
Estimating Gravity Model in the Czech Republic: Empirical Study of Impact of IFRS on Czech International Trade

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Abstract:

Purpose: In this paper, we test the influence on foreign trade and FDI by using the gravity model within the EU. The influence of IFRS is also tested, although we might expect that its influence will be smaller than that of other factors.

Design/Methodology/Approach: According to the gravity model, countries are trading according to their proximity and also according to the size of their GDP. Negative influence is played by trade barriers and positive by common traditions and a common political background. Big countries trade a lot between each other, e.g., the USA and Canada on the same continent or the USA and Germany in different continents. Smaller countries, like the Czech Republic, do not have such an impact on the scale of world trade. The size of exports /imports is influenced by the fact of whether or not they are part of some trading bloc, e.g., the EU in Europe or NAFTA in America. Accounting rules, namely IFRS, are expected to be perceived as a positive influence on the world trade of a particular country and a country's FDI (Foreign Direct Investment).

Findings: Contrary to our expectations, we have found that the influence of IFRS is not insignificant and is more pronounced after the year 2010 which coincides with the change of local regulations.

Practical Implications: The findings establish an interesting signal relating to perceiving the increasing quality of the Czech economic environment including accounting regulations.

Originality/Value: Based on our methodology accounting rules, namely IFRS, are expected to be perceived as a positive influence on the world trade of a particular country and a country's FDI (Foreign Direct Investment).

Keywords: Gravity model, export, EU, international trade, IFRS.

JEL Codes: M42, M48.

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1. Introduction and Motivation

International trade is an essential factor for the economic development of countries. It also leads to better economic performance for economies, especially for emerging market economies. The Czech Republic is one of the emerging economies in Europe that its economy expanded by 4.3% in 2017 and this growth rate is the second-fastest rate in a decade of the country (EC, 2018). The main driver of this growth is export. Export and import which means international trade of the countries have been investigated and numbers of theories have been developed for these issues such as the comparative advantage theory, and the absolute cost theory. In the economics literature, the gravity model is used to investigate international trade between countries.

We consider that international trade is affected by many reasons. Although there is no theory about the effect of the accounting of the firms on international trade, we claim that the accounting standards have a relationship between international trade. IFRS was introduced as a compulsory feature of accounting, in Europe, in 2005. The major purpose was to enable the use of information for financial markets and investors even though other positive aspects have been perceived by external and internal users of IFRS regulations. In 2010, there was an institutional change in Czech regulations as the Ministry of Finance allowed and encouraged the use of IFRS by Czech companies. IFRS could be used as a base for accounting purposes but, for tax purposes, the results still had to be accounted for according to Czech Accounting Standards (CAS) rules.

In the Czech Republic, there is an obligation to prepare to account according to Czech standards for the purpose of calculating the tax base. But there was a change in regulations in 2010 when IFRS was allowed to be used within Czech companies that were part of bigger international groupings. These subsidiaries were allowed to use IFRS as the primary standards rules, but subsidiaries, which are part of international companies, can use IFRS as their primary accounting standards and translate the relevant parts to CAS for tax purposes (Jindrichovska and Kubickova, 2017; Andre, 2017). This instructional change was described in many academic works, e.g., Jindrichovska and Kubickova (2016) and (2017), Prochazka (2017), Denisova *et al.* (2017) and others.

To investigate this relationship, we will use the gravity model. The gravity model in economics comes from Newton's "Law of Universal Gravitation" which was proposed in 1687. It states that every two particles in the universe attract each other. The formulation of the law as follows for two objects *i* and *j*.

$$F_{ij} = G \frac{M_i M_j}{D_{ij}^2} \quad (1)$$

where; F_{ij} is the attractive force, M_i and M_j are the masses and D_{ij} is the distance between the two objects, G is a gravitational constant depending on the unit of measurement for mass and force.

Although it is based on physics, it has long been one of the most successful empirical models in economics (Anderson, 1979; 2011). The Gravity equation to model the size of bilateral trade flows between any two countries was firstly presented, in 1962, by Jan Tinbergen (Muratoglu, Ugurlu and Muratoglu, 2017). The gravity model equation in economics is formalized as follows (Roy and Rayhan, 2012).

$$\text{Trade}_{ij} = \alpha \frac{\text{GDP}_i \text{GDP}_j}{\text{Distance}_{ij}} \quad (2)$$

where Trade_{ij} is the value of the bilateral trade between country i and j , and GDP_i and GDP_j are country i and j 's national incomes, respectively. Distance_{ij} is a measure of the bilateral distance between the two countries. After logarithms of the equation are taken, we have Equation 3 which is below:

$$\log(\text{Trade}_{ij}) = \alpha + \beta_1 \log(\text{GDP}_i \times \text{GDP}_j) + \beta_2 \log(\text{Distance}_{ij}) + u_{ij} \quad (3)$$

