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Bachelor thesis

2020 **Jakub Reinštein**

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The Belt and Road Initiative: Effects on eastern Europe and post-soviet republics gravity analysis.

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Abstract

In this paper I intend to examine the impact of Chinese Belt and Road Initiative (BRI), logistical performance and corruption on bilateral trade among countries along its inland corridors. In order to do so I have used micro-founded gravity model of trade. Ordinary Least Square and Pseudo Poisson Maximum Likelihood estimations with importer, exporter and year fixed effects were applied on panel dataset including information about 150 countries between 2007 and 2015.

My results indicate, that BRI has positive effect on bilateral trade between involved countries, however it has negative impact on the trade with the rest of the world. I have also found out, that logistics performance is significant factor in facilitating trade in some categories of goods. Interestingly my results have not identified corruption as negative factor in trade and in some cases, it appears that corruption might promote trade, however further research of this topic is needed.

Keywords

Gravity model, International trade, Belt and Road Initiative, Corruption, Logistics

Abstrakt

V této práci zamýšlím vyhodnotit dopady Čínské Nové Hedvábné Stesky (NHS), logistické výkonnosti a korupce na vzájemný obchod mezi zeměmi ležícími na vnitrozemských koridorech NHS. Za tímto účelem jsem použil Gravitační model obchodu. Metoda nejmenších čtverců a pseudo-Poissonova metoda maximální věrohodnosti s fixními efekty pro exportéra, importéra a rok byly aplikovány na panelový dataset obsahující data o 150 státech mezi lety 2007 a 2015.

Moje výsledky naznačují, že NHS má pozitivní dopad na bilaterální obchod mezi státy participující v této iniciativě. Zdá se ale, že NHS negativně ovlivňuje obchod mezi participujícími státy a zbytkem světa. Dále z mých výsledků vyplívá že kvalita logistiky je v některých kategoriích zboží signifikantní faktor ve zprostředkovávání obchodu. Nepodařilo se prokázat negativní dopad korupce na mezinárodní obchod, dokonce se zdá že v některých případech může korupce hrát pozitivní roly, nicméně toto téma vyžaduje další výzkum.

Klíčová slova

Gravitační model, mezinárodní obchod Nová Hedvábná Stezka, korupce, logistika

Range of thesis: 62 138 characters with spaces

Declaration of Authorship

1. The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

2. The author hereby declares that all the sources and literature used have been properly cited.

3. The author hereby declares that the thesis has not been used to obtain a different or the same degree.

Prague 1.5.2020 Jakub Reinštein

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I would like to express my gratitude to my thesis supervisor Mgr. Michal Paulus. He was always helpful and helped me to overcome many issues with my work. He was always willing to help and even during unexpected conditions caused by Covid-19 outbreak, we were still able to frequently consult my work.

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Bachelor's Thesis Proposal

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Notes: Please enter the information from the proposal to the Student Information System (SIS) and submit the proposal signed by yourself and by the supervisor to the Academic Director ("garant") of the undergraduate program.

Proposed Topic:

The Belt and Road Initiative: Effects on eastern Europe and post-soviet republics gravity analysis.

Preliminary scope of work:

Research question and motivation

My main research question is evaluation of effect of new infrastructure and trade agreements included in Chinese Belt and Road Initiative on trade between China and states in eastern Europe and central Asia.

When Belt and Road initiative (BRI, then called One Belt One Road - OBOR) was announced by Chinese president Xi Jinping during his visit of Kazakhstan in 2013, it appeared that it is the most ambitious Chinese international project of 21st century yet. By connecting more than 63 countries (initially, now it is even more) accounting for 64% of world population and 30% of global GDP China seeks to solve its massive overcapacity and to ensure its place as global economic superpower (Herrero, 2016).

Since BRI is relatively new initiative, there is not a huge number of academic papers evaluating real effects of those new infrastructural investments on trade between countries involved in BRI. Existing estimates suggest, that shortening the transportation time of goods on BIR by one day may increase exports by 5.2%. Moreover if new trade reforms are added to planned improvements in infrastructure, then the upper estimates of increase in trade between BRI economies are as high as 12.9% (Baniya, 2019)

In this thesis I intend to evaluate increase in trade potential among BIR economies using classical gravity model of trade. My main interest are countries in central and eastern Europe involved in so-called 16+1 initiative and former soviet republics in eastern Europe and central Asia. The vast scope of whole BRI includes common development strategies, industrial cooperation and sharing of knowledge (Fang, 2015), but I intend to focus on the effects of new infrastructure and trade deals.

Contribution

Since BRI is a project in its beginning stage, so is research on this topic. Existing research suggests, that construction of new infrastructure may truly decrease cost of trade (Konings, 2018) and that new railways is indeed significant factor leading to potential increase in exports (Li, 2018). I intend to add a complex analysis on its effect focusing on specific participating countries. By conducting further examination of this topic my thesis tries to answer the question of what changes we may expect in trade between China and Europe and hopefully will lead to a better understanding of future Sino-European trade relations.

Methodology

I intend to use micro-founded gravity model of international trade, based on seminal contribution of Andersen and van Wincoop (2003) with handbook by Shepherd (2016) as an auxiliary source. Dataset I will use for trade data is World Bank's (WB) World Integrated Trade Solution. For other control variables I will use International Monetary Fund's Direction of Trade Statistics, WB's World Development indicators, CEPII and for institutional variables WB's Worldwide Governance Indicators database if needed.

Outline

Abstract

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c. how I add to existing research
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Literature review and hypotheses

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b. what hypotheses will be tested
c. motivation why is it reasonable to test them

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b. why I use the independent and dependent variables I use, how they are measured
c. how I perform tests

Results

a. rejecting / not rejecting hypotheses
b. my interpretation of the results

Conclusion

a. broader interpretation of results
b. implications for practice
c. topics for further research

List of academic literature:

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List of acronyms

BRI	Belt and Road initiative
CCP	Chinese Communist Party
CPI	Corruption Perception Index
ETCR	Energy, Transport and Communication Regulations
ETI	Enabling Trade Index
FTA	Free Trade Agreement
GETR	Global Enabling Trade Report
ICT	Information and Communication Technology
LHS	Left Hand Side
LPI	Logistics Performance Index
MRT	Multilateral Resistance Term
MSR	Maritime Silk Road
OB	One Belt
ODI	Overseas Direct Investments
OLS	Ordinary Least Squares
PPML	Pseudo-Poisson maximum likelihood
RHS	Right Hand Side
SREB	Silk Road Economic Belt
TSLS	Two Stage Least Squares

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1.Introduction

In October of 2012 Xi Jinping was elected as secretary of Chinese Communist Party (CCP). In contrast to his predecessors, which were focused mainly on maintaining stable economic growth and were not overly active in international politics (Ferdinand, 2016), Xi had different vision. His ambitious plans were announced to the world when, during his visit to Kazakhstan, he unveiled the vision of New Silk Road Economic Belt and when a month later in Indonesia he presented The New Maritime Silk Road (Swaine, 2015). Countries all over Asia, Europe and East Africa are incorporated in this initiative.

China is chasing both political and economic gains. The economic goal of the Chinese government is to establish a network of new trade arrangements and infrastructure improvements, in order to facilitate easier trade between China, European Union and countries along BRI economic corridors. This includes modernization of ports, construction of new railways and roads as well as renovations of old ones (Reed and Trubetskoy, 2019). The outcome expected by Chinese is rise in bilateral trade among participating countries. The impact of infrastructure and institutions on trade is well documented in literature and is standardly expected to be positively corelated with trade. This was supported by many empirical studies such as Francois and Manchin (2013) or Bensassi et al. (2015).

In this thesis I will focus on overland route through central Asia. I intend to examine the impact of infrastructure improvements and new trade arrangements on flow of goods among the countries participating in this initiative. I will as well consider the role of institutions, cultural and colonial links between the involved economies. For this purpose, I have decided to follow gravity model of trade approach, concretely micro-founded structural gravity model as introduced by Anderson and Wincoop (2003).

My results indicate that participation in the Belt and Road initiative (BRI) increases trade among countries along its inland economic corridors by approximately 12 percent, however it decreases their bilateral trade with the rest of the world by roughly the same margin. Effect of BRI does not seem to be the same for trading of different categories of goods. It appears that trade in fuels and lubricants will be the most influenced by BRI participation.

I have also found that logistical performance is a significant factor in facilitating bilateral trade. Other interesting result from my model is that corruption seems to play positive role in some cases, however further research of this topic is needed.

This thesis is organized as follows: in Chapter 2 I provide the reader with broader context of Belt and road initiative. In Chapter 3 literature review can be found. Then in Chapter 4 I describe in detail my methodology, models and data I used. Chapter 5 presents the results I have obtained after regression analysis and lastly in Chapter 6 I will conclude my work and discus my results and their implications.

2.Belt and road initiative – broader context

Trade between China and the West can be traced far into the past. Roman emperor Augustus have met with embassy from kingdom Greeks called "Ceres" and we now believe that it was the Han China. Historians are not sure if those envoys were really representing Chinese state, or if they were just private merchants. We have only one written evidence of such event noted by Roman historian Florus, but it is universally agreed that trade relations between the East and the West were established long time before Augustus was even born (Hansen, 2012). What we are sure about is that the goods from China were imported through central Asia and Persia to Europe. Italian merchant Marco Polo was among the first Europeans writing about his first-hand experience from China. It was through his writing, Europeans started to be aware of new ideas and opportunities (Franke, 1966).

With this trade, culture and knowledge was spread. Chinese inventions such as papermaking, compass and gunpowder travelled with the merchants and influenced the course of history. Even Black death, event that changed Europe, came from the East (Pamuk, 2007). After the discovery of the New World, trade patterns have changed, and those ancient routes were slowly losing their importance. The stories about mystical and exotic lands as written by Marco Polo excited romanticists intellectuals of 19th century. In 1877 German geographer Ferdinand von Richthofen wrote short historical study "On the silk roads of central Asia" and thus the name of this route came to existence (Elisseeff, 2000).

This old trade route served as an inspiration for modern Chinese endeavors. As mentioned before, this New Silk Road project was initially announced in 2013 as One Belt, One Road. This name was later changed to the Belt and Road Initiative. It is probably the most ambitious Chinese international project of 21st century yet. This vast project was initially connecting more than 63 countries (this number has since risen) which accounts for 64% of world population and 30% of global GDP. China seeks to solve its massive overcapacity and to be acknowledged as global economic superpower (Herrero and Xu, 2017).

Although officially announced in 2013, it appears that roots of BRI can be traced further to the past. On this topic Constantinescu and Ruta (2018) published an interesting article in which they wrote *"It appears that the BRI announcement in 2013 put a stamp on a complex and, by then, already ongoing process."* (Constantinescu and Ruta, 2018, p.6). Also, it appears from the data published in this article, that currently the biggest share of infrastructure related goods goes to East Asia and Pacific region. Europe and Central Asia, which are of main focus in my thesis, experienced the biggest rise of those investments in years before the global financial crisis of 2008.

