

Charles University in Prague

Faculty of Social Sciences

Institute of Economic Studies



BACHELOR THESIS

**Comparative Analysis of Determinants of
Trade in Services:**

Cases of Ireland and United Kingdom

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Declaration of Authorship

I hereby declare that I compiled this thesis independently, using only the listed resources and literature.

I also declare that this thesis was not used for obtaining another degree.

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Prague, May 1, 2016

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Abstract

This thesis aims to estimate determinants of Services Export from Ireland and United Kingdom. The main contribution of the research lies in the multiple aggregations and categories at which the determinants are examined. Also, this thesis is up to date, to the best knowledge of the author, one of the most exhaustive and deep studies applying gravity model of trade to the exports of services. The core of this thesis consists of the evaluation of determinants for Travel and Business Travel for both, Ireland and United Kingdom; and subsequent analysis of the differences. Furthermore, other categories are discussed. Gravity Model with additional explanatory variables is estimated using the Poisson Pseudo-Maximum Likelihood estimator and robust inference is based on large sample properties. We find that the impact of distance largely depends on category for which the model is estimated. Moreover, we have found substantial impact of both trading partners' GDP and perhaps surprisingly, relatively large and statistically significant impact of common legal origins, regardless of category and aggregation. On the other hand, we have found no evidence of significant impact of trade agreements.

JEL Classification

F01, F14, C23, C52

Keywords

International trade; Determining factors of decision making of exporters; Gravity model; Comparative economics; Ireland; United Kingdom; Trade in Services; Export; Services

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Abstrakt

Tato práce má za cíl odhadnout vliv determinant ovlivňujících export služeb z Irska a Spojeného Království. Hlavní přínos spočívá v odhadech na úrovni různých agregací a kategorií. Pokud je autorovi známo, tato studie představuje jednu z nejdetailnějších aplikací gravitačního modelu na export služeb. Jádrem práce je vyhodnocení determinant ovlivňujících export služeb poskytnutých cestovatelům a služeb poskytnutým lidem na obchodních cestách. Pro tyto kategorie je následně provedena analýza rozdílů mezi oběma zeměmi. Gravitační model je odhadnut za pomoci Poissonské regrese s uvolněním požadavku na rovnost očekávané hodnoty a rozptylu. Z výzkumu vyplývá, že vliv vzdálenosti velmi závisí na kategorii služeb, pro kterou je model aplikován. Podobně jako u zboží, i u služeb se jeví vliv HDP obou zemí, zejména importéra, jako zásadní. Překvapivým zjištěním byl značný a statisticky významný vliv společných právních kořenů obchodních partnerů. Naopak obchodní dohody mezi partnerskými zeměmi se zdají mít nepodstatný vliv. Výše zmíněné vlivy se projevují napříč kategoriemi i stupni agregace.

Klíčová slova

Spojené Království, Irsko, Vývoz, Gravitační model, Poissonův odhad, Služby, Turismus

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Bachelor Thesis Proposal

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Research question and motivation

This thesis attempts to determine the driving factors behind trade in services. For this purpose, data for Ireland and United Kingdom will be analyzed. I will compare the results for multiple categories and levels of aggregations.

Contribution

The main contribution of this thesis lies in examining the driving factors behind trade in services. While similar research has been done over and over again under different scenarios for Trade in Goods, Trade in Services still represent quite unexplored field. Furthermore, majority of previous applications of the gravity model to trade in services has been using very limited datasets and estimated with ordinary least squares instead of the recent favorite: Poisson Pseudo-Maximum Likelihood Estimator.

Methodology

I will be using a dataset containing export data for Ireland and United Kingdom in years 2004 – 2012. During this period, BPM5 has been used by both countries for reporting the exports to Eurostat. Furthermore, the gravity model will be estimated using the Poisson Regression with loosened assumption of equidispersion. For robust inference, I will rely on large sample properties of the estimators instead of bootstrapping.

Outline

1. Introduction
2. Literature review
3. Methodology
4. Results
5. Conclusion

Preliminary List of Literature:

Bergstrand, Jeffrey H. The gravity equation in international trade: some microeconomic foundations and empirical evidence. *The review of economics and statistics* (1985): 474-481.

Carrere, Céline. Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model. *European Economic Review* 50.2 (2006): 223-247.

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Brakman, S., P. A. G. van Bergeijk, and P. A. G. Bergeijk. The comeback of the Gravity model. *The Gravity model in prospect and retrospect* (2010).

van Bergeijk, Peter AG, and Steven Brakman, eds. *The gravity model in international trade: Advances and applications*. Cambridge University Press, 2010

1 Introduction

It is a main purpose of this thesis to examine determinants of trade in services at different levels of aggregation. In order to perform the above comparison, gravity model of trade is employed to the task at hand. Furthermore, we obtain estimates for both, Ireland and United Kingdom.

This thesis starts by providing brief introduction to the topic. Then we follow with a discussion of previous developments in Gravity Model as well as application of theory to the trade in services. Most attention is paid to approach we choose and discussion of results in chapters 3 Empirical analysis and 4 Export of Services respectively. We summarize our research and draw conclusions in the last chapter.

In order to minimize the sample selection bias and the inherent heteroscedasticity issue of using OLS to estimate the gravity equation, we follow the suggestion of Silva and Tenreyro (2006) to use Poisson quasi – maximum likelihood estimator. As R programming language is used for the calculations instead of the usual Stata, we do not employ the PPML command implemented to Stata by Silva and Tenreyro, instead we create own implementation of the whole procedure. As our data do not satisfy the strict equidispersion assumption behind Poisson distribution, we use the Sandwich standard errors as described in Cameron and Trivedi (2013) and implemented as `Sandwich` package into R programming language by Zaileis (2006).

Moreover, we take into account the notion of multilateral resistance terms as described by Anderson and Van Wincoop (2001) and treat them using importer fixed effects as suggested in Baldwin and Taglioni (2006). In order to fix multicollinearity issues, we cut the number of explanatory variables as compared to approach of Yane Haruka (2013) who instead dropped importer fixed effects from his model.

Since research of determinants of trade in services is still relatively scarce and previous texts have usually suffered either from Gold, Silver and Bronze medal errors (terms coined by Baldwin and Taglioni (2006)), or from lack of data or use of inappropriate estimator such as OLS (for detailed history of gravity model application to trade in services up to 2006, see *Trade in Services: Does Gravity Hold? A Gravity Model Approach to Estimating Barriers to Services Trade* (Walsh, 2006)), we contribute to the academic discussion by providing improvements in the above mentioned fields and so attempt to minimize sources of bias.

Furthermore, we perform analysis at multiple levels of aggregation for two different exporters. Such approach has not been, to our knowledge, taken for trade in services before. Previous studies usually examine the average impact of variables over set of multiple exporters, usually set of few OECD countries (Kimura & Lee, 2006). Our thesis looks at the exact values for Ireland and United Kingdom separately. Services have been so far, with the notable exception of Walsh (2006), treated mostly at highest level of aggregation. Compared to Walsh we dig one disaggregation deeper, to the Business Travel category.

On the other hand, we acknowledge that our approach to application of Gravity Model is not completely unprecedented as similar method was chosen, albeit in case of goods, by Smotlachová (2014), who analyzed determinants of Czech goods exports at multiple levels of aggregation and subsequently by Tachovská (2015) who also looked into determinants at multiple disaggregation levels and compared cases of France and Czech Republic.

2 Gravity Model Development and Application

In this chapter we focus on the development of approaches to the Gravity Equation in international economics and on recent research on trade in services. First, we review recent advances in Gravity Models in general. Second, previous applications of Gravity Model to trade in services are discussed.

2.1 History and Developments of Gravity Model

The proposition of Gravity Model for social sciences was originally made by James Stewart (1948) and later on by Tinbergen for International Trade (1963). Since then gravity equation has been very popular and estimated over and over again for trade in goods using various versions, specifications (Anderson & Van Wincoop, Gravity And Gravitas: A Solution To The Border Puzzle, 2001) estimators and types of data (Baier & Bergstrand, Do free trade agreements actually increase members' international trade?, 2007) (Tenreyro & Santos Silva, 2006). Starting with Anderson (1979) who demonstrated gravity model to be consistent with assumption of products being differentiated by the country of origin (known as Armington assumption) and continuing with Bergstrand (1985), Helpman and Krugman (1985) and Deardorff (1998) who showed Gravity model to be consistent with usual trade theories such as Heckscher – Ohlin model or Monopolistic Competition assumption, theoretical background has been significantly improved over decades since introduction.

In early 2000s, improvements to the estimation techniques for gravity equation have started to appear. First, Anderson and Van Wincoop (2001) showed that it is not sufficient to account for bilateral resistance terms such as distance and tariff barriers. According to their research, one has to include what Anderson and Van Wincoop call Multilateral Resistance Terms. The intuitive explanation behind these terms is as follows: If country A has significantly higher

barriers to trade with countries other than country B, then there is additional incentive for country A to trade with country B. The problem with multilateral resistance terms as introduced by Anderson and Van Wincoop is that they are difficult to estimate. Thankfully, Feenstra (2002) shows that it is possible to use country pair fixed effects to eliminate the possible bias caused by omission of Multilateral Resistance Terms.

While fixed effects help to treat omitted variable bias, the approach do not allow for explicit calculation of multilateral resistance terms. For that reason, Baier and Bergstrand (2009) propose an alternative: use Taylor series expansion for approximation of price effect terms.

Furthermore, Tenreyro and Silva (2006) suggested to use Poisson Pseudo-Maximum Likelihood Estimator. They argue that gravity models should be estimated in their multiplicative form and transformed to the log-log form after estimation. Their article points out that expected value of logarithm is not in general equal to the logarithm of expected value and thus estimation using OLS and log-transformed dependent variable will yield misleading results. Moreover, when one does not use sample selection model, application of OLS after taking the logarithm of trade flows will in many cases result in sample selection bias. Cutting zero observations might result in reduction of number of countries in the sample. In case we cut down this number to 30 or less, usual cluster-robust standard errors shouldn't be used as these depend on large sample properties. Instead, technique such as bootstrapping would have to be employed.