According to some literature, the gravity model in economics was not very heavily used, and it was somewhat disconnected from to the family of economic theory. However, gravity has long been one of the most successful empirical models in economics (Anderson, 1979; 2011). Incorporating the theoretical foundations of gravity into recent practice has led to a richer and more accurate estimation and interpretation of the spatial relations of international trade described by gravity. Recent developments are reviewed here with suggestions for promising future research both at the macro level and on the level of individual industries. In this paper, we apply the gravity model to the special conditions of the Czech Republic – a small open economy that was transformed from a planned economy to a market system at the beginning of the 1990s. In particular, apart from relying only on data linked to international trade (bilateral imports and exports within the EU) we are also interested in the impact of a particular institutional feature – the introduction of IFRS into Czech accounting and we are searching to see whether we will find any evidence as to the importance of this variable.

Here we are testing the gravity model and, on the top of that, we will add the IFRS indicator to see whether this institutional change had any importance for Czech imports and exports as expected in the accounting literature. We test the volume and structure of international trade prior to 2010 and after 2010.

The structure of the paper is as follows: Section 1 provides an introduction and motivation, Section 2 characterizes previous literature on the gravity model, generally, and studies of the gravity model in the Czech Republic, in particular. It

also characterizes relevant IFRS studies in the Czech Republic. Section 3 concentrates on methodology and describes the model. Section 4 characterizes relevant data and provides descriptive statistics. Section 5 summarizes the results and suggests avenues for further research.

2. Literature Review

2.1 Studies on the Application of the Gravity Model

Many scholars have investigated the issues of various features of international trade using the gravity model, in particular, in different economies within particular economic blocs. A study by Paas and Tafenau (2005) uses the gravity equation to determine whether it describes trade integration of the EU-25 countries and whether there is any difference for the Baltic Sea Region (BSR). The results suggest that the BSR represents an exception within the EU, as the new trade theories cannot be used to explain BSR trade to the same extent as for the whole EU. Comparative advantages are the main basis for intensive trade relations within the BSR.

Sichei, Erero, and Gebreselasie (2008) employ an augmented gravity model to South Africa's exports of motor vehicles, parts and accessories to 71 countries during 1994-2004. The paper aims to determine which countries South Africa has, and has not, reached with its export potential and to determine whether there are any barriers to exploiting the export markets. Some of the variables related to the trading partners that increase South Africa's exports are GDP, government effectiveness, the English language, the use of left-hand drive vehicles, and EU, Africa, NAFTA, etc. membership. The results show that there are several countries where South Africa could export, but certain barriers exist, such as geographical distance, high import tariffs, and the lack of trade agreements.

Ravishankarand and Stack (2013) employ a stochastic frontier specification of the gravity model to determine trade efficiency against the maximum potential level, using bilateral export data between 17 Western European countries and ten new member states during 1994 and 2007. The findings reveal a high degree of East-West trade integration, the new member states obtaining two-thirds of frontier estimates, while high-efficiency scores suggest a low degree of trade resistances.

Nishitateno (2014) used the gravity model analysis and augmenting it to extend the scope of the research is prevalent in numerous studies in various fields. In his study, he used the gravity model to determine the network effects on auto parts exports from six major automobile producing countries. The findings suggest that overseas production by subsidiary plants increases exports from the home country, except for Japan, where it is a less critical determinant. This could be due to Japanese auto parts suppliers aiming to meet the needs of Japanese automakers, which weakens the network effects on exports from Japan.

Akhvlediani and Śledziewska (2016) analyzed the impacts of Common Commercial Policy (CCP) on the export performances of the Visegrad Four (V4) group of countries with the use of the augmented gravity model by employing the Poisson pseudo-maximum-likelihood (PPML) estimator. The authors found that CCP and EU enlargement had positive impacts on the V4's export performances. Furthermore, the authors state that, besides the officially signed agreements, there are the obvious positive impacts from trade with natural partners. Namely, trade with the Post-Soviet countries remains very considerable even after EU accession.

2.2 The Gravity Studies from the Czech Republic

Medvedev and Zemplineova (2005) concentrated on the Czech manufacturing industry and investigated the impact of domestic and import competition on performance in manufacturing in the period 1998-2002. The study was performed with the use of panel data, and the authors found a strong increasing non-linear (diminishing) relationship between the performance of Czech manufacturing and domestic competition, measured by the Herfindahl-Hirschman Index. The study confirmed that import competition measured by an import penetration ratio is negatively related to the performance of Czech industries, while foreign direct investments are positively correlated with performance.

