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Elena Rasenko

Potential of Agricultural Trade between China and Central and Eastern Europe within the 16+1 Framework

Master thesis

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Author: Elena Rasenko

Supervisor: Ing. Vilém Semerák, M.A., Ph.D.

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Abstract

The goal of the following paper is to analyse the trade potential for Central and Eastern Europe (CEE) and China in the trade of food products. Even though the trade in food products is comparably low, there are several reasons why it is worth a deeper analysis. Food security is having an important role in the Chinese domestic politics. Due to environmental, socio-economic and demographic changes, China cannot be self-sufficient and is therefore dependent on food imports. Since the introduction of the One Belt One Road Initiative and the 16+1 framework, China aims to improve the cooperation and trade in food commodities with participating countries. CEE can be a reliable partner because it produces high quality products with comparative advantages.

With the help of the Gravity Model, the effects of the 16+1 framework was estimated, as well as the trade potential. Following the results, the introduction of the 16+1 framework has a positive and significant effect on agricultural trade between CEE and China. However, only five countries have potential to increase their food exports to China, while the remaining eleven already exceed their food exports. China on the other hand, is exporting below its potential in most of the cases.

Keywords

Gravity Model, Trade Potential, China, 16+1, Central and Eastern Europe, Agricultural trade, Food security, Comparative Advantages, One Belt One Road

Abstrakt

Cílem následujícího článku je analyzovat obchodní potenciál medzi střední a východní Evropou (CEE) a Čínou pro obchod s potravinami. I když je obchod s potravinářskými výrobky porovnatelně nižší, existuje několik důvodů, proč stojí za hlubší analýzu. Potravinová bezpečnost hraje důležitou roli v čínské domácí politice. Z důvodu environmentálních, socioekonomických a demografických změn nemůže být Čína soběstačná, a proto je závislá na dovozu potravin. Od zavedení iniciativy One Belt One Road a rámce 16 + 1 má Čína za cíl zlepšit spolupráci a obchod s potravinovými komoditami se zúčastněnými zeměmi. CEE může být spolehlivým partnerem, protože vyrábí vysoce kvalitní výrobky s komparativními výhodami.

Pomocí modelu gravitace byly odhadnuty účinky 16 + 1 rámce, stejně jako obchodní potenciál. Na základě výsledků zavedení rámce 16 + 1 má pozitivní a významný vliv na obchod se zemědělskými produkty mezi CEE a Čínou. Pouze pět zemí však může zvýšit svůj vývoz potravin do Číny, zatímco zbývajících jedenáct již překročí svůj vývoz potravin. Čína na druhé straně vyváží pod svůj potenciál ve většině případů

Klíčová slova

Gravitační model, Obchodní potenciál, Čína, 16+1, Střední a východní Evropy, Zemědělský obchod, Zabezpečení potravin, Komparativní výhoda, Nová Hedvábná stezka

Range of thesis: 101965 characters

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, 27.07.2018 Elena Rasenko

Master Thesis Proposal

Author:	**Elena Rasenko**	Supervisor:	Ing. Vilém Semerák, M.A., Ph.D.
E-mail:	elena.rasenko@outlook.de	E-mail:	vilem.semerak@fsv.cuni.cz
Phone:	+420 776 390 989	Phone:	...
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Proposed Topic	Potential of Agricultural Trade between China and Central and Eastern Europe within the 16+1 Framework

Topic characteristics / Research Question(s):

One fifth of the world's population is living in China, however, only one tenth of the arable land is located there and the area of arable land is decreasing. This means, that without technological innovation, China cannot provide enough food for its own population and is therefore dependent on imports. In the following thesis it will be argued that Central and Eastern European Countries can be a potential source for agricultural imports for China.
The goal of the paper is to analyse the trade in agricultural commodities between China and Central and Eastern European Countries (CEEC) and to determine the potential trade for the CEEC and China following the introduction of the 16+1 framework and OBOR initiative. The 16+1 format was firstly introduced in 2012 to maintain and deepen the relations between 16 EU members and non-EU members in the CEE region.
Therefore, the following questions arise: will the Chinese-led cooperation with CEEC create new trade opportunities for CEEC and China? Will CEEC become a potential new source for China in regard of securing the food issue by increasing imports from CEEC?
To answer these questions, the importance of the food security issue in China will be examined. To ensure further understanding, the One Belt One Road initiative (OBOR) and the 16+1 framework will be introduced, and role of agriculture will be highlighted. The last part of the literature review introduces the Gravity Model of International Trade, which is the methodology that will be used to analyse the trade potential. In the next chapter, the development of CEE-China trade relations will be analysed with a focus on agriculture. Hereby the Trade Complementarity Index and the Revealed Comparative Advantages Index will be presented and calculated. The third chapter, Methodology, focuses on the application of the gravity model. The gravity model will be estimated and analysed and based on the best estimator the trade potential will be calculated. Following that, the overall results will be discussed, and the previous stated questions answered.

Working hypotheses:

1. CEEC have revealed comparative advantages in the agricultural sector in comparison with China.
2. The membership of both countries in the 16+1 framework has a significant positive effect on agricultural trade.
3. The actual agricultural trade between CEEC and China is below the potential trade, therefore there are opportunities to increase trade.

Methodology:

The literature review will give an overview about the development of the relations between CEE and China and will look deeper at the Chinese led initiatives, such as the 16+1 framework and OBOR, as well as the food security issue. The goals, structure, possible progress and challenges of these initiatives will be examined as well as the role of CEE within it. Therefore, official documents issued by the governments will be used, as well as other publications such as research papers, journals etc.
In the next chapter, the trade flows between the CEE and China will be analysed and indices such as the revealed comparative advantages and trade complementarity index will be calculated.
Following that, the gravity model of international trade will be estimated. With the help of the gravity model it will be possible to see what factors determine the agricultural trade and to calculate the trade potential for CEEC and China.
Therefore, common databases will be used such as UN Comtrade Database, Eurostat, World Bank etc. To receive information about the distance between two countries the database from CEPII will be used.

Outline:

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List of Abbreviations

APR	Actual-to-Potential Trade Ratio
CEEC	Central and Eastern European Countries
EU	European Union
FEM	Fixed Effects Model
MOA	Ministry of Agriculture of the People's Republic of China
MoU	Memorandum of Understanding
NAPR	Normalized Actual-to Potential Trade Ratio
NRCA	Normalized Revealed Comparative Advantages
NRDC	National Development and Reform Commission of the People's Republic of China
OBOR	One Belt One Road
REM	Random Effects Model
RCA	Revealed Comparative Advantages
SITC	Standard International Trade Classification
TCI	Trade Complementarity Index
TP	Trade Potential
WTO	World Trade Organization

Abbreviations of Countries

ALB	Republic of Albania
BGR	Republic of Bulgaria
BIH	Bosnia and Herzegovina
CHN	People's Republic of China
CZE	Czech Republic
EST	Republic of Estonia
HRV	Republic of Croatia
HUN	Hungary
LTU	Republic of Lithuania
LVA	Republic of Latvia
MKD	Former Yugoslav Republic of Macedonia (FYROM)
MNE	Montenegro
POL	Republic of Poland
ROU	Romania
SRB	Republic of Serbia
SVK	Slovak Republic
SVN	Republic of Slovenia

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Introduction

One fifth of the world's population is living in China, but only one tenth of the arable land is located there with the area of arable land is decreasing due to environmental changes. This means, without technological innovation, China cannot provide enough food for its own population, thus, it is dependent on imports. Therefore, since the first significant agricultural reforms were successfully introduced in the 1980s, food safety has posed an important security issue for Beijing.

Agriculture and food safety is an integral part of every Five-Year Plan of China, its domestic politics, and recently one of the aspects of the ambitious One Belt One Road Initiative (OBOR) and 16+1 initiative. The 16+1 framework was introduced in 2012 with the overall goal to maintain and deepen relations between China and 16 countries in Central and Eastern Europe (CEE), which combines 11 EU members and five non-EU member states.

One year later, the Chinese president Xi Jinping firstly mentioned the OBOR initiative, which aims to achieve deeper economic integration within China and with other participating countries along the OBOR, such as the Central Asian countries, Russia, Central and Eastern Europe and Western Europe by improving infrastructure and communication channels to increase trade and investment and deepen political relations. Within the OBOR initiative, China introduced several frameworks which aim to boost agricultural cooperation, exchange and trade between the OBOR countries, with the objective to make it more efficient and sustainable (MOA 2017). Even though the share of agriculture commodities[1] is relatively small in the trade between the CEEC and China, it will be argued in the following thesis that there is a potential for both to increase it.

The goal of the paper is to analyse the agricultural trade between China and CEE and to determine the potential trade for the CEEC and China following the introduction of the

16+1 framework and OBOR initiative. Therefore, the following questions will be analysed: will the Chinese-led cooperation with the CEEC create new trade opportunities for the CEEC and China? Will the CEEC become a potential new source for China regarding securing the food issue by increasing imports from the CEEC?

In connection with the questions, the following hypothesis will be examined and tested:

1. The CEEC have revealed comparative advantages in the agricultural sector in comparison to China.
2. The membership of both countries in the 16+1 framework has a significant positive effect on agricultural trade.
3. The actual agricultural trade between the CEEC and China is below the potential trade, therefore there are opportunities to increase trade.

To answer these questions and test the hypothesis, the OBOR and 16+1 framework will be introduced and the China-CEEC relations examined in the first part of the literature review. In the next part, the food security issue worldwide and in China will be emphasized, as well as the role of agriculture in the Chinese-led initiatives. This part will help to understand the motivation behind choosing the agricultural sector as the focus of the thesis. Next, the Gravity Model of International Trade will be introduced, which is the methodology that will be used to analyse the trade potential. The development, as well as the issues of the Gravity Model, will be presented. The Gravity Model is inspired by the Gravitation Theory developed by Newton. Its basic assumption is that countries tend to trade more the bigger they are and less the higher distance is. In the next chapter, the development of the CEEC-China

[1] Agricultural commodities are used hereby synonymously for food commodities according to the SITC-0 classification, food and live animals and all its divisions

trade relations will be studied with the help of descriptive analysis, the Trade Complementarity Index (TCI) and the Revealed Comparative Advantages Index (RCA). The third chapter, Methodology, focuses on the application of the previously presented Gravity Model. The Gravity Model will be estimated and analysed and, based on the best estimator, the trade potential will be calculated. Following that, the overall results will be discussed, and the previous stated questions answered.

The following thesis will contribute to the current state of research by providing an agricultural trade analysis with the help of the Gravity Model after the introduction of the OBOR and 16+1 framework. According to the author's current knowledge, no paper has been published in the English or German speaking academia using the gravity model to analyse the agricultural trade potential between the CEEC and China after the introduction of OBOR.

1. Literature Review

The literature review will provide an overview over the current state of research and all the necessary knowledge about the OBOR, 16+1 framework, food security and the Gravity Model of International Trade. The presented topics are crucial for understanding the analysis that will follow.

1.1 Current State of Research

Literature focusing on agricultural trade between China and CEE and using qualitative methods, i.e. Gravity Model of International Trade, is very rare. Empirical research has been done prior to the introduction of the 16+1 framework and OBOR, and only a limited amount was published afterwards. Jie Xie (2010) published a paper using the gravity model to analyse the agricultural trade between CEE and China. Since it was published in 2010, important changes such as the introduction of the OBOR initiative and 16+1 framework happened. The author also mentioned that there were only a few studies about agricultural trade between China and the CEE after the Eastern Enlargement of the EU, using the gravity model. Within the analysis, the effects of economic scale, population size, geographical distance and EU membership on agricultural trade were analysed. The result was, that the first two, economic scale and population size had a positive effect on agricultural trade, while geographical distance and EU membership reduced the trade. It is a main assumption of the gravity model, that distance has a negative effect on trade. The negative effect of the EU membership can be explained by the implementation of higher EU standards in the CEE countries, which made trade more difficult (Jie 2010).