Based on the arguments made by Silva and Tenreyro (2006) we estimate the gravity equation in its multiplicative form.

2.2 Previous Applications to Trade in Services

As mentioned previously, literature on applications of Gravity Model to trade in services is surprisingly scarce. Of the few articles and theses available, some possibly suffer from omitted variable bias due to not accounting for multilateral resistance terms (Yane, 2013), while others make the mistake, described in Baldwin and Taglioni (2006), of adding together value of imports and exports and then estimating total trade flows, as is the case of Janet Ceglowski (2006).

The analysis of trade in services was mostly hindered by unavailable data. It was no sooner than 2002 when OECD released a publication presenting data on total trade in services decomposed by trading partners. Moreover, only two years of data for 26 OECD members were available in the above publication. While more data at higher level of disaggregation has become available over time, more than 80% of export of services from Ireland has been classified in 2012 as Other commercial services and exact values marked as confidential in case of most trading partners.

Due to the data constraints, one of the first studies analyzing data on trade in services was conducted by Francois (2001) who uses Ordinary Least Squares to estimate impact of per capita GDP and distance on total trade flows. Comparing predicted flows to actual values they obtain tariff equivalents.

Furthermore, Grunfeld and Moxnes (2003) find that gravity model works for services at highest level of aggregation about as well as in case of goods. They found significant and negative impact of distance, positive impact of GDP of both, exporter and importer; and found no evidence of significant impact of free trade agreements.

The result for FTAs might be different if estimated on latest data since European Union as well as NAFTA made large steps towards services trade liberalization since 2000. Furthermore, the estimated impact of FTAs might depend on level of aggregation. In general, we shouldn't be surprised if we found FTA to have positive impact on services export as facilitation of goods trade might have indirect impact on services trade through strengthening of business ties as well as increasing demand for services complementary to the goods trade.

One of the more surprising results was obtained by Kimura and Lee (2006) when using data for years 1999 and 2000 to estimate the impact of distance to be more important for services than for goods. Yet they do not provide any plausible explanation for this observation, only suggest that analysis of disaggregated data should be made. We agree with their suggestion and perform the analysis. Prior to turning to our estimates we would propose that the possible explanation is that some services (such as travel) include physical movement of people between countries and it is likely that people enjoy long distance shipments slightly less than goods. Furthermore, trust and cultural proximity might play more significant role in case of services. Thus importer might prefer a service provided by exporter from nearby country. Moreover, they found statistically significant impact of FTAs on trade in services (as opposed to Grunfeld and Moxnes), while concluding that they do not have enough evidence that language plays any role.

Making the past research even more contradictory, Lejour and de Paiva Verheijden (2004) conclude that distance has lower impact for services than for goods. They also found regulation in importing country to have negative impact on trade in services.

Walsh (2006) finds GDP and language to be most important determinants. At the same time their research finds distance to be insignificant. Ceglowski (2006) find all core explanatory variables – GDP of importer and exporter; and distance - to be significant with expected sign.

Furthermore, she argues that liberalization of trade in goods should also lead to increased trade in services via indirect channels such as establishing closer ties between trading parties.

Most recent and thorough study was performed by Yane Haruka (2013) who examined dataset containing information on 40 countries over the period of 15 years. They examine determinants of trade in both, intermediate and final products in case of goods and services. As opposed to previous research on trade in services, Yane Haruka uses sample selection model to handle zero trade flows. One of the conclusions is that final services trade is more affected by trade costs and market size than is the trade in intermediate services. One notable feature of their research is that they do not use country pair fixed effects (i.e. country pair dummies) to treat unobservable variables as they argue that issue of multicollinearity would then arise. We confirm their concerns about multicollinearity bias, but decide instead to drop some of the proposed explanatory variables and keep importer dummies.

3 Empirical analysis

As the gravity model of trade has been successfully used as a tool for analysis of determinants of trade ever since its' introduction by Tinbergen back in 1960s (Tinbergen, 1963), it might seem that any application must have been already done. But our research clearly stands out from the crowd, as we employ the gravity model to the trade in services at different levels of aggregation. At more technical level, our research represents one of the few applications of R programming language to the gravity model of trade. Through R programming language, we calculate the fixed effects Poisson regression model suggested by Silva and Tenreyro (Tenreyro & Santos Silva, 2006), using over-dispersion adjusted, cluster and heteroscedasticity robust standard errors, similarly to the implementation of Poisson Pseudo Maximum Likelihood Estimator implemented into Stata by Silva and Tenreyro. At the same time our research is similar to most recent empirical endeavors in that we employ the gravity model to the analysis

of exports from one country at a time. Using exports of one-to-many instead of many-to-many countries gives us the opportunity to estimate the determinants for United Kingdom and Republic of Ireland separately. We estimate models for three different levels of aggregation: 1) Total Export of Services, 2) Travel Services, and 3) Business travel. Furthermore, we also estimate determinants for other categories of services, such as Communication, Insurance, Finance, Government and Other Business Services. Yet, since for these other categories we do not have available data for both Ireland and United Kingdom, we pay special attention to the Travel category. All above listed categories follow the definitions in fifth edition of Balance of Payments Manual (Transparency International, 2016).

3.1 The data

We have obtained the export data for Ireland and United Kingdom from the EUROSTAT (2016) database. This data follows a BPM5 guidelines and are obtained by Eurostat from Balance of Payments tables provided by regional statistical offices. At our disposal is the dataset depicting the export situation for 62 partner countries from 2004 to 2012. Given period is chosen especially due to the fact that BPM5 had been followed throughout these years. The explanatory variables were obtained from CEPII, The World Bank and Transparency International and the complete list of sources can be found in the Appendix A. While we have available many variables, most of them had to be dropped due to problems such as multicollinearity.

Same specification of the model was used for both exporting countries and all levels of aggregation. The significant amount of zeros in the dataset does not result in the inconsistency of estimates as we have employed the Poisson regression instead of logarithmic transformation of linear regression. Subsequently, we take a look at total services trade flows, the level called Travel and further disaggregation called business travel. Under BPM5 guidelines these

categories are encoded with codes 200, 236 and 237 respectively. We take a look at differences between countries as well as levels of aggregation.

The panel data structure should allow us to handle unobserved variables via means of importer dummies, which are practically equivalent to the fixed effect estimation. Through this method and through additional variables compared to the simple version of Gravity Model, we are able to account for multilateral resistance terms.

3.2 Overview of trade flows

It is the purpose of this chapter to shed light onto the structure of Services exports from Ireland and United Kingdom. We begin with total trade flows and continue with lower levels of aggregation. Quantiles of total exports for both Ireland and United Kingdom are provided in Table 13 and Table 14 respectively. More detailed information is provided in following paragraphs. Tables for Total Exports of Services, Travel and Business travel are reported in this chapter. Tables for other categories discussed in chapter 4.5 are provided in the Appendix (see table Table 15 and Table 16).

We can see that at total level of exports both countries share similar trade partners. At the top of the table we can see United Kingdom as number one trading partner for Ireland and United States in the position of main export market for United Kingdom. Based on this finding we would propose an argument that top trading partner tends to be the closest large economy. The measure of remoteness would be not only distance, but also historical relations, past trade patterns and various variables representative of society in given country. The large economy which is in these terms nearest to Ireland is obviously United Kingdom. For United Kingdom, we are able to find the number one strategic partner in United States. To extend this point beyond the scope of our thesis we can find a similar relationship between Czech Republic and Germany.

Second largest export market is in both cases Germany. We can see that exports from United Kingdom to this market are only 1.6 times larger than exports from Ireland, while variables such as mere distance and size of economy would probably suggest difference of a much higher degree. Combined with the fact that United Kingdom exports almost 2 times more to Japan than Ireland does and that United Kingdom exports over 4 times more to Switzerland than what are the exports from Ireland, we are led to believe that augmented Gravity Model should be more suitable than its' original version.

Out of the top 10 trading partners, 9 are the same – United States, Germany, France, Italy, Netherlands, Japan, Spain, Switzerland, with 9th being Ireland as an export market for UK and UK being an export market for Ireland. Due to the geographical proximity, membership in European Union, historical ties, language and legal traditions, we would expect nothing less.

Table 1: Top 20 Destinations (2012): Services Exports

Ireland		United Kingdom	
partner	export (million \$US)	partner	export (million \$US)
UK	22279.5	US	64842.9
DE	10320.0	DE	16350.9
US	10214.7	NL	15127.7
FR	7186.2	IE	14536.6
IT	6916.4	FR	13692.1
NL	5013.5	CH	13635.0
JP	3485.8	AU	9527.9
ES	3425.4	ES	8594.6
CH	2757.3	IT	8404.4
BE	2338.4	JP	6469.7
SE	2278.1	CA	6067.2
AU	2145.7	SE	4977.1
IN	1815.5	NO	4645.9
CA	1599.7	BE	4516.0
DK	1469.9	DK	4252.9
NO	1183.4	SG	4013.7
FI	1006.0	IN	3468.6
PL	913.5	ZA	3345.0
ZA	912.3	HK	3165.9
SG	884.0	RU	3058.2

When drilling down to exports of Travel services we find rather similar ranking of trading partners at top positions, with one most notable exception: Italians appear to love United Kingdom. At the bottom of the top 20 table though we discover what might be an interesting trend: smaller economies from central and eastern Europe appear as top travelers to Ireland. Furthermore, when looking into exports of Business Travel, the results for Ireland are rather similar. What is it that makes Ireland such an attractive destination for people from central and eastern Europe, especially from countries which are members of European Union?

It might well be that membership in European Union as well as Eurozone make Ireland more than just a “low-cost sibling to United Kingdom”. On the other hand, different dynamics might be also at play, because the previous question could be also rephrased from different perspective. What makes all the Australians, Nigerians, Russians, Norwegians and Brazilians choose United Kingdom over Ireland? Could it be that when the trading partner is far away, the size of exporting economy matters more than when trading partner is close? Could it be that once an importer takes into account distance and commonwealth ties, the cost of choosing United Kingdom over Ireland is no longer so large, while benefits of choosing United Kingdom are clear?