BRI is now composing of two main parts. Firstly, the Silk Road Economic Belt (SREB) and secondly the 21st century Maritime Silk Road (MSR). Those two components, as seen in Figure 1, can be then further divided into six main corridors:

i) the China-Mongolia-Russia Economic Corridor

ii) the New Eurasian Land Bridge,

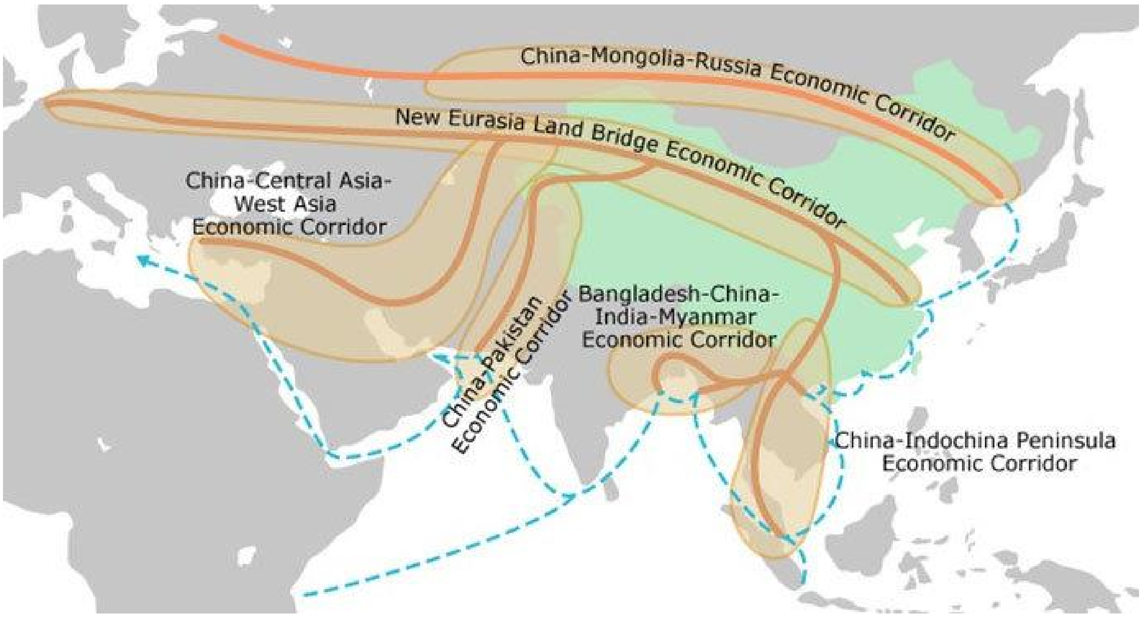
iii) the China–Central Asia–West Asia Economic Corridor

iv) the China–Indochina Peninsula Economic Corridor

v) the China-Pakistan Economic Corridor

vi) the Bangladesh-China-India-Myanmar Economic Corridor

Figure 1: Map of BRI corridors



Six economic corridors of the Belt and Road Initiative Source: china-trade-research.hktdc.com/business-news/article/The-Belt-and-RoadInitiative/The-Belt-and-Road-Initiative/obor/en/1/1X000000/1X0A36B7.html

Along those corridors, goods will be flowing in both directions, as well as common development strategies, industrial cooperation and sharing of knowledge (Fang, 2015). Since we live in digital age, it is also expected that networks for communication will be also established. Chinese government and enterprises collaborate on construction of transnational network infrastructure and increasing internet connectivity in BRI countries (Shen, 2018). This further illustrate the unprecedented scope of this project.

Relations between government and private companies in China are specific. System of state capitalism caused that there is only thin and blurry border between private and state-owned enterprises. Traditional equity ownership does not reflect the reality of ownership and control in Chinese companies (Milhaupt, 2014). Since BRI has a political dimension as well as economic it is important to be aware of interconnections between Chinese government and firms when observing their behavior in context of BRI.

My thesis primary focus are countries in central Asia and Eastern and Central Europe united in so called 16+1 (now it is 17+1) mechanism. I will thus focus on just three of aforementioned corridors. Namely:

i) the China-Mongolia-Russia Economic Corridor
ii) the New Eurasian Land Bridge
iii) the China–Central Asia–West Asia Economic Corridor

Chinese attempts to strengthen its the relations with eastern European countries arguably started in 2009 with signing of strategic partnership agreement with Serbia and culminated in 2012 when leaders of 16 eastern European countries gathered in Warsaw and agreed to strengthen their cultural exchange and economic cooperation (Li, 2017). Up until now relations between 16+1 mechanism countries work almost exclusively on basis of bilateral trade agreements with China and from promised Chinese investments not much has materialized. So far, the most of investments from China came to countries of Visegrád 4 accounting for 62% of all Chinese investments (Goralczyk, 2019). This might rise the questions if BRI can actually increase trade between 16+1 mechanism countries and China or not, which this thesis hopefully helps to answer.

3.Literature review

In this chapter I will start with summarizing studies about impact of BRI, then I will provide the reader with an overview of development of gravity models, issues with its estimation and finally I will describe in more detail research concerning BRI which is using gravity approach.

3.1 BRI

The literature on the effects of new projects connected to BRI on trade between Europe, China and countries along BRI corridors is young and scarce, but rapidly growing. Projects of such magnitude are rare, and it might be the most ambitious project of this kind in this century so far. Its scale is apparent from comprehensive list of BRI related infrastructural projects compiled by Reed and Trubetskoy (2019). They have listed more than 60 projects connected to BRI, assessed whether they generate value and identified most promising projects. Current literature in general is however divided on the estimates of outcomes BRI project.

Chinese authors such as Fang (2015) argue that BRI will result in win-win scenario for all participating countries. He argues that particularly countries involved in 16+1 mechanism could benefit greatly from BRI, since their goals are similar to Chinese ones and thus those countries would collaborate more to achieve them. Author emphasize possibilities of sharing knowledge and technology, such as collaboration on implementation of "Industry 4.0". Du and Zhang (2018) showed that Chinese overseas direct investment (ODI) rose significantly after introduction of BRI strategy. This was particularly apparent in countries along the inland corridors of BRI. Chinese state-owned enterprises played significant role in acquisition of local target firms and started first wave of investments. Xiao et al. (2018) came to conclusion that BRI promotes sustainable economic development in all participating economies. Pan et al. (2020) even argues that Chinese investments will improve quality of institutions in BRI countries.

It should be noted that BRI project is pragmatic economic calculus of Chinese government. China strives to gain position of Asian superpower and seeks economic profit. By strengthening Chinese geopolitical position, BRI might enable China to impose its influence on many eastern countries and gradually increase its power on world stage (Sorin-George, 2018). Balding (2018) pointed out rising domestic and international backlash towards BRI. He revealed dissatisfaction with vast spending, which parts of Chinese population view as wasteful, and increasing anger towards Chinese influence in BRI countries. In this context, papers published by Chinese authors might be biased towards BRI and should be taken with caution.

In contrast to Chinese authors, Cai (2017) is more skeptical about the level of trust between BRI countries and China. He argues, that although China is expecting, that work on BRI related projects alone would rise Chinas GDP by 0.2 to 0.3 percent and BRI countries are capable of absorbing Chinese industrial overcapacity, there is notable mistrust among BRI countries which would complicate further integration and achieving of Chinese goals.

The role of Eastern Europe was examined by Zuokui (2015). He proposes slower approach and advocates that market forces should be main driver of this project. Wei (2017) came to similar conclusion in case of five central Asian post-soviet republics. His analysis shown increasing bilateral trade potential among those countries and China. He further pointed out economic complementarity between China and those five countries. Other examples of complementarity can be found in the literature. China crucially needs to import energy sources and according to Zhao et al. (2019), in 2015 BRI countries, mainly Russia and Middle Eastern countries, controlled 52.27% of proven world energy reserves. He argued that since along BRI both supply and demand sides of energy trade are present, there is solid basis for future energy cooperation. This view is contradicted by Duan et al. (2018). The result from his paper points out relative high risk for Chinese energy investors in BRI countries and he proposed that investment in other countries such as Saudi Arabia appears to be safer.

Study focused mainly on implications of BRI on Russia was published by Královičová and Žatko (2016). They pointed out challenges that have to be overcome. One example can be fact that infrastructural projects undertaken by Chinese companies resulted in estimated 246 billion of dollar losses. However, provided that China, Russia and central Asian states would overcome initial difficulties, they expect BRI to be success story.

According to the predictions of Dumor et Yao (2019) there appears to be disparity in ability of BRI countries to achieve their targets. Using Neural Network Analysis, he found that only 50% of participating East African countries attained their predicted targets. This asymmetry is further reflected in paper by Fu et al. (2018). Based on calculated comprehensive distance, he divided BRI countries into four circles and defined four stages of trade cooperation network construction. His conclusion is that if new infrastructure will be constructed in BRI countries as well as if cultural exchange would take place, eventually those countries will converge into new gradually formed cooperation network and disparities among them would slowly be mitigated.

3.2 Gravity model

Concept of gravity model was introduced to economics by Nobel Prize laureate Jan Tinbergen in 1962. Physicist by trade, Tinbergen was well familiar with Newtons formula for gravity force. He proposed using the same basic concepts known in physics in order to determine trade flows between countries. Although new to economics, similar model was used in social science before, since as early as in 1885 E. Ravenstein used concept of gravity to determine migration flows.

Tinbergen (1962) pointed out three factors that determine trade flows between two countries:

i) Size of exporting economy – the amount of goods that country is able to supply depends on its ability to produce those goods. GDP is usually used as a proxy. (In the original paper GNP was used)

ii) Size of importing economy – the amount of goods demanded in a country is determined by the size of a market in the country. Again, GDP is usually used as a proxy.

iii) Transportation costs – the higher the transportation cost the higher the total cost of goods and lower quantity demanded at this price. Standardly geographical distance is used as a proxy measure for transportation costs.

Taking those factors into account Tinbergen initially proposed following equation:

$$E_{ij} = a_0 Y_i^{a_1} Y_j^{a_2} D_{ij}^{a_3}$$

Where E_{ij} represents exports from country i to country j, Y_i and Y_j are GNP of country i and j respectively and D_{ij} is geographical distance between them. Constant α_0 was also included and its value depended on the units in which other variables were measured. Exponents α_1, α_2 and α_3 reflected possible disproportionality among present variables.

To answer the question why this model is called gravity model it is illustrative to rewrite it as follows:

$$F_{ij} = R\frac{M_i^{\alpha} M_j^{\beta}}{D_{ij}^{\theta}}$$

Where F_{ij} is monetary flow from country i to country j, M_i and M_j are economical masses of those two countries usually expressed in their GDP, D_{ij} is distance between those countries and R is a constant.

The original newtons formula for gravitational force has following form:

$$F_{ij} = G\frac{M_i M_j}{D_{ij}}$$

The similarity is among those equations is evident and thus the name Gravity model of trade was created.

Tinbergen further ameliorated his base mode with two dummy variables, common border and membership in British Commonwealth. This policy variable enabled Tinbergen to asses potential preferential treatment of trade between the members of the Commonwealth. In order to conduct econometric analysis, he introduced the error term into this equation, logarithmized it and then estimated using Ordinary Least Squares (OLS) method. It is intuitive to deduce that big economies tend to trade more and that distance reduce this trade, thus it is expected that coefficients of economic mass will be positive and coefficient of distance negative.

The work of Tinbergen was well received by academia and many other scholars have presented they own papers using this approach. Student of Tinbergen, Hans Linnemann in 1966 published study in which he further extended the analysis. Problem of those early intuitive models was that they did not have solid grounding in economic theory. It lacked micro-foundation and suffered from omitted variable bias (De Benedictis and Taglioni, 2011).

In late 1970's attempts to provide theoretical explanation for gravity model have risen. Probably the most important of those papers was written by Anderson (1979). He showed that gravity equation can be obtained from properties of expenditure system. Cobb-Douglas expenditure function was initially used to demonstrate derivation of gravity-like equation. Firstly, he assumed that each country produces only one good and that there are no transportation costs or tariffs. He further developed system based on trade share in which he allowed differentiation between traded and non-traded goods.

This innovative approach was followed by Bergstrand in his two papers from 1985 and 1989. He insisted that despite empirical success of gravity models, it is necessary to provide sound theoretical foundations. In his paper from 1985 he presented and tested assumptions needed to generate gravity equation from general equilibrium framework. In this paper consumers have strong preference for variety and so countries differentiate production. His subsequent study in 1989 extended microeconomic foundations of gravity equation and considered specialization of countries in production of goods for which they are endowed with input. This results from Heckscher-Ohlin theorem. Later Deardorff (1998) in his paper provided detailed way to incorporate Heckscher-Ohlin theorem into theoretical foundations of gravity model.

In 2003 Anderson and Wincoop published key paper, in which they presented new micro-founded gravity model. They argue that relative trade costs determine bilateral trade. Exports from country i to country j are not only determined by total trade costs between those countries, but they are rather determined by the magnitude of this "resistance" relative to overall "resistance" of country *j* to exports. The average resistance of one country towards the trade with other countries they called Multilateral Resistance Term (MRT). Model specified in this paper takes the form:

$$F_{ij} = \frac{M_i M_j}{M} (\frac{t_{ij}}{\Pi_i P_j})^{1-\sigma}$$

Where F_{ij} represents flow of goods from i to j, M_i and M_j are GDP of country i and *j* respectively, M is world GDP, t_{ij} represents costs of import from *i* to *j*, Π_i and P_j are *i's* outward and *j's* inward MRT and σ is elasticity of substitution. Outward MRT captures the impact of trade cost across all possible export markets on exports from *i* to *j*. Similarly, inward MRT captures the impact of trade cost across all possible trade partners on imports to *j* from *i*. MRTs are able to capture the effect of change in trade costs in one bilateral trade route on other trade routes, because of relative price effect (Shepheard. 2016). Anderson and Wincoop (2003) argues that, if MRTs are left out from estimation, this leads to biased results caused by omitted variable.