Yu and Qi (2015) did research on agricultural trade between China and CEE. They calculated the Revealed Comparative Advantage (RCA), Trade Complementarity Index (TCI), Grubel-Llyod index to analyse the complementarity and comparative advantages

between China and the CEE (Yu and Qi 2015). Therefore, the authors used another methodology than the following thesis.

Zhang et al. (2016) had used the gravity model to analyse the agricultural trade after the introduction of OBOR, however, they focused on the trade between Central Asia and China. According to Zhang's research, economic scale, population size and geographical distance have a significant impact on trade in agricultural products between China and Central Asia. The OBOR initiative has a positive impact on the trade, however, its effect is not significant (Zhang et al. 2016).

In the paper "China's Belt and Road initiative: can Europe expect trade gains?", Garcia Herrero and Xu (2016) analysed the effects of OBOR on the trade between EU and China. With the help of the gravity model, they estimated the effects of a reduction of transportation costs and of the introduction of a free trade agreement on the trade flows between the EU and China. The result of the simulation was, that the improvement of infrastructure has a positive effect on the trade flows, while the free trade agreement would even lead to a small decrease of the trade flows (Garcia Herrero and Xu 2016).

Bergner et al. (2015) state that the OBOR initiative could contribute to the food safety situation in China by investing in infrastructure and therefore decrease the trade and transportation costs. Furthermore, it is aimed to expand the agricultural cooperation between the OBOR countries. China has shown success in the reduction of undernourishment since the 1990s. The OBOR initiative covers countries that differ significantly regarding food security. While food security is ensured in Russia and Europe, it is a serious issue for Asian states that are covered by the OBOR initiative. China managed it to reduce the share of people suffering from undernourishment in the last decades, however, it is still an important issue for 10% of the population. The share of undernourishment ranges from 10% in Vietnam and China to 20% in India and Iraq and 30% in Afghanistan (Bergner et al. 2015).

1.2 One Belt One Road Initiative

In the second part of the Literature Review, the OBOR initiative and the 16+1 framework will be introduced. In the previous years, China has developed several frameworks to increase their cooperation with countries in Asia, Europe and Africa. The most well-known is the ambitious OBOR initiative, which is covering around 70 countries and a population of over 4 billion people, and the 16+1 framework, which aims to improve the cooperation with thee CEEC. The 16+1 framework includes China and 16 countries from Central and Eastern Europe, from which eleven EU members (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) and five non-EU countries Albania, Bosnia and Herzegovina, Macedonia, Montenegro and Serbia.

1.2.1 Introduction of the One Belt One Road Initiative

The OBOR initiative was firstly mentioned in 2013 by the Chinese President Xi Jianping in the Kazakh capital city of Astana. The initiative consists of two parts, which are the Silk Road Economic Belt and the 21st-Century Maritime Silk Road.

The Silk Road Economic Belt aims to improve the connectivity between China via Central Asia and Eastern Europe with Western Europe by expanding the construction of railways and highways. It is inspired by the antique Silk Road, which was an important route from 200 BC to 1300 AD and dominated the trade between China, Central Asia, the Middle East and Europe. It was used to trade specialty goods like silk, gold, silver and herbs. The 21st-Century Maritime Silk Road's objective is to improve the sea connectivity between China and Europe over the South China Sea and the Indian Ocean (Nolan 2015).

Although the initiative is very ambitious in its aims, there are only few concrete documents published by the Chinese government and even less concrete projects, that were implemented. The most significant official document was published by the Chinese National

Development and Reform Commission (NRDC) is the “Visions and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road” (NDRC 2015), which describes the general objectives of OBOR. A major reason for the development of the initiative is the gradual recovery of the global economy after the financial crisis. The OBOR initiative aims to stabilize the economies of the states involved in Silk Road, from which China would benefit. The revitalization of the economic development should be achieved by improving cross-border cooperation and infrastructure, as well as establishing common standards and communication channels. The initiative is based on the five principles of peaceful coexistence, which include “mutual respect for each other's sovereignty and territorial integrity, mutual non-aggression, mutual non-interference in each other's internal affairs, equality and mutual benefit, and peaceful coexistence”.

Furthermore, China is aiming to improve the infrastructure and connectivity along the Silk Road, which includes the expansion of the road, railway and pipeline network, but also the establishment of a cross-border free trade zone to stimulate growth, trade and investment (NDRC 2015).

One main goal is to diversify the Chinese economy with a wider range of products, energy supplier, trade partners and routes (Rudolf 2015). Although economic cooperation appears to be of high importance, cooperation in other fields is supposed to increase as well. To enable an exchange, both existing communication platforms and newly created platform should be used.

Within the OBOR initiative, the financial integration is supported by the new founded institution, such as the Asian Infrastructure and Investment Bank (AIIB) and the Silk Road Fund. The AIIB is a multinational development bank, which consists of 52 member states. Initially the bank was designed to support Asian countries with their development, but the response of various non-Asian countries was so positive, that even 14 EU member states decided to join the AIIB. Similar to OBOR, the AIIB welcomes every country that is

interested to join without geographical restrictions. On the other side, the USA and Japan criticized the bank for not following international standards and even demanded the EU member states not to join it. However, although many EU countries already joined the AIIB, there is still no common response of the whole EU (Hilpert and Wacker 2015).

1.2.2 China-CEE Relations within the 16+1 Framework

According to Song (2017), the China-CEE relations are neglected a lot in international research, since most of the research focuses only on EU-China relations. The development of the relations between CEE and China were strongly shaped by the relations between China and the Soviet Union. While the diplomatic relations were strong in the 1950s due to a common communist ideology, they cooled down in the 1960s.

There was only a small amount of interaction between the two regions in the post-war period. However, countries like Czechoslovakia, Hungary and Poland were interested in the development of closer economic ties with China. China, on the other hand, was rather interested in the development of closer economic relations with the industrialized western countries, as they wanted to have access to a bigger market (Song 2017).

After the fall of the Communist Bloc in 1989, the paths of both groups were divided even more. CEE was about to transform itself economically and politically, whereby the priority was to re-establish their relations with Western Europe and the US. The 1990s were marked by the transformation process and the integration with the EU for some CEE countries. The first CEE countries to become members of the EU as part of their Eastern Enlargement in 2004 included the three Baltic states, Czech Republic, Slovakia, Poland, Hungary and Slovenia. Bulgaria and Romania followed in 2007 and Croatia in 2013 (Turcsányi 2014).

Although the 16 countries share some similarities, such as the geographical location and the communist past, they are still very heterogeneous in their history, development and culture. During the Cold War, the countries have differed between each other in their political and economic system. While Albania, Bulgaria, Poland, Romania, Czechoslovakia and Hungary were independent, they were still part of a Soviet-led military alliance called the Warsaw pact, while the three Baltic states of Estonia, Latvia and Lithuania were part of the Soviet Union entirely. The other six countries, i.e. Bosnia and Herzegovina, Croatia, Montenegro, Macedonia, Serbia and Slovenia, were part of the Socialist Federal Republic of Yugoslavia until 1992.

After the fall of the communist bloc, the countries have started their political and economic transition and rapprochement to the West, with varying degrees of success. Even between the 11 countries that have joined the EU, the economic performance differs. The GDP per capita in 2016 varied between 4125 USD in Albania and 21650 USD in Slovenia. The average GDP per capita within the 16 countries was 11525 USD, in comparison the GDP per capita in the whole EU is 32250 USD (World Bank).

In the previous decade, CEE and China started to pay more attention to each other, by increasing the number of official visits, deepening trade relations and creating new platforms for cooperation, which will be examined in the next parts (Song 2017). One of the platforms was the 16+1 framework, which was introduced prior to the OBOR initiative. It is complementary to OBOR, as claimed by Chinese Official it is a "pragmatic formula without political goals, whose main rationale is to bring mutual benefits to all of its participants" (Kowalski 2017). Within this initiative, these states might get a strategic bridge function for Chinese companies to enter the European market by improving the highways and railroads between the countries and important ports. Thus, the CEEC have the outlook to receive generous loans and investment from China (Picciau 2016). In comparison to investment and loans from established institutions, China is not demanding any reformation of the political or

economic system, however, many deals are based on the involvement of Chinese companies or goods. For investment, China provides up to 13bn USD from different Chinese institutions, such as the Chinese Central Bank, China-CEE Investment Fund and the China Export-Import Bank (Konzett et al. 2015). Further investments were made in the ports of Bulgaria and Croatia by Chinese companies, as well as in nuclear plants in Romania. The CEEC region is hoping to become more attractive for further investment (Godement and Stanzel 2015).

The 16 CEEC hope is to reduce their trade deficit with China by increasing its exports to China. This was only a partial success, since only half of the countries could reduce their imbalances with China (Jakobowski 2015).

Liu Zuokui (2016) outlined several reasons for the Chinese interest in CEEC, whereby all of them follow an economic purpose. Besides the geographic position, which could be used as a gateway to the Western European markets, the CEEC could politically support China in its negotiations with the EU about a bilateral investment agreement. This could be used as a foundation for a bilateral free trade agreement, from which the CEEC hopes to benefit. Furthermore, the CEE region is an interesting market itself with an increasing purchasing power and economic wealth, which could become an important destination for Chinese products, before they enter the traditional European markets (Liu 2016).

Chinese researchers claimed that deepening relations between CEE and China are necessary to ensure the success of the OBOR initiative and to strengthen the EU-China relations itself (Vangeli 2015). According to Jakobowski (2015), using the institutions created under the 16+1 framework and OBOR for coordination is “convenient for China” (Jakobowski 2015).

1.3 Food Security Issue

To ensure further understanding of the thesis and the motivation, the food security issue worldwide and in China will be explained in the following part of the literature review. It should help to explain why the agricultural sector is worth an analysis within the OBOR and 16+1 initiative. The food security issue is more present today than one may think, since 10% of the world population suffer from undernourishment. These are mostly concentrated in Asia and in Sub-Saharan Africa, from which a lot are located along the New Silk Road (Bergner et al. 2015).

1.3.1 Global Food Security

A definition for food security was provided on the World Food Summit in 1974, which describes the "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production prices" (FAO 2006). The definition was adjusted at the World Food Summit in 1996 and includes now the situation "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 2006).

Furthermore, food security is defined by four pillars which include availability, access, utilization and stability. Availability is about the sustainable supply of food, ensured by an increased production of food and agricultural development. Access describes on the one hand the physical accessibility of food for household and on the other the availability of income of households to purchase these products. Utilization deals with the efficient and sustainable usage of nutrition, health and sanitary services. Stability aims to ensure a sustainable access and availability of food regarding controlled food price volatility (Bergner et al. 2015).

Determining factors of food security are agricultural growth, infrastructural programmes, population growth, demographic changes and environmental challenges, such as climate change. Thus, the reasons for undernourishment are “poverty, war and civil conflict, internal displacement, unstable markets, food wastage, climate change and a lack of agriculture investment”. Some of the determining factors are of economic and political nature, others however are external and cannot be directly influenced by people (Bergner et al. 2015).

