially, the value chosen for σ is equal to 8, which is the average value generally used in the literature[12]. To deal with the case of countries that have no bilateral trade relationship, we replace exports equal to zero by a very small figure (0.00001). As a consequence, the calculated bilateral trade costs become very high (instead of being equal to minus one if we had kept the zeros). It allows us to account for zero trade flows in the subsequent quantitative analysis.

11. We don't use a deflator at this stage as the regression run after includes year fixed effects that will acount for changes in prices over the years included in the panel.

12. A robustness analysis based on different values for σ will be later provided. While the choice of the elasticity of substitution can affect the size of trade costs measured, it should not have an impact on the ranking of countries in the subsequent analysis.

Table 2. Average trade costs (by reporter)

Country	Total trade in goods (2005)		Total trade in services (2005)	
	Simple average	Trade-weighted average	Simple average	Trade-weighted average
Australia	2.45	1.34	2.60	1.67
Austria	1.51	1.00	1.58	1.20
Belgium	1.20	0.76	1.68	1.16
Cyprus	2.39	1.86	1.71	1.16
Czech Republic	1.54	0.95	2.11	1.56
Denmark	1.51	1.15	1.64	1.31
Estonia	2.70	1.65	3.13	2.07
Finland	1.54	1.24	2.14	1.50
France	1.33	0.95	1.72	1.29
Germany	1.06	0.85	1.37	1.21
Greece	2.00	1.49	1.91	1.38
Hungary	1.53	1.04	1.93	1.54
Ireland	1.67	1.02	1.60	1.10
Italy	1.36	1.07	1.72	1.38
Japan	1.96	1.19	2.38	1.39
Korea	1.88	1.24	2.78	1.37
Latvia	1.92	1.39	2.09	1.82
Lituania	2.19	1.56	2.65	2.00
Luxembourg	2.25	1.33	1.71	1.02
Malta	2.16	1.39	1.94	1.35
Netherlands	1.22	0.83	1.53	1.18
Poland	1.56	1.07	2.01	1.52
Portugal	1.91	1.16	2.39	1.52
Slovak Republic	1.74	1.04	2.30	1.55
Slovenia	1.91	1.21	2.56	1.61
Spain	1.53	1.02	1.94	1.26
Sweden	1.42	1.13	1.70	1.33
United Kingdom	1.34	1.01	1.43	1.12
United States	1.73	1.20	1.69	1.24

The values obtained for τ_{ij} are quite consistent with what one would expect. For total trade in goods, the two countries with the lowest bilateral trade costs are Belgium and the Netherlands, while the highest trade costs are between Australia and Estonia[13]. Table 2 gives an indication on the average trade costs observed for each country present in the dataset (an average over bilateral values). As exemplified by Australia, being geographically far from exporting markets leads to higher trade costs. This can be explained by transport costs in the case of goods, communication costs in the case of services. But this is only one component of overall trade costs. Among those trade costs are also some related to specific regulations that restrict trade, such as tariffs for goods, barriers to entry or qualification requirements for services. We need

13. The EU Klems database includes EU countries, plus Australia, Japan and USA.

therefore to find a way to disentangle the different explanations for high trade costs and to isolate a country specific component that could be related to regulations.

To do so, we decompose trade costs in a manner similar to Waugh (2007)[14]. We run the following regression:

$$\log \tau_{ij} = \alpha + \beta_1 \log dist_{ij} + \beta_2 border_{ij} + \beta_3 comlang_{ij} + \beta_4 colony_{ij} + \beta_i country\_fe_i + \varepsilon_{ij}$$

where τ_{ij} is the bilateral trade cost previously calculated, $dist_{ij}$ is the geographic distance between country *i* and country *j* (data from CEPII, great circle method), $border_{ij}$, $comlang_{ij}$ and $colony_{ij}$ are bilateral dummy variables corresponding respectively to common border, common (official) language and past colonial relationship (data from CEPII) and $country\_fe_i$ is a country specific fixed effect (for country *i*).

Because of the symmetry in the calculation of bilateral trade costs (and the balanced panel obtained), we do not need to have an importer fixed effect and an exporter fixed effect (both would have the same coefficients). We therefore use only a dummy variable for the reporting country *i*. When pooling different years, we add a year fixed effect. The above regression can furthermore be run for specific sectors.

The regression results are in Table 13 in the Annex for aggregate trade flows (goods and services). In addition to an OLS estimation, we use a Poisson Pseudo-Maximum Likelihood estimation (PPML), as in Novy and Chen (2008), to deal with heteroskedasticity. It could be argued also that the PPML estimator is better because of the way trade costs are calculated with a relationship that is not linear with a country size effect.

As can be seen in Table 13, distance explains a significant fraction of trade costs in the case of goods with a coefficient of 0.30. The coefficient is slightly lower in the Poisson estimation (0.23). For trade in services, we observe lower coefficients: 0.11 in the case of the OLS estimation and 0.07 in the PPML estimation. It is not surprising as distance is likely to capture a transport cost that does not affect in the same way trade in services. Having a common border, a common language or past colonial relationships decreases trade costs. These dummy variables are all significant with quite high negative coefficients both in the case of trade in goods and trade in services (with generally a larger impact in the case of trade in services). The coefficients for the country specific effects are generally significant. There are a few exceptions ascertain countries in the dataset have fewer observations and the country fixed effect cannot be

14. Waugh (2007) also calculates bilateral trade costs but through a formula derived from the model of Eaton and Kortum (2001), which is a Ricardian trade model with a continuum of goods and a probabilistic comparative advantage.

identified. Overall, the model is more adequate to explain trade costs in the case of goods than services (as indicated by lower r-square values for services trade).

What we capture in the country fixed effects is not guaranteed to be only related to regulations restricting trade. Some geographic or cultural characteristics not accounted for by distance and the usual dummy variables that can be found in gravity models would be captured as well. A difference in the collection of statistics would also be caught by the country fixed effect to the extent that it affects uniformly all the data from this country. However, most of the country regulations affecting trade with all partners are likely to be captured. In the case of trade in services, one can assume that most of the barriers are the same for all exporters as discriminating between partners is more difficult that in the case of trade in goods.

The results of the analysis can be seen in Table 3 for trade in goods and Table 4 for trade in services. The coefficients obtained for the country-specific fixed effects are values expressed relatively to the omitted country when creating the fixed effects (which is arbitrarily Australia the first country in alphabetical order). We normalise the data in order to obtain values between 0 and 1[15]. One could try to interpret the coefficients and to calculate a marginal impact, but at this stage we are interested in the ranking of countries.

Looking first at trade in goods, we find that Germany, Netherlands, Belgium and the US have the lowest country-specific trade costs in 2000-2005, suggesting a more liberal trade policy as well as an easy access for exporters. At the other end, countries found with relatively higher trade costs for the same period are Lithuania, Cyprus, Luxembourg and Estonia. This ranking is a bit different than the one previously obtained based on the MHR methodology. It should be stressed that it is not exactly the same kind of fixed effect that is measured through these two methodologies. The results here are also less sensitive to the number of zeros in the dataset.

15 . The minimum-maximum method of normalisation is used with the minimum set at -1.5 and the maximum at 1.5 (based on the lowest and highest figures obtained in all our estimations).