Using this method, they solved so called "border puzzle" proposed by McCallum (1995). He studied trade relations between Canadian provinces and US states. McCallum used gravity equation where trade flows depended on economic mass of those regions, their distance and separation by the border. His results indicated that provinces trade 22 times more among themselves than with US. Applying their method, Anderson and Wincoop (2003) came to more plausible results that nation borders reduced trade between US and Canada by 44% and by 29% for other developed countries.

3.3 Estimation issues of Micro-founded gravity model

Introduction of MRTs brought many challenges in the way they should be incorporated into models. This new variable is unobservable and does not appear in any data published by authorities (Shepheard, 2016). However, if MRTs are not incorporated into the model omitted variable bias arise. I will present two solutions proposed to this problem. Firstly, fixed effect approach and then MRT approximation as presented by Baier and Bergstrand (2009).

Model initially presented by Anderson and Wincoop (2003) was applicable only with cross-sectional data. This shortcoming was pointed by Baldwin and Taglioni (2006). In their paper, they have generalized original MRT to allow for panel data. They also pointed out three common mistakes, which appears in the literature, and "awarded" medals for them, based on severity of omitted variable bias. Those errors are:

Gold medal: Omission of Andersons' and Wincoops' MRTs. It was standard to use GDP as a proxy for importers demand and exporters supply and not taking into account MRTs. Those factors are corelated with trade costs and thus if not taken to account, omitted variable bias arise.

Silver medal: Using average of exports and imports as variable for trade flows. Since theory founded gravity model was derived as modified expenditure function, it explains flow of goods in one direction and thus exports and imports should be treated separately.

Bronze medal: Inappropriate deflation of trade flows. This error typically arises from using US aggregated price index. If we deflate inappropriately, spurious correlations will cause bias. However, if Golden medal mistake is taken care of, Bronze medal mistake should not arise, because country effects take those considerations into account (WTO, 2012)

Proposed solutions for Golden medal mistake was using the set of dummy variables. In case of panel dataset, those suggested variables are time-varying exporter and importer dummy, which would identify trade flows connected to specific nation and time dummies in order to deflate the nominal variables. This is what we mean when talking about fixed effects approach to estimating gravity. Silver medal mistakes can be solved by considering only uni-directional flows and "averaging after taking logs, not before" (Baldwin & Taglioni, 2006).

There is however one significant shortcoming of fixed effects approach, perfect collinearity of many exporter or importer specific variables with proposed set of dummy variables. For example, importer's ETCR score is constant for all exporters. Only variables that vary bilaterally and in time can be identified (Shepherd, 2016).

Second approach to MRT problem is using a Taylor-series expansion for approximating those unobservable terms. This approach was described by Baier and Bergstrand (2009). They propose solutions for both inwards and outwards MRT and using Monte Carlo method they demonstrated that their method produce same results as fixed effects while avoiding large number of dummy variables.

We also have to be aware of potential problem with endogeneity when estimating gravity model. This is important especially when policy variables are included into the model. This is because the level of integration in international markets co-determines country's policies. If explanatory variable is endogenous, the correlation between the variable and error term is created and thus assumptions of OLS are violated. Solution to this problem is using an instrumental variable approach. The simplest econometric technique which can be used is Two Stage Least Squares (TSLS) (Shepheard, 2016).

Other problem with estimating gravity equations is controlling for zero trade flows. Since logarithm of zero is not defined, those data have to be excluded from estimations. Three main methods to solve this problem were used.

i) Excluding zero trade flows from dataset
ii) Giving negligible constant to those trade such as 1$
iii) Estimating in levels

Unfortunately, we are also not able to identify if those zero trades are just missing observation or genuine representation of absence of trade between two countries.

Therefore, Helpman and Rubinstein (2008) have developed method which is able to predict zero trade flows between two countries and implemented it into gravity model. In empirical literature Pseudo-Poisson maximum likelihood estimator is often used. Advantage of this method is that it can be applied directly on non-linear form of gravity model and thus we do not have to drop zero trade since we do not logarithmize it. This approach is robust even in presence of heteroskedasticity (WTO, 2012).

3.4 BRI and Gravity model

Gravity model is one of the most commonly used ways to assesses the factors influencing trade among economies. In recent years, more and more papers are published using this approach on BRI countries.

The article by Herrero and Xu (2017) can be used as nice first look to literature concerning effects of BRI on trade among participating countries. Authors focused on the impact of trade costs on bilateral and multilateral trade. They have separated three main modes of transportation: aircrafts, ships and railways. As a proxy for transportation costs distances from two respective capitals were used. Authors made assumptions about speed of each mean of transportation and tested the effects of three scenarios:

1) Reduction of trade costs
2) Establishment of FTA among BRI countries
3) Both reduction of trade costs and establishment of FTA among BRI countries

In first scenario 50 percent reduction in railway transportation costs and 5 percent reduction in air transportation costs were assumed. Results indicated that such arrangement would greatly benefit countries of European Union with approximately 6 percent increase in trade. Similar impact is expected on non-EU European countries and 3 percent for Asian countries. Second scenario, on the other hand would benefit Asian countries with 12 percent expected increase in trade whilst EU countries would not notice the effect of this agreement. Finally, authors predict that in the case of third scenarios, EU countries can expect increase in trade, but now the main winners will be Asian countries with significantly higher expected trade gains than EU countries. Interestingly, according to those estimations, landlocked countries would be huge beneficiaries in all scenarios.

Optimistic views of Herrero and Xu (2017) are shared by Baniya et al. (2019). Authors attempted to answer the question how much will proposed improvements in infrastructure affect the trade among participating countries. They have decided to use Gravity model of trade with some modifications. Important contribution of this paper was usage of network analysis in order to estimate time needed to transport the goods. Similar approach can be found also in de Soyres et al. (2018). This approach appears to be superior to previously used “great circle formula”, measurement of road distance between capitals of respected countries etc. Network solution is based on finding the shortest path between two cities, where several factors such as average speed on the way, geographical parameters, number of borders and average delay on them. This approach produces distance parameter for gravity equation which is reflecting reality reasonably well.

Later Banyia et al. (2019) conducted assessment of the impact of new infrastructure on trade flows. Initial assumed speed of railway was increased, and times needed to handle the goods in ports were reduced. Results of the regression combined with those new assumptions indicated expected rise in trade between 2.5 and 4.1 percent. Inclusion of new trade agreements leading to reduction of delays on border indicated even higher trade gains.

The effects of railway improvements were studied by Li et al. (2018). He focused on nine already finished rail connection between China and Europe. The main explanatory variable in his article was railway connection. He used it as dummy variable and tested two hypotheses:

1) Railway connection will increase the connected country’s imports from China

2) Railway connection will increase the connected country’s exports to China

Results obtained from regression published in this study show that countries directly connected to China via railway are likely to import more Chinese goods, especially miscellaneous manufactured articles, import of which is expected to rise as high as 35,9 percent if the country is connected by railway to China. Interesting regression result is that railways does not have positive effect on exports of most goods to China. This does not further support findings of Herrero and Xu (2017) and Banyia et al. (2019) and offers different point of view on the question who is going to benefit most from BRI. Of course, as authors admit, the results of this study have to be interpreted with caution since the BRI is still in its infancy and whole research of this topic is in its initial stage.

Different approach to the issue of measuring trade costs along BRI is offered by Ramasamy et al. (2017). In his paper he examined effects of BRI on countries along 6 main economic corridors. Differently to Banyia et al. (2019) or Herrero and Xu (2017) data from World Economic Forum's Global Enabling Trade Report (GETR) were used as proxy for trade costs.

The benchmarking tool used in this report is Enabling Trade Index (ETI). This index is composed of four sub-indexes which can be further divided into so called "Seven Pillars". Those pillars are: 1.Domestic market access, 2.Foreign market access, 3.Eddiciency and transparency of border administration, 4.Availability and quality of transport infrastructure, 5.Availability and quality of transport services, 6.Availability and use of information and communication technologies (ICTs) and 7.Operating environment. Ramasamy et al. (2017) was particularly interested in pillars 3,4 and 6.

He used gravity model approach and he found out that *"A one-percent increase in the efficiency of border administration and transport infrastructure will increase exports by 1.5 percent and 0.7 percent, respectively. A one percent improvement in the quality of ICT on the other hand can increase exports by 1.4 percent."* (Ramasamy et al., 2017, p.32) Those effects vary among six economic corridors proposed. Results from this paper are further assuring of positive impact of BRI on trade.

4. Methodology

In this section I will start with presenting methods used to estimate gravity models then I will present estimated models and justify the use of included explanatory variables. After that I will formulate the hypotheses I intend to test, put them into context of existing knowledge and show my contribution to academic literature about this topic. I will conclude this section with presentation of dataset I have compiled for the estimations.

4.1 Estimation of gravity models

Gravity model as initially specified by Tinbegren (1962) can be estimated by simple OLS method. This straightforward approach to estimation is standardly used in the literature and relative simplicity of OLS estimation is one of the advantages of Gravity model. Even micro-founded gravity models can be estimated by least squares. However, some authors pointed out OLS estimations, although widely used, are biased and inconsistent in presence of heteroskedastic errors (Sheprherd, 2016). One of proposed solutions is using Pseudo-Poisson maximum likelihood PPML estimator (Silva and Tenreyro, 2006). There are also additional desirable properties of PPML estimator. Firstly, if gravity model is estimated with PPML and fixed effects it is consistent with equilibrium constraints imposed by structural micro-founded gravity model as presented by Anderson and Wincoop (Fally, 2015) and secondly, since PPML models are in level-log form it enables to account for zero trade flows which are dropped from OLS estimations since log of zero is not defined. Taking those factors into account results from PPML might be preferred over the results obtained from OLS (Shepherd, 2016).

Both methods have proven its validity over time, however recent literature (e.g. Fernández-Val and Weidner, 2016; Larson et al., 2018; Silva and Tenreyro, 2006; Shepheard, 2016; WTO, 2012) pointed out the qualities of PPML that surpass the OLS. I have decided to estimate first model by PPML and use it as a benchmark for other two models, which will be estimated by OLS in order to provide comparison for the results and for robustness check.

As mentioned before my models are based on Anderson and Wincoop (2003) model. The biggest challenge this decision produced was capturing unobservable MRTs. There are alternative ways to deal with this problem. MRTs can be approximated using Taylor-series expansion, and then estimated by OLS (Baier and Bergstrand, 2009). Alternatively, fixed effects approach with specific set of dummy variables can be used. In this thesis I have chosen estimation strategy based on fixed effects. This decision was motivated by works of Feenstra (2002) and Baldwin and Taglioni (2006). The advantage of fixed effects approach is that it also accounts for unobserved heterogeneity and thus prevent potential bias.

This decision however produced technical challenges. If fixed effects with time-varying country dummy variables as specified by Baldwin and Taglioni (2006) are used, problem of perfect collinearity between exporter and importer dummies and country specific explanatory variables appears. The solution to this might be taking product or difference of two such variables for exporter and importer as explanatory variable (Shepherd, 2016). This will prevent perfect collinearity, but it complicates interpretation of results. The approach I used in Model 3 was inspired by this.

Fortunately, I am dealing with data from relative short time period and thus I have decided to use approach specified in WTO (2012, p.110). I have used dummy variables identifying, exporter, importer and year in my model. Although not perfect and only working in short sample period, this solution enables use of country specific explanatory variables.

By inclusion of country and year dummy variables I have accounted for MRTs and thus prevented Golden medal mistake and consequently dealt with Bronze medal mistake. Silver medal mistake was avoided by estimating separately imports and exports in each model.

Gravity models are dealing with variables, which can likely violate the assumption of homoskedasticity of the error term. In order to prevent potential bias, I have been using robust standard errors. Possible shortcoming of my approach is high number of explanatory variables when including exporter, importer and year dummy variable. This leads to the loss of degrees of freedom. In case of my dataset this should not cause major problem since the number of observations included is rather high.

4.2 Estimated models

As mentioned before, I based my models on Anderson's and Wincoop's (2003) micro-founded gravity model. In order to account for MRTs I decided to use fixed effect approach and included three dummy variables identifying year, exporter and importer. Also, I differentiated between seven basic Broader Economic Categories (BEC) form COMTRADE and estimated separately exports and imports.