According to Kym Anderson (2016), food insecurity is a consumption issue and it is closely interlinked with the income of the households. Every economic and political initiative that aims to increase trade and the welfare of its population also addresses the issue itself, since international trade is improving the wealth of the nation, therefore it is contra productive to restrict food imports. Anderson states that, if “all countries were open to international trade and investment, it would optimize the use of resources devoted to producing the world’s food, maximize real incomes globally, and minimize fluctuation in international food prices and quantities traded”. Even though food and agricultural trade accounts for only a small share of international trade, its impact on food security is significant. Although trade openness increased since World War II, trade in food commodities is still heavily protected and leads to the result that resources are not used efficiently (Anderson 2016).

For international organizations such as the United Nations Development Programme, World Food Programme, World Health Organization and Agricultural Organization, as well as financial institutions such as the World Bank and International Monetary Fund, the food security issue is an important aspect of their agenda. According to Bergner et al. (2015), more than 65% of all undernourished people worldwide are located along the OBOR initiative. The authors examined the potential role of the OBOR initiative regarding food security governance (Bergner et al. 2015).

1.3.2 Agricultural Situation in China

In the following section, it will be examined why food security is still an important issue for Beijing. One of the most critical essays regarding this topic, "Who will feed China?", was published by Lester Brown in 1994. It is marked by a general negative outlook of China's food situation, which is deeply linked to global food security. He forecasted a huge deficit in food production and argued that no single country or a group of countries will be able to cover this deficit. He concludes by arguing that "food scarcity will become the world's scarcity; its shortages of cropland and water will become the world's shortages. Its failure to check population growth much more aggressively will affect the entire world" (Brown 1994). Even though Brown's essay is highly sceptical, the issue he addresses is still relevant. Over one fifth of the world's population is living in China, however only one tenth of arable land is located there, which makes self-sufficiency very challenging for China.

But also, the progress China made cannot go unnoticed, as Bergner et al. (2015) argue, because China has shown significant success in the reduction of undernourishment in the last century. According to Ghose (2014), several events had a big impact on the agricultural situation in China. The foundation of the new republic in 1949 was the first, and the second being the economic reforms that were introduced in the late 1980s. The latter led to an improvement in agricultural production and increasing productivity and thus, China was able to supply itself with most of the food it needed (Ghose 2014).

Although China has managed to increase its total agricultural output by 4.5 times between 1978 and 2011, it continues to face challenges in self-sufficiency. According to a study by the OECD, China is facing rising food prices, declining food quality, as well as demographic changes. The latter is not only dealing with the ageing of the population, but also of the increasing emigration of young people from rural areas to urban areas in the hope of finding a well-paid job (OECD 2013). According et al. (2015), over 60% of China's population will live in urban areas by 2020, which means that the demand for food will

increase, while the production will decrease. This leads to a higher need for diversifying agricultural import (Bergner et al. 2015).

Another aspect are the socioeconomic changes in the society. The Chinese middle class is growing and becoming wealthier, which leads to a change in preferences towards a western diet focusing on meat and dairy. The rise in meat and dairy consumption goes along with a higher demand for grain, which is needed to produce animal products. While in 1978 7% of grain was used for meat and dairy production, the number increased to 20% in 1990. For each additional kilogram of poultry 2 kg of grain are needed, 4 kg for one additional kilogram of pork and 7 kg for beef (Brown 1994). This would mean that not only the demand for meat is increasing, but also for grain to feed the animals.

Furthermore, environmental changes, such as air pollution and climate change impacts do have a negative effect on the quality of arable land and therefore the total output (OECD 2013). Already in 1994, Brown warned of the destruction of agricultural land and the decrease in quality of land, air and water due to the urbanization and the expansion of infrastructure. Besides that, further environmental problems go along, such as waterlogging and salting, soil erosion, air pollution, global warming and acid rain. To ensure a food production that meets the demand of the population, China must increase the productivity of its croplands (Brown 1994).

This leads to relatively high prices of agricultural products in China, which make them relatively expensive in comparison to imports, which still can ensure a higher quality of products. Several food scandals that happened in China contributed to the reduction of trust in local production and therefore higher attraction of imported products (Jakobowski 2015).

1.3.3 Chances for Central and Eastern European Countries

Consequently, self-sufficiency is an import cornerstone of China's food and agricultural policy, however, it becomes more challenging to achieve it. As Kym Anderson (2016) stated, open trade is crucial to achieve a higher level of food security, because it would lead to a better allocation of resources (Anderson 2016). Thus, China is becoming more open regarding trade and is looking for alternative sources for its food supply. Based on China's Marching West strategy, Zhang Hongzhou commented on China's strategy to diversify its food supply from its Western neighbours, i.e. Central Asia, Russia and Europe. China has signed an Agriculture Cooperation Plan with the EU in 2012, which confirms the cooperation between the EU and China. The EU is one of the leading food exporters worldwide, from which Germany, France and the Netherlands are the most important ones. However, since the foundation of the 16+1 cooperation framework, China's focus is turning towards the CEE (Zhang 2014).

Based on this, new opportunities arise for the CEE to export their agricultural products. According to the OECD forecast, developing countries, Latin America, as well as the CEE, will become the leading suppliers of agricultural products by 2022 (OECD 2013).

Constant flows of high quality food could be ensured from the CEE, such as meat, dairy, infant products, jams, vegetable oil, honey, wine, and grains. The advantages of the CEE agricultural products are that they fulfil the high standards of the EU but are still cheaper than comparable products from Western Europe (Jakobowski 2015).

According to Jie Xie's (2010) analysis, already in 2010, China imported mostly animal products, fruits and other agricultural products from CEE. In 2007, animal products and other agricultural products, accounted for 52% and 32%, respectively, of China's agricultural imports from CEE. Most important exporters were Poland, followed by Romania and Hungary (Jie 2010). Based on the analysis of Yu and Qi (2015), there is a lot of potential

between CEE and China in agricultural trade, which could lead to mutual benefits and win-win results for both parties (Yu and Qi 2015).

China granted access to several hundred agricultural producers from CEE to export their products. This led to a result where the imports from CEE to China tripled within three years. However, the share of agricultural products in the total export volume remains insignificant small (Jakobowski 2015).

In 2013, the total trade volume of agricultural trade between China and the 16 CEE countries was about 1.07 bn USD. Hereby, Poland was the most important exporter with a share of almost 50%, followed by Romania (11.14%), Czechia (7.82%), Lithuania (6.12%) and Bulgaria (4.91%). The other countries accounted each for less than 4%. The non-EU countries of Macedonia, Montenegro and Bosnia and Herzegovina reached less than 1% only. The result of the study was that agricultural trade is highly complementary and opens great potential for products having comparative advantages and intra-industry trade tendencies (Yu and Qi 2015).

The OECD summarizes the current challenges by forecasting that the agricultural imports will continue to grow. “The challenge is clear: feeding China in the context of its rapid economic growth and limited resource constraints is a daunting task with both potential risks and opportunities for global markets” (OECD 2013).

1.3.4 The Role of Agriculture within the OBOR initiative and the 16+1 Framework

The food security issue and the sustainability of agricultural supply was part of the 12th Five-Year Plan for National Economic and Social Development and National Modern Agriculture Development plan. This plan was focusing on safeguarding national grain security, transforming agricultural development, increasing farmer’s standard of living, ensuring high quality of food, and protecting agricultural resources. Furthermore, it is about

strengthening agricultural development and institutional reforms, and increasing political support and protection for agriculture. As well as supporting the opening of the agricultural market and improving the legal system dealing with agriculture (OECD 2013).

In the framework of the OBOR initiative, the Ministry of Agriculture and Rural Affairs of the People's Republic of China (MOA), published a document in May 2017 called "Vision and Action on Jointly Promoting Agricultural Cooperation on the Belt and Road". It is the first specific document of the Chinese government with an explicit focus on agriculture. In the previous Visions and Actions document from 2015, agriculture was only mentioned along other policy fields. However, this document shows that the food issue is of higher importance and that China is realizing its own role in achieving the 2030 Agenda for Sustainable Development goals and the fight against hunger. It is encouraging developed and developing countries to cooperate closer in agricultural matters to achieve agricultural sustainability in the world. By using the OBOR framework in an efficient manner, the initiative could lead to significant contribution in the trade of agricultural products through improved infrastructure, dialogues and cooperation platforms. These would also create the opportunity for a wide range of the world's population, especially the Chinese population, to have a better access to food products, thus, the decrease in undernourishment.

The situation became even more challenging after the financial crisis. Countries became more committed to agriculture and regard it as an important part of their economy. China's aim is to develop a framework where all OBOR countries can work together in agricultural matters. This includes the creation of platforms for exchange, as well as the improvement of infrastructure and financial links, which would offer the countries the ideal conditions to cooperate with each other. Based on this, the trade and investment conditions, as well as the openness of economies, should be improved. China's aim is to develop projects with the countries along the Silk Road to create "new structures of agricultural cooperation with links running eastward and westward over land and sea, which supports the shaping of

the community of shared interests, the community of shared responsibilities, and the community of shared future along the Belt and Road". The cooperation and communication should be improved by building new policy dialogue platforms and using the existing one more efficient. Thereby the focus should not only be on the dialogue between governments, but between important institutions and companies that are involved in the agrobusiness. The MOA claims that with the help of dialogues, conflicts and questions can be addressed faster, which means that progress could be reached more efficiently (MOA 2017).

The FAO expressed that the intention of the OBOR initiative is coherent with the Sustainable Development Goals from 2017 and it was confirmed that the FAO will support the OBOR initiative regarding the agricultural cooperation and improvement. The cooperation will be based on four pillars: health approach for sustainable agriculture and trade, sustainable food production and value chain development, science and technology for agri-food innovation and smart agriculture and communication technologies in the industry. The Director-General of the FAO, José Granziano da Silva emphasizes the importance of agriculture in the OBOR countries and mentions the great opportunity which the OBOR initiative provides. It is an important sector, which accounts for more than 25% of the GDP of the countries involved. In some countries, 40% of the population are employed in the agricultural sector, which makes it crucial for their economy, as well as for the OBOR initiative. Furthermore, he stressed "that agriculture is not only important for generating and promoting sustainable livelihoods, but it is essential for ensuring food and nutrition security, preserving natural resources and biodiversity, and for promoting rural development" (FAO 2017).

In regard to agricultural trade, not only transportation routes must be built to ensure a higher trade volume, but also a closer cooperation on safety of products and common standards in inspection, quarantine and other control measures. Another objective of the OBOR initiative is to encourage higher investment in agriculture by financial institutions

across the OBOR countries, thus “production, processing, storage, transportation and distribution” could become more efficient. This would lead the creation of new and sustainable employment opportunities and higher comparative advantages. Investment should be also used to improve the capacities and quality of the people employed in agriculture, i.e. farmers as well as managers and other talents, by providing a better structured training and vocational education.

In addition to investment in infrastructure, the document emphasizes the importance of creating agro-industrial parks where agricultural enterprises will have a foundation to cooperate, improve the supply chain and reduce costs and risks. The participants are encouraged to share their knowhow, experiences and agricultural technology and science improvements (MOA 2017).

Regarding the 16+1 framework, China and the CEEC agreed on intensifying cooperation in the agricultural sector on the 16+1 summits in Bucharest and Belgrade in 2012 and 2014, respectively. The cooperation includes “food safety regulations, fostering trade in agricultural produce, cooperation in animal breeding and food processing”. The new platforms that were developed since the introduction were the China-CEEC Agrotrade and Economic Cooperation Forum in 2013 and in 2015 the China-CEEC Association for the Promotion of Agricultural Cooperation: platform for information exchange was founded. Additionally, since 2015 agricultural cooperation is an integral part of the OBOR, whereby a multilateral forum for food safety regulations was established. Furthermore, China plans to create a free trade zone in the Bulgarian city of Plovdiv. According to the signed agreement, China aims to invest at least 50 million Euro in new infrastructure (Jakobowski 2015).