Hanousek, Kočenda, and Maurel (2011) analyzed the direct and indirect effects as well as the externalities of FDI in emerging European markets based on a literature survey. The authors found that there are weakening effects of FDI over time. This is imputable to publication bias and to the fact that more sophisticated methods and more controls can only be used once a sufficient period of time has passed. The authors assumed that panel studies are likely to find relatively lower spillover effects. More specific to the sampled studies is the role played by forward and backward spillovers, which dominate other channels in driving FDI externalities.

Babunek (2012) compared the inflow of foreign direct investment per capita in the V4 countries and their most important trading partners. It was found that there are statistically significant differences between the V4 countries; however, it was revealed that there are no statistically significant differences between the countries after the inclusion of Germany and Austria, which are the geographically closest countries to the V4 countries. After the inclusion of all trading partners who have ties to more countries, with the V4 it is already evident that there are significant differences between countries. Variances are statistically significant in the inflow of investment to all countries. In work, it is shown that a country of the V4 and its nearest trading partners are a compact unit in the inflow of foreign direct investments.

Simakova (2014) analyzed the impact of exchange rate volatility on trade flows between the Czech Republic and its 17 trading partners, using data from 1997-2012. The researcher uses an extended gravity model equation, with additional factors,

such as spot exchange rate and its volatility. The findings reveal a weak adverse effect of exchange rate volatility on bilateral trade of the country with its main partners. Thus, any policy aimed at exchange rate development cannot significantly improve Czech international trade.

Wlazel (2014) incorporates indirect trade effects into the gravity model for the Czech Republic, using data for 56 countries during 1995-2009. The results of the research are ambiguous, proving that the gravity model does not perform better when adjusted only for domestically produced exports. The findings also confirm that the demand for German exports is the main driver for Czech exports.

A study by Paulus and Michalíková (2014) analyzed trade between the Czech Republic and its 177 trade partners during 1995-2011. It confirmed that Czech exports are directed towards European countries, with the economic factors of domestic and foreign GDP the key drivers. A controversial finding was that higher level of corruption in a partner country should increase mutual trade. This is attributed to the presence of corruption matching. The gravity model has also been used by several researchers adjusting it to analyze different phenomena in the Czech Republic. Jandová and Paleta (2015) analyzed the link between size, distance, and economic variables and internal migration flow within the Czech Republic. The researchers employed several versions of an extended gravity model, using wage, unemployment, and job vacancies as repressors and the internal migration flow as the dependent variable. The variables were used in different forms (values, differences, and rates) to determine what kind of data people consider. The results of the models reveal that rates have a higher explanatory value compared to differences and values, i.e., people tend to consider the ratios of the variables more. Wage and job vacancies are the most significant factors; unemployment rates having a small impact on migration flows.

Another Czech industry-specific study, by Blazkova and Chmelikova (2015), deals with the food and beverages industry in the Czech Republic. Their paper deals with market concentration and the development, and impact of import competition in the Czech food and beverages industry in 2003-2013. The results indicated that market concentration grew in the Czech food and beverages industry in 2003-2013 and that import competition strengthened. However, there are differences among specific sectors in this Czech industry.

2.3 Relevant IFRS Studies

Very broad literature has been written on the impact of IFRS on economic consequences and on impact on international trade worldwide. For example, Daske *et al.* (2008) researched mandatory IFRS reporting around the world to observe early evidence on the economic consequences. Their findings suggest an increase in market liquidity around the time of IFRS adoption and a decrease in firms' cost of capital and an increase in equity valuations. Countries with strong legal enforcement

and incentives for firms to be transparent are the only ones where capital-market benefits occur. Another interesting finding was that capital market effects are most evident in companies that have voluntarily adopted IFRS. Specific concerns of IFRS adoption in Africa are discussed in Iyoha, and Owolabi (2012) and in Efobi, Iyoha, and Mukoro (2014), where the impact on international trade and foreign direct investment are analyzed. Similarly, Márquez-Ramos (2011) concentrated on impact on trade and FDI and authors Gordon, Loeb and Zhu (2012) focused on impact on FDI.