Table 2: Top 20 Destinations (2012): Travel Exports

Ireland		United Kingdom	
partner	export (million \$US)	partner	export (million \$US)
UK	1090.8	US	4275.1
US	848.0	IT	2877.5
DE	291.7	DE	2113.8
FR	242.8	FR	1990.2
ES	232.6	AU	1749.3
IT	137.5	IE	1483.1
CA	109.2	ES	1424.5
DK	69.4	NL	1375.4
NL	65.5	IN	938.1
SE	60.4	CA	911.1
PL	59.1	NO	874.7
BE	42.4	SE	868.3
AT	16.7	CH	698.8
LT	15.4	PL	690.9
PT	15.4	RU	576.8
FI	10.3	BR	522.9
LV	10.3	NG	513.4
CZ	9.0	DK	486.5
JP	9.0	BE	478.5
HU	6.4	HK	416.7

Table 3: Top 20 Destinations (2012): Business Travel Exports

Ireland		United Kingdom	
partner	export (million \$US)	partner	export (million \$US)
UK	278.8	US	836.6
US	106.6	IT	562.5
ES	38.5	DE	413.6
FR	33.4	FR	388.2
DE	28.3	AU	342.3
NL	19.3	IE	290.0
BE	16.7	ES	278.9
DK	15.4	NL	269.4
SE	15.4	IN	183.8
IT	14.1	CA	177.5
CA	10.3	NO	171.1
PL	9.0	SE	169.5
PT	5.1	CH	136.3
AT	3.9	PL	134.7
FI	3.9	RU	112.5
JP	3.9	BR	101.4
CZ	2.6	NG	99.8
HU	2.6	DK	95.1
LT	1.3	BE	93.5
LV	1.3	HK	80.8

3.2 Considered Explanatory variables

Below, we introduce explanatory variables which were considered for the model. A quick overview of them can be found in Table 12 in Appendix A; description, intuition and comments follow. Statistical summary of variables included in the final model can be found in Table 13 and Table 14 for Ireland and United Kingdom respectively.

Logarithm of exporter's GDP, importer's GDP and distance between countries are core variables of any gravity model of international trade. We expect the distance to have negative impact on trade. As an example, one can plausibly argue that travel across longer distances is more expensive, which decreases the demand for travel. Furthermore, as countries closer together are likely to interact more with each other on almost any level, one can argue that incentives for increased travel and transportation are higher. The impact of GDP is expected to be positive for importer as well as exporter. With increased size of the market, supply and demand should be higher at any given price while holding any other factors fixed. The GDP for all trading parties is obtained from World Development Indicators database maintained by World Bank (2015). The GDP values are reported in current USD. In addition to the distance between importing and exporting countries, we consider a distance from three major markets – United States of America, Germany and China – as proxies to ease of access to the rest of global economy. We would argue that proximity to large markets such as those above move the country in practice closer to the global market and so decrease transaction costs. On the other hand, proximity to rest of the global economy might result in relatively higher Multilateral Resistance Terms. All distances in our dataset are measured in kilometers.

In order to augment the Gravity model with core building blocks of other influential approaches to explanation of trade flows, we consider Gross Fixed Capital Formation and population size as possible explanatory variables. These so called factor endowments are the core building

blocks of Hecksher – Ohlin model originally proposed back in 1933 (Hecksher & Ohlin, 1933). While both, the standard Hecksher – Ohlin and Hecksher – Ohlin – Vanek models have been criticized for low explanatory power, the results provided no ground for excluding these variables from consideration for our model. In theory, we would expect Gross Fixed Capital Formation to be positively correlated with the amount of trade in services, while the total population to be correlated negatively. One possible reason behind this expected negative relationship between trade in services and total population would be that with increase in population, the average purchasing power of individuals decreases and since services mostly are not necessities, less income is being spent on them as a result. On the other hand, with increase in Gross Fixed Capital Formation, we would expect increased trade in services, as the demand for likes of business travel and other business services is likely to be higher. Furthermore, increase in real wages of the workers is expected to go hand in hand with rise in Gross Fixed Capital Formation and so the population has more money to spent on tourism, music streaming services and the like. Moreover, intuitive explanation can be found for the argument that any given country should trade more with country similarly endowed with capital as such countries might be able to produce same quality goods which are in some way differentiated. There are also economic theories such as theory of comparative advantage (Ricardo, 1891), which could provide plausible explanation of why should similar countries trade less. We have obtained data on these variables from World Bank's WDI.

As access to internet and access to mobile services might be likely to reduce the real cost of trade in services, we take into account also Internet Users per 100 people and Mobile cellular subscriptions per 100 people. That being said, we have to keep in mind that these indicators do not reflect the quality of given service and so a person with access to high-speed broadband connection available at any given time is reflected in such measure in the same way as a person with very limited access to the slowest of dial-ups.

In addition to variables mentioned above, we include also size of country measured in square kilometers, arguing that geographical size of the trading partner's market might increase trade costs related to geographical distance. We also include the Corruption Perception Index, because the need to pay bribes and lack of certainty related to corrupt environment is expected to increase trade costs. The Corruption Perception Index is a ranking of countries put together by the Transparency International (Transparency International, 2016).

The exchange rate deviation index (ERDI) is also included in order to account for diminished purchasing power of countries with weaker currencies. The ERDI has been calculated using data from World Development Indicators database and has been converted to show deviation compared to the exporter's currency instead of using just the deviation from USD. It would be unwise to use the usual ERDI with respect to USD, as the relative position of the two trading partners should be more important than just the relative position of the importer to some third country. In our case the aforementioned third party would be United States of America. We would expect the increase of overvaluation of importer's currency to lead to an increase of their imports as the services obtained from abroad should be suddenly relatively cheaper compared to the domestic stuff.

The decision to include the refugee population by country of asylum might seem a bit controversial, but one can clearly argue that high number of people from foreign countries, with knowledge of foreign languages and connections to disparate regions of the world, might be able to make foreign markets more accessible to the local exports. This data has been collected from the WDI database and has been merged to the final dataset using R programming language.

Last, but not least, we include a traditional set of dummies on Regional Trade Agreements, common colonizer, common legislature and common language. These last dummies represent

a standard in any Gravity Model literature (Baier & Bergstrand, Do free trade agreements actually increase members' international trade?, 2007) and they come mostly from the CEPII database (Head, Mayer, & Ries, 2010), in case of Regional Trade Agreements they have been updated based on World Trade Organization information. We would expect the impact of Regional Trade Agreements on trade in services to be positive, since RTA should decrease trade costs. This expectation is in line with results derived by Baier and Bergstrand, who used panel data to find that over the period of 10 years an FTA leads, on average, to doubling of bilateral trade (Baier & Bergstrand, Do free trade agreements actually increase members' international trade?, 2007). Our expectation is, that common legislature and common language should lead to increased trade in services as both importer and exporter should be able to find common ground more easily and the trust between trading parties should be supported by their common cultures.

We also consider including importer and time dummies in order to account for time trend and fixed effects. Obviously, we will have to drop few of the importer dummies due to the collinearity with other variables and also some of the proposed variables will not be included due to econometric reasons.

3.3 Methodology

The employed methodology is discussed in this chapter. While it is standard in recent econometric literature to use both, the recent favorite quasi-poisson estimator and ordinary least squares estimator for benchmarking, we refrain from this practice because of the unfavorable properties of ordinary least squares. Our research sticks to the quasi-poisson estimator. Researchers in the field of international trade working with Stata might know this estimator also as Poisson Pseudo-Maximum Likelihood Estimator, which is a term used by Silva and Tenreyro who implemented the PPML command into Stata (Tenreyro & Santos Silva, 2006).

Their command also uses the subcommand *robust* to easily obtain clustered, heteroscedasticity-robust standard errors. Since the *regress* command requires specification of both, *cluster* and *robust* options, it might lead some less technically skilled researchers to obtain even more bogus results for their OLS benchmarking.

As discussed in chapter 3, taking logarithms of variables and then calculating estimates via means of ordinary least squares results generally leads to biased results as OLS is likely to be biased or inconsistent estimator. Furthermore, as trade flows of value 0 are dropped before taking the logarithm of trade flow variable, we would have difficulties obtaining within cluster serial correlation robust standard errors, as estimators of these standard errors usually rely on large sample properties in terms of number of clusters. But it might very well happen that after dropping all zero values, our number of clusters suddenly drops below 30 in case of some categories. That being said, low number of clusters is problem that can be solved by other method, such as bootstrapping. The use of bootstrap for inference with clustered standard errors is being discussed and evaluated by Cameron, Gelbach and Miller in their National Bureau of Economic Research working paper. They conclude that in case of low number of clusters (i.e. between 5 and 30 clusters), bootstrap will generally provide an improvement compared to the usual asymptotic method of obtaining clustered standard errors (Cameron, Gelbach, & Miller, 2007). But the Bootstrap technique is not usually used by researchers in field of International Trade as they tend to stick with the asymptotic approach to clustering even when the number of clusters is decreased due to omission of zero trade flows.

The quasipoisson regression allows us to keep zero trade flows in the dataset. Thus we are not as likely to suffer from sample selection bias compared to use of OLS. Furthermore, keeping zero trade flows in the dataset, data for all 62 importing countries can be used. As each

importing country yields one cluster, we can rely on asymptotic properties of cluster robust standard errors.

The implementation of cluster and heteroscedasticity robust standard errors using sandwich estimator is based on article *Object-oriented Computation of Sandwich Estimators* by Achim Zeileis (2006). Mahmood Arai provides nice introduction to the Cluster-Robust standard errors using R programming language (Arai, 2016).