The document by the MOA, similar as the Visions and Actions Plan by the NDRC (2015), lists many goals, values and possible actions of the agricultural cooperation along the New Silk Road. However, it does not name any concrete projects that will be implemented. These rather happen on a smaller scale, such as within the 16+1 framework, where it was

agreed from both sides to cooperate closer with each other. The effects of this cooperation are hard to quantify thus far.

1.4 Gravity Model of International Trade

The last part of the Literature Review will deal with the chosen methodology for the following thesis, the Gravity Model of International Trade. The focus of this part will be on the development from an intuitive approach to a micro-founded theoretical model.

1.4.1 Intuitive Gravity Model

The Gravity Model of International Trade was inspired by Newton's gravitation theory, which implies that objects are attracted to each according to their mass and distance (WTO and UNCTAD 2012).

The first mathematical foundation and empirical application of the gravity model of international trade was provided by Tinbergen in 1962. In his basic model, bilateral trade between two countries is positively determined by the economic size of two countries, measured in GDP, and the geographical distance. Therefore, the larger two economies are the bigger is their trade flow, however, the bigger the distance between two countries is the smaller are the trade flows. It is represented in the following equation:

$$(1) \quad \boldsymbol{T_{ij}} = \frac{\boldsymbol{GDP_i^{\alpha} GDP_j^{\beta}}}{\boldsymbol{D_{ij}^{\theta}}}$$

$T_{ij,}$ is the bilateral trade between the two countries i and j, GDP_i and GDP_j represent the economic size of country i and j, respectively, and is measured in GDP, α, β and θ are the parameters. D_{ij} indicates the distance between the two economies, which is not a static concept. It does not only consider the geographic distance in kilometres but is used as a proxy

for transportation cost and time. The economic distance is influenced by further factors, such as the "different legal and economic institutions, different cultures, and different technologies" (van Bergeijk and Brakman 2010).

Anderson and van Wincoop (2003) contributed to the Gravity Model by providing a microeconomic theoretical foundation. Furthermore, they extended the model to offer a more precise result and included dummy variables for common language, common border, a dummy variable for countries that shared the same territory or have a colonial history, for countries that are part of free trade agreement (Anderson and van Wincoop 2003). The Gravity Model is interesting for policy researchers, since it enables them to estimate the impact of trade-related policies on trade. In the beginning of the gravity research, the model was used in an intuitive way. The concrete specification of the model was based on "intuitive ideas as to which variables are likely to influence trade" and not an economic theory.

The basic intuitive Gravity Model in a logarithm form looks as followed:

(2) $$\boldsymbol{logX_{ij} = c + \beta_1 logGDP_i + \beta_2 logGDP_j + \beta_3 log\tau_{ij} + e_{ij}}$$

(3) $$\boldsymbol{log\tau_{ij} = log(distance_{ij})}$$

X_{ij} represents the exports from country i to j, τ_{ij} indicated the geographical distance, i.e. trade costs between country i and j. The term *c* is a constant, e represents an error term and *ß* are the estimated coefficients. The basic assumption hereby is that large economies trade more with each other, while countries that are further away trade less, thus, the coefficient of distance is expected to be negative. A common source for geographical distance is provided by CEPII (Mayer and Zignago 2011).

Obstacles of the presented model are that it is not based on economic framework, which means that the chosen model specification can be incorrect and lead to specification

bias. Furthermore, it excludes changes in trade costs between country j and a third country k, for example through improved infrastructure, decreased trade barriers or participation in a free trade agreement. Based on economic theory, this would affect the trade flows between country i and j, even though i does not benefit from a reduction of trade costs. The following case would not be represented in the intuitive gravity model (Shepherd 2013).

1.4.2 Micro-founded Gravity Model

Although the intuitive model explained up to 80% of the trade flows, it was criticized for having a lack of theoretical foundation. Based on this critique, researchers tried to provide a theoretical foundation for the Gravity Model, which would lead to a better specification of the equation.

The first theoretical foundation was provided by Anderson (1979), Bergstrand (1985) and Helpman and Krugman (1985) (Bergstrand 1989). According to van Bergeijk and Brakman (2010), Anderson (1979) emphasizes the "relationship between trade theory and bilateral trade and includes the supply side of the economy explicitly" (van Bergeijk and Brakman 2010).

Anderson and van Wincoop (2003) provided a theory-based approach for the Gravity Model by including the Multilateral Resistance Terms (MRT) in the gravity equation. The MRT follow the idea that the "bilateral trade between two countries does not only depend on bilateral variables related to these two countries alone, but also on their position relative to the world economy" (van Bergeijk, Brakman 2010). The equation with the multilateral resistance terms looks as followed:

$$(4)\ \boldsymbol{T_{ij}} = \boldsymbol{Y_i E_j} \left(\frac{\boldsymbol{t_{ij}}}{\boldsymbol{\Pi_i P_j}}\right)^{\boldsymbol{1-\sigma}}$$

Which can be also expressed as a log function:

$$(5)\ \boldsymbol{logX_{ij}^k = logY_i^k + logE_j^k - logY_j^k + (1-\sigma_k)\left[log\tau_{ij}^k - log\Pi_i^k - logP_j^k\right]}$$

$$(5.1.)\ \boldsymbol{\Pi_i^k = \sum_{j=1}^{C}\left\{\frac{\tau_{ij}^k}{P_j^k}\right\}^{1-\sigma_k}\frac{E_j^k}{Y^k}} \qquad (5.2)\ \boldsymbol{P_j^k = \sum_{i=1}^{C}\left\{\frac{\tau_{ij}^k}{\Pi_i^k}\right\}^{1-\sigma_k}\frac{Y_i^k}{Y^k}}$$

In the presented equation, E represents the expenditure, Y^k the world GDP, σ_k is the intra-sectoral elasticity of substitution for sector k and Π_i and P_j represent the MRTs. However, in reality, the MRTs are not observable, "because they do not correspond to any price indices collected by national statistical agencies". However, different approaches were developed that help to include these effects (Shepherd 2013).

Anderson and van Wincoop added the assumption of symmetry of trade costs ($t_{ij} = t_{ji}$) to overcome the problem (van Bergeijk and Brakman 2010). The trade cost function $log\tau_{ij}^k$ can be elaborated further and expressed as the following equation, where further dummy variables are added:

$$(6)\ \boldsymbol{log\tau_{ij}^k = \beta_1 \log distance_{ij} + \beta_2 contig + \beta_3 comlan\_off + \beta_4 colony + \beta_5 comcol}$$

The trade costs are dependent on the distance between country i and j, but also on dummy variables which can have the value 1, if it is the case and 0 if it is not the case. Contig is a dummy variable for countries that share a common border, comlan_off is for countries having a common official language, colony describes the colonial relationship between two countries and comcol is a dummy variable for countries that were colonized by the same country.

Another technique is to use fixed effects estimators for importers and exporters. Therefore, dummy variables for all importers and exporters have to be created, where 1 denotes a certain country and 0 is expressing other countries. With the help of this approach, it is possible to have a proxy which that expresses the remoteness of a country and it is possible to see its effects on trade. These dummy variables should be added in the regression model as explanatory variables, whereby one has to consider whether these fulfil the OLS assumptions of consistencies, unbiases and efficiency. The object of interest has to vary bilaterally. Furthermore, to avoid perfect collinearity, one dummy variable must be omitted before computing the estimation (Shepherd 2013).

Bergstrand (1989) provided another theoretical foundation, which is especially used to estimate the bilateral exports for specific sectors. He criticizes other studies for not taking population or the GDP per capita into consideration and presented an attempt to "integrate the gravity equation in the factor-proportions theory of trade" (Bergstrand 1989). This means that he improved the existing microeconomic foundation for the gravity model by including factor-endowment variables following Heckscher-Ohlin, as well as taste variables following Linder.

The equation looks as followed:

$$(7) \quad PX_{ij} = \gamma_0 (Y_i)^{\gamma 1} (Y_i/L_i)^{\gamma 2} (Y_j)^{\gamma 3} (Y_j/L_j)^{\gamma 4} (D_{ij})^{\gamma 5} (A_{ij})^{\gamma 6} e_{ij}$$

PX is the trade flow from country i to country j, Y is the GDP, which can be regarded as a "proxy of i's national output expressed in term of units of capital". L is the population and therefore the Term Y/L represents the GDP per capita, which is a proxy of the capital labour endowment ratio. D represents the distance, A is any other factor, which is resisting or aiding trade between i and j, and e is the error term. Usually coefficients are positive,

especially when the examined good or industry is a luxury good. This means, that it is a capital-intensive production, which elasticity of substitution exceeds unity. As a result, the products are “capital intensive in production and luxuries in consumption”. The more of these assumptions are not fulfilled, the less it will be expected that all coefficients are positive. Since the agricultural sector is a labour intensive non-luxurious good, it can be assumed that not all coefficients will be positive.

According to Bergstrand (1989), Deardorff (1982) provided an approach which was rather weak in the generalization of the Heckscher-Ohlin Theorem. However, he proved that countries rather export the goods where they have the needed factors in abundance. Therefore, the coefficient of the GDP per capita of the reporter country will indicate whether it is a labour or capital-intensive industry. Based on Bergstrand’s calculations, the exporter GDP per capita tends to be positive for the export of food products, which would mean that they are more capital intensive in their production (Bergstrand 1989).

1.4.3 Zero Trade Flows

One major issue of the Gravity Model, which was criticized in literature, is the issue of zero trade flows. Zero trade flows occur for several reasons. First, the trade flow of some country pairs is zero, because they do not trade with each other. Second, the data for a certain period and for some country pairs is not available. This is mostly the case in small and developing countries which have inconsistencies in data collection. Another reason for zero trade flows are rounding errors in presence of very low trade, i.e. if a country pair trades goods of only several hundred USD, it could be rounded to zero. Zero trade flows are not uncommon and comprise a big part of the sample for the gravity model. The problem with the zero-trade issue is that the reason for the zero is not clear. Furthermore, the logarithm of zero is not defined, therefore these observations are automatically omitted. If one is sure, that the

zero-trade is caused by a rounding mistake or is actually zero, one small constant (of 1) can be added to the trade flows, so the logarithm can be defined (Santos Silva and Tenreyro 2006).

In the data set that will be used for the following thesis, zero trade flows comprise more than 48.5% of all observations. It was observed that some countries do not provide any data (i.e. Uzbekistan, Tajikistan and Turkmenistan), thus, they were omitted. Therefore, it is possible that other countries do not report complete trade data.

Certainly, the zero trade flow observations can be dropped from the panel, but as mentioned before they usually comprise of a big part of the data set. Dropping all zero trade flows, as suggested for the OLS model, bears the risk of selection bias. This problem can be handled with the use of the Poisson pseudo-maximum likelihood estimator (PPML), since it includes the zero trade flow observations. The Poisson estimator has several advantages in comparison to the OLS estimator, since it "provides consistent estimates of the original nonlinear model" (WTO, UNCTAD 2012), which means that it is consistent in case fixed effects are present. Another important benefit of the Poisson estimator is that it includes observation where the trade flow is actually zero. Another advantage of the Poisson estimator is that the interpretation of the coefficients is the same as under the OLS model. Furthermore, the Poisson estimator is convincing because it has a higher goodness of fit of the model, which is reflected in a higher R-squared of the model, in comparison to the OLS model (WTO, UNCTAD 2012).