Table 3. Ranking of country-specific trade costs for total goods trade

Total trade in goods							
Country	2003	Country	2004	Country	2005	Country	2000-2005
Germany	0.45	Germany	0.45	Germany	0.45	Germany	0.45
Netherlands	0.48	Netherlands	0.48	Netherlands	0.48	Netherlands	0.48
Belgium	0.49	Belgium	0.49	Belgium	0.49	Belgium	0.49
United States	0.49	United States	0.49	United States	0.50	United States	0.49
Italy	0.50	Italy	0.51	Italy	0.51	Italy	0.50
United Kingdom	0.50	France	0.51	France	0.52	United Kingdom	0.50
France	0.51	United Kingdom	0.51	United Kingdom	0.52	France	0.51
Sweden	0.52	Sweden	0.52	Sweden	0.53	Sweden	0.52
Spain	0.53	Korea	0.52	Korea	0.53	Spain	0.53
Japan	0.54	Spain	0.53	Spain	0.54	Korea	0.54
Korea	0.54	Japan	0.54	Japan	0.54	Finland	0.54
Finland	0.54	Finland	0.54	Finland	0.55	Japan	0.55
Denmark	0.55	Denmark	0.55	Denmark	0.56	Denmark	0.55
Ireland	0.57	Hungary	0.57	Hungary	0.57	Ireland	0.57
Hungary	0.57	Ireland	0.57	Poland	0.58	Hungary	0.58
Austria	0.59	Poland	0.58	Czech Republic	0.58	Austria	0.59
Czech Republic	0.59	Austria	0.58	Ireland	0.59	Czech Republic	0.59
Portugal	0.60	Czech Republic	0.58	Austria	0.59	Australia	0.60
Australia	0.60	Portugal	0.60	Australia	0.60	Poland	0.60
Poland	0.60	Australia	0.60	Portugal	0.61	Portugal	0.60
Greece	0.62	Slovak Republic	0.62	Slovak Republic	0.63	Greece	0.63
Slovak Republic	0.63	Greece	0.63	Greece	0.64	Slovak Republic	0.64
Slovenia	0.66	Latvia	0.66	Latvia	0.65	Malta	0.66
Latvia	0.66	Malta	0.66	Slovenia	0.66	Latvia	0.66
Malta	0.66	Slovenia	0.66	Malta	0.68	Slovenia	0.66
Lithuania	0.70	Cyprus	0.70	Lithuania	0.70	Lithuania	0.72
Cyprus	0.74	Lithuania	0.70	Cyprus	0.74	Cyprus	0.72
Estonia	0.75	Luxembourg	0.74	Estonia	0.77	Luxembourg	0.76
Luxembourg	0.77	Estonia	0.77	Luxembourg	0.78	Estonia	0.77

The ranking is obtained through the coefficients estimated for country fixed effects in the equation described in Section 5. Coefficients are normalised between 0 and 1 (minimum-maximum normalisation). Countries with the lowest country-specific trade costs are on top of the Table.

Table 4. Ranking of country-specific trade costs for total services trade

Total trade in services							
Country	2003	Country	2004	Country	2005	Country	2000-2005
United Kingdom	0.23	Netherlands	0.30	United Kingdom	0.26	United Kingdom	0.29
Netherlands	0.23	United Kingdom	0.30	Netherlands	0.26	Netherlands	0.30
Austria	0.27	Austria	0.34	Denmark	0.28	Denmark	0.32
Belgium	0.27	Denmark	0.34	Ireland	0.30	Austria	0.33
Denmark	0.28	Belgium	0.36	Austria	0.31	Italy	0.35
United States	0.30	Italy	0.36	Italy	0.32	United States	0.35
Italy	0.31	Ireland	0.38	Belgium	0.32	Belgium	0.38
Poland	0.35	Germany	0.39	Cyprus	0.34	Cyprus	0.40
Greece	0.36	Cyprus	0.40	Germany	0.35	Greece	0.40
France	0.37	United States	0.40	Hungary	0.36	France	0.43
Germany	0.38	Greece	0.40	United States	0.36	Poland	0.43
Cyprus	0.38	Hungary	0.41	Greece	0.36	Hungary	0.44
Hungary	0.39	Latvia	0.41	Poland	0.38	Spain	0.44
Spain	0.41	France	0.43	Malta	0.38	Germany	0.48
Portugal	0.45	Finland	0.44	France	0.40	Portugal	0.49
Luxembourg	0.46	Poland	0.45	Finland	0.40	Ireland	0.50
Slovak Republic	0.47	Malta	0.46	Spain	0.43	Malta	0.54
Ireland	0.48	Spain	0.48	Slovak Republic	0.43	Luxembourg	0.55
Latvia	0.48	Portugal	0.51	Portugal	0.45	Latvia	0.55
Slovenia	0.50	Slovenia	0.52	Slovenia	0.47	Sweden	0.55
Sweden	0.52	Luxembourg	0.54	Lithuania	0.48	Finland	0.56
Japan	0.56	Lithuania	0.55	Luxembourg	0.51	Japan	0.56
Lithuania	0.57	Japan	0.55	Latvia	0.52	Slovak Republic	0.58
Czech Republic	0.58	Slovak Republic	0.56	Estonia	0.55	Slovenia	0.59
Finland	0.58	Sweden	0.59	Sweden	0.55	Australia	0.60
Estonia	0.59	Estonia	0.60	Japan	0.56	Czech Republic	0.61
Australia	0.60	Australia	0.60	Czech Republic	0.58	Lithuania	0.63
Korea	0.67	Czech Republic	0.62	Korea	0.59	Estonia	0.64
Malta	0.67	Korea	0.70	Australia	0.60	Korea	0.66

The ranking is obtained through the coefficients estimated for country fixed effects in the equation described in Section 5. Coefficients are normalised between 0 and 1 (minimum-maximum normalisation). Countries with the lowest country-specific trade costs are on top of the Table.

For trade in services, we find similar countries in the top of the table, such as the Netherlands and Belgium. Some countries like Austria, Denmark and the United Kingdom seem however to have relatively lower country-specific trade costs in the case of services as compared to trade in goods and are now in the top of the Table. At the bottom, we find Estonia, Australia, Korea and Malta. Table 14 in the Annex presents results for 8 services sectors. Again, they seem consistent with what we know about trade in services and differences between countries in terms of trade costs. For example, Luxembourg has on average trade costs relatively higher than other OECD countries when looking at total trade in services in Table 4. But in Table 14, it is the country with the lowest trade costs for financial services and business services.

An interesting question is whether there is some correlation between these estimates and the Product Market Regulation indicators previously mentioned. The next step in the analysis will be to compare the coefficients estimated for country-specific fixed effects with the PMR indicators for 2003. Looking at Figure 1 in Section 1, there is some similarity in the ranking of countries and this should be further investigated. The PMR indicators could also be introduced as independent variables in the regression of

trade costs. Chen and Novy (2008) find that policy variables (such as the extent of Technical Barriers to Trade) are significant in such a regression. Their analysis covers only goods and could be extended to services.

5. Concluding remarks

This paper has explored two methodologies of estimating trade restrictiveness in services from a top down approach, inferring trade costs directly from observed trade patterns. The first methodology applies the first step in Helpman, Melitz and Rubinstein (2008) gravity model, which estimates the probability that a country pair trades with each other. The great advantage of this approach is that the only trade data that is needed is information on whether or not country pairs trade with each other. When applied to trade in goods, for which data are readily available and of a reasonably good quality, the methodology produces reasonable results. However, as has been documented in the paper, it is very difficult to assess which countries trade with each other, and the estimated results are quite sensitive to the assumptions being made on missing observations. The methodology should therefore be used with caution when there is poor data availability.

The other methodology builds on a recent study by Novy (2008), and although more demanding in terms of data on actual trade flows, it provides more reasonable results. A possible explanation is that the intensive margin is more important for services trade, and most of the action takes place there. To conclude, the top down approach taken in this paper provides some promising avenues to complement information on regulatory profiles with direct estimates of the true services trade restrictiveness which should ideally be a single trade cost estimate that, when replacing all existing fixed and variable trade costs, will yield the same trade volume and the same number of trading partners as the existing trade regime.