In order to handle the multilateral resistance terms described by Anderson and Van Wincoop, we use the Dummy Variable approach to panel data, thus taking care of the country specific fixed effects. This approach has been proposed by Baldwin and Taglioni (2006). The country specific dummies allow us to address what Baldwin and Taglioni call Gold medal error. The above mentioned authors also coined terms Silver medal error and Bronze medal error. The Silver medal mistake refers to use of average of bilateral trade flow instead of uni-directional trade flow. An example would be export of services from Ireland to France added to export of services from France to Ireland and then divided by two. We avoid the Silver medal by using just value of exports from Ireland to foreign countries. The Bronze medal refers to use of trade flow values deflated by a price index. Baldwin and Taglioni believe that adjusting the total trade flows for inflation results in spurious correlation as for example inflation in USA will be usually correlated with economic situation in Europe. We avoid this mistake by using trade flows denominated in current unadjusted prices.

Having taken care of the various issues connected with empirical research, we can now move on to model specification.

3.4 Model Specification

In the following lines, we proceed with model specification. Variables available in our dataset could be split into three categories – dummy variables, value variables and percentages. Variables belonging neither to dummy variable category nor to percentages variable category will be transformed using natural logarithm. Such transformation will allow us to speak in terms of elasticities when interpreting results of the model. After first estimation of the model with all variables available in our dataset (see Table 12 in Appendix A), we have to check for multicollinearity using generalized variance-inflation factor.

Perhaps unsurprisingly, the abovementioned test discovers serious multicollinearity issues. Based on results of this test, we have to drop multiple explanatory variables, including some importer dummy variables. Failure to omit these highly correlated variables would lead us to biased estimates for the key variables, which are distance and GDPs of both trading partners, as well as corruption perception index and Regional trade agreement dummy. Based on calculation of Generalized Variance-Inflation Factors, we conclude that a viable model for estimation has the following form:

$$\begin{aligned}
 Export_{ijt} = & \exp(\beta_0 + \beta_1 \log(distance)_{ij} + \beta_2 \log(GDP)_{it} + \beta_3 \log(GDP)_{jt} \\
 & + \beta_4 \log(land)_{jt} + \beta_6 \log(celphones)_{jt} + \beta_7 \log(refugees)_{it} \\
 & + \beta_8 \log(refugees)_{jt} + \beta_9 \log(internetUsers)_{jt} + \beta_{10} urban_{jt} \\
 & + \beta_{11} cpi_{jt} + \beta_{12} \log(ERDI)_{ijt} + \beta_{13} landlocked_j + \beta_{14} rta_{ijt} \\
 & + \beta_{15} comleg_{ijt} + \varepsilon_{ijt})
 \end{aligned}$$

Where index ijt signifies relevance of the variable to both importer and exporter at time t , index ij means the variable is not changing over time and index it means the variable is related to exporter only. Correspondingly, when variable is subscripted with jt it's value concerns

importer only. Please note that neither importer dummies nor time dummies are listed in the equation above and one would have to include them in order to have here the exact form of the estimated model. As their inclusion would mean listing multiple tens of dummies, we decided to use abbreviated form of the equation.

Furthermore, we employ form of Hausman (1978) specification test suitable for panel data, which can be applied to Generalized Linear Models and has been proposed by Bartolucci, Belotti and Peracchi, who have shown the test performs well in finite sample setting and shows `good power properties` (Bartolucci, Belotti, & Peracchi, 2013). Based on this test we have decided to stick to the fixed effects estimation method.

4 Export of Services

Having chosen the set of explanatory variables and fixed effect specification, we proceed with estimation of the model. In all cases we estimate the model specified in section 4.4 with use of heteroscedasticity and cluster robust standard errors. In the following parts we provide result of the estimation for different levels of aggregation.

4.1 Total Exports of Services

Let's start with the case of total exports from Ireland and United Kingdom. In the tables with regression results we will present just the interesting parameters, skipping importer dummies and time trends.

Table 4: Total Exports: Ireland

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-70.5650	31.9876	-2.2060	0.0274
log(distance)	-0.3366	0.1393	-2.4163	0.0157
log(domesticGDP)	0.2449	0.1901	1.2887	0.1975
log(foreignGDP)	0.9376	0.0752	12.4678	0.0000
log(land)	-0.0765	0.0481	-1.5922	0.1113
log(celphones)	0.7058	0.2586	2.7291	0.0064
log(domesticRefugees)	-0.0284	0.1490	-0.1903	0.8490
log(foreignRefugees)	-0.0066	0.0278	-0.2374	0.8123
log(foreignInternetUsers)	-0.0339	0.2299	-0.1475	0.8827
% urban population	-0.0004	0.0072	-0.0532	0.9576
foreign CPI	0.0865	0.0544	1.5909	0.1116
log(ERDI)	-0.1980	0.1656	-1.1958	0.2318
landlocked	-0.0373	0.2330	-0.1600	0.8729
rta	1.0727	0.3869	2.7728	0.0056
comleg	0.5743	0.1376	4.1732	0.0000

* Errors clustered by importer

In case of Total Exports of Services from Ireland, we observe five statistically significant variables at 0.05 level of significance. These include distance, GDP of the importer, number of cellphone subscriptions per 100 people, regional trade agreement dummy and common legal origins dummy. No other variable is approaching any reasonable significance level with possible exception being CPI of the importer which approaches 0.1 level. As mentioned above, coefficients for variables in logarithms can be interpreted as elasticities. We find that 1% increase in distance between capital cities of Ireland and its trading partner leads to decrease in trade in services by 0.34%. The impact of domestic GDP is not considered statistically significant. This could be caused by the relatively low variation of GDP in the exporting economy. We have data only on years 2004 – 2012 which makes estimation of coefficients related to variables relevant only for exporting economy rather difficult. The impact of foreign

GDP is statistically significant at all levels. At 0.94 the effect is almost unity, which corresponds to the values usually estimated when gravity equation is employed to the trade in goods (Tenreyro & Santos Silva, 2006), (Smotlachová, 2014), (Tachovská, 2015).

Comparison with results obtained by other researchers is difficult as the research on trade in services is still quite uncommon. One of the more famous articles was written by Yane Haruka (2013), who find that when two countries already trade with each other, then the increase of importer's GDP by 1% results in trade higher by 0.8%. Yane further finds that GDP of exporter translates into trade in services with coefficient of 0.86 and 1% increase in distance results in 0.78% decrease in total trade in services. It is immediately obvious, that Yane's results are quite different from what we have obtained. On the other hand, such difference does not mean that either Yane's or our results are wrong. We use slightly different set of variables, totally different estimation method and different sample. While we use Poisson Pseudo-Maximum likelihood method, Yane use two step regression, first calculating whether two countries indeed trade with each other and then calculating the impacts of variables on total trade for those that were chosen as trading countries. Furthermore, while it is aim of our research to analyze exports just for one country at a time, Yane calculates the average impacts for set of importers (please note that while it is aim of this thesis to analyze exports, Yane was working with imports). Moreover, Yane refrains from using fixed effects estimation due to multicollinearity between trading partner dummies and explanatory variables. We, on the other hand, cut down number of explanatory variables while using trading partner dummies.

Additionally, we do not have to restrict ourselves to comparison with models of trade in services. Comparing our results with that of Silva and Tenreyro (2006) yields expected results. Silva and Tenreyro find that 1% increase in exporter's GDP results in 0.73% increase in total exports. Coefficients for importer's GDP and distance, reported in their research, are 0.74 and

-0.78 respectively. Exactly as expected, the impact of distance is much lower when it comes to trade in services: We estimate 1% increase in distance between trading partners to lead to 0.34% decrease in total trade in services in case of Ireland and 0.38% decrease in case of United Kingdom.

Moving on with the analysis of our results, we have found that in case of Ireland, a 1% rise in cellphone subscription rate is expected to lead to 0.71% increase in trade in services. The sign of this impact appears to be intuitive, as cellphones make it much easier to purchase services from abroad. Similar to the results obtained by other researchers when applying gravity model to trade in goods, we find significant impact of regional trade agreements and common legal origins. When Ireland has a trade agreement with its trading partner the trade is expected to be higher by 192% compared to the case when no trade agreement is in place. This effect is comparable to that obtained by Silva and Tenreyro (2006). It might very well be the case that although free trade agreements do not usually concern trade in services (with formidable exception of European Union economic zone) they have an indirect impact through facilitation of trade in goods. These strengthened ties and higher visibility of services available for export might in turn lead to increased trade in services. Last but not least, common legal origins have positive impact of 78% on Irish exports.

Table 5: Total Exports: United Kingdom

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-71.3354	32.0082	-2.2287	0.0258
log(distance)	-0.3775	0.1026	-3.6811	0.0002
log(domesticGDP)	0.7424	0.1258	5.9014	0.0000
log(foreignGDP)	0.8515	0.0431	19.7531	0.0000
log(land)	-0.0775	0.0370	-2.0934	0.0363
log(celphones)	-0.1086	0.1550	-0.7008	0.4834
log(domesticRefugees)	0.1126	0.0936	1.2040	0.2286
log(foreignRefugees)	-0.0516	0.0336	-1.5369	0.1243
log(foreignInternetUsers)	-0.1166	0.1265	-0.9215	0.3568
% urban population	-0.0069	0.0066	-1.0365	0.3000
foreign CPI	0.2333	0.0565	4.1263	0.0000
log(ERDI)	-0.2442	0.1122	-2.1772	0.0295
landlocked	0.1881	0.3026	0.6214	0.5343
rta	0.1744	0.3476	0.5018	0.6158
comleg	1.2009	0.1740	6.9005	0.0000

* Errors clustered by importer

Results for the exports from United Kingdom are slightly different. We find following variables to be significant: distance, GDPs of importer and exporter, the size of importing country as measured in square kilometers, corruption perception index in the importing country, exchange rate deviation index and common legal origins. The results distance and GDP of the importer are similar as in case of Ireland. United Kingdom is expected to export 38% less to countries further away by 1%. Impact of percentage change in domestic and foreign GDP is now 0.74 and 0.85 respectively. These estimates are comparable to those obtained by Silva and Tenreyro (2006). What causes the difference between estimate of impact of change in the domestic GDP between Ireland and United Kingdom? Possible explanation is that as Ireland is comparatively small economy and so an increase of 1% in its GDP is not likely to have significant impact on

the global trade. In other words, Irish exports could be much more driven by the demand than by the supply.