Model 1:

My first model, used as a benchmarking model, is estimated by PPML. In its essence it is simple level-log model. Variables for corruption and logistics, in form of Corruption Perception index (CPI) and Logistics Performance Index (LPI), were included in logarithmic form for easier interpretation. The resulting equation has following form:

$$Flow_{ijt} = \alpha_0 + \alpha_1 \ln(distance) + \alpha_2 \ln(gdp_{it}) + \alpha_3 \ln(gdp_{jt}) + \alpha_4 \ln(cpi_{it}) + \alpha_5 \ln(cpi_{jt}) + \alpha_6 \ln(lpi_{it}) + \alpha_7 \ln(lpi_{jt}) + \alpha_8 ob.both + \alpha_9 ob.one + \alpha_{10} border + \alpha_{11} language + \alpha_{12} colony + \alpha_{13} currency + D_i + D_j + D_t + \varepsilon$$

Where $Flow_{ijt}$ stand for either exports or imports from country i to country j in time t, ε is error term and other explanatory variables are described in following table (Table 1).

Table 1: Meaning of variables

Variable	description
Distance	Distance between capitals of country pair
gdp_{it}	GDP of exporting country in time t
gdp_{jt}	GDP of importing country in time t
cpi_{it}	CPI of exporting country in time t
cpi_{jt}	CPI of importing country in time t
lpi_{it}	LPI of exporting country in time t
lpi_{jt}	LPI of importing country in time t
ob.both	Dummy which =1 if both countries are in One belt corridor after 2012
ob.one	Dummy which =1 if one country from the pair is in One belt corridor after 2012
Border	Dummy for common border
Language	Dummy for common official language
Colony	Dummy for common colonial links
Currency	Dummy for common currency
D_i	Fixed effect dummy identifying exporter
D_j	Fixed effect dummy identifying importer
D_t	Fixed effect dummy identifying year

Model 2:

My second model is log-log version of the first one, this time estimated by OLS. It uses same explanatory variables and should serve as robustness check for the first model. The form of second model is:

$$\ln\,(Flow_{ijt}) = \alpha_0 + \alpha_1 \ln(distance) + \alpha_2 \ln(gdp_{it}) + \alpha_3 \ln\left(gdp_{jt}\right) + \alpha_4 \ln(cpi_{it}) + \alpha_5 \ln\left(cpi_{jt}\right) + \alpha_6 \ln(lpi_{it}) + \alpha_7 \ln\left(lpi_{jt}\right) + \alpha_8 ob.both + \alpha_9 ob.one + \alpha_{10} border + \alpha_{11} language + \alpha_{12} colony + \alpha_{13} currency + D_i + D_j + D_t + \varepsilon$$

Model 3:

Third model uses same explanatory variables as first two, however the difference is that now country specific indexes are incorporated into model in form of absolute value of their difference. In the estimations I named it *lpi* and *cpi* distance. This is motivated by the properties of fixed effect approach I used, where problem of perfect collinearity with country specific variables and fixed effect dummies might appear. Although my models follow WTO (2012, p.110) specification and should not suffer from perfect collinearity, I have decided that for the sake of clarity it is desirable to include also model without country specific variables as s form of a robustness check. Third model was also estimated by OLS and has following from:

$$\ln(Flow_{ijt}) = \alpha_0 + \alpha_1 \ln(distance) + \alpha_2 \ln(gdp_{it}) + \alpha_3 \ln\left(gdp_{jt}\right) + \alpha_4 \ln(cpi.distance) + \alpha_5 \ln(lpi.distance) + \alpha_6 ob.both + \alpha_7 ob.one + \alpha_8 border + \alpha_9 language + \alpha_{10} colony + \alpha_{11} currency + D_i + D_j + D_t + \varepsilon$$

Although third model does not suffer from perfect collinearity in the long run, first and second model are only valid for short sample period, so if further analysis will be conducted with data from longer time spawn, different models must be formulated.

4.3 Logistics performance index and the distance

LPI is benchmarking tool introduced by World bank in 2007. It enables comparing logistics in 160+ countries. LPI is composed from six components:

i) The efficiency of customs and border clearance
ii) The quality of trade and transport infrastructure
iii) The ease of arranging competitively priced shipments
iv) The competence and quality of logistics services
v) The ability to track and trace consignments
vi) The frequency with which shipments reach consignees within scheduled or expected delivery times

Those components are rated from 1 to 5 (Arvis et al., 2018). Higher the score the better. Final score is then average of scores in those components.

LPI was used by some authors as an explanatory variable in gravity models. Felipe and Kumar (2012) found that LPI plays significant role in bilateral trade. Since LPI is taking six most relevant factors influencing logistics in a particular country into account it appears to be sufficient tool to be used in conjunction with distance as proxy for trade costs. Since 2010 data on LPI are published every two years. In case of years without published LPI arithmetic average of LPI in previous and following year were used. Dataset on LPI was downloaded directly from WB. As a variable for distance I have used CEPII database for bilateral distances between capitals.

4.4 CPI and control variables

CPI is benchmarking tool published yearly by Transparency International. It evaluates perceived level of corruption in 180 countries. Rating was initially on continuous scale from 0 to 10, however since 2012 new scale is from 0 to 100. Higher the score, lower the level of perceived corruption in the country. Since the change of scale were not connected to changes in methodology and only scaled up former scale I have multiplied CPI scores before 2012 by 10 to obtain same measure with newer CPI scores. Inclusion of this indicator to my model was motivated by empirical findings in literature (e.g. Bardhan, 1997 and Kenny, 2006) that corruption slows down economic development and infrastructural improvements.

In the academic literature there is a debate about the effect of corruption on economy. Some researchers proposed, that in some cases, corruption may actually have positive impact. According to them, when institutional framework is suboptimal, corruption may improve the outcomes. This is called “Greasing the wheals” hypothesis. Findings of Méon and Weill (2010), that in case of countries with highly inefficient institutions corruption has positive impact, support this hypothesis. Dreher and Gassebner (2013) further shown, that corruption facilitates firms entry to the market in highly regulated economies. Other possible positive role of corruption is introduction of competition for government resources, which improves the outcomes (Aidt, 2003). This contrast more mainstream conventional findings such as those of Mauro (1995, 1998), Elliott (1997) and Rose-Ackerman (1996) that corruption has adverse effects on economic outcomes. The impact of corruption on trade was studied by Thede and Gustafson (2012). They came to conclusion that international trade is affected overall negatively by corruption although in specific cases firms or individuals may benefit from it. Their findings are supported by Dutt and Traca (2010), which argue that in majority of cases corruption has negative impact on trade and that only in high-tariff environments it might have positive effect. Comprehensive review of literature concerning corruption by Bahoo et al. (2019) highlighted predominantly negative effects of corruption on business and argued for strong anti-corruption laws. In the light of those papers, I would expect positive signs of coefficients of CPI, however the academic debate about this topic is still ongoing and there is still much to learn.

Other two variables I have included to my estimations are dummies which take the value of one if one of two trade partners is along the One Belt (OB) economic corridor after 2012 and the second one equals one if both partners are along OB. In this paper I have focused only on countries along inland corridors of BRI. As the starting date I have chosen the year 2013, although as mentioned in the beginning of this paper Chinese activities in BRI countries preceded the official introduction of this initiative. Introduction of these dummy variables should enable the assessment of those Chinese initiatives.

In case of other control variables, I have decided to use the same set of variables as were used in aforementioned paper by Herrero and Xu (2017). Those variables are often used and appear to capture the factors influencing bilateral trade rather well. Those dummy variables are: common border, common currency, common language and colonial links. All those data were gathered from CEPII database. In case of language I have decided to use official language and not language of minority ethnicities. This is because BRI is government founded large scale project and thus the role of ethnicity in bilateral trade seems to be of lesser importance. Colonial links are considered just between colonizer and colony. All those variables are standardly expected to have positive impact on bilateral trade.

4.5 Hypothesis tested in the context of current literature

I intend to add additional point of view on the assessment of BRI impact on bilateral trade. I have focused my attention on land component of BRI and try to further expand findings of Herrero's and Xu's (2017) by using Anderson's and Wincoop's (2003) micro-founded gravity model accounting for MRTs, which were omitted by authors from their model. In contrast to their paper, instead of evaluating separately the effect of land, air and sea transportation times on bilateral trade I have focused on overall logistics performance, bilateral distance and participation in land component of BRI. I have also included the corruption to my model in order to better reflect the impact of institutions on trade.

My first hypothesis (H1) is that Chinese activities promote bilateral trade among participating countries. This is tested by including dummy variables for participation of one or both partners in BRI. If Chinese activities along the inland corridors of BRI have some positive effects I expect the coefficient (α_8) of *ob.both* dummy variable to be significant and positive. My second hypothesis (H2) is that bilateral trade within BRI is dependent on geographical distance as well as on logistical performance of participating economies and my third hypothesis (H3) is that trade depends also on level of corruption within those countries. In order to test those hypotheses, I have included Logistics Performance Index (LPI) and Corruption Perceptions Index (CPI) into the estimated models. My hypothesis regarding corruption (H3) is that it negatively effects trade and thus I expect coefficients of CPI (α_4 and α_5) to be significant and positive. In case of logistics, my hypothesis (H2) is that higher LPI has positive impact on bilateral trade, thus positive coefficients (α_6 and α_7) are expected.

4.6 Description of data

I have created panel dataset consisting of 13 different variables varying across 150 countries between the years 2007 and 2015. The list of those countries along with the list of OB counties can be found in the Appendix 3 as well as descriptive statistics of main explanatory variables in Appendix 4. In Table 2 I present list of variables included in my models along with their measure, source and code.

Table 2: Measures and sources of variables

Variable	Code	Measure	Source
Exports	*exp*	current US dollars	COMTRADE
Imports	*imp*	current US dollars	COMTRADE
Distance	*distance*	kilometers	CEPII
gdp_{it}	*gdp_o*	current US dollars	CEPII
gdp_{jt}	*gdp_d*	current US dollars	CEPII
cpi_{it}	*cpi_o*	scale 0 to 100	Transparency international
cpi_{jt}	*cpi_d*	scale 0 to 100	Transparency international
lpi_{it}	*lpi_o*	continuous scale 1 to 5	WB
lpi_{jt}	*lpi_d*	continuous scale 1 to 5	WB
ob.both	*ob_both*	dummy	Author, list of countries is provided in Appendix 3
ob.one	*ob_one*	dummy	Author, list of countries is provided in Appendix 3
Border	*border*	dummy	CEPII
Language	*language*	dummy	CEPII
Colony	*colony*	dummy	CEPII
Currency	*currency*	dummy	CEPII

Separated datasets were created for left and right hand side (LHS and RHS) of the gravity equation. This is because I have done 16 separate regressions per model in order to determine the factors influencing exports and imports in top 7 Broad Economic Categories (BEC) and total trade. BEC is classification of goods defined in terms of Standard International Trade Classification (SITC). I used first structure level. Those categories correspond to:

1) Food and beverages
2) Industrial supplies not elsewhere specified
3) Fuels and lubricants
4) Capital goods (except transport equipment), and parts and accessories thereof
5) Transport equipment and parts and accessories thereof
6) Consumer goods not elsewhere specified
7) Goods not elsewhere specified

Datasets for LHS are COMTRADE data on bilateral trade between all countries included (list of them is in Appendix 3) between 2007 and 2015 ranging from 71 407 observations from BEC-3 exports to 291 234 observations in case of total imports. Missing observations were dropped from all models and observations with zero trade flows were dropped from models estimated by OLS.

RHS is compiled from WB, CEPPI and TI data and include over 190 000 observations from the 150 countries. Rows with missing observations were dropped. It is however important to say that in some cases data were missing for country pair in a particular year and those missing data were different in LHS and RHS dataset thus, when combined and estimated, number of observations is lower. The lowest number of observations in the regression was 36 470 in case of BEC-3 exports in Model 2 on the other hand the highest was 117 230 in case of total imports in Model 1.

5. Results and discussion

In this chapter I will start with presentation of regression results, I will interpret them and discus their signs and magnitude. Then I will assess possible future impact of BRI and discuss policy implications.

5.1 Empirical results

48 regression in total were carried out in Stata 16 software. The results exhibited good R-squared and F-test scores in case of OLS models and Chi-squared in case of PPML models. Ramsay RESET test was also carried out in case of OLS models in order to control functional form misspecification. The results of those tests indicate that my models are explaining well the factors influencing bilateral trade and can be found in Appendix 5. I will present whole results from my benchmarking Model 1 and results from Model 2 and 3 will be used as robustness check.