2. Trade in Agricultural Commodities between Central and Eastern Europe and China

The following part will offer a deeper exploration of the CEE-China trade relations. The goal is to provide a descriptive overview of the development of the agricultural trade between CEE and China with the data from the UN Comtrade database. Following that, the Revealed Comparative Advantages (RCA) and the Trade Complementarity Index (TCI) will be described and calculated. The last part of this section provides a deeper analysis of the trade between China and two CEE countries, namely Poland and Serbia.

2.1. Descriptive Analysis of Trade between the CEEC and China

For the analysis of trade statistics, the United Nations provide a clear definition of commodities with the help of the Standard International Trade Classification (SITC, Rev. 4). Agricultural products are defined as the SITC sections 0 (Food and Live Animals), 1 (Beverages and Tobacco), 2 (Crude Materials, inedible, except fuels) 4 (Animal and Vegetable Oils, Fats and Waxes) but without the divisions 27 and 28. Food products are defined as section 0, 1, 4, and division 22.

However, in the following thesis the analysis will be based only on the SITC section 0, Food and Live Animals and its ten two-digits divisions. The section consists of the division 00 - live animals other than animals of division 03, 01 – meat and meat preparations, 02 – dairy products and birds' eggs, 03 - fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates and preparations thereof, 04 - cereals and cereal preparations, 05 - vegetables and fruit, 06- sugars, sugar preparations and honey, 07- coffee, tea, cocoa, spices, and manufactures thereof, 08 - feeding stuff for animals, 09 - miscellaneous edible products and preparations (WTO 2017).

2.1.1 Development of Trade in Food Products between the CEEC and China

The data for the following analysis was taken from the UN Comtrade Database. The goal is to analyse the trade flows of SITC section 0, Food and Live Animals, between the 16 CEE countries and China in the period 2007-2016. Hereby the 16 CEE countries will be regarded as one entity.

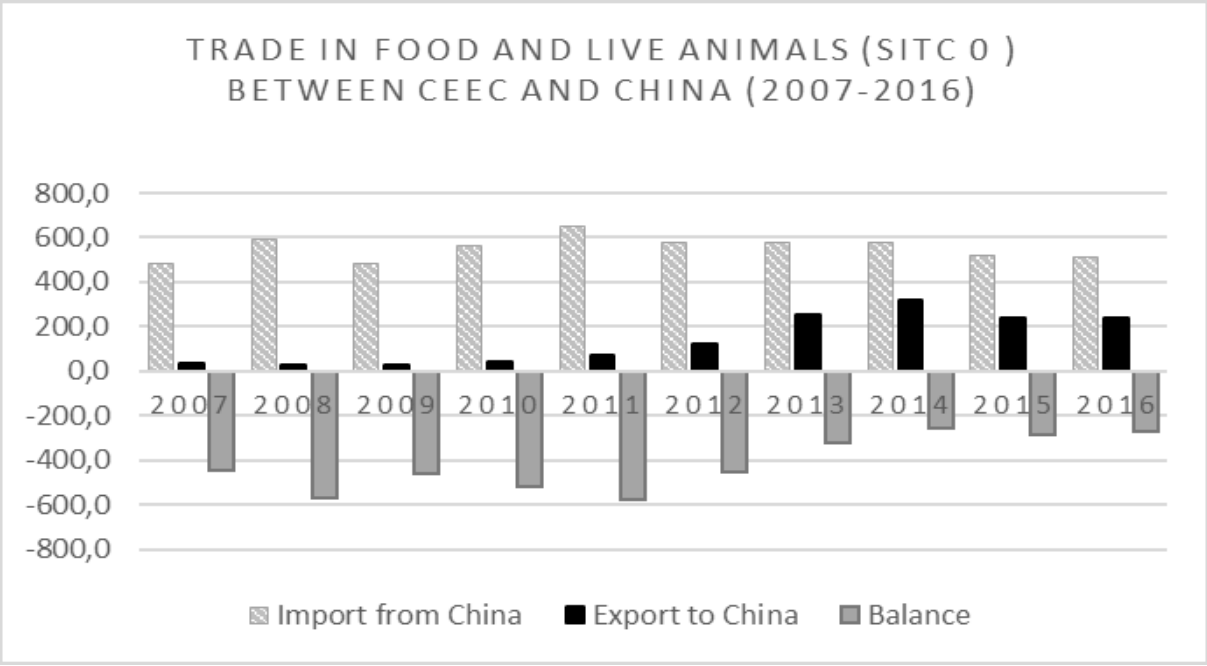

Figure 1: ***Trade in Food and Live Animals (SITC-0) between CEE and China (2007-2016) in million euro.***
Source: UN COMTRADE

The trade relations between CEE and China in Food and Live Animals is marked by high trade deficits for CEE. The absolute and relative trade deficit decreased in the examined period. It reached its peak, in absolute and relative terms, during the financial crisis in 2008. Thereby, CEE exported only 5% (29 million USD) of what exported from China (595 million USD). The deficit decreased in the following year slightly, before it reached another peak in 2011 with 579 million USD. In relative terms, CEE exported 10% of the value of what it imported from China. Following that, the exports from CEE almost doubled from 2011 to 2012 (70 to 126 million USD) and doubled another time from 2012 to 2013 (up to 256 million

USD). After a small increase in 2014 (316 million USD), the exports fell slightly to approximately 240 million USD in 2015 and 2016. From 2013 on CEE exported between 45-55% of the value it imported from China in Food and Live Animals. In the period from 2007 to 2016, the exports rose by six times. In comparison to CEE's rapid growth in exports, imports from China stayed constant ranging between 480 million USD in 2007 to 648 million USD in 2011.

All in all, it observable that the trade deficit is decreasing steadily especially since 2013, which is also one year after the introduction of the 16+1 framework and the year the OBOR initiative was first mentioned. In part 3.3. it will be analysed with the help of the gravity model whether the 16+1 framework has a positive effect on exports.

2.1.2 Trade in Food Commodities between China and each CEE country

In the following section, a further analysis will be provided about the trade of Food and Live Animals. The most important trading partner for China in the region is Poland with a total trade value of 354 million USD (export: 105 million USD; import: 250 million USD). Poland is followed by Czech Republic (total trade value: 103 million USD), Hungary (83 million USD) and Romania (44 million USD), whereby Hungary is the only country with a trade surplus of 56 million USD. Furthermore, it is observable that the South-East European countries, i.e. Albania, Montenegro, Bosnia and Herzegovina, Serbia and Macedonia, have a very high relative trade deficit. In relative numbers it is ranging from 100% in Albania to 77% in Macedonia. The lowest trade deficit is observable in the Baltic countries, i.e. Latvia, Estonia and Lithuania, ranging from 3% in Latvia to 43% in Lithuania, as well as in Hungary, Romania and Poland. Croatia, Bulgaria, Slovenia and the Czech Republic are in the middle range, which means that they export around 70% of what they import from China.

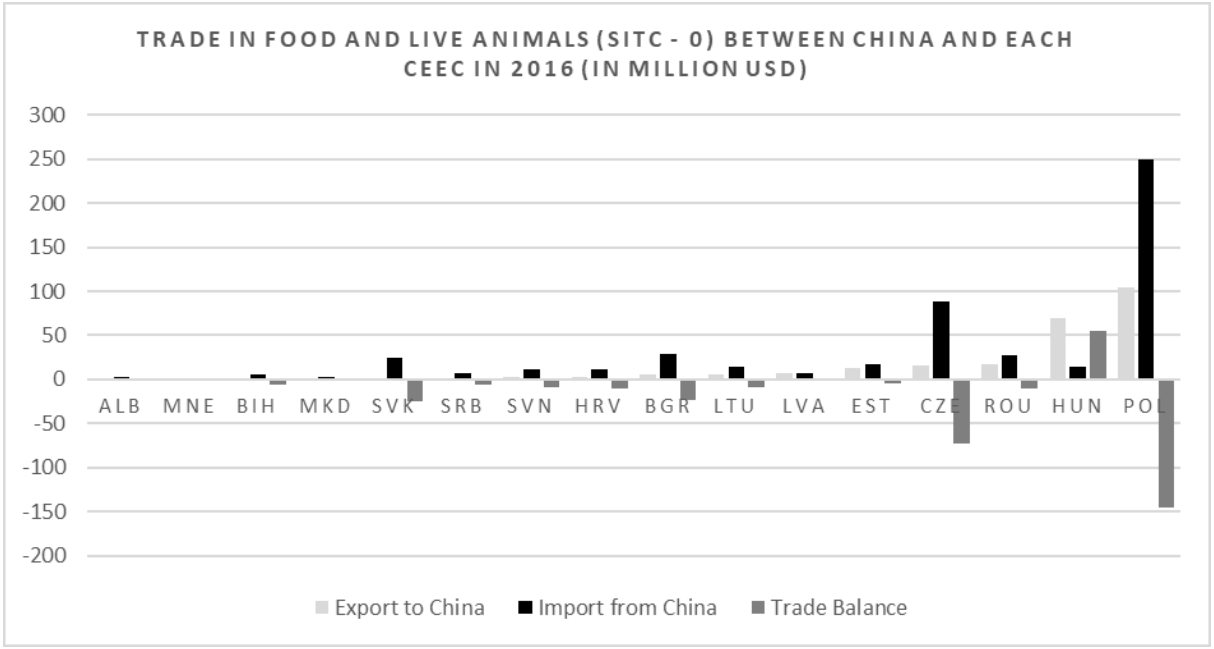

Figure 2*: Trade in Food and Live Animals between CEE and China in 2016 in million euro*
Source: UN COMTRADE

2.1.3 Structure of the traded Food Commodities

In the following section, the structure of the trade in Food and Live Animals will be examined in more detail. Hereby the 16 CEE countries are taken as one entity again. It should give an overview of what China is importing from the region, as well as what CEE is importing from China.

There are four commodity groups which have a surplus with China, and one can assume also a comparative advantage (which will be calculated in part 2.2.1.). These are meat and meat preparations, dairy products and bird's eggs, live animals and cereals and cereal preparations. The CEEC have a significant trade surplus in meat and meat preparations with 112 million USD. The biggest trade deficit is in vegetables and fruit and in fish, crustaceans, mollusc etc. (161 and 139 million USD, respectively).

Division	Export to China in Million USD	Import from China in Million USD	Trade Balance in Million USD
01: meat and meat preparations	115,59	2,78	112,82
02: dairy products and birds' eggs	37,57	0,04	37,53
00: live animals other than animals of division 03	5,72	0,10	5,61
04: cereals and cereal preparations	7,07	4,54	2,53
06: sugars, sugar preparations and honey	8,87	26,81	-17,94
09: miscellaneous edible products and prep.	15,02	39,83	-24,81
08: feeding stuff for animals	2,88	41,57	-38,68
07: coffee, tea, cocoa, spices etc.	6,80	54,54	-47,74
03: fish (not marine mammals), crustaceans etc.	7,51	146,63	-139,12
05: vegetables and fruit	35,21	196,26	-161,05
total	**242,25**	**513,10**	**-270,85**

Table 1: 1 ***Most traded food commodities in 2016***
Source: UN COMTRADE

2.2 Trade Analysis

2.2.1 Revealed Comparative Advantages

2.2.1.1 Theoretical Foundation of the Revealed Comparative Advantages

In the previous part, the development of agricultural trade between China and CEE was analysed, as well as the most traded commodity groups. Hereby, it is relevant to analyse the trade pattern in more detail with the help of comparative advantage. Balassa (1965), introduced the revealed comparative advantages (RCA), which is used for measuring the comparative advantages. A country has a comparative advantage when it has lower opportunity costs in producing a certain good than another country. It is considering the "ratio of product k's share in country i's exports to its share in world trade" and is represented in the following formula:

$$(8)\ \boldsymbol{RCA_k^i} = \frac{\boldsymbol{X_k^i / X^i}}{\boldsymbol{X_k / X}}$$

X_k^i is the country i's exports for good k, X^i is the sum of total exports ($X^i = \sum_k X_k^i$), X_k is the world exports of good k ($X_k = \sum_i X_k^i$) and X are world's total exports ($X = \sum_i \sum_k X_k^i$). If the RCA>1, it means that one sector k of country i has a revealed comparative advantage in the sector.