The negative impact of size of importing country on trade in services seems a little surprising. While in case of goods, one could argue that size of importing country increases the cost of transportation from point of entry to final destination, in case of services such explanation would seem fishy. It might be, that holding other factors fixed, size of the country implies lower concentration of businesses and consumers in any given place in the country. Due to this lower concentration it might be that some actors in the importing economy have worse access to the global market and thus to the services from United Kingdom. This explanation might be more clear thanks to following example: let's say that inhabitant of some foreign village decides to travel to United Kingdom. Cost of his tourism is not just the travel and hotel in United Kingdom, but also the travel to any airport in his neighborhood. Thus, size of the importing economy increases costs of travel, with situation being similar for transportation and other services. On the other hand, economic significance of the impact might be quite low as 10% increase in importing country size is connected just to 0.8% decrease in exports of services from United Kingdom.

Another significant variable is value of Corruption Perception Index in importing country. This variable was found to be insignificant for Ireland, but at least the sign of impact is the same. The intuition is that corruption increases cost of trade and thus some exporters might be discouraged from operating in given foreign country. Furthermore, there might be reputation costs to doing business in corrupt countries with risk of being caught handing in bribes to officials and handing controversial gifts to prominent representatives of the partner side. Another possible explanation is that United Kingdom pursues trade enhancing policies with governments which are in their domestic countries perceived as less corrupt. Such explanation

would mean that Corruption Perception Index is considered as statistically significant only because of its correlation with other determinants not included in the model. On the other hand, if government of the United Kingdom is more likely to strike trade promoting deals with less corrupt governments, then corruption level is, albeit indirect, determinant of trade. We expect that importer scoring 1% higher on corruption perception index trade 0.23% more with United Kingdom.

Furthermore, Exchange Rate Deviation Index is found to be significant for exports from United Kingdom. A 1% increase in exchange rate deviation index is expected to lead to decrease in trade by 0.24%. Statistically significant negative impact of ERDI has been found by Tachovská (2015) when applying Gravity model of Trade to trade in goods on different levels of Aggregation. On the other hand, Smotlachová (Smotlachová, 2014) in her bachelor thesis at Institute of Economic Studies found that significance of ERDI depends on level of aggregation. Moreover, Smotlachová finds the effect of ERDI on total exports of goods from Czech Republic to be highly insignificant. Based on our estimation for Ireland and United Kingdom, we could argue that for countries with currencies closely following Euro, the impact of ERDI is insignificant at highest level of aggregation, whereas for countries with more independent currencies, the influence of ERDI is significant.

Once again, common legal origins represent highly significant variable and United Kingdom is expected to export 232% more services when sharing legal origins with its trading partner.

4.2 Export or Travel services

Travel services are marked with number 236 under the BPM5. As there might be some misunderstanding about what travel services stand for, let us start with what International Monetary Fund, the institution behind BPM 5, has to say regarding this topic. First of all, what is called travel services under BPM5, is known as Tourism under United Nations System of

National Accounts (SNA) and also in the World Trade Organization terminology. As BPM5 points out, 'Travel (...) is a demand-oriented activity' (International Monetary Fund, 1993). Furthermore, it is important to note that travel do not represent a specific service. It refers to consumption of basket of services by travelers. Thorough definition of travel can be found in Balance of Payments Manual published by International Monetary Fund. Our research is aligned with 5th edition from 1993 and its revision published in 2008. Let us now proceed with Irish Travel related exports.

Once again the results have been estimated using quasipoisson regression with heteroscedasticity and cluster robust standard errors. In order to account for unobserved variables, we have employed fixed effects estimation in form of importer dummies.

Table 6: Travel Exports: Ireland

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	316.1014	62.2602	5.0771	0.0000
log(distance)	-1.1227	0.3019	-3.7191	0.0002
log(domesticGDP)	0.3242	0.4877	0.6648	0.5062
log(foreignGDP)	1.0935	0.1950	5.6093	0.0000
log(land)	0.3296	0.1067	3.0882	0.0020
log(celphones)	1.2492	0.5012	2.4922	0.0127
log(domesticRefugees)	-0.2863	0.1598	-1.7915	0.0732
log(foreignRefugees)	-0.1686	0.0533	-3.1634	0.0016
log(foreignInternetUsers)	1.3340	0.4558	2.9270	0.0034
% urban population	0.0013	0.0167	0.0794	0.9367
foreign CPI	-0.1065	0.0776	-1.3730	0.1698
log(ERDI)	0.2282	0.1794	1.2724	0.2032
landlocked	0.5376	0.3421	1.5715	0.1161
RTA	0.4511	0.8437	0.5347	0.5928
comleg	0.7096	0.2782	2.5503	0.0108

* Errors clustered by importer

We can see that impact of distance is much higher than in case of total exports of services. At -1.1, the coefficient is close to unity meaning that travelers from country 1% further away are

expected to spend 1.1% less on services in Ireland. Exactly as one would intuitively expect, change in domestic GDP does not have any significant impact on spending habits of foreigners. And indeed, it would be foolish to expect that just because the Irish economy has grown between given two years in nominal terms, either business or personal travelers would suddenly start to purchase more services in Ireland. Last of the core gravity variables is foreign GDP. With the coefficient higher than 1, we can see that those who provide services to foreign travelers are disproportionately more benefiting from growth in rest of global economy. In fact, if any partner country's GDP grows by 1%, we expect Ireland to export 1.1% more travel related services.

From the non-core group of explanatory variables, we find number of refugees in importing country, land, cellphone subscriptions, internet users and common legislature to be statistically significant at 0.05 level of significance. Moreover, significance of refugees in domestic country is fairly close to the above mentioned level. The coefficient for number of refugees in the importing country suggests, that as number of refugees in foreign country goes up by 1%, Ireland can expect 0.17% lower spending on services by travelers from that country. This result is both, slightly surprising and also very problematic because of the implications it would have in case our model was correct. How can we expect Europe to willingly accept refugees from countries torn apart by wars and other conflicts, when it is likely to have negative impact on international trade and through that on standard of living? Thankfully, intuitive answer is at our disposal. This negative impact is likely not a direct result of incoming refugees, rather it might be an outcome of isolationist policies implemented by local governments in an attempt to curb migration. Furthermore, the impact of immigration into exporting economy has significant impact neither at total level of aggregation nor in case of Travel Exports. The negative effect appears only in case of immigration into the importing economy.

Common legal origins again appear to be significant with highly positive impact. Ireland is expected to sell 100% more to travelers from foreign countries with which it shares legal origins. Proliferation of cellphones and internet connections in importing country has large positive impact on exports from Ireland. When cellphone usage goes up by 1%, we expect Ireland to sell 1.2% more services to travelers. Impact of internet subscriptions is even higher with coefficient above 1.3.

Table 7: Travel Exports: United Kingdom

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	99.8255	38.7449	2.5765	0.0100
log(distance)	-0.2673	0.0936	-2.8544	0.0043
log(domesticGDP)	0.9444	0.1989	4.7474	0.0000
log(foreignGDP)	0.6514	0.1027	6.3458	0.0000
log(land)	0.0420	0.0729	0.5764	0.5644
log(celphones)	0.1698	0.2105	0.8066	0.4199
log(domesticRefugees)	-0.3048	0.1047	-2.9100	0.0036
log(foreignRefugees)	-0.0430	0.0380	-1.1313	0.2579
log(foreignInternetUsers)	0.0803	0.1375	0.5840	0.5592
% urban population	-0.0093	0.0073	-1.2689	0.2045
foreign CPI	0.0665	0.0836	0.7956	0.4263
log(ERDI)	-0.2471	0.2031	-1.2167	0.2237
Landlocked	-0.3231	0.1995	-1.6191	0.1054
Rta	0.4991	0.3231	1.5445	0.1225
Comleg	0.9059	0.1921	4.7158	0.0000

* Errors clustered by importer

On one hand, as far as the sign of coefficients is concerned, results for England are similar. We see statistically significant influence of distance and both GDPs with expected sign. Clearly, distance plays much lower role when it comes to purchases of services by travelers coming to United Kingdom than in case of Ireland. We find that travelers from country that is 1% further away buy 0.26% less services. We will return do this difference later. On the other hand, impact of domestic economy' GDP is statistically significant and close to unity. As we argued above, United Kingdom is comparatively large economy and thus can have bigger impact on trade

patterns. That being said, we should always take the coefficient for domestic GDP with a pinch of salt as we have only few different values recorded in the dataset. Each year, GDP of exporting country is observed once and we have data on the period 2004 – 2012. As more and more refugees arrive in United Kingdom we expect the level of travel services export to go down. For an increase of number of asylum seekers by 1%, we expect the export to go down by 0.3%. Having said that, we are highly skeptical about direct impact of number of refugees on level of exports. More likely is the explanation that in response to influx of foreigners, local government starts rising barriers or, as current anecdotal evidence from European Union demonstrates, stop pursuing the trade and movement enhancing agenda. Furthermore, number of current asylum seekers could also reflect efficiency of the current bureaucracy.

Last statistically significant variable is common legal origins dummy. According to our estimation, we would expect United Kingdom to trade 147% more with countries sharing the same legal origins.

The difference between impact of domestic GDP and distance in cases of Ireland and United Kingdom could be caused by different motives for traveling into these countries. In case of one it could be all about tourism, in case of the other mostly business travelers could be visiting the country. These two groups might respond to obstacles such as distance differently and travels by business travelers might be actually impacted by changes in GDP of the exporting country. There is likely more going on and we would need more detailed data available over longer period in order to determine appropriately the reason for difference. Nevertheless, we attempt to shed some light on this issue by investigating determinants of business travel

4.3 Export of Business Travel

In this chapter we discuss results obtained for Business Travel, which is encoded as 239 under the BPM5 classification. This category, as defined by BPM5, covers expenses by travelers on business trips. It includes `carrier crews stopping off or lying over, government employees on official travel; employees of international organizations on official business; and employees doing work for enterprises that are not resident in the economies in which the work occurs` (Balance of Payments Manual, 1993). As in case of Travel, included are any services bought by visiting travelers. Information on services that are not provided on quid pro quo basis is not available.