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ANNEX – ESTIMATION STRATEGY BASED ON HMR (2008) AND TABLES

Estimation Strategy based on Helpman, Melitz and Rubinstein (2008)

Helpman, Melitz and Rubinstein (2008, HMR) provide a theoretical and empirical framework that allows controlling for the extensive margin of trade, i.e. the fraction of firms that is exporting from country j to country i, albeit using aggregate trade data. We follow their theoretical model and adopt the first part of their empirical specification strategy in order to infer importer fixed costs. In their model, operating profits of firms heterogeneous in productivity are given by:

$$\pi_{ij}(a) = (1-\alpha)\left(\frac{\tau_{ij}c_j a}{\alpha P_i}\right)^{1-\sigma} Y_i - c_j f_{ij}$$

The profits of a firm exporting from country j to country i are the higher the lower bilateral variable trade costs τ_{ij}, the lower input costs c_j, the higher the productivity a of the firm, the higher the income Y_i and the price index P_i of importing country i and the lower bilateral fixed costs f_{ij} associated to exporting. Setting $\pi_{ij}(a) = 0$ gives the zero-profit condition for the firm with productivity level a_{ij} that is indifferent between exporting and serving only the domestic market.

$$(1-\alpha)\left(\frac{\tau_{ij}c_j a_{ij}}{\alpha P_i}\right)^{1-\sigma} Y_i = c_j f_{ij}$$

Using the zero-profit condition, HMR define a latent variable Z_{ij} as the ratio of variable export profits of the most productive firm to fixed export costs. Hence, the latent variable Z_{ij} indicates whether two countries trade with each other or not: If variable export profits of the most productive firm (a_L) exceed the fixed costs of exporting (*i.e.*, $Z_{ij} \geq 1$), then at least one firm, *i.e.*, at least the most productive firm, will export to market i.

$$Z_{ij} = \frac{(1-\alpha)\alpha^{\sigma-1}\left(P_i\frac{\alpha}{c_j\tau_{ij}}\right)^{\sigma-1} Y_i a_L^{1-\sigma}}{c_j f_{ij}}$$

To export from country j to country i, firms must burden fixed costs f_{ij} of exporting. These fixed exports costs are the same for all firms but vary by partner country, i.e. are specific to a bilateral country pair. In the model, fixed consist of four components, i.e. costs specific to the exporting country, costs specific to the importing country, costs specific to a given country pair and random bilateral costs: $f_{ij} = e^{(\phi_j + \phi_i + \kappa\phi_{ij} - \nu_{ij})}$.

While fixed costs occur only once, namely when the firm decides to enter the foreign market, variable costs, *e.g.*, shipping costs, depend on the amount of goods exported. Variable trade costs are as well composed of a systemic part as captured by bilateral distance between countries and a stochastic part: $\tau_{ij}^{\sigma-1} = D_{ij}^{\gamma} e^{-u_{ij}}$.

Inserting the expressions for fixed and variable export costs into the equation, taking the logarithm and rearranging yields the following expression:

$$\ln z_{ij} = \overbrace{\ln(1-\alpha) + (1-\varepsilon)\ln a_k}^{\gamma_0} + \overbrace{(\varepsilon-1)\ln\alpha - \varepsilon\ln c_j}^{\xi_j} - \overbrace{\phi_j}^{\phi_i} + \overbrace{(\varepsilon-1)\ln P_i + \ln Y_i}^{\zeta_i} - \phi_i$$
$$- \gamma\ln D_{ij} - \kappa\phi_{ij} + \overbrace{u_{ij} + v_{ij}}^{\eta_{ij}}$$

Or in short-hand notation:

$$z_{ij} = \gamma_0 + \xi_j + \zeta_i - \gamma d_{ij} - \kappa\phi_{ij} + \eta_{ij}$$

Hence, the ratio of variable export profits to fixed costs is a function of a constant γ_0, an exporter fixed effect ξ_j, distance d_{ij}, bilateral country characteristics ϕ_{ij} reflecting fixed (and potentially variable) costs such as common border and language, as well as of an importer fixed effect ζ_i that contains among other terms fixed market entry costs ϕ_i:

$$\zeta_i = (\varepsilon-1)p_i + y_i - \phi_i = (\varepsilon-1)\ln P_i + \ln Y_i - \phi_i$$

The variable z_{ij} is latent, *i.e.*, not observable. However, we know that if country j and country i trade with each other, $z_{ij} > 0$, while if they do not, $z_{ij} = 0$. This distinction in two cases allows us to estimate a probit model with the dependent variable being one if two countries trade with each other and zero if they do not:

$$\Pr(Trade_{ij} = 1 | observed\ var.s) = \Phi(\gamma_0 + \xi_j + \zeta_i - \gamma d_{ij} - \kappa\phi_{ij} + \eta_{ij})$$

In estimating the probit regression, we include bilateral variables reflecting fixed and variable bilateral trade costs, i.e., distance, common border, colonial relationship and common language[16], as well as exporter and importer dummies that control for country characteristics. However, our main interest is not the estimation of the probability of two countries trading with each other but the estimation of the importer fixed effect ζ_i from which we will be able to infer the unobservable fixed trade costs ϕ_i associated to the importing country.[17]

Therefore, we take the estimated importer fixed effect $\hat{\zeta}_i$ from the probit regression and use it as a dependent variable in a second stage OLS regression. More specifically, we regress $\hat{\zeta}_i$ on the income and price levels of importing countries as measured by current GDP in current US dollars from World Development Indicators 2007 and the price level of GDP from Penn World Tables respectively.[18]

16 . The source of bilateral variables is CEPII.

17 . We estimate the probit regression without a constant term so that we are able to include all country dummies. Typically, the constant term is kept and one country dummy is omitted from the regression. Then, coefficients of country dummies reflect the difference in impact between the respective country and the omitted country. We can easily recover these standard coefficients if we subtract the fixed effect of the potentially omitted country from the absolute fixed effects of all other countries. However, estimated fixed costs stay the same, irrespective of whether absolute or relative terms are used to estimate them.

18. We use GDP and the price level of GDP in the second stage estimation of all four service sectors. However, we plan to estimate the second stage regression for the three pilot sectors with sector specific expenditure and price data when available.

$$\hat{\xi}_i = \beta_0 + \beta_1 \ln P_i + \beta_2 \ln Y_i + u_i \qquad with\ u_i = -\phi_i + \varepsilon_i$$

The residual $u_i = -\phi_i + \varepsilon_i$ of the second stage OLS regression indicates the part of the importer fixed effect that cannot be explained by price and income level of the importing country. Hence, it captures the importer specific fixed costs that each firm has to burden when it starts exporting to country i and a random country shock ε_i. Higher fixed costs ϕ_i will result in a lower residual for country i. Therefore, the ranking of residuals should reflect the ranking of fixed costs of countries. A decreasing ranking of residuals would hence put importing countries with lowest fixed costs at the top of the ranking. However, for the sake of clarity, residuals have been normalized between zero and one so that lower values indicate lower fixed costs.

A last remark should be made to the possibility of omitted variables in the second stage OLS regression. We follow the theoretical model of HMR in which importer fixed effects are explained by income, prices and fixed costs. However, in practice importer fixed effects might be determined by other variables as well. For instance, imagine that variable trade costs are not only a function of bilateral distance but also of importer specific variables such as a tariff. Then, this tariff will be captured by importer fixed effects in the probit regression and consequently also by the residual in the second stage OLS regression.