After calculating the RCA, it is suggested to calculate the normalized revealed comparative advantage index (NRCA), since the RCA is asymmetric. This means that it is "unbounded for those sectors with a revealed comparative advantage, but it has a zero-lower bound for those sectors with a comparative disadvantage". The formula for the NRCA is as followed:

$$(9)\ \boldsymbol{NRCA_k^i} = \frac{\boldsymbol{RCA_k^i - 1}}{\boldsymbol{RCA_k^i + 1}}$$

In comparison to the RCA, the critical value is now 0 with symmetric lower (-1) and upper (+1) bounds (WTO and UNCTAD 2012). Based on economic theory, international trade is the most beneficial when countries specialize and use the comparative advantages they have. Generally, economies that are lightly populated and rich in arable land are expected to have higher comparative advantages in agriculture than vice versa (Anderson (2016).

2.2.1.2 Results

Based on this theoretical underpinning, the RCA and NRCA of China and CEE in the SITC-0 category Food and Live Animals, as well as in its nine subcategories, will be calculated. To see if the comparative advantages changed in the last decade, the calculation was performed for the years 2006 and 2016. Hereby, we take up the first hypothesis, which was stated in the introduction: *The CEEC have revealed comparative advantages in the agricultural sector in comparison with China.*

After computing the RCA and NRCA, the results for the whole SITC-0 section are presented in the following Table 2 (see Appendix 1 for the RCA and NRCA for each SITC-0 division).

In 2016, 12 out of 17 countries had comparative advantages in the export of “Food and live animals”, whereby Serbia has the biggest comparative advantage (RCA: 2.30; NRCA: 0.39), followed by Lithuania, Latvia and Croatia. Slovenia, Czech Republic, Slovakia and China have a comparative disadvantage, whereby China’s is the biggest (RCA: 0.44; NRCA: -0.38).

Country	NRCA 2006	NRCA 2016
SRB	0.5471	0.3943
LTU	0.4134	0.3741
LVA	0.3095	0.3358
HRV	0.3085	0.2607
BGR	0.0810	0.2578
POL	0.2640	0.2459
MNE	-0.2787	0.1318
EST	0.0749	0.0883
ALB	-0.0604	0.0704
MKD	0.2427	0.0531
BIH	-0.1056	0.0401
ROU	-0.3785	0.0053
HUN	0.0139	-0.0179
SVN	-0.3059	-0.1495
CZE	-0.2630	-0.2944
SVK	-0.1276	-0.3251
CHN	-0.2926	-0.3846

Table 2: NRCA for all 16+1 Countries in 2006 and 2016
Source: UN COMTRADE, own calculation

By taking a closer look at the comparative advantages of the divisions of SITC-0 *food and live animals*, it is visible that the biggest comparative advantages in CEE are in the following product groups: cereals and cereal preparations (Bulgaria: RCA: 5.61; NRCA: 0.70), live animals (Romania: RCA: 5.00 NRCA: 0.66), sugary and sugar preparations (Croatia, RCA: 4.56; NRCA: 6.40), dairy products (Latvia: 3.95; 0.60), meat and meat preparations (Montenegro: 3.82; 0.58).

The CEEC has the biggest comparative disadvantages in sea food (fish, crustaceans), which is because many countries in CEE are landlocked. On the other hand, China has its only comparative advantage in seafood (1.14; 0.06). Its biggest disadvantages are in dairy products, cereals and meat, which are the products in which CEEC have the highest comparative advantages. In the next part it will be tested whether the trade in food products is complimentary between CEE and China.

Within one decade, the comparative advantages of the 17 countries have changed. In 2006, Serbia had the highest comparative advantages in the region (RCA: 3.4, 0.57), followed by Lithuania and Latvia. It is noticeable that Serbia had very high comparative advantages in sugar and sugar preparation (10.51, 0.82). In total nine out of 17 countries have comparative advantages and eight have disadvantages, from which the highest are in China (0.55, 0.29), Slovenia (0.53. -0.31) and Romania (0.45; 0.38).

Highest comparative advantages were noticeable in the following product groups: sugar, sugar preparations and honey; cereals and cereals preparations; dairy products and bird eggs and live animals. Similar as in 2016, China has a comparative advantage in sea food (1.40; 0.17), while many CEEC have high comparative disadvantages in it. China had its highest comparative disadvantages in cereal (0.24, -0.62), animal feed stuff (0.20, -0.67) and dairy products and bird eggs (0.04, -0.91).

Following this analysis, the hypothesis which was stated in the beginning of this part can be proven. One can see that the majority of CEEC have a comparative advantage in the export of food and live animals in comparison to China. Which means that the opportunity costs for CEEC to produce food products are lower than for China, and therefore they have an advantage, while China has an advantage in another sector. In fact, China's NRCA even decreased from -0.29 in 2006 to -0.38 in 2016. In CEE, 12 of 16 countries have a comparative advantage, only Hungary, Slovenia, Czech Republic and Slovakia have a comparative disadvantage in 2016. In the comparison to 2006, the number of countries that have a positive NRCA increased from nine (Montenegro, Albania, Bosnia and Herzegovina and Romania got comparative advantages). Only Hungary showed a slightly negative development from 0.01 to -0.02. However, the calculation of the NRCA proofs that most of the CEEC have a comparative advantage in the food and live animals in comparison to China and consequently they can be a potential source for food imports.

2.2.2 Trade Complementarity Index

2.2.2.1 Theoretical Foundation of the Trade Complementarity Index

To measure to what extent countries are „natural trading partners, the trade complementarity index (TCI) was introduced. The aim of the TCI is to show "the adequacy of j's export supply to i's import demand by calculating the extent to which i's total imports match j's total exports" (WTO, UNCTAD 2012).

The index was developed by Kojima Kiyoshi and later improved by Peter Drysdale in 1967 and used by Chuanmin Shuai and Xi Wang (2011) to analyse the agricultural trade between China and the US. Following equation will be used to calculate the TCI between country i and j, i.e. between China and the CEEC:

$$C_{ij}^{k} = RCA_{xi}^{k} \times RCA_{mj}^{k} \tag{10}$$

$$RCA_{xi}^{k} = \left(X_i^k / X_i\right) / \left(X_w^k / X_w\right) \tag{11}$$

$$RCA_{mj}^{k} = \left(M_j^k / M_j\right) / \left(X_w^k / X_w\right) \tag{12}$$

C_{ij}^{k} is the complementarity index between country i and j for a commodity k. If $C_{ij}^{k} > 1$, it means that trade complementarity between i and j exists in good k. On the other hand, when C_{ij}^{k} is smaller than one, it shows that the complementarity between the two countries in a certain good is low. RCA_{xi}^{k} is the revealed comparative advantage index as described in the previous part. The higher the index the higher the comparative advantages of the country. Similar to that the RCA_{mj}^{k} takes into consideration the country's import value of good k (M_j^k) and the total import value of country j (M_j) (Shuai and Wang 2011). In the above-mentioned equations, i would be China and j the CEEC. It means, when j is CEEC, the trade complementarity of China's exports is measured.

2.2.2.1 Results of the TCI Calculation

In the following, the TCI was calculated for China and CEEC for year 2006 and 2016. The two time periods should indicate possible changes in the trade structure (see appendix 2).

Trade complementarity of China's exports to CEEC's demand

In 2006, 34 out of 160 commodities that China exported were complementary to CEEC's demand. The highest TCI was in the export of fish products to Bosnia and Herzegovina (9.10), Poland (8.13) and Latvia (5.91). Other commodities with a high TCI were vegetables and fruits and miscellaneous edible products.

Similar in 2016, China had the highest TCI in fish and crustaceans (TCI: 2.64 with Lithuania). Although the products which were complimentary to CEE's demand became more diversified, there were only 14 out of 160 commodities with a positive TCI. Besides vegetables and fruit and miscellaneous edible products, the TCI increased in the trade of live animals with Montenegro (1.95) and in sugar commodities (1.33 with Bosnia and Herzegovina).

Trade complementarity of CEE's exports to China's demand

In 2006, 12 out of 160 commodities from CEE were complementary with China's demand. The most complementary commodities came from Serbia (Sugar, TCI=3.32; Cereals, TCI=1.14), Lithuania (Animal Feed Stuff, Fish and Dairy products), Croatia (Sugar, Fish, Misc. edible products), but also from Albania, Latvia and Hungary.

In 2016, the number of commodities from CEE which were complimentary with China's demand increased to 27 of 160. From which the highest TCI was reached by Montenegro's meat and meat preparations (TCI=2.91), but also with Cereals from Bulgaria (2.53), Latvia (2.28), Serbia (2.20), Romania (1.86) and Lithuania (1.61). Other products were dairy products and other misc. edible products.

2.3 Trade Analysis on the Example for Poland and Serbia

Following the trade analysis of the CEEC, a more detailed analysis will be provided for two countries, namely for Poland and Serbia. The two countries were chosen because of the high importance of agriculture in their trade structure. Of all CEEC, Serbia have the highest share of food exports and Poland exports the highest absolute value of food and live animals.

In the last years, China became a more interesting economic partner for Poland, which goes along with Poland's aim to diversify its trading partners. Szczudlik (2016) refers to Mao Yinhui (2016) and according to him, the Polish foreign policy is mostly driven by the debt crisis in the EU, migration crisis and the unstable situation in its neighbouring country Ukraine. However, the EU member states are still the most important trading partner for Poland, but trade with these depends on the economic stability of the EU (Szczudlik 2016).

Poland's agricultural sector benefited from accession to the EU and especially from agricultural subsidies, which led to a tripling of Polish incomes in ten years after accession. Jerzy Wilkin, an economics professor at Warsaw University called it a "Golden age of Polish farming". The former agriculture minister Stanislaw Kalemba stated that "agriculture is one of the main pillars of the economy" (The Economist 2014).

Another important market for agricultural goods, besides the EU, was Russia. However, since Russia imposed sanctions on the import of western agricultural goods, another important and reliable market disappeared. To diversify its trading partners, Poland is increasingly engaging with different countries in Asia and especially China. As Szczudlik (2016) outlines, Poland sees itself as a big European economy, that aims to deepen its relations with another big economy, which is China, and therefore strengthen its position within the EU. There are several problems present in connection with the trade with China,

such as the very high trade deficit, which Poland aims to decrease by increasing its exports to China, or issues in getting trade certificates for food and agricultural goods (Szczudlik 2016).

A further issue that affected Poland is that China imposed bans or certain products, such as pork and poultry. The latter was banned due to an epidemic flu in the end of 2016, however, it was lifted in 2018 again (Adamowski 2018). For China, Chinese analysts see potential for Poland to become a major partner in the EU. The current relations are mostly limited to trade (Kaczmarski and Jakobowski 2015).