In the Czech Republic specifically, authors Jindrichovska, Kubickova and Kocmanova, (2014), Jindrichovska and Kubickova (2016a, 2016b and 2017) characterized the development of rules and practices of accounting and the application of IFRS. The authors investigated the relationships between local and global standards of accounting, the impact on the legal and institutional environment and, as well, the perceived benefits of adopting IFRS in accounting practices in the country on the level of individual companies. The authors show that, in recent years, one can observe some activity in the transformation of IFRS in the field of accounting; however, this is not systematic or homogenous, as the application of local rules is still required in the domain of taxation. The analysis of the development of accounting regulations in the Czech Republic implies that the majority of Czech companies, in 2014, had little motivation to switch to international reporting standards; especially if there is no further reason for doing so, like a government requirement, the presence of the subject on capital markets, or a reliable business partner – e.g. a parent company from abroad that the Czech entity reports to using an international accounting format.

Procházka (2017) has written a study on forced IFRS adoption by companies of the “EU-15 Parents-CEE subsidiaries” coming from the standpoint that there are very limited benefits of IFRS adoption in the Czech Republic. The same author has also assessed the profitability of subsidiaries in the global economy (Prochazka 2018).

3. Data and the Model

In this research, we investigate the relationships between the foreign trade of the Czech Republic and its trade partner countries which are members of the European Union. We use two foreign trade variables which are independent variables of two different models. These variables are exports from the Czech Republic to an EU member country and imports from an EU member country to the Czech Republic as the foreign trade variables. The independent variables are the Gross Domestic Product (GDP) of the Czech Republic, the GDP of partner countries, the population of the Czech Republic, the population of partner countries, a dummy variable for Visegrad countries among partners, a dummy variable denoting dummies for a common land border and a dummy variable for an IFRS application of the Czech Republic. Their sources and names are presented in Table 1. The dataset covers 27

of the EU member trading partners of the Czech Republic (see the Appendix) within the period 2008-2017.

Table 1. List of explanatory variables

Abbreviation	Definition	Source
EXP	Exports from the Czech Republic (i) to partner country (j)	Czech Statistical Office
IMP	Imports from partner country (j) to the Czech Republic(i)	Czech Statistical Office
GDP_H	Host (Czech Republic) Country Gross Domestic Product (Purchaser's prices, constant 2010 US\$)	World Bank, WDI
GDP_P	Partner Country Gross Domestic Product (Purchaser's prices, constant 2010 US\$)	World Bank, WDI
POP_H	Host Country Population	World Bank, WDI
POP_P	Partner Country Population	World Bank, WDI
DIST	Distance Between Countries (km)	CEPII
BORD ^a	Border Dummy: 1 if the country has a border with the Czech Republic and 0 for others	Authors' Calculation
VIS ^b	Visegrad(V4) Dummy: 1 for Visegrad countries and 0 for others	Authors' Calculation
IFRS	IFRS Dummy: 1 if the year is 2010 and after and 0 for others	Authors' Calculation

Notes: a: Austria, Germany, Poland, and the Slovak Republic. b: Hungary, Poland, Slovak Republic.

Figure 1. Graph of Distance

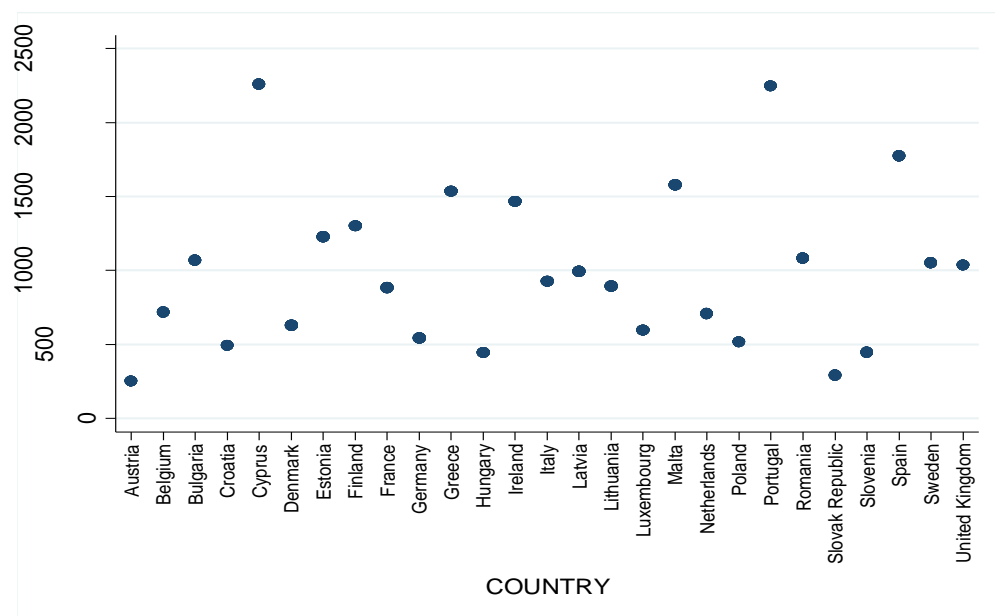


Figure 1 shows the distance between the Czech Republic and the trade partner countries among the EU members. Austria is the nearest trade partner of the Czech Republic, while Cyprus is the most distant trade partner country of the Czech Republic. To understand the magnitude of imports and exports between the two countries we created Figure 2 and Figure 3, respectively.