Table A1. Ranking of importer fixed costs for total services

A. Missing values are set to zero								B. Missing values are not changed							
Importer	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**	**Importer**	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**
Italy	0.142	Italy	0.152	Italy	0.139	Italy	0.284	Estonia	0.338	Poland	0.319	Poland	0.263	Greece	0.356
France	0.167	France	0.158	France	0.166	France	0.301	Greece	0.367	Hungary	0.337	Austria	0.304	Austria	0.387
Netherlands	0.219	UK	0.207	UK	0.234	Netherlands	0.352	India	0.368	China	0.386	Estonia	0.328	France	0.408
Austria	0.271	Poland	0.214	Poland	0.235	Russia	0.362	Austria	0.375	Estonia	0.411	Belgium	0.347	Estonia	0.410
Belgium	0.288	Netherlands	0.214	Denmark	0.241	Czech Rep.	0.364	Portugal	0.388	Luxembourg	0.446	Hungary	0.353	Belgium	0.417
Czech Rep.	0.293	Hungary	0.231	Netherlands	0.247	Austria	0.375	France	0.432	Finland	0.453	Portugal	0.355	China	0.421
Russia	0.297	Estonia	0.257	Estonia	0.252	Hungary	0.384	Slovenia	0.455	Sweden	0.469	Turkey	0.406	India	0.427
Luxembourg	0.322	Austria	0.273	Hungary	0.273	Belgium	0.392	Czech Rep.	0.456	Australia	0.472	Czech Rep.	0.426	Turkey	0.446
Greece	0.327	Belgium	0.287	Czech Rep.	0.280	UK	0.404	Poland	0.464	South Africa	0.474	Sweden	0.432	Portugal	0.453
Estonia	0.347	Luxembourg	0.292	Belgium	0.288	Luxembourg	0.414	Sweden	0.469	Czech Rep.	0.477	Slovak Rep.	0.444	Czech Rep.	0.471
Hungary	0.353	Greece	0.299	Austria	0.302	Denmark	0.424	Hungary	0.483	Slovenia	0.507	Luxembourg	0.458	Poland	0.473
Slovenia	0.415	Slovenia	0.326	Sweden	0.344	Sweden	0.425	Luxembourg	0.507	Indonesia	0.531	Australia	0.465	Luxembourg	0.475
Finland	0.420	Czech Rep.	0.339	Luxembourg	0.357	Greece	0.430	Australia	0.519	Slovak Rep.	0.581	Indonesia	0.505	Sweden	0.480
Portugal	0.423	Portugal	0.443	Slovenia	0.393	Slovenia	0.442	Finland	0.522	Iceland	0.587	Finland	0.507	Hungary	0.490
Slovak Rep.	0.451	Finland	0.467	Slovak Rep.	0.402	Portugal	0.449	Ireland	0.525	Korea, Rep.	0.625	Slovenia	0.539	Slovenia	0.493
Ireland	0.459	Ireland	0.482	China	0.445	Estonia	0.455	Norway	0.525	Mexico	0.706	South Africa	0.558	Slovak Rep.	0.510
India	0.480	China	0.493	Portugal	0.481	Finland	0.465	Russia	0.536	Chile	0.719	Ireland	0.589	Ireland	0.524
Denmark	0.497	Australia	0.508	Finland	0.506	Poland	0.482	Slovak Rep.	0.547	Austria		Korea, Rep.	0.618	Indonesia	0.526
Australia	0.505	Denmark	0.518	Australia	0.518	Slovak Rep.	0.490	South Africa	0.561	Belgium		Iceland	0.680	South Africa	0.527
Sweden	0.512	Canada	0.520	Greece	0.519	India	0.499	Korea, Rep.	0.565	Brazil		Chile	0.745	Norway	0.533
Canada	0.515	Sweden	0.535	Canada	0.523	Canada	0.503	Brazil	0.581	Canada		Mexico	0.785	Russia	0.537
China	0.515	Indonesia	0.539	Ireland	0.544	Australia	0.508	Iceland	0.637	Denmark		New Zealand	0.895	Australia	0.542
UK	0.527	Slovak Rep.	0.566	Indonesia	0.550	China	0.522	Mexico	0.668	France		Brazil		Iceland	0.543
Indonesia	0.536	South Africa	0.590	USA	0.576	Ireland	0.527	Chile	0.712	Germany		Canada		Finland	0.555
South Africa	0.573	USA	0.599	South Africa	0.613	Indonesia	0.550	Belgium		Greece		China		Korea, Rep.	0.585
USA	0.575	Japan	0.647	Japan	0.657	USA	0.553	Canada		India		Denmark		Brazil	0.590
Spain	0.590	Spain	0.650	Spain	0.669	Spain	0.565	China		Ireland		France		New Zealand	0.621
Japan	0.608	Chile	0.697	Chile	0.730	South Africa	0.565	Denmark		Israel		Germany		Chile	0.621
Brazil	0.620	Norway	0.706	Korea, Rep.	0.730	Japan	0.590	Germany		Italy		Greece		Mexico	0.677
Germany	0.663	New Zealand	0.737	Norway	0.739	Brazil	0.599	Indonesia		Japan		India		Canada	
Korea, Rep.	0.666	Korea, Rep.	0.741	Germany	0.742	Germany	0.619	Israel		Netherlands		Israel		Denmark	
New Zealand	0.672	Germany	0.745	Turkey	0.797	Turkey	0.624	Italy		New Zealand		Italy		Germany	
Chile	0.675	Turkey	0.763	Mexico	0.821	Chile	0.626	Japan		Norway		Japan		Israel	
Norway	0.682	Mexico	0.768	Israel	0.849	Korea, Rep.	0.628	Netherlands		Portugal		Netherlands		Italy	
Poland	0.686	Israel	0.810	Switzerland	0.878	Norway	0.629	New Zealand		Russia		Norway		Japan	
Turkey	0.693	Switzerland	0.846	Iceland	0.958	Israel	0.660	Spain		Spain		Russia		Netherlands	
Mexico	0.721	Iceland	0.882	Brazil		Mexico	0.665	Switzerland		Switzerland		Spain		Spain	
Israel	0.722	Brazil		India		Switzerland	0.672	Turkey		Turkey		Switzerland		Switzerland	
Switzerland	0.753	India		New Zealand		Iceland	0.699	UK		UK		UK		UK	
Iceland	0.820	Russia		Russia		New Zealand		USA		USA		USA		USA	

Notes: Higher ranked countries have lower fixed cost. For shaded countries fixed costs could not be estimated because they are either dropped in the probit regression or no price data are available. While in A. each importer faces 207 exporting partners, in B. each importer may have a different number of partners. Countries are ranked according to the residual obtained from second stage OLS regressions of importer fixed effects on income and price levels. The number of observations in these regressions correspond to the number of countries, i.e. the number of fixed effects obtained from the first stage probit regression. Residuals have been normalised between zero and one with higher values reflecting higher fixed costs. However, since each ranking is based on a different OLS regression, values cannot be compared between years and sectors.