Table 8: Business Travel Exports: Ireland

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1015.1528	182.1208	-5.5741	0.0000
log(distance)	-0.7853	0.4591	-1.7106	0.0872
log(domesticGDP)	2.2366	1.4498	1.5427	0.1229
log(foreignGDP)	1.4953	0.3784	3.9515	0.0001
log(land)	0.5556	0.2064	2.6916	0.0071
log(celphones)	3.1108	1.3265	2.3452	0.0190
log(domesticRefugees)	3.8611	0.6563	5.8830	0.0000
log(foreignRefugees)	-0.2106	0.1003	-2.1003	0.0357
log(foreignInternetUsers)	4.9394	2.1230	2.3266	0.0200
% urban population	0.0669	0.0746	0.8962	0.3701
foreign CPI	-0.3539	0.3152	-1.1228	0.2615
log(ERDI)	1.2377	0.6182	2.0021	0.0453
Landlocked	-0.4258	1.2579	-0.3385	0.7350
Rta	2.5425	1.8005	1.4121	0.1579
Comleg	0.7548	0.3733	2.0222	0.0432

* Errors clustered by importer

Of the three core explanatory variables, only foreign GDP is significant at 0.05 level. 1% increase of importer's GDP is connected with 1.5% rise in Business Travel expenditure. We

would conclude that impact of distance is statistically different from zero only at 0.1 significance level. On the other hand, the sign as size of coefficient are about as expected. Domestic GDP has large point estimate, but also huge standard error. This error, which is possibly caused by high number of zero trade flows in the dataset, means that domestic GDP is considered as statistically insignificant. Furthermore, more spending is done by visitors from geographically large countries. There is a huge statistically and economically significant impact of cellphone and internet proliferation in the importing country. 1% increase in cellphone subscriptions in importing economy has estimated impact of 3.9% rise in export of Business travel services. For internet access, the impact is even higher at 4.9%. Coefficient related to number of refugees in Ireland is unexpectedly large and could mean that there is a relationship between number of refugees in Ireland and number of government visitors from foreign countries. We would have to take a closer look at split between corporate and government travelers in order to be able to say more on the topic. Regretfully, such data is not available. Furthermore, ERDI coefficient either suggests that our results are highly unstable due to large count of zero trade flows for Business Travel in case of Ireland, or more business travelers arrive from countries with undervalued currencies. Intuitively, this could very well be the case as visitors from developing countries happen to visit corporate hubs at countries such as Ireland. Furthermore, government visits might be more frequent from countries in worse shape of the economy.

Common legal origins have the usual positive, statistically significant impact. Other variables are not statistically significant.

Results for United Kingdom are discussed next. The output from our regression is reported in Table 9.

Table 9: Business Travel Exports: United Kingdom

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	174.2326	37.7159	4.6196	0.0000
log(distance)	-0.2702	0.0910	-2.9683	0.0030
log(domesticGDP)	1.5076	0.1919	7.8555	0.0000
log(foreignGDP)	0.6472	0.1026	6.3101	0.0000
log(land)	0.0438	0.0724	0.6057	0.5447
log(celphones)	0.1552	0.1992	0.7791	0.4359
log(domesticRefugees)	-0.3962	0.1032	-3.8392	0.0001
log(foreignRefugees)	-0.0411	0.0388	-1.0590	0.2896
log(foreignInternetUsers)	0.0863	0.1359	0.6350	0.5254
% urban population	-0.0093	0.0073	-1.2649	0.2059
foreign CPI	0.0690	0.0817	0.8447	0.3983
log(ERDI)	-0.2287	0.1844	-1.2401	0.2150
Landlocked	-0.3097	0.2005	-1.5447	0.1224
Rta	0.4921	0.3259	1.5100	0.1310
Comleg	0.9148	0.1917	4.7727	0.0000

* Errors clustered by importer

It is immediately obvious that estimates for United Kingdom are much more conservative. This is likely to be caused by the fact that there are many more non-zero observations in this dataset. In case of Ireland, over 300 of them were zero and thus there is chance that the gravity model appears insufficiently strong in case of Ireland. For United Kingdom the model fits data well and sign as well as size of the coefficients is what we would expect. All core gravity variables are significant with expected sign.

We can see that domestic GDP plays a large role as the model predicts 1% growth in GDP to result in 1.5% growth in business travel related exports. At -0.27 the distance coefficient is much smaller than what Smotlachová (2014) found when analysing exports of Machinery and Automobiles from Czech Republic. Lower impact of distance is exactly what we would expect for export of services, especially in case of United Kingdom. While some corporate and government travellers might skip certain countries because of the distance, United Kingdom is

not one to avoid just because it is further away from your homeland. So we shouldn't be too surprised that in this particular case, visitors are not so much disincentivised as in case of average country. When we compare the result for Ireland, we can immediately see that small country is much more persecuted by it's distance from trading partners. Furthermore, number of refugees seeking asylum in United Kingdom has statistically significant negative impact on export of services. But once again, we believe this is more because of social and political dynamics that sudden influx of refugees causes in the exporting country. It would be naive to believe that refugees have direct negative effect on export performance.

Common legal origins are again significant with expected direction of influence.

4.4 Travel and Business Travel:

Discussion of results for Ireland and United Kingdom

One might very well ask: what is the cause of differing estimates between United Kingdom and Ireland? In this chapter we attempt to shed more light on the matter. On the highest level of aggregation, it is likely to be caused by different shares of various categories of services on total exports. While travel exports might closely follow that of goods, other categories, such as insurance, might be less susceptible to distance and much more to trade agreements. And indeed we find, that while travel makes for 13% of total British exports, it is mere 6% in case of Ireland. So, if we were to base our reasoning just on the share of Travel, we would infer that distance is likely to play higher role in case of total exports from United Kingdom than that of Ireland. But even at lower levels of aggregation, such as Travel, differences across countries might persist.

While comparing estimates for Travel exports from respective countries one has to ask how travelers choose their destination. The first and most important step is to look at differences

between choices made by tourists and business travelers. We would argue that business travelers are likely to be less influenced by the distance between countries than tourists. While tourists choose destination based on factors such as attractiveness and cost, business travelers usually do not have much choice to which company hub they would like to travel. Once the corporate headquarters are established much of business travel is determined. Furthermore, companies in Ireland might be in general more cost averse – the reason for choosing Dublin over London would most likely be lower taxes and lower costs. On the other hand, a company would choose London in order to lure the top talent or boost its prestige.

It turns out that while 23% of British travel exports consists of Business Travel, Irish exports consist of 9% business travel and 91% tourism. Thus we observe much higher impact of distance on exports from Ireland than UK. Furthermore, domestic GDP plays much lower role for Ireland. This can be again explained by the fact that tourists do not care much about economic strength of visited economy, whereas growth of economy might very well increase incentives for business travel. On the other hand, size of importer's GDP is much higher for Ireland which is exactly what we would expect! As exports from Ireland are driven much more by mere tourism, wealth of importing economy is likely to be significant.

Moreover, we find that common legal origins are more influential when it comes to United Kingdom. It is possible to argue that legal framework is much more important determinant of business travel. Legal framework might make business traveling easier or it might influence decisions of British companies to set up a subsidiary in foreign countries. Employees of this subsidiary are then likely to visit United Kingdom.

Further, our results suggest that number of internet users in foreign country is significant determinant of travel exports in case of Ireland, but not so much in case of United Kingdom. One possible explanation would be that travelers to United Kingdom come not only from

developed countries where internet facilitates journey preparation, but also from developing countries, where the elite has amassed amazing fortunes and is ready to spend lavishly in destinations such as London. These people might not be lured to Ireland as much.

Moving on to the discussion of Business Travel, we find out that distance is significant only at 0.1 level in case of Ireland. While the point estimate is larger in case of this country, the large standard error really prevents us from making any conclusive judgement regarding the “real” difference between United Kingdom and Ireland.

Interestingly, impact of foreign GDP appears to be much larger in case of Irish Business Travel exports. This suggests that Ireland will be much more responsive to weakness in global economy (but also thrive more in time of boom). Reason for this difference might lie in different price dynamics in both countries. As stated previously, firms are likely to establish headquarters in Ireland due to favorable tax regime and lower property prices. It might well be that these firms respond more dynamically to the boom-bust cycle and thus travel expenses respond much more to changes in rest of the world.

Last but not least, coefficient for common legal origins supports our intuition regarding export of total travel services. In case of business travel, common legal origin is more important than in case of Travel in general. Legal framework is likely to help enhance business ties between countries while it is unlikely to significantly affect tourists.

4.5 Other categories

In this section we very briefly comment on other categories of services. These sectors are not covered in such a depth as Travel and Total since we usually do not have enough data either for Ireland or United Kingdom.

Table 10:

Other services exports: Ireland								
# observations:	477		419		378		372	
McFadden's pseudo-R ² :	0.926		0.963		0.901		0.945	
BPM5 codes	268		245		260		253	
	Estimate	Pr(> z)	Estimate	Pr(> z)	Estimate	Pr(> z)	Estimate	Pr(> z)
(Intercept)	-139.9185	0.0346	-49.8603	0.4750	298.9328	0.1437	251.3375	0.0000
log(dist)	-0.4568	0.0374	-1.1259	0.0000	-1.0765	0.0103	-0.5728	0.0029
log(dGDP)	0.7593	0.0511	0.9979	0.0420	0.5983	0.0771	0.3092	0.6007
log(fGDP)	0.8900	0.0000	0.7201	0.0030	0.8056	0.0000	0.8667	0.0000
log(land)	-0.1260	0.0769	0.5133	0.0155	0.0322	0.8186	0.0599	0.6123
log(phones)	-0.0134	0.9688	2.1848	0.0014	2.9362	0.0138	2.4469	0.0000
log(dRefugees)	0.2820	0.3112	-0.5687	0.2737	-0.5633	0.1445	-0.4593	0.0575
log(fRefugees)	-0.1001	0.0363	0.2209	0.0056	-0.0264	0.7094	0.1246	0.0194
log(fInternet)	0.4242	0.3598	-0.6782	0.2426	0.3693	0.6581	0.0952	0.8188
%urban	-0.0122	0.2134	0.0791	0.0074	0.0393	0.0603	-0.0001	0.9933
fCPI	0.0519	0.5140	0.2221	0.1032	-0.2729	0.0739	-0.2552	0.0008
log(ERDI)	-0.6280	0.3317	0.6603	0.0501	-0.8398	0.1210	-1.4201	0.0093
landlocked	-0.1483	0.6666	0.4473	0.5669	1.3572	0.0434	-0.9584	0.0506
rta	0.3276	0.5850	1.3671	0.1599	-1.2891	0.2597	-0.0697	0.9013
comleg	0.4399	0.0492	0.7969	0.0002	0.6465	0.1006	0.5907	0.0060

* Errors clustered by importer, source: own calculations

Let us start with estimates for Ireland. In order to maintain degree of readability, we have abbreviated names of the variables in table above. The BPM codes 268, 245, 260 and 253 belong to Other Business Services, Communication Services, Financial Services and Insurance Services respectively. We can see that in all cases impact of distance is negative and ranging between -0.46 for Other Business Services and -1.13 for Communication Services. We found distance to be both, statistically and economically significant determinant of trade for all of the four listed categories.