Figure 2. Scatter plot of Logarithm of Imports by Countries

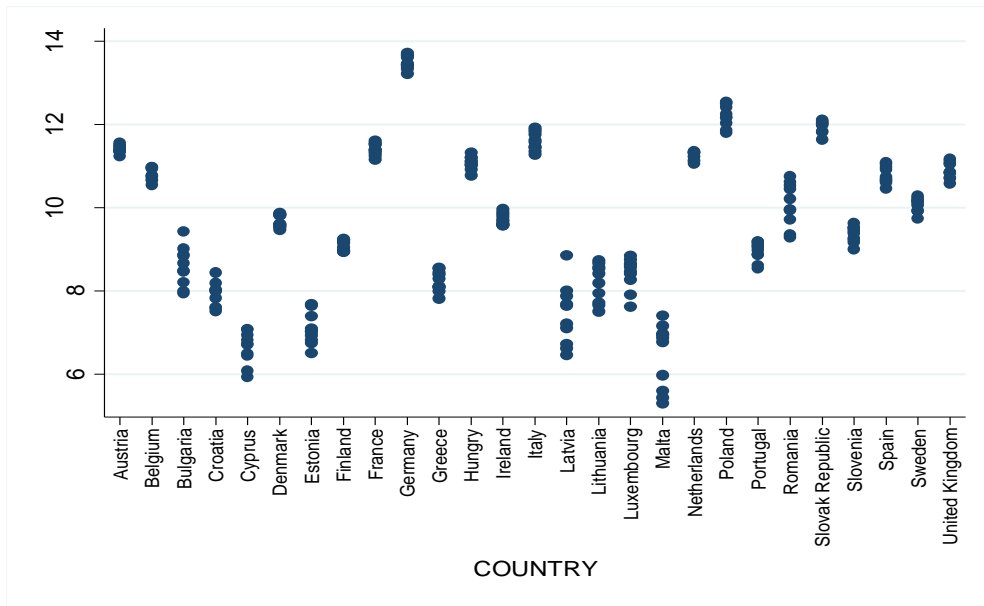
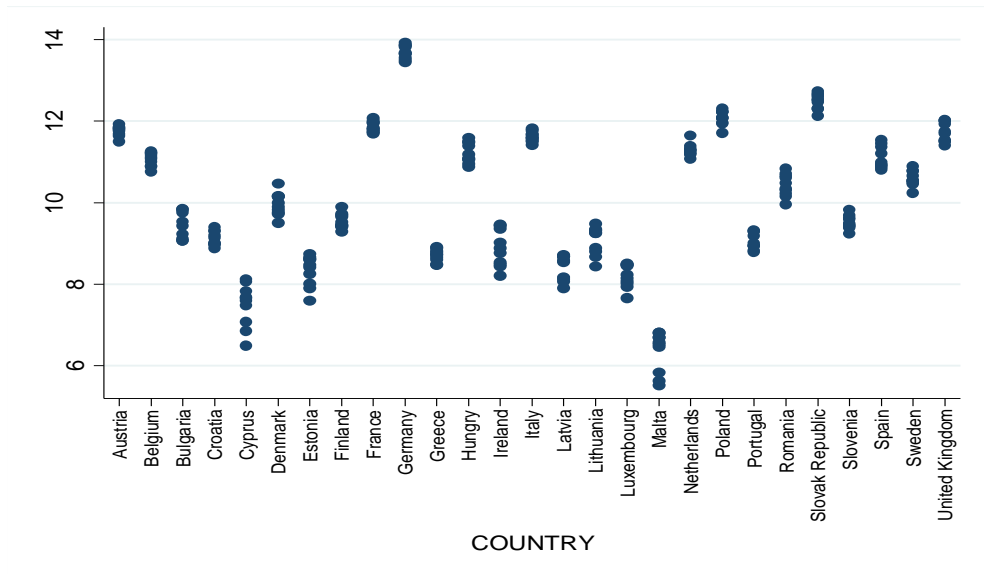


Figure 3. Scatter plot of Logarithm of Exports by Countries



As we see from the formula of the gravity model, if the countries have close distance, they trade more. However, if the countries are far from each other, foreign trade between those expected to be lower than between neighboring countries because transport costs between those are higher. Therefore, we expect that the distance variable has a negative coefficient. Our expectation of the coefficient of the population variable is not precise. As stated in Paulus and Michalíková (2014), the influence of the population is not so straightforward because, on the one hand, large markets can stimulate imports and, on the other hand, such markets can be more self-sufficient. Thus, the coefficient can be both positive or negative.