Table A2. Ranking of importer fixed costs for communication services

A. Missing values are set to zero								B. Missing values are not changed							
Importer	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**	**Importer**	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**
Sweden	0.285	Germany	0.344	Germany	0.360	Russia	0.371	Australia	0.254	Sweden	0.190	Australia	0.251	Australia	0.349
Russia	0.295	Poland	0.368	Sweden	0.407	Sweden	0.386	South Africa	0.309	Australia	0.292	Denmark	0.309	New Zealand	0.362
Germany	0.352	Sweden	0.400	Denmark	0.422	Germany	0.399	Estonia	0.372	France	0.342	Belgium	0.333	Germany	0.380
Australia	0.435	Norway	0.429	Israel	0.438	Netherlands	0.453	Germany	0.380	New Zealand	0.353	Chile	0.366	South Africa	0.402
Estonia	0.438	USA	0.434	Norway	0.439	Australia	0.453	New Zealand	0.380	Canada	0.391	New Zealand	0.368	Canada	0.406
USA	0.440	Hungary	0.435	USA	0.439	USA	0.459	Sweden	0.387	Belgium	0.410	Canada	0.414	Chile	0.413
Portugal	0.442	Iceland	0.442	Switzerland	0.443	Portugal	0.463	Canada	0.405	Netherlands	0.422	South Africa	0.438	Sweden	0.415
Israel	0.444	Estonia	0.449	Hungary	0.444	France	0.468	Switzerland	0.408	Estonia	0.424	Portugal	0.451	UK	0.417
Belgium	0.447	Switzerland	0.450	Estonia	0.449	Austria	0.470	Israel	0.416	Chile	0.424	Estonia	0.472	Belgium	0.440
Iceland	0.449	Israel	0.454	Australia	0.467	Estonia	0.470	Belgium	0.422	Hungary	0.454	Luxembourg	0.472	Netherlands	0.449
South Africa	0.458	Australia	0.456	Greece	0.473	Hungary	0.472	Brazil	0.445	South Africa	0.455	Switzerland	0.474	Portugal	0.450
Switzerland	0.462	New Zealand	0.470	Czech Rep.	0.473	New Zealand	0.478	Norway	0.454	Iceland	0.470	Indonesia	0.478	Switzerland	0.458
UK	0.472	Greece	0.476	Poland	0.474	South Africa	0.481	Portugal	0.459	Korea, Rep.	0.497	Greece	0.484	Indonesia	0.466
Czech Rep.	0.474	Czech Rep.	0.477	Belgium	0.475	Czech Rep.	0.483	Iceland	0.466	Luxembourg	0.497	Hungary	0.495	Brazil	0.471
Norway	0.474	Belgium	0.479	France	0.485	Iceland	0.483	Russia	0.474	Indonesia	0.507	Israel	0.518	Estonia	0.473
Hungary	0.479	France	0.485	Netherlands	0.489	Switzerland	0.487	Turkey	0.478	Greece	0.520	Norway	0.522	Iceland	0.483
Greece	0.481	Netherlands	0.487	Slovak Rep.	0.490	Greece	0.488	France	0.489	Mexico	0.521	Korea, Rep.	0.524	Israel	0.483
France	0.493	Canada	0.491	Chile	0.491	Norway	0.490	Czech Rep.	0.521	Israel	0.521	Iceland	0.530	Luxembourg	0.491
Canada	0.501	South Africa	0.497	New Zealand	0.495	Israel	0.492	Chile	0.524	China	0.527	China	0.543	Russia	0.492
Turkey	0.509	Indonesia	0.503	Indonesia	0.497	Canada	0.498	Slovenia	0.541	Czech Rep.	0.529	Italy	0.545	Denmark	0.498
Austria	0.514	UK	0.505	Turkey	0.497	UK	0.498	Indonesia	0.543	Switzerland	0.542	Czech Rep.	0.550	France	0.508
Netherlands	0.516	Slovenia	0.508	UK	0.497	Belgium	0.500	Spain	0.544	Norway	0.547	Poland	0.558	India	0.525
Indonesia	0.517	Finland	0.515	Slovenia	0.500	Finland	0.501	China	0.549	Finland	0.564	Finland	0.558	Norway	0.534
Slovak Rep.	0.518	Slovak Rep.	0.517	South Africa	0.505	Slovak Rep.	0.505	Korea, Rep.	0.552	Italy	0.571	Japan	0.580	Spain	0.536
Slovenia	0.519	Turkey	0.519	Iceland	0.508	Italy	0.505	Luxembourg	0.555	Spain	0.571	Austria	0.582	Hungary	0.541
India	0.520	Austria	0.525	Canada	0.508	Poland	0.508	Japan	0.562	Slovenia	0.580	Slovak Rep.	0.588	Greece	0.543
Italy	0.524	Chile	0.529	China	0.522	Slovenia	0.509	Hungary	0.565	Poland	0.583	Slovenia	0.599	Czech Rep.	0.543
Japan	0.526	Italy	0.532	Austria	0.531	Indonesia	0.510	India	0.572	Austria	0.603	Mexico	0.618	Austria	0.544
Finland	0.531	Japan	0.546	Finland	0.533	Chile	0.512	Italy	0.572	Slovak Rep.	0.606	Turkey	0.633	China	0.553
Luxembourg	0.533	Korea, Rep.	0.547	Italy	0.537	India	0.530	Denmark	0.576	Denmark	0.629	Ireland	0.745	Slovenia	0.553
Brazil	0.540	China	0.549	Korea, Rep.	0.537	Japan	0.534	Austria	0.578	Japan	0.638	Brazil		Korea, Rep.	0.563
Korea, Rep.	0.552	Mexico	0.572	Japan	0.557	Turkey	0.537	Greece	0.579	Turkey	0.644	France		Poland	0.563
China	0.559	Portugal	0.580	Portugal	0.562	Brazil	0.544	Finland	0.602	Ireland	0.673	Germany		Turkey	0.568
Chile	0.575	Ireland	0.594	Luxembourg	0.621	China	0.552	Slovak Rep.	0.634	Brazil		India		Finland	0.569
Poland	0.606	Luxembourg	0.612	Ireland	0.624	Korea, Rep.	0.559	Mexico	0.657	Germany		Netherlands		Italy	0.575
Denmark	0.637	Denmark	0.655	Mexico	0.625	Denmark	0.561	Ireland	0.776	India		Russia		Slovak Rep.	0.601
Ireland	0.644	Spain	0.670	Spain	0.685	Luxembourg	0.567	Netherlands		Portugal		Spain		Mexico	0.610
Mexico	0.666	Brazil		Brazil		Ireland	0.578	Poland		Russia		Sweden		Japan	0.619
Spain	0.671	India		India		Mexico	0.614	UK		UK		UK		Ireland	0.653
New Zealand		Russia		Russia		Spain	0.634	USA		USA		USA		USA	

Notes: Higher ranked countries have lower fixed cost. For shaded countries fixed costs could not be estimated because they are either dropped in the probit regression or no price data are available. While in A. each importer faces 207 exporting partners, in B. each importer may have a different number of partners. Countries are ranked according to the residual obtained from second stage OLS regressions of importer fixed effects on income and price levels. The number of observations in these regressions correspond to the number of countries, i.e. the number of fixed effects obtained from the first stage probit regression. Residuals have been normalised between zero and one with higher values reflecting higher fixed costs. However, since each ranking is based on a different OLS regression, values cannot be compared between years and sectors.