Serbia has a key role within the 16+1 platform by having a comprehensive strategic partnership with China and due to its geographical location and good historic ties. It is the first European country that has a visa-free entry regime for China. In addition, Serbia is a loyal partner, supporting China's position on critical issues, such as the South China Sea, market economy status and human right. The Sino-Serbian relations were even more strengthened following the global financial crisis, after which Serbia was looking for ways to diversify its economy.

Dragan Pavlicevic (2016), refers to Gao (2016), who states that Chinese investors have good opportunities in different fields such as infrastructure, energy, tourism and agriculture. In January 2017, a memorandum of understanding (MoU) in agriculture was signed between Serbia and China with the goal to increase investment in the agricultural sector in Serbia. With the help of MoU, exports of raw materials, especially meat and dairy, from Serbia to China should increase (Bjelotomic 2017). The Chinese Minister of Agriculture, Han Changfu, states that imports from Serbia are welcome in China due to its quality and safety (Xinhua 2017).

However, there are several risks that must be considered regarding the trade with Serbia, which China is aware of, such as that the domestic laws and standards are less strict and clear than in the EU. Furthermore, part of Serbian society is suspicious of China's engagement in Serbia and believe that their only goal is to make money. Pavlicevic (2016)

refers to Zhu (2016), who examines further issues, such as “high fiscal deficits, foreign debt and public debt levels”, as well as “unstable market, low investment returns, and no corresponding guarantees, all of which hinder Chinese enterprises’ activity in the Serbian economy” (Pavlicevic 2016). In Serbia, agricultural exports account for approximately 15% of its total exports to the world. The share of agriculture to China varies between 1% in 2009 and 9% in 2010 (2.4% in 2016). However, the total exports of Serbia to China increased every year by 27% (see figure 3).

Poland is the biggest economy and the biggest agricultural producer in CEE. It is exporting agricultural products to the world worth approximately 20 billion USD, which accounts for 11% of its total exports. Regarding the trade with China, 5% (0.1bn USD) of goods that Poland exported to China in 2016 were agricultural goods. There is a decline observable, because in 2014 and 2013, the share of agricultural goods in exports to China accounted for approximately 9% (0.2bn USD). The exports grew more than two-fold in 2012, which is also the year of the introduction of the 16+1 framework.

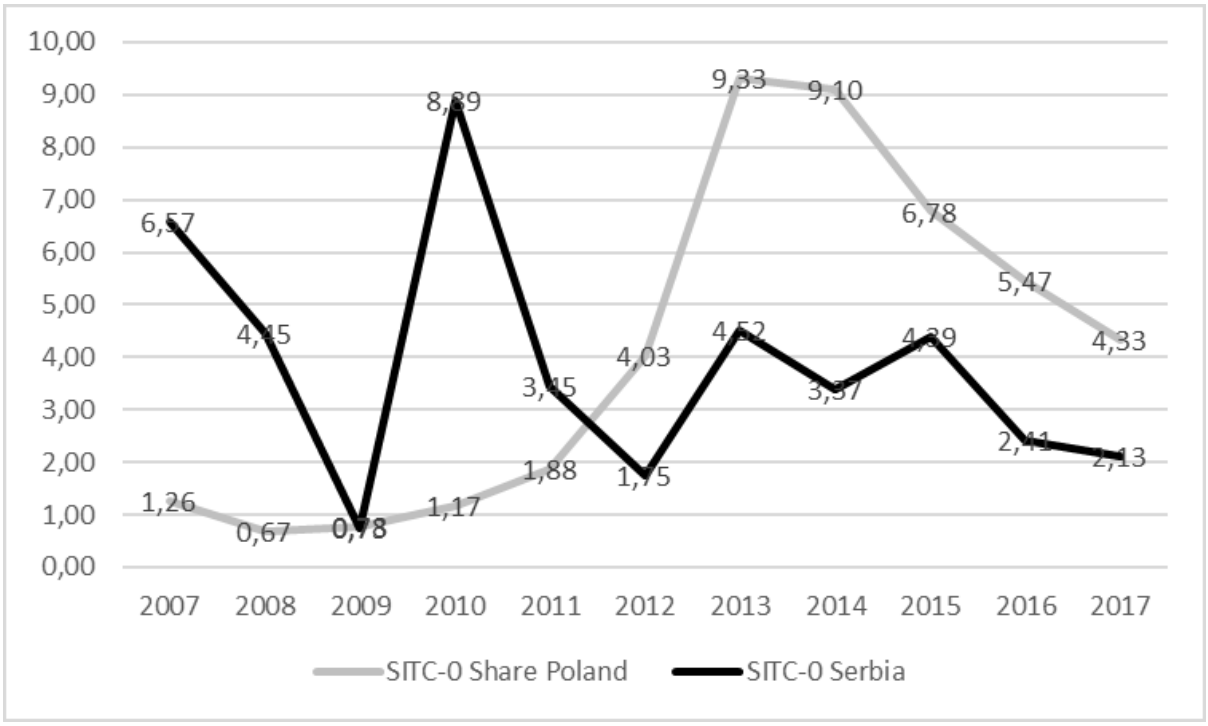

Figure 3: S*ITC-0 share of total exports from Serbia and Poland to China (2007-2017)*
Source: UN COMTRADE

In 2016, Serbia exported food and live animals worth 0.6 million USD, from which 75% consisted of vegetables and fruits, followed by meat and meat preparations (15%) and feeding stuff for animals (4%). Exports of SITC-0 accounted for 2.4% of all Serbian exports to China. In 2009, the year with the highest share of agricultural exports, Vegetables and fruits accounted for 93% of all agricultural exports, followed by feeding stuff for animals (4.5%).

In 2016, Poland exported food and live animals to China worth 104 million USD. From Which the share of dairy products and birds' eggs was the highest with 34%, followed by meat and meat preparations (32%), Miscellaneous edible products (10%), sugars, sugar preparations and honey (6%) and vegetable and fruit (6%). It gets visible, that Poland's exports to China are more diversified than Serbia, where most of the agricultural exports consist of Vegetables and fruits.

In the following part, a deeper analysis will be made based on the RCA and TCI, which were calculated before. For the whole SITC-0 classification, Serbia's NRCA is about 0.39, which means that they have a comparative advantage in the export of food and live animals. The product groups cereals and cereal preparations have the highest NRCA with 0.66, followed by vegetables and fruits (0.57) and sugar preparations (0.55). In fish (-0.80), meat and meat preparations (-0.17) and coffee, tea, cocoa and spices (-0.01) Serbia has comparative disadvantage. Even though Serbia has a comparative disadvantage in meat and meat perpetrations it is still its second biggest export product group within the SITC-0 classification. The TCI for Serbian exports to China shows that, cereals and cereal preparations (2.20), vegetable and fruits (1.35), misc. edible products (1.29), sugar (1.17) and animal feed stuff (1.15) are very complimentary with the Chinese demand. On the other side, Chinese agricultural exports to Serbia indicate TCI's below 1, which means that the complementarity between China's agricultural exports and Serbian demand is very low.

Poland's average NRCA for the SITC-0 classification is lower with 0.25, however it is still positive and means that Poland have a comparative advantage worldwide. It has the highest NRCA for meat and meat preparations (0.51), followed by dairy products and birds eggs (0.36). These are also the product groups in which Poland's exports are the most complementary with Chinese demand. The TCI for meat and meat preparations is 2.37 and for dairy products its 0.99. In regard of imports from China, the import of fish products indicates the highest TCI (1.52). Poland has a comparative disadvantage in live animals (-0.23) and animal feed stuff (-0.06).

3. Methodology and Estimation

In the following chapter, the methodology of the following thesis will be explained. It will be mostly based on the gravity model, which was introduced in the literature review. First, the specification of the mode, the estimator and the dataset will be explained. Second, the estimations will be computed and analysed. Based on the best estimator, the trade potential will be calculated in the last part. This section has the aim to test the second and third hypothesis:

- The membership of both countries in the 16+1 framework has a significant positive effect on agricultural trade.
- The actual agricultural trade between CEEC and China is below the potential trade, therefore there are opportunities to increase trade.

3.1 Model Specification

In the literature review section *1.4. Gravity Model of International Trade,* the intuitive and the micro-founded Gravity Model were presented. Anderson and van Wincoop and Bergstrand did major contributions in the theoretical Gravity Model research and thus, their concepts will be picked up in the following part. Anderson and van Wincoop's (2003) major contribution was the inclusion of the MRT in the gravity equation, as well as a more detailed elaboration of the trade costs. Bergstrand's (1989) provided a theoretical foundation based on the Hecker-Ohlin Theorem to include factor-endowment variables, such as the GDP per capita, which is a proxy for the capital-labour endowment ratio. A positive coefficient of GDP per capita of the exporter indicates that the product group is rather capital intensive in their production. His approach is especially useful to estimate the trade in certain product groups (which is the case for SITC-0 trade in his estimations).

Based on this and the part 1.4.2, the following specification is derived, and the Table 3 below represents all variables that will be used for the gravity equation:

(13)

$$\log X_{ij} = c + \beta_1 \log GDP\_R + \beta_2 \log GDP\_P + \beta_3 \log GDPcapitaR + \beta_4 \log GDPcapitaP + \beta_5 \log Dist + \beta_6 Colony + \beta_7 Comcol + \beta_8 Comlang_{ethno} + \beta_9 Contig + \beta_{10} landlocked_{partner} + \beta_{11} ceecchina + \varepsilon$$

Variable	Explanation	Source
X	Agricultural export from reporter country i to partner country j	UN Comtrade in the SITC-0 category
GDPcapitaP	GDP per capita of the partner country	World Bank Database
GDPcapitaR	GDP per capita of the reporter country	World Bank Database
GDP_P	GDP of partner country	World Bank Database
GDP_R	GDP of reporter country	World Bank Database
Dist	Distance between country i and country j. Measured by using the great circle formula.	CEPII Geodist database
Colony	Dummy variable takes the value of 1 if there was any colonial relationship between reporter and partner. It is 0 otherwise	CEPII Geodist database
Comcol	Dummy variable takes the value of 1 if there	
Comlang_ethno	Dummy variable takes the value of 1 when at least 9% of the population in both countries speak the same language. It is 0 otherwise	CEPII Geodist database
Contig	Dummy variable for contiguity, which takes the value of 1 if the country pair shares a common border. It is 0 if otherwise.	CEPII Geodist database
Landlocked_partner	Dummy variable, which takes the value of 1 if the partner country is landlocked. It is 0 if otherwise.	CEPII Geodist database
ceecchina	Dummy variable, which takes the value of 1 if the partner country is part of the 16+1 framework. 0 Otherwise	
Xplus1	Export of SITC-0 from i to j, whereby the value of 1 was added	UN Comtrade in the SITC-0 category
Xin1000	Export of SITC-from i to j divided by 1000.	UN Comtrade in the SITC-0 category

Table 3: ***Variables of the Gravity Model***

3.2 Dataset and Estimation Methodology

For the following gravity model an asymmetrical panel (125 x 128) in the period 2006-2016 will be used. The reporter and partner countries are comprised from countries that are part of the 16+1 framework and OBOR initiative, but also other major economies from all

continents, that are not part of any initiative (see Appendix 3). These deserve to be in the panel, since they have an important impact on the global economy, such as the United States and Japan. The dataset was organized in Excel and it will be estimated with the freeware software Gretl. To proceed with the estimation, several approaches will be used.