Moreover because of the logic of the gravity model and also because of its being an important determinant of the relationship between countries, the common border variable is expected to have a positive effect on trade. We expect, therefore, that the coefficient of GDP variable for both the host and partner country is positive. As member states of the European Union, the countries are subject to the IAS Regulation adopted by the European Union, in 2002. The IFRS Regulation applies to the consolidated financial statements of European companies traded in regulated markets starting in 2005. Exceptions are:

- Bulgaria – joined the EU in 2007, but IFRS standards were required for banks as a result of the Law on Banking 1997 and were required for publicly traded companies under a law passed, in 2001, with effect in 2003.
- Malta – joined the EU in 2004, but IFRS standards (then known as IAS standards) were adopted in 1995 for all companies.

In the Czech Republic, there is an obligation to prepare accounts according to Czech standards for the purpose of calculating the tax base. However, there was a change in regulations in 2010, when IFRS was allowed to be used in Czech companies that were part of bigger international groupings. These subsidiaries were allowed to use IFRS as the primary standard, but subsidiaries, which are part of international companies, can use IFRS as their primary accounting standard and translate the relevant parts to CAS for tax purposes (Mejzlik and Zarova, 2009; Jindrichovska, Kubickova, 2017; André, 2017). We use all variables in a logarithmic form that is shown by the capital letter “L.” The equations are as follows:

$$\begin{aligned} \text{LEXP}_{ijt} = & \alpha_0 + \alpha_1 \text{LGDP}_{H_{it}} + \alpha_2 \text{LGDP}_{P_{jt}} + \alpha_3 \text{LPOP}_{H_{it}} + \alpha_4 \text{LPOP}_{P_{jt}} + \\ & \alpha_5 \text{LDIST}_{ijt} + \alpha_6 \text{BORD}_{ijt} + \alpha_7 \text{VIS}_{jt} + \alpha_8 \text{IFRS}_{it} + \varepsilon_{itj} \end{aligned} \quad (4)$$

$$\begin{aligned} \text{LIMP}_{ijt} = & \beta_0 + \beta_1 \text{LGDP}_{H_{it}} + \beta_2 \text{LGDP}_{P_{jt}} + \beta_3 \text{LPOP}_{H_{it}} + \beta_4 \text{LPOP}_{P_{jt}} + \\ & \beta_5 \text{LDIST}_{ijt} + \beta_6 \text{BORD}_{ijt} + \beta_7 \text{VIS}_{jt} + \beta_8 \text{IFRS}_{it} + \varepsilon_{itj} \end{aligned} \quad (5)$$

In the logarithmic model, the coefficients in the logarithm can be interpreted as elasticities (Gujarati, 2004, p. 176).

Table 2 shows the descriptive statistics of the variables, the correlation coefficient of the variables can be seen in the Appendix.

Table 2. Descriptive Statistics of the Variables

Variable	Mean	Std. Dev.	Min	Max
GDP_H	2.16x10 ¹¹	1.16 x10 ¹⁰	2.03E+11	2.41 x10 ¹¹
GDP_P	6.41 x10 ¹¹	9.53 x10 ¹¹	8.44 x10 ⁷	3.87 x10 ¹²
POP_H	1.05E+07	57264.68	1.04 x10 ⁷	1.06 x10 ⁷
POP_P	1.84E+07	2.33 x10 ⁷	409379	8.27 x10 ⁷
IMPORT	67841.61	142743.4	199	904175
EXPORT	86871.56	175348	246	1118862
DIST	999.5185	531.5468	252.4479	2260.553
LGDP_H	26.09936	0.052359	26.03581	26.20915
LGDP_P	26.0766	1.602226	22.85648	28.98318
LPOP_P	15.87197	1.419201	12.9224	18.23067
LPOP_H	16.16738	0.00546	16.15583	16.17554
LIMP	9.734823	1.828965	5.293305	13.71478
LEXP	10.11053	1.707529	5.505332	13.92782
LDIST	6.76028	0.561094	5.531205	7.723365

The economic model uses the twenty-seven EU member trading partners of the Czech Republic, from 2008 to 2017, as was stated above. The data is in a panel data formation. We present in Table 3 and Table 4 the estimated coefficients for the gravity equations. Table 3 shows the Ordinary Least Squares (OLS), robust OLS, Random Effect Model³ (REM) and robust REM results for the import model. Using a logarithmic form of variables is one of the ways to deal with heteroscedasticity. To avoid autocorrelation, and also heteroscedasticity, we use robust estimations. Table 4 shows the estimation results for the export variable.