Table A3. Ranking of importer fixed costs for construction services

A. Missing values are set to zero								B. Missing values are not changed							
Importer	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**	**Importer**	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**
Russia	0.324	Germany	0.303	Germany	0.314	Germany	0.361	South Africa	0.336	Iceland	0.269	Iceland	0.272	Iceland	0.372
Germany	0.339	Poland	0.393	Iceland	0.417	Russia	0.380	Iceland	0.355	Germany	0.299	South Africa	0.353	Germany	0.372
Sweden	0.382	Iceland	0.395	Israel	0.429	Sweden	0.421	Brazil	0.376	Australia	0.364	Australia	0.363	Australia	0.388
Estonia	0.437	Switzerland	0.429	Switzerland	0.438	France	0.434	Australia	0.379	Estonia	0.384	New Zealand	0.372	South Africa	0.396
Iceland	0.447	Sweden	0.431	South Africa	0.446	Italy	0.444	Switzerland	0.384	France	0.386	Belgium	0.417	USA	0.413
Slovak Rep.	0.448	Estonia	0.434	Sweden	0.449	Netherlands	0.444	Canada	0.385	Sweden	0.414	Japan	0.421	New Zealand	0.424
France	0.456	France	0.435	France	0.454	Austria	0.448	USA	0.403	New Zealand	0.425	Israel	0.427	Estonia	0.439
South Africa	0.459	Italy	0.447	Estonia	0.455	Iceland	0.459	Germany	0.408	USA	0.430	USA	0.428	Switzerland	0.446
Switzerland	0.460	Slovak Rep.	0.453	Japan	0.456	Slovak Rep.	0.460	Slovenia	0.421	Chile	0.441	Estonia	0.429	Indonesia	0.449
Japan	0.461	Japan	0.456	Belgium	0.463	Estonia	0.463	New Zealand	0.423	South Africa	0.448	Korea, Rep.	0.430	Netherlands	0.456
Belgium	0.461	Austria	0.463	Czech Rep.	0.467	Japan	0.470	Estonia	0.424	Portugal	0.449	France	0.436	Brazil	0.464
Italy	0.463	Australia	0.468	Turkey	0.473	Switzerland	0.473	Japan	0.434	Italy	0.454	Switzerland	0.437	Luxembourg	0.478
Austria	0.475	Finland	0.477	Slovenia	0.473	Czech Rep.	0.482	Mexico	0.434	Mexico	0.458	Portugal	0.439	Canada	0.480
Canada	0.485	Czech Rep.	0.481	Austria	0.478	South Africa	0.483	Luxembourg	0.470	Austria	0.465	Sweden	0.455	Japan	0.483
Norway	0.489	Slovenia	0.481	Italy	0.483	Slovenia	0.486	Slovak Rep.	0.480	Switzerland	0.466	Mexico	0.466	Sweden	0.484
Slovenia	0.492	Turkey	0.495	Poland	0.489	Australia	0.495	Denmark	0.483	Finland	0.471	Canada	0.504	France	0.485
Australia	0.493	South Africa	0.496	China	0.494	Belgium	0.503	Sweden	0.485	Canada	0.481	Slovenia	0.508	Slovenia	0.485
Czech Rep.	0.495	Hungary	0.496	Korea, Rep.	0.495	Hungary	0.507	France	0.486	Japan	0.482	Austria	0.510	Mexico	0.488
Luxembourg	0.497	Israel	0.497	Hungary	0.498	Poland	0.509	Belgium	0.489	Slovak Rep.	0.483	Netherlands	0.515	Belgium	0.490
New Zealand	0.498	USA	0.499	Australia	0.499	Portugal	0.509	Russia	0.506	Belgium	0.492	Indonesia	0.520	Chile	0.495
India	0.500	Belgium	0.502	Slovak Rep.	0.499	Finland	0.509	Netherlands	0.511	Korea, Rep.	0.507	Italy	0.525	Russia	0.497
Brazil	0.505	Portugal	0.515	Greece	0.502	Israel	0.510	China	0.512	Slovenia	0.508	UK	0.526	Italy	0.500
Greece	0.507	Chile	0.519	USA	0.512	Greece	0.511	Korea, Rep.	0.515	Israel	0.536	Chile	0.529	Korea, Rep.	0.500
Finland	0.514	China	0.526	Indonesia	0.515	India	0.511	Italy	0.517	Netherlands	0.537	Czech Rep.	0.547	Spain	0.501
China	0.523	Canada	0.527	Portugal	0.518	Indonesia	0.514	Austria	0.519	Turkey	0.537	Turkey	0.555	Israel	0.507
Portugal	0.528	Korea, Rep.	0.539	Netherlands	0.538	USA	0.529	Chile	0.531	Czech Rep.	0.539	China	0.557	Austria	0.510
Mexico	0.529	Indonesia	0.539	Finland	0.542	Canada	0.530	India	0.538	Indonesia	0.539	Greece	0.560	Slovak Rep.	0.511
USA	0.531	Norway	0.545	Canada	0.546	Turkey	0.532	Turkey	0.552	Denmark	0.541	Slovak Rep.	0.578	India	0.526
Turkey	0.537	Mexico	0.552	Denmark	0.548	Norway	0.533	Indonesia	0.553	Spain	0.556	Hungary	0.591	Denmark	0.531
Indonesia	0.539	Netherlands	0.557	UK	0.553	Brazil	0.538	Czech Rep.	0.555	Hungary	0.559	Finland	0.591	Czech Rep.	0.544
Netherlands	0.543	Ireland	0.582	Norway	0.562	Korea, Rep.	0.543	Finland	0.569	Poland	0.566	Denmark	0.609	Portugal	0.555
Ireland	0.545	Greece	0.585	Luxembourg	0.566	China	0.544	Ireland	0.591	China	0.572	Poland	0.618	China	0.556
Korea, Rep.	0.547	UK	0.596	Mexico	0.566	Ireland	0.553	Portugal	0.591	Ireland	0.635	Norway	0.724	Turkey	0.569
Hungary	0.563	Denmark	0.610	Chile	0.598	Chile	0.554	Spain	0.593	Greece	0.671	Ireland	0.786	Finland	0.576
Israel	0.567	Spain	0.633	Ireland	0.630	Mexico	0.562	Greece	0.623	Luxembourg	0.695	Brazil		Poland	0.577
Poland	0.572	Luxembourg	0.647	Spain	0.634	Luxembourg	0.563	Norway	0.629	UK	0.719	Germany		Greece	0.581
UK	0.582	Brazil		Brazil		Denmark	0.564	Hungary	0.646	Norway	0.724	India		Ireland	0.583
Chile	0.590	India		India		UK	0.576	Israel	0.675	Brazil		Luxembourg		Hungary	0.591
Denmark	0.601	New Zealand		New Zealand		Spain	0.594	UK	0.717	India		Russia		Norway	0.643
Spain	0.615	Russia		Russia		New Zealand		Poland		Russia		Spain		UK	0.653

Notes: Higher ranked countries have lower fixed cost. For shaded countries fixed costs could not be estimated because they are either dropped in the probit regression or no price data are available. While in A. each importer faces 207 exporting partners, in B. each importer may have a different number of partners. Countries are ranked according to the residual obtained from second stage OLS regressions of importer fixed effects on income and price levels. The number of observations in these regressions correspond to the number of countries, i.e. the number of fixed effects obtained from the first stage probit regression. Residuals have been normalised between zero and one with higher values reflecting higher fixed costs. However, since each ranking is based on a different OLS regression, values cannot be compared between years and sectors.

Table A4. Ranking of importer fixed costs for other business services

A. Missing values are set to zero							
Importer	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**
Russia	0.269	Poland	0.352	Germany	0.383	Russia	0.343
Sweden	0.342	Germany	0.375	Czech Rep.	0.444	Sweden	0.408
Germany	0.389	Luxembourg	0.436	Hungary	0.445	Germany	0.417
Czech Rep.	0.421	Czech Rep.	0.442	Poland	0.446	Austria	0.420
UK	0.441	Norway	0.446	Luxembourg	0.448	Czech Rep.	0.432
Austria	0.448	USA	0.456	USA	0.452	Netherlands	0.436
Luxembourg	0.456	Austria	0.460	Norway	0.462	Hungary	0.453
Hungary	0.456	Sweden	0.463	Austria	0.463	Denmark	0.457
Belgium	0.459	UK	0.463	Slovak Rep.	0.463	Slovak Rep.	0.458
Slovak Rep.	0.472	Hungary	0.470	Sweden	0.468	France	0.460
Slovenia	0.478	Denmark	0.475	Denmark	0.470	Italy	0.463
Ireland	0.480	Slovak Rep.	0.480	Switzerland	0.473	UK	0.473
Greece	0.482	Belgium	0.483	Ireland	0.473	Slovenia	0.480
Australia	0.483	China	0.483	Netherlands	0.475	Australia	0.481
Italy	0.484	Israel	0.485	China	0.475	Greece	0.487
Denmark	0.484	Estonia	0.486	Turkey	0.478	USA	0.487
France	0.486	Switzerland	0.489	Indonesia	0.480	Norway	0.500
Netherlands	0.487	Netherlands	0.489	Israel	0.481	Luxembourg	0.501
USA	0.496	Slovenia	0.495	Slovenia	0.481	Estonia	0.502
Norway	0.503	Australia	0.495	Belgium	0.484	South Africa	0.508
South Africa	0.505	Italy	0.496	Italy	0.485	Belgium	0.512
Switzerland	0.506	Turkey	0.496	Greece	0.496	India	0.514
Estonia	0.514	Greece	0.496	France	0.501	Poland	0.517
China	0.514	South Africa	0.498	South Africa	0.502	Portugal	0.518
India	0.517	France	0.504	Australia	0.503	Switzerland	0.519
Israel	0.517	Indonesia	0.508	Japan	0.506	Ireland	0.520
Indonesia	0.519	Japan	0.516	Estonia	0.512	Japan	0.520
Iceland	0.521	Ireland	0.523	UK	0.513	Indonesia	0.524
Turkey	0.529	Iceland	0.531	Korea, Rep.	0.517	China	0.532
Portugal	0.529	Korea, Rep.	0.537	New Zealand	0.518	Israel	0.533
Japan	0.536	Chile	0.552	Iceland	0.522	Iceland	0.536
Korea, Rep.	0.538	Canada	0.562	Canada	0.540	Turkey	0.541
New Zealand	0.548	Mexico	0.610	Chile	0.554	Korea, Rep.	0.546
Chile	0.552	Finland	0.625	Mexico	0.620	Canada	0.551
Canada	0.557	Portugal	0.629	Finland	0.631	Chile	0.555
Brazil	0.567	Spain	0.692	Portugal	0.638	Finland	0.566
Mexico	0.600	Brazil		Spain	0.699	Brazil	0.572
Finland	0.608	India		Brazil		Mexico	0.610
Poland	0.633	New Zealand		India		Spain	0.648
Spain	0.674	Russia		Russia		New Zealand	