GDP of Ireland has positive impact on exports, just as we would expect. For Other Business Services, Communication Services and Financial Services we find enough evidence that domestic GDP has non-zero effect on Exports when tested at 0.1 significance level. The impact is significant for Communication Services even at 0.05 level and Other Business Services and Financial Services are not too far from the threshold. On the other hand, we find no evidence that domestic GDP has any influence over export of insurance services.

GDP of the trading partner is statistically significant at all reasonable levels and has positive impact on export of services for all categories. When trading partner's economy gets 1% bigger, we expect the increase in services exports to be between 0.72 in case of Communication Services and 0.89 for Other Business Services.

The geographic size of importer is statistically significant at 0.05 level only for communication services. As this category covers telecommunication and postal services, such influence is in reality possible since need to use such service might be higher in sparsely populated countries. Intuitively, we see no possible argument for seeing statistically or economically significant impact of land size for other services and so we gladly accept the result.

While proliferation of cellphone subscriptions is not significant determinant for Other Business Services, it is significant for all other considered categories at any plausible significant level. Furthermore, sign of impact is positive, exactly as we expect. For Communication services, Financial services and Insurance services, we estimate that 1% increase in cellphone use by inhabitants of partner economy translates to over 2% increase in exports from Ireland.

Once again we can see that estimated effect of number of refugees in importing economy is estimated to be significant variable, but since the sign is negative for different categories about as often as positive, we refrain from drawing any conclusions.

Our finding that number of internet users is statistically insignificant for all of the categories is of the more surprising ones. In general, we would expect internet connection to provide customers with means of consuming foreign services and thus result in higher exports from Ireland.

Furthermore, level of urbanization in partner country has positive and statistically significant impact on exports of Communication and Financial services. Clearly, we would expect that

city dwellers are more likely to engage in consumption of such services provided by foreign companies.

Our calculations suggest that Ireland exports 0.22% less Insurance services to countries with higher corruption perception index. This means that with decreasing level of corruption in partner economy (as perceived by people from importing country), Irish exports decline. We believe that this relationship mostly demand driven. We believe that the causality is that demand for Insurance is higher in countries which are comparatively more corrupt rather than that Irish insurers pursue business in more corrupt countries. It could also be that Irish insurers face lower competition in corrupt countries. On the other hand, we have to acknowledge that this finding could be driven more by spurious correlation. Developing countries in Africa, Asia and South America also happen to be those more corrupt. With growth of investment in these countries, more and more insurance is needed.

Last but not least, we find statistically significant impact of common legal origins on export of all considered categories of services. The estimated coefficients range between 0.44 for Other Business Services and 0.8 for Communication services. These coefficients translate into 55% to 122% higher exports to countries with which Ireland shares similar legal system.

Table 11: Government Services: United Kingdom

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	199.4422	54.6875	3.6469	0.0003
log(dist)	-0.2941	0.1805	-1.6294	0.1032
log(dGDP)	0.3005	0.1780	1.6885	0.0913
log(fGDP)	0.7911	0.1191	6.6399	0.0000
log(land)	0.1311	0.0897	1.4609	0.1441
log(phones)	-0.0596	0.1316	-0.4527	0.6508
log(dRefugees)	-0.2758	0.1762	-1.5655	0.1175
log(fRefugees)	0.0505	0.0439	1.1502	0.2501
log(fInternet)	0.0434	0.1404	0.3088	0.7575
%urban	0.0015	0.0124	0.1211	0.9036
fCPI	-0.0409	0.0697	-0.5866	0.5575
log(ERDI)	0.2137	0.1389	1.5388	0.1239
landlocked	-0.0387	0.3209	-0.1205	0.9041
rta	-0.3238	0.4187	-0.7733	0.4393
comleg	0.9397	0.2616	3.5915	0.0003

* Errors clustered by importer, source: own calculations

Let us finish this chapter by briefly summarizing results for export of Government services.

This category covers `government service transactions (including those of international organizations) not contained in previous classifications` (Balance of Payments Manual, 1993).

Here we would find expenditures by `embassies, consulates, military units, (...)` (Balance of Payments Manual, 1993).

We find that distance is merely approaching significance at 0.1 level and domestic GDP is barely significant at same threshold. GDP of the foreign country is found to be significant and we estimate that for 1% improvement in partner's GDP, United Kingdom exports 0.79% more government services. All three core gravity variables have expected sign of influence.

As in previous cases, common legal origins represent statistically significant variable with positive impact on trade. When importer shares legal origins with United Kingdom, the trade flow is expected to be 156% higher.

5 Conclusion

This thesis embarked on a comparison of determinants of trade in services. In the literature overview we have discussed some of the results obtained previously by other authors and provided comments on their approach. In chapter five we compared our results with that of authors examining different levels of aggregation of trade in goods (Smotlachová, 2014) (Tachovská, 2015) as well as studied differences between drivers of Travel exports and explained differing results for Ireland and United Kingdom.

Based on high value of McFadden's pseudo-R², consistency of both, intuitive sign and scale of estimated coefficients for key explanatory variables and good fit of the data as well as impressive performance across all categories, multiple levels of aggregation and both, comparable and sensible results for Ireland and United Kingdom, following conclusion can be made: With the available evidence it is reasonable to believe that gravity model of trade does indeed explain most of the trade flows in segment of services regardless of disaggregation level.

We have also found that the impact of distance is indeed lower in case of services. This finding is contradictory to the finding of Yane Haruka who found that with increase of distance by 1%, the import of services goes down by about 1.5 % for both, imports of intermediates and imports of final products (Yane, 2013). On the other hand, Walsh (2006) finds distance to be insignificant, which is a finding for which we found no support. This thesis reports estimated effect of distance to be between -0.27 for Business Travel provided by United Kingdom and -1.1 in case of both, communication services and travel services provided by Ireland. In most of

the cases we find the estimate to be around the -0.5 region. Smotlachová (2014) found that in case of exports of goods from Czech Republic the coefficient depends significantly on aggregation. They found the effect to be largest for highest level of aggregation (-1.29) and lowest at the level of Automobile Exports (-0.511). We have evaluated 10 models and in six cases found the distance coefficient to be less (in absolute value) than the -0.511 reported by Smotlachová for export of automobiles. Furthermore, when we evaluated export of services at highest level of aggregation, we found the effect of distance to be -0.33 and -0.38 for Ireland and United Kingdom respectively.

Moreover, we have found no evidence that exports of services are diminished by the importing country being landlocked, which is what we would expect since travelers choose mostly airplanes as their means of transportation and other categories usually do not require naval shipping either.

This thesis confirmed that in case of certain services the proliferation of smartphones and internet in importing country matter while regional trade agreements do not appear to have significant influence for services. Of ten estimated models we have found sufficient evidence for claim that regional trade agreements enhance trade only when estimating model for total exports from Ireland. Interestingly, we have not found the evidence when looking at disaggregated level. Thus we have found support for claim that Gravity models should be estimated in lower levels of aggregation in order not to compare apples and oranges. Above claim has been previously demonstrated (among others) by Smotlachová (2014) and later on by Tachovská (2015).

Furthermore, while we have found that the Gravity Model is returning mostly expected results over aggregations and categories in case of United Kingdom, we have encountered some surprising findings for Ireland. For example, how is it possible that Exchange Rate Deviation

Index has positive impact on Irish exports of Communication Services? There are two possible explanations: some unobserved and untreated variables affect the trade in this category or the inflated number of zero trade flows results in unstable estimates. On one hand, we use method which can handle nonzero trade flows. On the other hand, not even this method can cope with too little variation in the sample caused by majority of observations being zero.

When examining the results for export of Travel Services we have found that distance is much less influential in case of United Kingdom. We have argued that this is most likely caused by higher share of Business Travel on exports from United Kingdom. Moreover, determinants of Business Travel have been examined in chapters 4.3 Export of Business Travel and 4.4 Travel and Business

Travel:

Discussion of results for Ireland and United Kingdom. We have found that in case of Ireland distance affects export of Business Travel much less than Travel in general. Furthermore, we have found that firms with headquarters in Ireland respond much more to changes in importer's GDP and are more influenced by distance compared to their counterparts in United Kingdom. We have argued that thriftier firms are more likely to be based in Ireland and such firms are likely to quickly respond to financial bust and cut spending. Furthermore, determinants of business travel are likely to differ based on structure of exporter's economy. Firms in different industries are likely to respond differently to variables such as economic cycle.

Moreover, we have found common legal origins to be significant across categories and aggregations. Although we might have anticipated slightly lower influence of this variable, the positive sign is exactly in line with our prior expectations.