Model 1 identified all of my explanatory variables as statistically significant. In case of models 2 and 3 estimated by OLS, in many BECs LPI and CPI were insignificant at 95% confidence level, however coefficients of OB participation dummy variables were significant in nearly all BECs across all models and thus can be considered robust. The same can be said about other control variables used in my models with the exception of currency variable, which was often insignificant at 95% confidence level.

The coefficients of continuous variables shall be interpreted as simple elasticities and thus the $\Delta\%y = \alpha\ \Delta\%x$. Coefficients of dummy variables have to be converted to elasticities by the use of following formula $\Delta\%y = (e^{\alpha} - 1) * 100$ (WTO, 2012, p.127). The results are reported with five decimal places accuracy and their standard errors can be found underneath them in italics.

Table 3.1: Results from Model 1 with exports as dependent variable part 1

Exports	Total	BEC-1	BEC-2	BEC-3
ln_distance	-0.82005***	-0.91316***	-0.88067***	-1.34896***
	0.00000	*0.00002*	*0.00001*	*0.00002*
ln_gdp_o	0.45394***	0.21712***	0.46285***	0.19736***
	0.00002	*0.00009*	*0.00005*	*0.00009*
ln_gdp_d	0.53662***	0.65724***	0.44734***	0.45559***
	0.00003	*0.00009*	*0.00005*	*0.00010*
ln_lpi_o	0.18058***	0.04693***	-0.27015***	0.75534***
	0.00015	*0.00048*	*0.00028*	*0.00033*
ln_lpi_d	0.11213***	-0.08870***	0.35864***	-0.69398***
	0.00014	*0.00043*	*0.00026*	*0.00060*
ln_cpi_o	-0.02222***	0.00071**	0.03523***	-0.22237***
	0.00006	*0.00021*	*0.00012*	*0.00015*
ln_cpi_d	0.11900***	-0.02431***	0.24198***	-0.40302***
	0.00006	*0.00019*	*0.00011*	*0.00024*
ob_one	-0.12696***	-0.04083***	-0.09371***	-0.31579***
	0.00001	*0.00004*	*0.00002*	*0.00005*
ob_both	0.11411***	0.11231***	0.07224***	0.34751***
	0.00002	*0.00007*	*0.00004*	*0.00007*
language	0.10677***	0.14876***	-0.01140***	0.41719***
	0.00001	*0.00004*	*0.00002*	*0.00005*
colony	0.12205***	0.45568***	0.30767***	0.05713***
	0.00001	*0.00005*	*0.00003*	*0.00007*
currency	0.12019***	0.57907***	0.29473***	-0.26745***
	0.00002	*0.00005*	*0.00003*	*0.00010*
border	0.49591***	0.52477***	0.50554***	0.39112***
	0.00001	*0.00004*	*0.00002*	*0.00005*
Pseudo R2	0.93280	0.87000	0.91770	0.83910
observations	109,909	82,114	95,394	37,780

*Note: *p<0.1; **p<0.05; ***p<0.01*

Table 3.2: Results from Model 1 with exports as dependent variable part 2

Exports	BEC-4	BEC-5	BEC-6	BEC-7
ln_distance	-0.78219***	-0.75960***	-0.81234***	-0.87109***
	0.00001	*0.00001*	*0.00001*	*0.00002*
ln_gdp_o	0.43640***	0.42526***	0.47524***	0.70281***
	0.00005	*0.00008*	*0.00005*	*0.00017*
ln_gdp_d	0.43108***	0.71706***	0.74780***	0.77136***
	0.00006	*0.00008*	*0.00008*	*0.00012*
ln_lpi_o	0.87112***	1.33712***	-0.01127***	2.43751
	0.00040	*0.00048*	*0.00042*	*0.00089*
ln_lpi_d	0.18498***	-0.20503***	0.06982***	0.50993***
	0.00030	*0.00038*	*0.00036*	*0.00061*
ln_cpi_o	0.01498***	-0.20886***	0.18168***	-1.18433***
	0.00015	*0.00019*	*0.00017*	*0.00037*
ln_cpi_d	0.06472***	0.19682***	0.01674***	0.10896***
	0.00013	*0.00016*	*0.00016*	*0.00026*
ob_one	-0.12556***	-0.15293***	-0.08321***	-0.26774***
	0.00003	*0.00003*	*0.00003*	*0.00006*
ob_both	0.11132***	0.09480***	0.12849***	-0.09136***
	0.00004	*0.00005*	*0.00005*	*0.00009*
language	0.21568***	0.12900***	0.23288***	-0.01293***
	0.00003	*0.00004*	*0.00003*	*0.00005*
colony	0.02463***	-0.31209***	0.20589***	0.54093***
	0.00003	*0.00004*	*0.00004*	*0.00007*
currency	-0.10832***	0.15588***	0.34203***	0.28388***
	0.00003	*0.00004*	*0.00004*	*0.00007*
border	0.28810***	0.75484***	0.42891***	0.46215***
	0.00003	*0.00003*	*0.00003*	*0.00006*
Pseudo R2	0.94600	0.92270	0.93250	0.86580
observations	84,765	71,804	91,549	62,235

*Note: *p<0.1; **p<0.05; ***p<0.01*

Surprisingly, in case of Model 1 – exports, nearly all variables are statistically significant even at 99% confidence level, as can be seen in Tables 3.1 and 3.2. Signs of coefficients were mostly as expected, the exceptions to this were negative signs on CPI and LPI coefficients in some BECs. It appears that level of perceived corruption in exporting country has actually positive impact on bilateral trade in case of total exports, exports of fuels and lubricants, transport equipment and BEC-7: goods not elsewhere specified. In case of importing country the positive effect of perceived corruption can be seen in case of food and beverages and again fuels and lubricants. The impact of CPI is strongest in case of trade with fuels and lubricants. Negative values of coefficients of CPI refute my initial hypothesis (H3) about corruption and might support the "Greasing the wheals" hypothesis in some BECs particularly in BEC-3 fuels and lubricants.

Positive signs on LPI coefficients in case of total trade both in exporting and importing country support my initial hypothesis (H2) about the role of logistics performance in bilateral trade. However even in case of logistics performance, in some BECs results indicate negative effect of LPI. Those categories are BEC-2 and BEC-6 in case of exporter and BEC-1, BEC-3 and BEC-5 in case of importer.

My first hypothesis (H1) is supported by positive signs of *ob_both* coefficients in all BECs with exception of BEC-7. The strongest effect of *ob_both* can be seen in case of trade with fuels and lubricants. Particularly interesting results from Model 1 are negative signs of *ob_one* coefficient across all BECs, with biggest absolute value in case of BEC-3: fuels and lubricants. This category appears to be the most responsive to my explanatory variables.

Signs on GDPs, distance and control variables (language, border, colony and currency) were also mostly expected and are in line with findings in empirical literature. Only exception is negative role of currency union in case of trade with fuels and lubricants. The values of distance coefficient are in line with findings in other empirical literature, where its values usually range between -0.7 to -1.5 (WTO, 2012).

The results from regressions with exports are further supported by results from regressions with imports as a dependent variable.

Table 4.1: results from Model 1 with imports as dependent variable part 1

Imports	Total	BEC-1	BEC-2	BEC-3
ln_distance	-0.74929***	-0.84724***	-0.84373***	-1.39567***
	0.00000	*0.00002*	*0.00001*	*0.00002*
ln_gdp_o	0.37830***	0.08533***	0.33037***	0.13909***
	0.00002	*0.00010*	*0.00005*	*0.00008*
ln_gdp_d	0.58411***	0.68983***	0.48808***	0.60892***
	0.00002	*0.00009*	*0.00004*	*0.00007*
ln_lpi_o	0.26259***	0.29180***	-0.19806***	0.12314***
	0.00014	*0.00046*	*0.00027*	*0.00028*
ln_lpi_d	-0.09194***	-0.22666***	0.19962***	-0.77993***
	0.00014	*0.00045*	*0.00026*	*0.00048*
ln_cpi_o	-0.09557***	0.02577***	0.08299***	-0.23035***
	0.00005	*0.00020*	*0.00011*	*0.00011*
ln_cpi_d	0.08060***	-0.10852***	0.30354***	-0.50331***
	0.00006	*0.00020*	*0.00011*	*0.00019*
ob_one	-0.11973***	-0.05023***	-0.08453***	-0.25523***
	0.00001	*0.00004*	*0.00002*	*0.00004*
ob_both	0.11991***	0.10481***	0.06415***	0.26881***
	0.00002	*0.00007*	*0.00004*	*0.00006*
language	0.10207***	0.13549***	0.02199***	0.32978***
	0.00001	*0.00004*	*0.00002*	*0.00004*
colony	0.13902***	0.38677***	0.25742***	0.26835***
	0.00001	*0.00005*	*0.00003*	*0.00006*
currency	0.22663***	0.51751***	0.29662***	-0.07177***
	0.00002	*0.00005*	*0.00003*	*0.00008*
border	0.41741***	0.54489***	0.42204***	0.36554***
	0.00001	*0.00004*	*0.00002*	*0.00004*
Pseudo R2	0.93200	0.87120	0.92560	0.85220
observations	117,230	89,738	102,773	40,488

*Note: *p<0.1; **p<0.05; ***p<0.01*

Table 4.2: results from Model 1 with imports as dependent variable part 2

Imports	BEC-4	BEC-5	BEC-6	BEC-7
ln_distance	-0.70567***	-0.71691***	-0.67539***	-0.70605***
	0.00001	*0.00001*	*0.00001*	*0.00002*
ln_gdp_o	0.50972***	0.43236***	0.08419***	1.11187***
	0.00004	*0.00008*	*0.00005*	*0.00012*
ln_gdp_d	0.40872***	0.80981***	0.73789***	1.48289***
	0.00005	*0.00008*	*0.00008*	*0.00015*
ln_lpi_o	1.19514***	1.86410***	0.22215***	-0.05083***
	0.00038	*0.00049*	*0.00040*	*0.00074*
ln_lpi_d	0.19047***	-0.21706***	0.14196***	-1.71598***
	0.00029	*0.00039*	*0.00038*	*0.00077*
ln_cpi_o	-0.19585***	-0.28401***	0.32788***	-0.60375***
	0.00014	*0.00020*	*0.00017*	*0.00027*
ln_cpi_d	0.10242***	0.26644***	0.21136***	-0.61892***
	0.00012	*0.00017*	*0.00016*	*0.00031*
ob_one	-0.06399***	-0.16199***	-0.11485***	-0.05170***
	0.00003	*0.00003*	*0.00003*	*0.00006*
ob_both	0.07831***	0.08654***	0.07521***	0.11108***
	0.00004	*0.00005*	*0.00005*	*0.00008*
language	0.25789***	0.06180***	0.20353***	-0.12003***
	0.00002	*0.00004*	*0.00003*	*0.00005*
colony	0.04729***	-0.20778***	0.11404***	1.03476***
	0.00003	*0.00004*	*0.00004*	*0.00007*
currency	-0.03617***	0.32283***	0.28413***	0.88577***
	0.00003	*0.00004*	*0.00004*	*0.00007*
border	0.14105***	0.55503***	0.29872***	0.51356***
	0.00002	*0.00003*	*0.00003*	*0.00006*
Pseudo R2	0.95340	0.92790	0.94180	0.79120
observations	95,494	78,491	101,349	61,857

*Note: *p<0.1; **p<0.05; ***p<0.01*

As can be seen from Tables 4.1 and 4.2, again my explanatory variables are statistically significant and results from exports and imports as dependent variables are rather similar.

5.2 Robustness check

In this section I will compare results from all models and discuss their implications. I will however focus only on main explanatory variables. The full results from Model 2 and Model 3 can be found in the Appendix 1.

Results from Model 1 should be interpreted with caution, but it seems, that BRI has significant impact on bilateral trade. The results from Model 1 show positive coefficient on *ob_both* and negative on *ob_one* variable. Those variables were significant across all 3 models and the signs were the same. This might indicate, that across all BECs Chinese initiatives lead to further strengthening of trade connections among participating countries on the expanse of their trade connections with the rest of the world.