B. Missing values are not changed							
Importer	**2003**	**Importer**	**2004**	**Importer**	**2005**	**Importer**	**00-05**
New Zealand	0.329	Australia	0.310	Ireland	0.355	Netherlands	0.358
Austria	0.390	Austria	0.350	Luxembourg	0.378	Austria	0.404
South Africa	0.394	Luxembourg	0.350	Australia	0.410	Sweden	0.419
Australia	0.404	South Africa	0.360	Denmark	0.427	South Africa	0.433
Canada	0.406	Portugal	0.404	Canada	0.431	France	0.444
Ireland	0.440	Chile	0.420	South Africa	0.432	Italy	0.445
Iceland	0.446	Denmark	0.423	Chile	0.433	Australia	0.447
Luxembourg	0.450	New Zealand	0.427	Japan	0.435	Belgium	0.448
China	0.454	Norway	0.431	New Zealand	0.442	Luxembourg	0.450
Czech Rep.	0.457	Switzerland	0.463	Korea, Rep.	0.443	Ireland	0.456
Belgium	0.461	Israel	0.465	Iceland	0.446	Russia	0.466
Indonesia	0.461	Ireland	0.466	Austria	0.452	Canada	0.469
Sweden	0.463	Korea, Rep.	0.466	Portugal	0.454	Czech Rep.	0.469
Chile	0.470	China	0.471	Indonesia	0.469	Switzerland	0.470
Norway	0.481	Japan	0.476	China	0.481	Indonesia	0.472
Israel	0.486	Canada	0.478	Czech Rep.	0.494	Chile	0.472
Slovenia	0.486	Czech Rep.	0.483	Hungary	0.502	New Zealand	0.472
Korea, Rep.	0.505	Indonesia	0.500	Israel	0.513	Denmark	0.482
Switzerland	0.511	France	0.513	Slovenia	0.520	India	0.489
Russia	0.516	Spain	0.516	France	0.521	Slovenia	0.498
Denmark	0.519	Iceland	0.533	Slovak Rep.	0.535	Slovak Rep.	0.502
Japan	0.525	Estonia	0.536	Poland	0.542	Japan	0.508
Mexico	0.526	Italy	0.555	Greece	0.560	Korea, Rep.	0.508
Brazil	0.527	Slovenia	0.573	Estonia	0.574	Israel	0.509
Turkey	0.540	Poland	0.574	Spain	0.579	China	0.510
Estonia	0.542	Hungary	0.577	Norway	0.590	Estonia	0.510
UK	0.546	Slovak Rep.	0.580	Turkey	0.616	Iceland	0.513
Hungary	0.548	Greece	0.586	Mexico	0.644	Hungary	0.514
India	0.561	UK	0.608	Finland	0.818	Norway	0.530
Greece	0.581	Turkey	0.624	Belgium		Brazil	0.539
Slovak Rep.	0.609	Mexico	0.639	Brazil		Greece	0.552
Portugal	0.638	Finland	0.843	Germany		Poland	0.559
Finland	0.827	Belgium		India		Portugal	0.566
France		Brazil		Italy		UK	0.584
Germany		Germany		Netherlands		Turkey	0.587
Italy		India		Russia		Spain	0.591
Netherlands		Netherlands		Sweden		Mexico	0.613
Poland		Russia		Switzerland		Finland	0.742
Spain		Sweden		UK		Germany	
USA		USA		USA		USA	

Notes: Higher ranked countries have lower fixed cost. For shaded countries fixed costs could not be estimated because they are either dropped in the probit regression or no price data are available. While in A. each importer faces 207 exporting partners, in B. each importer may have a different number of partners. Countries are ranked according to the residual obtained from second stage OLS regressions of importer fixed effects on income and price levels. The number of observations in these regressions correspond to the number of countries, i.e. the number of fixed effects obtained from the first stage probit regression. Residuals have been normalised between zero and one with higher values reflecting higher fixed costs. However, since each ranking is based on a different OLS regression, values cannot be compared between years and sectors.

Table A5. Regression results - Dependent variable: trade costs

Pooled regression (2000-2005)	Total trade in goods		Total trade in services	
	OLS	Poisson	OLS	Poisson
Distance	0.302***	0.234***	0.113***	0.0669***
	(0.00261)	(0.00277)	(0.00856)	(0.00385)
Common border	-0.595***	-1.003***	-0.584***	-0.979***
	(0.0107)	(0.0176)	(0.0230)	(0.0217)
Common language	-0.312***	-0.312***	-0.297***	-0.115***
	(0.0130)	(0.0151)	(0.0274)	(0.0197)
Past colonial relationship	-0.296***	-0.459***	-0.770***	-1.313***
	(0.0216)	(0.0363)	(0.0460)	(0.0781)
Austria	0.130***	-0.0126	-0.0775*	-0.0374*
	(0.0175)	(0.0182)	(0.0439)	(0.0215)
Belgium	-0.0532***	-0.0900***	-0.113**	-0.0886***
	(0.0194)	(0.0197)	(0.0496)	(0.0266)
Cyprus	0.691***	0.606***	-0.155**	-0.407***
	(0.0183)	(0.0162)	(0.0729)	(0.0511)
Czech Republic	0.273***	0.203***	0.0514	-0.0820***
	(0.0163)	(0.0168)	(0.0420)	(0.0228)
Germany	-0.292***	-0.256***	-0.484***	-0.813***
	(0.0178)	(0.0197)	(0.0375)	(0.0259)
Denmark	0.0164	-0.0293*	-0.409***	-0.593***
	(0.0169)	(0.0177)	(0.0468)	(0.0371)
Spain	-0.0346**	-0.0648***	-0.336***	-0.514***
	(0.0159)	(0.0169)	(0.0427)	(0.0304)
Estonia	0.775***	0.516***	0.698***	0.621***
	(0.0162)	(0.0149)	(0.0514)	(0.0210)
Finland	0.165***	0.0997***	0.332***	0.411***
	(0.0160)	(0.0164)	(0.0470)	(0.0188)
France	-0.0994***	-0.0879***	-0.274***	-0.313***
	(0.0165)	(0.0178)	(0.0423)	(0.0230)
United Kingdom	-0.175***	-0.166***	-0.505***	-0.556***
	(0.0168)	(0.0183)	(0.0405)	(0.0239)
Greece	0.286***	0.142***	-0.246***	-0.336***
	(0.0165)	(0.0174)	(0.0419)	(0.0236)
Hungary	0.237***	0.170***	-0.00843	-0.0966***
	(0.0178)	(0.0174)	(0.0455)	(0.0234)
Ireland	0.234***	0.193***	0.383***	0.476***
	(0.0178)	(0.0166)	(0.0603)	(0.0213)
Italy	-0.0521***	-0.0859***	-0.138***	-0.0779***
	(0.0163)	(0.0184)	(0.0461)	(0.0230)
Japan	0.0924***	0.125***	-0.106***	-0.175***
	(0.0170)	(0.0151)	(0.0380)	(0.0193)
Korea	0.168***	0.201***	0.339***	0.386***
	(0.0171)	(0.0149)	(0.0459)	(0.0179)
Lithuania	0.628***	0.434***	0.584***	0.552***
	(0.0165)	(0.0155)	(0.0528)	(0.0217)
Luxembourg	0.669***	0.495***	0.163**	0.209***
	(0.0211)	(0.0165)	(0.0729)	(0.0300)
Latvia	0.438***	0.271***	0.260***	0.307***
	(0.0215)	(0.0171)	(0.0578)	(0.0238)
Malta	0.818***	0.678***	0.174**	-0.122**
	(0.0236)	(0.0177)	(0.0754)	(0.0515)
Netherlands	-0.200***	-0.204***	-0.282***	-0.223***
	(0.0177)	(0.0189)	(0.0455)	(0.0224)
Poland	0.260***	0.201***	0.00422	-0.00977
	(0.0170)	(0.0168)	(0.0483)	(0.0246)
Portugal	0.243***	0.196***	-0.000105	-0.0406*
	(0.0170)	(0.0154)	(0.0425)	(0.0207)
Slovak Republic	0.423***	0.357***	0.177***	0.0609***
	(0.0180)	(0.0161)	(0.0454)	(0.0224)
Slovenia	0.493***	0.293***	0.373***	0.271***
	(0.0175)	(0.0164)	(0.0507)	(0.0238)
Sweden	-0.0511***	-0.0637***	-0.222***	-0.317***
	(0.0169)	(0.0175)	(0.0437)	(0.0223)
United States	-0.235***	-0.153***	-0.665***	-0.883***
	(0.0157)	(0.0154)	(0.0337)	(0.0223)
Number of observations	62328	62328	18668	18668
R-squared	0.694	-	0.407	-
Adjusted R-squared	-	0.527	-	0.221