Table 3. Estimation Results for Imports

Dependent Variable: LIMP				
Variables	OLS	OLS Robust	REM	REM Robust
LGDP_H	0.9239 (0.353)	0.92389** (0.042)	0.781383 (0.106)	0.781383* (0.079)
LGDP_P	0.7560*** (0.000)	0.7560*** (0.000)	0.926054*** (0.000)	0.926054*** (0.000)
LPOP_H	18.4202 (0.209)	18.42025*** (0.009)	18.70434*** (0.007)	18.70434*** (0.005)

³We do not use the Fixed Effect Model (FEM) because some dummy variables must be omitted when the FEM is estimated. For this reason, it is not appropriate to use the Hausmann test and compare FEM and REM results.

LPOP_P	0.1345** (0,025)	0.134541 (0.463)	-0.09241 (0.591)	-0.09241 (0.66)
LDIST	-0.8247*** (0.000)	-0.82474*** (0.003)	-0.76163*** (0.002)	-0.76163** (0.017)
BORD	0.7102*** (0.000)	0.7102 (0.027)	1.35076* (0.061)	0.756833*** (0.000)
VIS	1.1802*** (0.000)	1.1802*** (0.002)	0.756833*** (0.001)	1.35076*** (0.000)
IFRS	0.155743 (0.294)	0.1557*** (0.000)	0.155083** (0.018)	0.155083*** (0.000)
R-squared	0.9247	0.9247	0.9205 ^a	0.9205 ^a
Observation	270	270	270	270
F Test	400.71*** (0.000)	109.75*** (0.000)	-	-
Wald Test	-	-	504.63*** (0.000)	854.87*** (0.000)

Note: *, **, *** show a %10, %5 and %1 significance respectively. a: Overall R-squared. Values of p are in parentheses.

In Table 3 OLS model, the LGDP_P, LPOP_P, LDIST, BORD and VIS variables are statistically significant. In the robust OLS model, the LGDP_H, LGDP_P, LPOP_H, LDIST, VIS and IFRS variables are statistically significant. In these two models, all coefficients are in line with our expectations. The IFRS dummy has a positive and significant effect on the second model. The GDP of the Czech Republic and partner countries have a positive effect on the exports of the Czech Republic in the robust model. If national income in foreign countries increases, it leads to an increase in exports from the Czech Republic. Both the population of the Czech Republic and the population of the partner country have a positive effect on the imports of the Czech Republic in the robust OLS. However, in the OLS model, LGDP_H is not significant. Distance has an adverse effect on exports as it is in line with expectations. Having the same border, and being a Visegrad country dummy variables show a significant relationship in all models except the OLS model. These variables have a positive coefficient. The IFRS variable has a significant and positive coefficient in the robust OLS model. Therefore, we can see the positive impact of IFRS on exports from the Czech Republic. The models have high R-squared values, and at first glance, the results bring to mind multicollinearity. To investigate the existence of multicollinearity we can use correlation coefficients of the variables. In the Appendix the correlation coefficients of the variables are presented; there are high and significant correlations among the dependent variable and independent variables and insignificant or significant but low correlations among the independent variables.

If the REM and robust REM model are taken into consideration, we will have nearly the same results. All significant coefficients are in line with expectations. The difference between the REM and Robust REM model is the host country population variable. This is not significant in the REM model and, while it is significant in the robust REM model, it still has a low significance level in the robust model. The directions of the coefficients of the variables are the same with the OLS model.

Table 4. Estimation Results for Exports

Dependent Variable: LEXP				
Variables	OLS	OLS Robust	REM	REM Robust
LGDP_H	1.8309** (0,029)	1.8309*** (0,000)	1.4153*** (0,000)	1.4154*** (0,000)
LGDP_P	0.3096*** (0,000)	0.3096*** (0,000)	0.7990*** (0,000)	0.7990*** (0,000)
LPOP_H	10.6830 (0,387)	10.6831** (0,011)	11.3779** (0,017)	11.3779*** (0,003)
LPOP_P	0.578*** (0,000)	0.5785*** (0,000)	0.06589 (0,635)	0.065866 (0,752)
LDIST	-1.027*** (0,000)	-1.0271** (0,041)	-0.8862*** (0,000)	-0.8862*** (0,000)
BORD	0.6411*** (0,000)	0.6411 (0,152)	0.5860* (0,091)	0.5860** (0,043)
VIS	0.5276*** (0,000)	0.5276*** (0,000)	1.0178*** (0,005)	1.0178*** (0,006)
IFRS	0.136 (0,274)	0.1365*** (0,001)	0.1350*** (0,005)	0.1350*** (0,000)
R-squared	0,9388	0,9388	0,9127 ^a	0,9127 ^a
Observation	270	270	270	270
F Test	500,22*** (0,000)	123,14*** (0,000)	-	-
Wald Test	-	-	751,79 (0,000)	656,26 (0,000)

Notes: *, **, *** show a %10, %5 and %1 significance respectively. a: Overall R-squared. Values of p are in parentheses.