Table 5.1: *ob_one* and *ob_both* across the models part 1

Exports	**Total**	**BEC-1**	**BEC-2**	**BEC-3**
ob_one				
Model 1	-0.12696***	-0.04082***	-0.09371***	-0.31579***
	0.00001	*0.00004*	*0.00002*	*0.00004*
Model 2	-0.31970***	-0.23991***	-0.25158***	-0.23322***
	0.02597	*0.03139*	*0.03029*	*0.06389*
Model 3	-0.29368***	-0.22709***	-0.22973***	-0.18879***
	0.02548	*0.03101*	*0.02971*	*0.06338*
ob_both				
Model 1	0.11411***	0.11231***	0.07224***	0.34751***
	0.00002	*0.00007*	*0.00004*	*0.00007*
Model 2	0.89337***	0.77148***	0.80113***	0.46755***
	0.05016	*0.05689*	*0.05542*	*0.10367*
Model 3	0.94179***	0.79971***	0.84053***	0.53581***
	0.04952	*0.05585*	*0.05424*	*0.10068*

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 5.2: *ob_one* and *ob_both* across the models part 2

Exports	BEC-4	BEC-5	BEC-6	BEC-7
ob_one				
Model 1	-0.12556***	-0.15293***	-0.08321***	-0.26774***
	0.00002	*0.00003*	*0.00003*	*0.00005*
Model 2	-0.25245***	-0.26071***	-0.33829***	-0.35297***
	0.02794	*0.03472*	*0.02923*	*0.04381*
Model 3	-0.19894***	-0.21903***	-0.29546***	-0.32904***
	0.02723	*0.03398*	*0.02880*	*0.04325*
ob_both				
Model 1	0.11132***	0.09480***	0.12849***	-0.09136***
	0.00004	*0.00005*	*0.00005*	*0.00009*
Model 2	0.77415***	0.66170***	1.01506***	0.09434
	0.05041	*0.06290*	*0.05782*	*0.08393*
Model 3	0.86290***	0.72581***	1.09957***	0.10658
	0.04883	*0.06100*	*0.05676*	*0.08190*

*Note: *p<0.1; **p<0.05; ***p<0.01*

Tables 5.1 and 5.2 show, that OLS models tends to predict higher coefficients on target variables. Coefficient of *ob_both* in case of total exports in Model 1 indicates 12.08 percent increase in exports among countries involved in OB. This supports my initial hypothesis that OB increase bilateral trade along its corridors. The effect of OB is most noticeable in case of BEC-3 (fuels and lubricants) where OB increase exports among its participants by 41.48 percent. This might be explained by the fact that China is particularly interested in energy resources (Zhao et al. ,2019) and projects facilitating their import are prioritized.

Negative signs in case of *ob_one* might reflect the substitution effect. Export capacity of participating countries might be oriented more towards trade among themselves and China than with the rest of the world. The values of the coefficients would indicate approximately 11.91 percent decrease in total trade with the rest of the world. Again, the effects of OB differ among BECs and the most effected BEC is fuels and lubricants. However, this hypothesis has to be tested and further research of this topic is needed.

Results from Model 2 indicate that coefficients of *lpi_o* and *lpi_d* are statistically insignificant in most of BECs. Coefficients of *lpi_o* are significant at 99% confidence level and supports results from Model 1 in BEC-3 and BEC-7, however they contradict them in case of BEC-6. In case of BEC-2 and BEC-4 *lpi_o* is significant at least on 90% confidence level and also supports results from Model 1. In comparison to results for *ob_one* and *ob_both* variables, results from Model 1 for *lpi_o* and *lpi_d* appear to be less robust and shall be interpreted with caution.

Table 6.1: *lpi_o* and *lpi_d* across the models part 1

Exports	**Total**	**BEC-1**	**BEC-2**	**BEC-3**
lpi_o				
Model 1	0.18058***	0.04693***	-0.27015***	0.75534***
	0.00015	*0.00048*	*0.00028*	*0.00033*
Model 2	0.08226	0.00632	-0.3551*	1.67138***
	0.16743	*0.21724*	*0.20219*	*0.53626*
lpi_d				
Model 1	0.11213***	-0.08870***	0.35864***	-0.69398***
	0.00014	*0.00043*	*0.00026*	*0.00060*
Model 2	0.09821	0.0844	-0.0761	-0.4797
	0.12938	*0.16859*	*0.15709*	*0.35457*

*Note: *p<0.1; **p<0.05; ***p<0.01*

Table 6.2: *lpi_o* and *lpi_d* across the models part 2

Exports	**BEC-4**	**BEC-5**	**BEC-6**	**BEC-7**
lpi_o				
Model 1	0.87112***	1.33712***	-0.01120***	2.43751***
	0.00040	*0.00048*	*0.00042*	*0.00089*
Model 2	0.3888*	0.1621	0.58449***	1.30759***
	0.21197	*0.25470*	*0.19177*	*0.32025*
lpi_d				
Model 1	0.18498***	-0.20503***	0.06982***	0.50993***
	0.00030	*0.00038*	*0.00036*	*0.00061*
Model 2	-0.0431	0.2665	-0.055	0.0437
	0.14514	*0.18053*	*0.15581*	*0.23979*

*Note: *p<0.1; **p<0.05; ***p<0.01*

In case of Model 2 the coefficients of *cpi_o* are statistically insignificant only in BEC-3 and BEC-5, however *cpi_d* is significant at 99% confidence level only in BEC-4. Results from Model 1 in BEC-4 are supported by results from Model 2 and in this case, it seems that corruption plays negative role in trade. The negative sign of coefficient of *cpi_o* in case of total exports in Model 1 is contradicted by statistically significant positive coefficient in Model 2. In case of trade with fuels and lubricants, which exhibited the highest negative coefficient of both *cpi_o* and *cpi_d* in Model 1, the coefficients from Model 2 are not statistically significant and thus the robustness of results from benchmarking model is not certain.

Table 7.1: c*pi_o* and *cpi_d* across the models part 1

Exports	**Total**	**BEC-1**	**BEC-2**	**BEC-3**
cpi_o				
Model 1	-0.02222***	0.00071***	0.03523***	-0.22237***
	0.00006	*0.00021*	*0.00012*	*0.00015*
Model 2	0.50649***	0.27407**	0.36277***	0.0688
	0.09206	*0.11352*	*0.10808*	*0.29553*
cpi_d				
Model 1	0.11900***	-0.02431***	0.24198***	-0.40302***
	0.00006	*0.00019*	*0.00011*	*0.00024*
Model 2	0.0973	-0.0582	0.1100	0.2624
	0.07592	*0.09545*	*0.08891*	*0.20220*

*Note: *p<0.1; **p<0.05; ***p<0.01*

Table 7.2: c*pi_o* and *cpi_d* across the models part 2

Exports	**BEC-4**	**BEC-5**	**BEC-6**	**BEC-7**
cpi_o				
Model 1	0.01498***	-0.20886***	0.18168***	-1.18433***
	0.00015	*0.00019*	*0.00017*	*0.00037*
Model 2	0.39631***	0.1072	0.37859***	-0.5562***
	0.11086	*0.13536*	*0.10667*	*0.18309*
cpi_d				
Model 1	0.06472***	0.19682***	0.01674***	0.10896***
	0.00013	*0.00016*	*0.00016*	*0.00026*
Model 2	0.23283***	-0.0147	0.16135*	0.3052**
	0.08541	*0.10536*	*0.09011*	*0.13872*

*Note: *p<0.1; **p<0.05; ***p<0.01*

The negative coefficients of *cpi_o* and *cpi_d* might be surprising, however as mentioned before, current academic literature knows specific cases when corruption appears to play positive role. My results indicate, that some BECs (BEC-3: Fuels and lubricants and BEC-7: Goods not elsewhere specified in particular) might exhibit unexpected reaction towards increasing level of perceived corruption and the possible presence of "Greasing the wheals" effect should not be dismissed. Other institutional influences might play role in those results and they should be studied before any conclusions are drawn. The effects of corruption on trade are certainly not trivial and research of this topic might be interesting subject of future studies.

Lastly, the results of *lpi_distance* and *cpi_distance* variables from Model 3 indicates that trade depends negatively on institutional distance between partners. Results are statistically significant in nearly all BECs and negative with exception of *lpi_distance* in case of total trade in both export and import and BEC-1 and BEC-2 in case of imports where coefficients are positive. However, across all BECs coefficients of those variables are low and thus the effects of institutional distance are less noticeable compared to other factors.

Table 8.1: Institutional distances part 1

	Total	**BEC-1**	**BEC-2**	**BEC-3**
Model 3: export				
ln_lpi_distance	0.05557***	-0.0076	-0.0374***	-0.03859**
	0.00673	*0.00808*	*0.00791*	*0.01937*
ln_cpi_distance	-0.01007	-0.0658***	-0.0696***	-0.1016***
	0.00725	*0.00873*	*0.00840*	*0.02051*
Model 3: import				
ln_lpi_distance	0.09707***	0.05144***	0.01747**	-0.06417***
	0.00660	*0.00840*	*0.00745*	*0.01896*
ln_cpi_distance	-0.00687	-0.03140***	-0.07457***	-0.04428**
	0.00712	*0.00911*	*0.00801*	*0.02001*

*Note: *p<0.1; **p<0.05; ***p<0.01*

Table 8.2: Institutional distances part 2

	BEC-4	BEC-5	BEC-6	BEC-7
Model 3: export				
ln_lpi_distance	-0.1261***	-0.1846***	-0.1025***	-0.1436***
	0.00802	*0.00962*	*0.00769*	*0.01233*
ln_cpi_distance	-0.0409***	-0.1122***	-0.0469***	-0.02777**
	0.00847	*0.01009*	*0.00831*	*0.01292*
Model 3: import				
ln_lpi_distance	-0.07542***	-0.19016***	-0.06331***	-0.18737***
	0.00744	*0.00913*	*0.00705*	*0.01242*
ln_cpi_distance	-0.04952***	-0.11008***	0.0142*	-0.10922***
	0.00812	*0.00973*	*0.00757*	*0.01320*

*Note: *p<0.1; **p<0.05; ***p<0.01*

5.3 Discussion

Coefficients of *ob_one* and *ob_both* are both statistically significant and show the effects of BRI. However, BRI is only in its initial stage and majority of the projects connected to this initiative have not materialized yet. If China will really carry on with those projects, it might significantly influence the flow of goods along OB economic corridors.

The results from PPML regression indicates the significance of LPI in facilitating exports. This is in line with recent studies, such as Martí et al. (2014), which indicates, that improvement in any component of LPI leads to significant increase in trade flows. Some researchers such as Rezaei et al. (2018) and Puertas et al. (2014) argued, that some of components of LPI have higher impact on overall logistics performance and thus they should have higher weight than others.

In order to determine impact of BRI on bilateral trade flows, I assume that projects connected to BRI will increase LPI of participating countries. This assumption is based on findings of Ojala et al. (2015). He studied LPI in Turkey and found out that increasing investments of government had played crucial role in improvement of infrastructure. Turkish LPI have risen by approximately 11% between 2007-2014 driven mainly by infrastructural improvements. BRI is expected to improve infrastructure and reduce other trade barriers as well. Considering findings of Rezaei et al. (2018) that other components of LPI have lesser impact on overall logistics performance than infrastructure, it is reasonable to assume just slightly higher increase in LPI than in case of Turkey, which achieved their improvement of LPI mainly by said infrastructural investments.

If we assume 15 percent increase in LPI in exporting country this might lead to increase in trade as high as 11.25 percent in BEC-3 according to Model 1. However, it is unclear, if China will really invest that heavily in the infrastructure in participating countries and if other factors of LPI such as efficiency of customs and border clearance can be improved. Those estimates are more of a thought exercise than predictions.

My results also indicate, that for some BECs, CPI is significant factor positively influencing trade. In literature (predominantly Chinese) is sometimes pointed out possible improvement of institutional quality in BRI countries caused by Chinese outward direct investments (ODI). Pan et al. (2020) came to conclusion that Chinese ODI improves institutional quality in BRI countries both in the short run and long run. However, as pointed before, papers by Chinese authors should be approached cautiously, since they might be biased towards Chinese political interests. Moreover, Balding (2018, p.1) postulated that *"China does not require its partners to meet stringent conditions related to corruption, human rights, or financial sustainability".* The impact of Chinese activities on corruption within BRI countries is questionable and even if it was positive, results from Model 1 indicated overall negative impact of those improvements in some BECs and thus lowering corruption might not increase trade along OB corridors.

6. Conclusion

My goal in this thesis was to examine the effects of BRI on states along its land corridors. In order to do so I have chosen the micro-founded gravity model approach as specified by Anderson and Wincoop (2003) and worked with panel dataset which was composed of information about bilateral trade among 150 countries between the years 2007 and 2015. In order to be able to assess the impact of logistical performance and corruption I have included data on each country's CPI and LPI and to capture other forces influencing trade I also included dummies for common currency, border, official language and colonial past.