Last but not least, it is important to point out the data quality constraints and analysis approach constraints. First, the quality of data on export of services is subject to ability and willingness of local statistical offices to collect accurate and detailed data. Such task is not simple and some

inaccuracies might be present in the dataset. Second, results of estimation are likely to depend on choices made by researchers. For example, when Yane Haruka (2013) faced multicollinearity issues, decision was made not to include country level fixed effects. Doing so might result in omitted variable bias. On the other hand, Smotlachová (2014), it appears, used VIF test on set of variables not including importer dummies. Thus, importer dummies were added only after VIF test was performed, most likely leading to multicollinearity bias. This thesis took yet another approach. We performed the VIF test on full set of variables including importer dummies. As a result of using fixed effects we had to cut down on number of explanatory variables in order to avoid multicollinearity issues.

Appendix A

Table 12: Proposed explanatory variables

Variable	Measure	Source	Expected impact	Concerned country
Distance between capitals	km	CEPII	-	Pair
Distance from Washington	km	CEPII	-	Importer
Distance from Berlin	km	CEPII	-	Importer
Distance from Beijing	km	CEPII	-	Importer
Gross Fixed Capital Formation	Current USD	World Development Indicators by Wrold Bank	+	Exporter, Importer
Gross Domestic Product	Current USD	World Development Indicators by Wrold Bank	+	Exporter, Importer
Internet Users	per 100 people	World Development Indicators by Wrold Bank	+	Importer
Cellphone Subscriptions	per 100 people	World Development Indicators by Wrold Bank	+	Exporter, Importer
Land Area	km ²	World Development Indicators by Wrold Bank	-	Importer
Refugees by Asylum	Count	World Development Indicators by Wrold Bank	+	Exporter, Importer
Labor Force	Count	World Development Indicators by Wrold Bank	+	Importer
Urban Population	Count	World Development Indicators by Wrold Bank	+	Exporter, Importer
Rural Population	Count	World Development Indicators by Wrold Bank	+	Importer
Total Population	Count	World Development Indicators by Wrold Bank	+	Exporter, Importer
Urban Population	%	World Development Indicators by Wrold Bank	+	Importer
Corruption Perception Index	Index	Transparency International	+	Exporter, Importer
Regional Trade Agreement	Dummy	CEPII	+	Pair
Common Legal Origins	Dummy	CEPII	+	Pair
Common Currency	Dummy	CEPII	+	Pair

Contiguity	Dummy	CEPII	+	Pair
Common Official Language	Dummy	CEPII	+	Pair
Colonial Ties	Dummy	CEPII	+	Pair
Landlocked	Dummy	CEPII	-	Importer
EU Membership	Dummy	Own calculation	+	Importer
ASEAN Membership	Dummy	Own calculation	+	Importer
NAFTA Membership	Dummy	Own calculation	+	Importer
Exchange rate deviation index	Index (wrt exporter currency)	Own calculation based on World Bank data	-	Pair

For information on the original source of data used by World Bank see the WDI database

Table 13: Ireland statistics 2004-2012

	Total Exports (million \$)	Distance from trading partners (km, log)	Domestic GDP (\$, log)	Foreign GDP (\$, log)	Foreign CPI (log)
Min. :	0	6.132	25.99	22.57	1.6
1st Qu.:	75.28	7.428	26.12	25.68	3.5
Median :	368.75	7.831	26.17	26.41	5.36
Mean :	472.61	8.097	26.18	26.52	5.713
3rd Qu.:	105.2	9.066	26.21	27.52	8
Max. :	395.73	9.853	26.34	30.41	9.7

	Foreign Internet Users (per 100 people, log)	Foreign Cellphone Subscriptions (per 100 people, log)	Foreign Refugees (Count, log)	Domestic Refugees (Count, log)	Exchang e Rate Deviation Index (log)
Min. :	0.2516	1.548	0	8.753	-0.3876
1st Qu.:	3.381	4.41	6.682	8.87	0.1114
Median :	4.0351	4.633	8.597	9.018	0.5263
Mean :	3.7274	4.518	8.606	9.004	0.6722
3rd Qu.:	4.2887	4.779	10.914	9.141	0.9552
Max. :	4.5665	5.435	13.886	9.183	5.981

	Foreign Urbanized population (% of total)	Common Legal Origins (Dummy)	Regional Trade Agreement (Dummy)
Min. :	28.9	0	0
1st Qu.:	61.12	0	0
Median :	73.59	0	1
Mean :	71.66	0.2517	0.6026
3rd Qu.:	83.82	1	1
Max. :	100	1	1

Table 14: United Kingdom statistics 2004-2012

	Total Exports (million \$)	Distance from trading partners (km, log)	Domestic GDP (\$, log)	Foreign GDP (\$, log)	Foreign CPI (log)
Min. :	6.24	5.78	28.46	22.45	1.6
1st Qu.:	308.74	7.271	28.51	25.26	3.5
Median :	989.28	7.646	28.58	26.22	5.2
Mean :	732.75	7.934	28.57	26.19	5.618
3rd Qu.:	894.63	9.082	28.6	27.23	7.79
Max. :	842.86	9.86	28.72	30.41	9.7

	Foreign Internet Users (per 100 people, log)	Foreign Cellphone Subscriptions (per 100 people, log)	Foreign Refugees (Count, log)	Domestic Refugees (Count, log)	Exchange Rate Deviation Index (log)
Min. :	0.2516	1.548	0	11.92	-0.364
1st Qu.:	3.3673	4.395	6.386	12.38	0.0358
Median :	3.979	4.623	8.328	12.58	0.4628
Mean :	3.6998	4.503	8.333	12.45	0.6059
3rd Qu.:	4.2711	4.758	10.661	12.61	0.9408
Max. :	4.5665	5.435	13.886	12.62	5.8992

As is:	Foreign Urbanized population (% of total)	Common Legal Origins (Dummy)	Regional Trade Agreement (Dummy)
Min. :	28.9	0	0
1st Qu.:	61.14	0	0
Median :	73.31	0	1
Mean :	71.77	0.2347	0.6126
3rd Qu.:	84.55	0	1
Max. :	100	1	1

Table 15: Top 20 Destinations (2012): Other Exports from Ireland

Other Business Services		Communication Services*		Financial Services		Insurance Services	
partner	export (million \$US)	partner	export (million \$US)	partner	export (million \$US)	partner	export (million \$US)
UK	5117.6	UK	261.3	UK	2563.3	UK	2933.3
US	2866.5	US	109.8	US	1070.3	IT	2235.7
RU	1712.7	DE	23.6	IT	781.2	US	1467.3
FR	1669.0	SE	18.1	BE	335.3	FR	894.3
IT	1471.2	FR	15.3	DE	325.1	DE	801.8
JP	1220.6	BE	5.6	FR	214.6	NL	317.4
NL	1125.5	ES	2.8	NL	214.6	CA	278.8
CA	1031.7	IT	2.8	JP	192.7	SE	213.3
AU	1013.8	CA	1.4	CH	179.9	DK	176.0
IN	815.9	AR	0.0	ES	147.8	ES	176.0
BE	813.3	AU	0.0	SE	95.1	AU	95.1
ES	747.8	AT	0.0	CA	72.0	NO	88.7
DE	669.4	BG	0.0	FI	72.0	JP	87.4
SG	582.0	BR	0.0	NO	68.1	CH	86.1
CH	516.5	CL	0.0	HK	66.8	BE	84.8
SE	513.9	CY	0.0	ZA	63.0	MX	45.0
KR	431.7	CZ	0.0	SG	51.4	SG	39.8
CY	403.4	DK	0.0	AU	37.3	ZA	39.8
BR	235.1	EG	0.0	AT	34.7	CL	27.0
MY	222.3	EE	0.0	DK	24.4	BR	24.4

* Export values for 2011 are displayed in case of Communication services

Table 16: Top 20 Destinations
(2012): Exports of Government
Services from United Kingdom

Other Business Services	
partner	export (million \$US)
UK	5117.6
US	2866.5
RU	1712.7
FR	1669.0
IT	1471.2
JP	1220.6
NL	1125.5
CA	1031.7
AU	1013.8
IN	815.9
BE	813.3
ES	747.8
DE	669.4
SG	582.0
CH	516.5
SE	513.9
KR	431.7
CY	403.4
BR	235.1
MY	222.3

Table 17: List of Countries Covered by the Study

2 Letter Code	Country Name	2 Letter Code	Country Name
AL	Republic of Albania	IT	Italian Republic
AR	Argentine Republic	JP	Japan
AT	Republic of Austria	KR	Republic of Korea
AU	Commonwealth of Australia	LT	Republic of Lithuania
	Territory of Ashmore and Cartier Islands		Grand Duchy of Luxembourg
AU	Coral Sea Islands Territory	LV	Republic of Latvia
BE	Kingdom of Belgium	MA	Kingdom of Morocco
BG	Republic of Bulgaria	MK	Republic of Macedonia
BR	Federative Republic of Brazil	MT	Republic of Malta
BY	Republic of Belarus	MX	United Mexican States
CA	Canada	MY	Malaysia
CH	Swiss Confederation	NG	Federal Republic of Nigeria
CL	Republic of Chile	NL	Kingdom of the Netherlands
CO	Republic of Colombia	NO	Kingdom of Norway
CY	Turkish Republic of Northern Cyprus	NZ	New Zealand
CY	Republic of Cyprus	PH	Republic of the Philippines
CZ	Czech Republic	PL	Republic of Poland
DE	Federal Republic of Germany	PT	Portuguese Republic
DK	Kingdom of Denmark	RO	Romania
EE	Republic of Estonia	RU	Russian Federation
EG	Arab Republic of Egypt	SE	Kingdom of Sweden
ES	Kingdom of Spain	SG	Republic of Singapore
FI	Republic of Finland	SI	Republic of Slovenia
FR	French Republic	SK	Slovak Republic
	Hong Kong Special Administrative Region		
HK	Region	TH	Kingdom of Thailand
HR	Republic of Croatia	TR	Republic of Turkey
HU	Republic of Hungary	UA	Ukraine
ID	Republic of Indonesia	UK	United Kingdom
IE	Republic of Ireland	US	United States of America
			Oriental Republic of Uruguay
IL	State of Israel	UY	Bolivarian Republic of Venezuela
IN	Republic of India	VE	
IR	Islamic Republic of Iran	ZA	Republic of South Africa
IS	Republic of Iceland		

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