Table 4 shows the gravity model results for the exports variable of the Czech Republic. On the basis of all four regression results, the distance and the GDP variables are essential in explaining the export relations between the Czech Republic and the EU member countries. Whereas the population of the Czech Republic is significant in the robust OLS, REM and robust REM models, the population of the

partner countries is significant in both the OLS and OLS robust models. All these coefficients are positive in all models. This means that both the Czech Republic's population and the partner countries' populations increase the imports of the country. Also, the border effect and the Visegrad Four effect are statistically significant in all models except the OLS robust model. Also, in OLS robust model BORD variable is insignificant.

Moreover, all these dummies have a positive effect on exports. Furthermore, the IFRS variable is significant except in the OLS model similar with model which is presented in Table 3. At last IFRS affects positively the imports of the Czech Republic. This finding is in accordance with the view that the role of distance is still an effective variable in bilateral trade relations.

4. Conclusion and Further Research

International trade is a vital factor for the economic growth of the world economy and countries. There are many theories about international trade. Moreover there is a growing literature which is named as the gravity model. In this paper, we investigated the existence of a positive effect of usage of IFRS standards on international trade using the Czech Republic data. It is important for the Czech Republic because the country is one of the emerging economies that the export of the country drives its economy. The gravity model is valid for the relationship of the Czech Republic and EU member countries. Our findings support the previous literature on international trade and gravity in the Czech Republic (Akhvlediani and Śledziowska, 2016; Babuněk, 2012; Paulus and Michalíková, 2014; Jandová and Paleta, 2015).

Besides that, and contrary to our expectations based on previous findings in the literature on Czech conditions and the implementation of IFRS, where the literature was showing just limited use and impact, we found a significant association between trade and IFRS (Prochazka and Pelak, 2015; Procházka, 2017; 2018). IFRS was introduced as voluntary reporting in 2003 and 2005. As stated in the literature until recently, Czech companies did not see the benefits of IFRS introduction because they had to report according to Czech GAAP for tax purposes. Nevertheless, over the years, the proportion of IFRS adoption in Czech companies has been growing, and the number of firms using IFRS is increasing. This is even though, until recently, we did not see any significant impact on the Czech economy (Zarova, 2009; 2013; Jindrichovska, Kubickova 2016; 2017; Prochazka, 2017).

Our present findings constitute a excellent signal of the increasing quality of the Czech economic and institutional environment, which is in line with the intention to introduce common accounting standards, like IFRS, to increase trading in capital markets and subsequently, or concurrently, to improve the institutional and regulatory environment in the real economy (Brüggemann, Hitz & Sellhorn, 2013;

Horton *et al.*, 2013; Marra *et al.*, 2011; Landsman *et al.*, 2012; Kouki, 2018) and that should increase the volume of international trade. The paper witnesses also the fact that the environment in European countries is changing, which is the result of globalization and more intensive international trade. The significant impact of IFRS on Czech trade is now empirically documented in the presented study of the Czech environment, which is the major contribution of this work.

Further investigation could be undertaken in terms of the impact of IFRS on international trade in specific sectors and, or, an improved methodology using triangulation with a qualitative study exploring in more depth relevant institutional features.

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APPENDIX: Correlation Coefficients of the Variables

	lngdp_h	lngdp_p	lnpop_p	lnpop_h	lnimport	lnexport	lndist
lngdp_h	1						
lngdp_p	0.0278	1					
	0.6492						
lnpop_p	0.0035	0.9153	1				
	0.9538	0.000					
lnpop_h	0.7251	0.0193	0.0037	1			
	0.000	0.7521	0.9518				
lnimport	0.0978	0.8147	0.7958	0.1146	1		
	0.1088	0.000	0.000	0.0601			
lnexport	0.1026	0.7985	0.8257	0.1078	0.9614	1	
	0.0924	0.000	0.000	0.077	0.000		
lndist	0	-0.108	-0.0919	0	-0.5149	-0.5408	1
	1	0.0765	0.1319	1	0.000	0.000	