I have proposed three models and used PPML in my benchmarking model and OLS method as a robustness check in my estimations. I have used fixed effects for importer, exporter and year to account for MRTs. The results from my estimations are indicating that BRI is promoting bilateral trade among countries along its inland corridors. It appears that BEC-3: fuels and lubricants is the most effected category of goods. It also appears, that trade with the rest of the world is negatively influenced by participation in BRI. Other significant factor facilitating bilateral trade seems to be logistical performance in both importing and exporting country, however the results are not robust across all BECs. Interestingly I was not able to prove my initial hypothesis that corruption influences negatively trade, and in some categories of goods my results even indicated positive impact of corruption on trade, especially in trade with fuels and lubricants. Further research of this topic is needed and might be interesting topic for my future master's thesis. Another interesting topic for future research would be study of Covid-19 pandemics impact on trade between countries I was examining in this thesis, however new data are needed for this purpose and it might take some time till they become available.

From my results it appears, that BRI might create closer economic relationships among involved countries and China, while reducing the trade with the rest of the world. This can increase economic and political interdependency between involved countries and might lead to change in established international trade environment. It is also possible that along with strengthening economic links, China will also be pushing its political interests through BRI. In my thesis I examined economic side of BRI, however we should be also aware of geopolitical implications when talking about this topic. The rise of Chinese influence can be seen in participating countries and from a policy point of view, decisionmakers should also take this into account.

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Appendices

Appendix 1: *Complete results from Model 2 and 3*

Model 2: Export	Total	BEC-1	BEC-2	BEC-3
ln_distance	-1.5785***	-1.5519***	-1.7865***	-2.3576***
	0.01034	*0.01231*	*0.01189*	*0.02801*
ln_gdp_o	0.24516***	0.04025	0.13921**	0.40575***
	0.05069	*0.05857*	*0.05796*	*0.13469*
ln_gdp_d	0.49714***	0.71064***	0.4037***	0.4357***
	0.04600	*0.05862*	*0.05323*	*0.12088*
ln_lpi_o	0.08226	0.00632	-0.3551*	1.67138***
	0.16743	*0.21724*	*0.20219*	*0.53626*
ln_lpi_d	0.09821	0.08444	-0.0761	-0.4797
	0.12938	*0.16859*	*0.15709*	*0.35457*
ln_cpi_o	0.50649***	0.27407**	0.36277***	0.06885
	0.09206	*0.11352*	*0.10808*	*0.29553*
ln_cpi_d	0.09731	-0.0582	0.1100	0.26244
	0.07592	*0.09545*	*0.08891*	*0.20220*
ob_one	-0.3197***	-0.2399***	-0.2515***	-0.2332***
	0.02597	*0.03139*	*0.03029*	*0.06389*
ob_both	0.89337***	0.77148***	0.80113***	0.46755***
	0.05016	*0.05689*	*0.05542*	*0.10367*
language	0.91059***	0.66988***	0.77560***	-0.1952***
	0.02240	*0.02779*	*0.02637*	*0.06171*
colony	0.66124***	1.01132***	0.79191***	1.14535***
	0.04146	*0.04587*	*0.04311*	*0.07546*
currency	-0.0134	0.57956***	0.04209	-0.8594***
	0.03893	*0.04258*	*0.04302*	*0.07972*
border	0.68744***	0.82940***	0.49071***	1.38894***
	0.04462	*0.04433*	*0.04843*	*0.08028*
r-squared	0.76360	0.63170	0.71770	0.57510
observations	108,774	81,496	94,392	36,940

*Note: *p<0.1; **p<0.05; ***p<0.01*

Model 2: Export	BEC-4	BEC-5	BEC-6	BEC-7
ln_distance	-1.6084***	-1.6610***	-1.8358***	-1.4026***
	0.01159	*0.01434*	*0.01186*	*0.01707*
ln_gdp_o	0.21049***	0.0626	0.12128**	-0.5562***
	0.05861	*0.07132*	*0.05841*	*0.09462*
ln_gdp_d	0.5843***	0.7117***	0.6005***	0.6381***
	0.05191	*0.06388*	*0.05312*	*0.08115*
ln_lpi_o	0.38881*	0.1621	0.58449***	1.30759***
	0.21197	*0.25470*	*0.19177*	*0.32025*
ln_lpi_d	-0.0431	0.2665	-0.0555	0.04378
	0.14514	*0.18053*	*0.15581*	*0.23979*
ln_cpi_o	0.39631***	0.1072	0.37859***	-0.5562***
	0.11086	*0.13536*	*0.10667*	*0.18309*
ln_cpi_d	0.23283***	-0.0147	0.16135*	0.30524**
	0.08541	*0.10536*	*0.09011*	*0.13872*
ob_one	-0.2524***	-0.2607***	-0.3382***	-0.3529***
	0.02794	*0.03472*	*0.02923*	*0.04381*
ob_both	0.77415***	0.66170***	1.01506***	0.09434
	0.05041	*0.06290*	*0.05782*	*0.08393*
language	0.95001***	0.88827***	1.20589***	0.57284***
	0.02607	*0.03101*	*0.02619*	*0.03701*
colony	0.74489***	0.69147***	0.74056***	0.85982***
	0.04257	*0.04568*	*0.04471*	*0.06265*
currency	0.0366	0.21309***	0.35305***	0.63543***
	0.04208	*0.04605*	*0.04610*	*0.05883*
border	0.46270***	0.62023***	0.55573***	0.45029***
	0.04594	*0.04858*	*0.05013*	*0.05984*
r-squared	0.77890	0.71480	0.74790	0.63650
observations	80,925	67,078	90,059	60,072

*Note: *p<0.1; **p<0.05; ***p<0.01*

Model 2: Import	Total	BEC-1	BEC-2	BEC-3
ln_distance	-1.3957***	-1.4406***	-1.6348***	-2.2616***
	0.01000	*0.01237*	*0.01135*	*0.02672*
ln_gdp_o	0.04324	-0.1604***	0.01317	-0.1171
	0.04617	*0.05820*	*0.05251*	*0.12927*
ln_gdp_d	0.55777***	0.62124***	0.38460***	0.7473***
	0.04842	*0.06152*	*0.05450*	*0.12926*
ln_lpi_o	0.0991	0.35994*	-0.2426	1.34929***
	0.14100	*0.18918*	*0.17303*	*0.51278*
ln_lpi_d	0.02145	-0.0732	-0.0547	0.14489
	0.13562	*0.18771*	*0.15993*	*0.39467*
ln_cpi_o	0.08526	0.1489	0.07832	-0.3268
	0.08103	*0.10745*	*0.09634*	*0.27837*
ln_cpi_d	0.0615	-0.0331	0.20765**	-0.0146
	0.08071	*0.10602*	*0.09247*	*0.22785*
ob_one	-0.3067***	-0.2348***	-0.2660***	-0.2789***
	0.02544	*0.03184*	*0.02900*	*0.06525*
ob_both	0.66321***	0.77401***	0.55439***	0.33685***
	0.04914	*0.05764*	*0.05239*	*0.10654*
language	0.9865***	0.83161***	0.74752***	-0.3428***
	0.02175	*0.02855*	*0.02521*	*0.06239*
colony	0.59461***	0.77199***	0.65736***	1.23762***
	0.03905	*0.04691*	*0.04194*	*0.08065*
currency	-0.1809***	0.0600	-0.0702*	-0.6350***
	0.04133	*0.04265*	*0.04229*	*0.08157*
border	0.64095***	0.88607***	0.56121***	1.22796***
	0.04493	*0.04676*	*0.04594*	*0.08176*
r-squared	0.78160	0.65790	0.74120	0.56110
observations	117,221	89,736	102,771	40,485

*Note: *p<0.1; **p<0.05; ***p<0.01*

Model 2: Import	BEC-4	BEC-5	BEC-6	BEC-7
ln_distance	-1.4713***	-1.5889***	-1.577***	-1.2665***
	0.01104	*0.01362*	*0.01103*	*0.01742*
ln_gdp_o	-0.0227	-0.3262***	-0.1611***	-0.02028
	0.05133	*0.06574*	*0.04894*	*0.08580*
ln_gdp_d	0.56991***	0.56373***	0.89422***	0.19924**
	0.05463	*0.06638*	*0.05144*	*0.09377*
ln_lpi_o	0.27653*	0.75720***	0.46731***	0.14068
	0.16191	*0.21672*	*0.15008*	*0.26127*
ln_lpi_d	-0.28393*	-0.2898	0.0593	-1.3446***
	0.16062	*0.18916*	*0.15085*	*0.29109*
ln_cpi_o	0.00918	-0.0502	0.0584	0.25360*
	0.09042	*0.11962*	*0.08590*	*0.14999*
ln_cpi_d	0.24790***	-0.0665	0.0721	-0.7625***
	0.09458	*0.11526*	*0.08917*	*0.16143*
ob_one	-0.1554***	-0.2538***	-0.2613***	-0.3055***
	0.02717	*0.03440*	*0.02612*	*0.04719*
ob_both	0.75176***	0.71853***	0.75908***	0.19496**
	0.05123	*0.06515*	*0.05174*	*0.09096*
language	0.8435***	0.75916***	1.28206***	0.75293***
	0.02482	*0.03018*	*0.02463*	*0.03804*
colony	0.74348***	0.55999***	0.52117***	1.08462***
	0.04216	*0.04763*	*0.04212*	*0.06437*
currency	-0.08045**	0.28376***	0.21540***	0.45949***
	0.04057	*0.04513*	*0.04457*	*0.06429*
border	0.64312***	0.73460***	0.60930***	0.64078***
	0.04584	*0.04936*	*0.04993*	*0.06486*
r-squared	0.80190	0.73460	0.79280	0.58290
observations	95,490	78,489	101,333	61,849

*Note: *p<0.1; **p<0.05; ***p<0.01*

Model 3: import	Total	BEC-1	BEC-2	BEC-3
ln_distance	-1.4117***	-1.4446***	-1.6279***	-2.2436***
	0.01013	*0.01253*	*0.01151*	*0.02712*
ln_gdp_o	0.07570*	-0.10075*	0.02057	-0.0696
	0.04375	*0.05518*	*0.04972*	*0.12204*
ln_gdp_d	0.58867***	0.63440***	0.44465***	0.76532***
	0.04686	*0.05964*	*0.05278*	*0.12417*
ln_lpi_distance	0.09707***	0.05144***	0.01747**	-0.06417***
	0.00660	*0.00840*	*0.00745*	*0.01896*
ln_cpi_distance	-0.00687	-0.03140***	-0.07457***	-0.04428**
	0.00712	*0.00911*	*0.00801*	*0.02001*
ob_one	-0.29419***	-0.22259***	-0.25001***	-0.25664***
	0.02507	*0.03144*	*0.02869*	*0.06484*
ob_both	0.67118***	0.79307***	0.57162***	0.37033***
	0.04854	*0.05659*	*0.05145*	*0.10365*
language	0.99448***	0.84241***	0.75611***	-0.35272***
	0.02194	*0.02879*	*0.02550*	*0.06325*
colony	0.58590***	0.76615***	0.65286***	1.25080***
	0.03889	*0.04730*	*0.04236*	*0.08150*
currency	-0.10771**	0.06713	-0.11362***	-0.67638***
	0.04166	*0.04341*	*0.04290*	*0.08180*
border	0.63542***	0.88725***	0.54157***	1.19320***
	0.04539	*0.04747*	*0.04664*	*0.08287*
r-squared	0.78210	0.65860	0.74120	0.56250
observations	115,302	88,427	101,171	39,955

*Note: *p<0.1; **p<0.05; ***p<0.01*

Model 3: import	BEC-4	BEC-5	BEC-6	BEC-7
ln_distance	-1.4495***	-1.5377***	-1.5661***	-1.21036***
	0.01122	*0.01382*	*0.01116*	*0.01776*
ln_gdp_o	0.0201	-0.23708***	-0.10150**	0.0937
	0.04891	*0.06206*	*0.04664*	*0.08165*
ln_gdp_d	0.62723***	0.59541***	0.93356***	0.0331
	0.05234	*0.06382*	*0.04963*	*0.09042*
ln_lpi_distance	-0.07542***	-0.19016***	-0.06331***	-0.18737***
	0.00744	*0.00913*	*0.00705*	*0.01242*
ln_cpi_distance	-0.04952***	-0.11008***	0.0142*	-0.10922***
	0.00812	*0.00973*	*0.00757*	*0.01320*
ob_one	-0.13104***	-0.22532***	-0.23292***	-0.32648***
	0.02677	*0.03390*	*0.02572*	*0.04674*
ob_both	0.79911***	0.77672***	0.80590***	0.1052
	0.05010	*0.06282*	*0.05069*	*0.08897*
language	0.83567***	0.72806***	1.27245***	0.70677***
	0.02496	*0.03022*	*0.02482*	*0.03816*
colony	0.75479***	0.59319***	0.53325***	1.11299***
	0.04244	*0.04751*	*0.04223*	*0.06469*
currency	-0.19173***	0.0639	0.16995***	0.29092***
	0.04145	*0.04605*	*0.04540*	*0.06470*
border	0.60776***	0.66453***	0.58508***	0.57503***
	0.04652	*0.04995*	*0.05058*	*0.06576*
r-squared	0.80320	0.73810	0.79340	0.58610
observations	94,088	77,360	99,786	61,055