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses (robust standard errors in the OLS estimation). Country fixed effects are listed but industry and year fixed effects are not reported.

Table A6. Ranking of country-specific trade costs for services trade, by industry

Cross-border trade in services (2000-2005)							
Construction		**Trade and repairs**		**Hotels and restaurants**		**Transport, storage & aux.**	
Germany	0.12	United Kingdom	0.04	United Kingdom	0.10	United States	0.09
Cyprus	0.24	Italy	0.08	United States	0.16	Germany	0.14
United States	0.31	Germany	0.11	Italy	0.18	United Kingdom	0.14
Netherlands	0.41	Sweden	0.17	Belgium	0.19	Greece	0.20
Spain	0.46	Denmark	0.17	Germany	0.21	France	0.21
France	0.48	United States	0.19	Greece	0.23	Denmark	0.23
Italy	0.49	Austria	0.23	Denmark	0.26	Spain	0.25
Sweden	0.49	Spain	0.23	Portugal	0.28	Austria	0.25
Malta	0.52	Greece	0.27	Spain	0.28	Cyprus	0.27
Denmark	0.54	France	0.29	France	0.36	Belgium	0.31
Japan	0.58	Ireland	0.30	Japan	0.42	Netherlands	0.34
Australia	0.60	Luxembourg	0.32	Austria	0.42	Japan	0.35
Belgium	0.62	Netherlands	0.37	Slovak Republic	0.51	Malta	0.36
Poland	0.65	Slovak Republic	0.40	Cyprus	0.51	Hungary	0.37
Austria	0.66	Cyprus	0.43	Netherlands	0.52	Poland	0.38
Greece	0.68	Czech Republic	0.46	Slovenia	0.53	Italy	0.41
Hungary	0.69	Japan	0.48	Czech Republic	0.55	Finland	0.42
Portugal	0.70	Portugal	0.55	Poland	0.55	Sweden	0.45
United Kingdom	0.70	Korea	0.60	Latvia	0.59	Latvia	0.47
Czech Republic	0.71	Australia	0.60	Australia	0.60	Czech Republic	0.49
Luxembourg	0.72	Latvia	0.60	Finland	0.64	Portugal	0.50
Latvia	0.73	Slovenia	0.62	Malta	0.70	Korea	0.52
Slovak Republic	0.77	Malta	0.63	Hungary	0.70	Slovak Republic	0.53
Ireland	0.78	Belgium	0.67	Lithuania	0.71	Luxembourg	0.58
Slovenia	0.80	Poland	0.69	Estonia	0.74	Lithuania	0.60
Korea	0.81	Finland	0.74	Ireland	0.79	Slovenia	0.60
Finland	0.83	Lithuania	0.79	Sweden	0.80	Australia	0.60
Estonia	0.86	Hungary	0.79	Luxembourg	0.81	Estonia	0.71
Lithuania	0.90	Estonia	0.80	Korea	0.95	Ireland	0.89

Cross-border trade in services (2000-2005)							
Post & telecommunications		**Finance**		**Computer activities**		**Other business services**	
United States	0.23	Luxembourg	0.05	United States	0.10	Luxembourg	0.03
Denmark	0.29	United Kingdom	0.16	Germany	0.26	Austria	0.06
United Kingdom	0.30	United States	0.25	Denmark	0.33	Netherlands	0.08
Germany	0.31	Denmark	0.33	Sweden	0.36	United Kingdom	0.08
Cyprus	0.42	Spain	0.36	United Kingdom	0.40	Malta	0.12
Greece	0.44	Ireland	0.40	Spain	0.41	Belgium	0.12
Sweden	0.45	Sweden	0.41	Hungary	0.48	Sweden	0.13
Spain	0.48	Japan	0.41	Netherlands	0.48	Portugal	0.21
Malta	0.53	Cyprus	0.41	Belgium	0.49	Denmark	0.22
Hungary	0.53	Hungary	0.46	Japan	0.55	France	0.26
France	0.54	Greece	0.48	Malta	0.55	United States	0.27
Belgium	0.58	Germany	0.48	Greece	0.55	Germany	0.28
Czech Republic	0.59	Czech Republic	0.49	Czech Republic	0.57	Slovenia	0.30
Portugal	0.59	Malta	0.51	Australia	0.60	Slovak Republic	0.33
Australia	0.60	Austria	0.56	Slovak Republic	0.61	Ireland	0.36
Netherlands	0.61	Portugal	0.56	Poland	0.63	Czech Republic	0.36
Poland	0.64	France	0.57	Portugal	0.66	Poland	0.37
Japan	0.68	Poland	0.59	Slovenia	0.68	Latvia	0.37
Slovak Republic	0.72	Slovak Republic	0.59	Luxembourg	0.70	Estonia	0.42
Slovenia	0.76	Belgium	0.59	France	0.72	Lithuania	0.42
Italy	0.80	Australia	0.60	Latvia	0.75	Greece	0.53
Austria	0.80	Italy	0.65	Korea	0.81	Australia	0.60
Ireland	0.83	Netherlands	0.67	Austria	0.83	Hungary	0.68
Finland	0.86	Korea	0.72	Finland	0.85	Finland	0.74
Korea	0.88	Slovenia	0.73	Lithuania	0.87	Spain	0.80
Luxembourg	0.93	Latvia	0.78	Estonia	0.89	Cyprus	-
Lithuania	0.94	Finland	0.83	Cyprus	-	Italy	-
Latvia	0.95	Lithuania	0.84	Ireland	-	Japan	-
Estonia	0.97	Estonia	0.90	Italy	-	Korea	-

The ranking is obtained through the coefficients estimated for country fixed effects in the equation described in Section 5. Coefficients are normalised between 0 and 1 (minimum-maximum normalisation). Countries with the lowest country-specific trade costs are on top of the Table.