*Note: *p<0.1; **p<0.05; ***p<0.01*

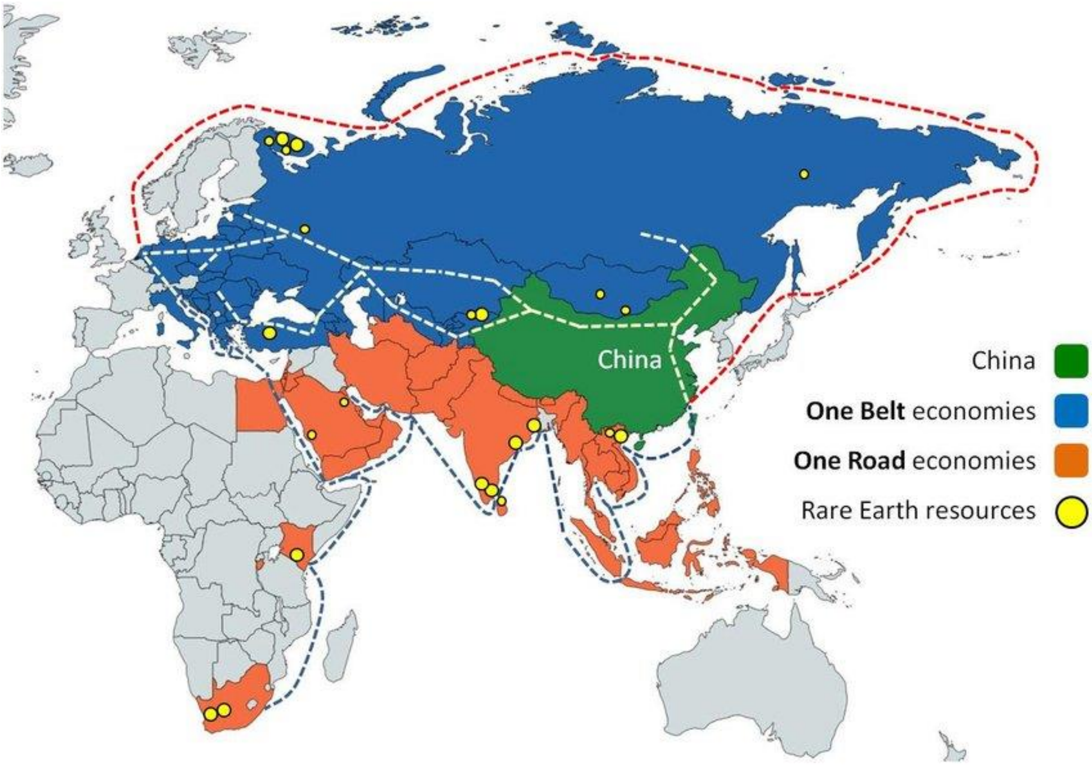
Model 3: export	Total	BEC-1	BEC-2	BEC-3
ln_distance	-1.5869***	-1.5415***	-1.7687***	-2.3424***
	0.01049	*0.01250*	*0.01206*	*0.02836*
ln_gdp_o	0.33857***	0.1009*	0.20370***	0.51717***
	0.04763	*0.05571*	*0.05446*	*0.12842*
ln_gdp_d	0.52547***	0.71943***	0.45275***	0.45162***
	0.04451	*0.05686*	*0.05148*	*0.11621*
ln_lpi_distance	0.05557***	-0.0076	-0.0374***	-0.03859**
	0.00673	*0.00808*	*0.00791*	*0.01937*
ln_cpi_distance	-0.01007	-0.0658***	-0.0696***	-0.1016***
	0.00725	*0.00873*	*0.00840*	*0.02051*
ob_one	-0.2936***	-0.2271***	-0.2297***	-0.1887***
	0.02548	*0.03101*	*0.02971*	*0.06338*
ob_both	0.94179***	0.79971***	0.84053***	0.53581***
	0.04952	*0.05585*	*0.05424*	*0.10068*
language	0.91721***	0.66949***	0.77201***	-0.2027***
	0.02263	*0.02805*	*0.02665*	*0.06230*
colony	0.66006***	1.01598***	0.79722***	1.14507***
	0.04158	*0.04633*	*0.04359*	*0.07629*
currency	0.01672	0.52368***	-0.0366	-0.9201***
	0.03934	*0.04311*	*0.04386*	*0.08035*
border	0.67537***	0.80975***	0.45692***	1.31971***
	0.04525	*0.04496*	*0.04932*	*0.08142*
r-squared	0.76370	0.63230	0.71830	0.57680
observations	107,110	80,307	93,005	36,470

*Note: *p<0.1; **p<0.05; ***p<0.01*

Model 3: export	BEC-4	BEC-5	BEC-6	BEC-7
ln_distance	-1.5743***	-1.6017***	-1.806***	-1.370***
	0.01179	*0.01457*	*0.01199*	*0.01746*
ln_gdp_o	0.32164***	0.11556*	0.24348***	-0.5754***
	0.05509	*0.06715*	*0.05477*	*0.09019*
ln_gdp_d	0.64415***	0.75550***	0.65966***	0.72248***
	0.05033	*0.06173*	*0.05111*	*0.07822*
ln_lpi_distance	-0.1261***	-0.1846***	-0.1025***	-0.1436***
	0.00802	*0.00962*	*0.00769*	*0.01233*
ln_cpi_distance	-0.0409***	-0.1122***	-0.0469***	-0.02777**
	0.00847	*0.01009*	*0.00831*	*0.01292*
ob_one	-0.1989***	-0.2190***	-0.2955***	-0.3290***
	0.02723	*0.03398*	*0.02880*	*0.04325*
ob_both	0.86290***	0.72581***	1.09957***	0.10659
	0.04883	*0.06100*	*0.05676*	*0.08190*
language	0.92227***	0.8425***	1.18356***	0.53922***
	0.02625	*0.03105*	*0.02637*	*0.03737*
colony	0.77150***	0.73063***	0.76274***	0.88626***
	0.04301	*0.04590*	*0.04507*	*0.06312*
currency	-0.07510*	0.03258	0.25152***	0.56271***
	0.04282	*0.04645*	*0.04686*	*0.05946*
border	0.41700***	0.55383***	0.51249***	0.40396***
	0.04666	*0.04901*	*0.05092*	*0.06045*
r-squared	0.78050	0.71920	0.74900	0.63770
observations	79,795	66,154	88,760	59,276

*Note: *p<0.1; **p<0.05; ***p<0.01*

***Appendix 2**: Map of BRI countries.*



Source: https://www.iasipstnpsc.in/china-trying-to-create-its-own-globally-decisive-naval-force-through-bri-pentagon/

***Appendix 3:** List of countries included in the dataset.*

One Belt economies
Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, China, Croatia, Czech Republic, Estonia, Germany, Greece, Hungary, Italy, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Montenegro, Moldova, Mongolia, Netherlands, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, Ukraine, Uzbekistan
Other economies
Afghanistan, Algeria, Angola, Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Benin, Bolivia, Brazil, Burkina Faso, Burundi, Bhutan, Cambodia, Cameroon, Canada, Chad, Chile, Colombia, Comoros, Costa Rica, Côte d'Ivoire, Cyprus, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Ethiopia, Finland, France, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Kuwait, Laos, Lebanon, Lesotho, Liberia, Luxemburg, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Morocco, Mozambique, Myanmar, Namibia, Nepal, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Portugal, Qatar, Rwanda, Sao Tome, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Syria, Taiwan, Tanzania, Thailand, Timor-Leste, Togo, Tunisia, Uganda, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe

Appendix 4: *Descriptive statistics of chosen variables in the dataset*

variable	observations	mean	std. dev.	min	max
gdp_o	196,680	4,620	15,700	1.44	180,000
gdp_d	196,680	4,620	15,700	1.44	180,000
distance	201,150	7307.066	4272.326	59.61723	19951.16
lpi_o*	187,442	2.883025	0.5833185	1.21	4.19
lpi_d*	187,442	2.883025	0.5833185	1.21	4.19
cpi_o	192,806	41.70094	20.94742	8	94.62681
cpi_d	192,806	41.70094	20.94742	8	94.62681
Exports					
Total	248,026	7.39	68.99	0.00	4,970.00
BEC-1	171,114	0.74	5.11	0.00	305.00
BEC-2	204,793	2.36	17.96	0.00	918.00
BEC-3	71,407	1.68	15.57	0.00	1,050.00
BEC-4	182,095	2.18	20.77	0.00	1,460.00
BEC-5	149,536	1.77	18.08	0.00	1,100.00
BEC-6	198,240	1.34	14.84	0.00	1,630.00
BEC-7	145,400	1.31	15.33	0.00	1,840.00
Imports					
Total	291,234	7.00	70.06	0.00	5,850.00
BEC-1	199,222	0.70	5.05	0.00	414.00
BEC-2	232,253	2.21	17.44	0.00	780.00
BEC-3	76,163	3.28	27.46	0.00	1,720.00
BEC-4	217,648	1.95	23.86	0.00	1,880.00
BEC-5	168,269	1.45	15.83	0.00	1,110.00
BEC-6	234,722	1.20	17.48	0.00	1,810.00
BEC-7	151,423	1.23	16.95	0.00	1,980.00

GDPs and trade flows were scaled down by the factor of 100,000,000

**Years 2008,2009,2011,2013 and 2015 were approximated by arithmetic averages of LPIs in adjacent years. In case of 2008 I have weighted LPI from 2007 by 3/5 and LPI from 2010 by 2/5, the same approach was used for 2009 only weights of 2007 and 2010 LPIs were switched.*

Appendix 5: *Results of RESET test, F-scores and Chi-squared*

Model 1:

Exports	Chi-squared	Imports	Chi-squared
Total	559,000,000,000	***Total***	628,000,000,000
BEC-1	37,000,000,000	***BEC-1***	38,000,000,000
BEC-2	144,000,000,000	***BEC-2***	158,000,000,000
BEC-3	47,800,000,000	***BEC-3***	71,300,000,000
BEC-4	130,000,000,000	***BEC-4***	164,000,000,000
BEC-5	85,100,000,000	***BEC-5***	90,200,000,000
BEC-6	93,900,000,000	***BEC-6***	106,000,000,000
BEC-7	30,800,000,000	***BEC-7***	28,400,000,000

Model 2:

Exports	F-score	RESET test: F-score	Imports	F-score	RESET test: F-score
Total	1233.79	1785.93	***Total***	1469.77	2289.49
BEC-1	526.29	503.76	***BEC-1***	642.01	665.28
BEC-2	834.66	1278.50	***BEC-2***	1036.34	1545.34
BEC-3*	1027.39	436.81	***BEC-3****	1004.69	433.99
BEC-4	1030.09	1139.11	***BEC-4***	1472.73	1338.18
BEC-5	628.69	1074.40	***BEC-5***	891.23	1183.66
BEC-6	923.06	1743.98	***BEC-6***	1354.83	2185.93
BEC-7	531.66	327.15	***BEC-7***	377.12	641.38

**testparm stata command had to be used*

Model 3:

Exports	F-score	RESET test: F-score	Imports	F-score	RESET test: F-score
Total	1246.33	1755.13	***Total***	1496.40	2177.56
BEC-1	527.35	513.88	***BEC-1***	648.93	647.77
BEC-2	839.17	1327.94	***BEC-2***	1043.58	1575.78
BEC-3*	1210.46	421.29	***BEC-3***	232.71	424.28
BEC-4	1039.06	1122.44	***BEC-4***	1494.32	1358.02
BEC-5	641.37	995.53	***BEC-5***	902.28	1095.70
BEC-6	922.55	1791.93	***BEC-6***	1360.24	2181.34
BEC-7	543.22	271.89	***BEC-7***	392.15	512.04

**testparm stata command had to be used*