According to Peter Egger (2002), the conclusion of an estimation should not be based only on simple OLS estimation[2], since it has a high risk of an inconsistent result. Especially if the data varies over time, he rather suggests using the Random Effects Model (REM) or the Fixed Effect Model (FEM), which are more consistent. To test whether to proceed with Random Effects Model (REM) or the Fixed Effect Model (FEM), the Hausman test can be used. Based on this, the corresponding estimator will be used. Furthermore, a comparison will be made between a model, where all observations with zero trade will be omitted and another one, where a small constant of one will be added to all exports and thus, the logarithms of all exports can be generated. The advantage of the FEM is that it is "always consistent in the absence of endogeneity of errors in variable" (Egger 2002).

Another estimation will be computed with the Poisson model, which has the advantage that all observations can be included, since the dependent variable is used in its linear form i.e. zero trade flows can be included. Another benefit of the Poisson estimator is that in can be used in the presence of heteroskedasticity. However, the share of zero trade flows is relatively high (48.5%).

[2] The OLS estimation will be neglected in the following thesis, due to insignificant results.

3.3 Estimation Results and Analysis

Before proceeding to the estimation results, several tests are computed with the Gretl software, that will indicate what test to use. The first two tests, the joint significance of differing group means and the Breusch-Pagan test, have the null hypothesis that the pooled OLS estimator is adequate. Since the p-value is zero in both cases, the null hypothesis must be rejected in favour of the REM and FEM. To decide whether to use the REM or the FEM, the Hausman test was computed. The null hypothesis is that the random effects model is consistent. Since the p-value is close to the zero, the null hypothesis can be rejected. Therefore, the FEM will be estimated in the next step (see table 4).

Joint significance of differing group means:
F(11737, 76626) = 29.4145 with p-value 0

Breusch-Pagan test statistic:
LM = 167015 with p-value = prob(chi-square(1) > 167015) = 0

Hausman test statistic:
H = 513.222 with p-value = prob(chi-square(5) > 513.222) = 1.11721e-108

Distance and the other dummies, except for ceecchina, were omitted due to exact collinearity. Furthermore, time dummies were added to the following model. A Wald joint test on time dummies was performed which tests the null hypothesis that there are no time effects. Since the p-value is very low, the null hypothesis can be rejected, which means that time effects exist which supports the use of time dummies.

Fixed-effects, using 89069 observations
Included 11838 cross-sectional units
Time-series length: minimum 1, maximum 11
Dependent variable: l_X

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	5.51485	2.16161	2.551	0.0107	**
l_gdp_R	−0.919123	0.101909	−9.019	<0.0001	***
l_gdpcapitaP	−0.231947	0.0906726	−2.558	0.0105	**
l_gdpcapitaR	1.09358	0.109215	10.01	<0.0001	***
l_gdp_P	0.961960	0.0849459	11.32	<0.0001	***
ceecchina	0.147138	0.0481501	3.056	0.0022	***
dt_2	0.0937081	0.0230522	4.065	<0.0001	***
dt_3	0.132564	0.0235112	5.638	<0.0001	***
dt_4	0.151614	0.0216735	6.995	<0.0001	***
dt_5	0.215335	0.0231851	9.288	<0.0001	***
dt_6	0.337135	0.0261990	12.87	<0.0001	***
dt_7	0.359601	0.0268022	13.42	<0.0001	***
dt_8	0.444839	0.0282264	15.76	<0.0001	***
dt_9	0.511544	0.0290981	17.58	<0.0001	***
dt_10	0.528391	0.0271185	19.48	<0.0001	***
dt_11	0.544515	0.0277790	19.60	<0.0001	***

Mean dependent var	14.54681	S.D. dependent var	3.443183
Sum squared resid	108142.7	S.E. of regression	1.183436
LSDV R-squared	0.897587	Within R-squared	0.073147
LSDV F(11852, 77216)	57.10012	P-value(F)	0.000000
Log-likelihood	−135024.9	Akaike criterion	293755.8
Schwarz criterion	405140.5	Hannan-Quinn	327735.2
rho	0.234098	Durbin-Watson	1.242111

Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(10) = 656.551
with p-value = 1.32409e-134

Table 4: ***Regression result of the Fixed Effects Model, Gretl***

The estimation results show that all chosen variables are significant. The dummy variable for both countries being part of the 16+1 framework is positive with a coefficient of 0.147. Which means, that when a country is a member of 16+1, the exports increase by 14.7%.

The coefficient of the GDP per capita of the partner and the GDP of the reporter are significant but surprisingly negative. The GDP per capita of the reporter and the GDP of the partner have positive coefficients. The increase of the GDP of the reporter by 1% leads to a decrease of Exports by -0.92%. On the other hand, the increase of the GDP of the partner by 1% leads to increase of exports by 0.96%, but when the GDP per capita of the partner increases by 1%, the exports decrease by -0.23%. The increase of the GDP per capita of the reporter by 1% has a positive effect on the exports by adding 1.10%. According to Bergstrand (1989), a positive GDP per capita of the reporter indicates that the exported goods are capital-intensive in their production. The results of the FEM are coherent with Bergstrand's estimation result. Based on this estimation, one can conclude that bigger countries (high GDP), but with a low GDP per capita tend to export less food products and import more. On the other hand, small and relatively rich countries tend to export more, especially to bigger countries with a low per capita income. The overall model seems to have high explanatory power with a high R-squared, which describes 90% of all observations.

Besides the presented FEM with 89069 observations, another FEM was estimated for 170489 observations, in which a small constant of one was added to the exports. However, by computing the FEM, the results were less significant and had a lower explanatory power than the FEM with omitted zero trade (see Appendix 4).

The next step is to estimate the Poisson model (see table 5), which was previously described. Since zero trade is not omitted, 170489 observations are included. The dependent variable is Xin1000, because some error occurred in the Gretl software when using the regular exports, that's why the variable X was divided by 1000. The overall model has a lower

explanatory power than the FEM with a R-squared of 0.79. Similar as the previous estimator, all variables are significant on the highest level. One can see, that the coefficients of the GDP of the reporter and partner, as well as the GDP per capita of the partner are positive. The coefficient of GDP per capita of the reporter is negative. Based on these observations, one can say that bigger countries (high GDP) with a lower GDP per capita tend to export more agricultural goods.

As expected, the coefficient of distance is negative, which means that an increase in distance by 1% leads to a decrease of the exports by 0.0062 units. The dummy variables landlockedpartner, colony, comcolony and ceecchina are negative as well. Based on this result, a country i will export less to a country j which is landlocked and has some colonial ties with it. Based on this model, also countries that are part of the 16+1 framework tend to trade less by 0.18 units.

Poisson, using 170489 observations
Dependent variable: Xin1000

	Coefficient	*Std. Error*	*z*	*p-value*	
const	−18.3336	0.000277229	−6.613e+004	<0.0001	***
l_gdp_R	0.677009	7.07721e-06	9.566e+004	<0.0001	***
l_gdpcapitaP	0.0699114	1.18357e-05	5907.	<0.0001	***
l_gdpcapitaR	−0.0566052	1.13189e-05	−5001.	<0.0001	***
l_gdp_P	0.612208	7.54881e-06	8.110e+004	<0.0001	***
ceecchina	−0.186444	0.000115950	−1608.	<0.0001	***
Colony	−0.00198559	4.64851e-05	−42.71	<0.0001	***
Comcol	−0.0316972	7.88819e-05	−401.8	<0.0001	***
ComlangEthno	0.315480	2.86511e-05	1.101e+004	<0.0001	***
Contig	1.03636	3.42315e-05	3.028e+004	<0.0001	***
Landlockedpartner	−0.501485	4.53971e-05	−1.105e+004	<0.0001	***
l_Dist	−0.624869	1.28122e-05	−4.877e+004	<0.0001	***

Mean dependent var	48910.56	S.D. dependent var	422425.0
Sum squared resid	1.37e+16	S.E. of regression	283260.9
McFadden R-squared	0.780941	Adjusted R-squared	0.780941
Log-likelihood	−6.16e+09	Akaike criterion	1.23e+10
Schwarz criterion	1.23e+10	Hannan-Quinn	1.23e+10

Table 5: ***Regression Results of the Poisson Model, Gretl***

Following the estimations, the second hypothesis will be discussed now: *the membership of both countries in the 16+1 framework has a significant positive effect on agricultural trade*.

In both estimations, the dummy variable for country pairs being a member in the 16+1 framework was significant at the 1%-level. However, the coefficients of ceecchina differed in both estimations. In the FEM ceecchina had a positive coefficient of 0.147 and would increase the agricultural exports by 14.7%. In the Poisson estimation, the coefficient of ceecchina is negative with −0.186. The dependent variable Xin1000 and ceecchina have a level-level relation, which means that the exports would decrease by -0.18 units. Since the dependent variable is 1000, it means that if a country pair is part of the 16+1 initiative, the agricultural exports decrease by 186 USD. Therefore, the effect of both countries being a member in the 16+1 framework is significant, however, it depends on the estimator whether it is positive or not. The estimation results of the FEM are considered to have a higher explanatory power, since the result is coherent with Bergstrand's (1989) estimation results for food products, which had a positive GDP per capita of the reporter as well and that indicate that small but rich countries tend to export more. Furthermore, it was suggested by the Hausman Test to use the FEM. Based on this estimator, the hypothesis can be proven, since the effect of a country being in the 16+1 framework is significant and positive with a coefficient of 0.147.

3.4 Trade Potential

In the following, the export potential of the CEEC and China will be estimated, based on the FEM estimation results in table 4, using 89069 observations and time dummies. The comparison between different estimators, shows that it is the most acceptable and describes the model the best. It will be done by comparing the predicted exports and the actual exports. Since the 16+1 countries were included in the regression, it will be an in-sample-trade

potential estimator. The goal of this part is to test the third hypothesis: *the actual agricultural trade between CEEC and China is below the potential trade, therefore there are opportunities to increase trade*.

Armstrong (2007) defines trade potential as "maximum possible trade that can be achieved" and "it can be used as an estimate of what trade would be in the hypothetical case of most frictionless and free trade possible under present circumstances observed throughout the world" (Armstrong 2007).

Peter Egger (2002) states in his paper 'An Econometric View on the Estimation of Gravity Models and the Calculation of Trade Potentials' that the choice of the right estimator is crucial "for the interpretation of the gravity coefficients". His focus was on panel estimators, which are also relevant for the following thesis. Regarding the calculation of trade potentials, Egger is criticising that researchers often focus only on the residuals but not on the parameters. For predicting trade potentials, it is important to use an econometric set-up. To calculate the trade potential, he used the actual-to-potential trade ratio, which will be used in the following calculation (Egger 2002).

The actual-to-potential trade ratio (APR) is calculated by dividing the actual trade (AT) by the predicted trade (PT). To show the percentage difference between AT and PT, the trade potential TP will be calculated. De Benedictis and Vicarelli (2004) suggest calculating the normalized actual-to-potential trade ratio (NAPR):

(14) $APR = \frac{AT}{PT}$ (15) $TP = 1 - APR$ (16) $NAPR = \frac{APR - 1}{APR + 1}$

The NAPR can have any value between +1 and -1, whereby a positive value indicates that the actual trade is above the predicted trade and a negative NAPR shows that the potential trade is higher than the actual trade, which means that a trade potential exists.

Over the years, the out-of-sample and the in-sample trade potential estimator were developed as the two mainly used strategies to calculate the trade potential. The first one, the out-of-sample trade potential estimator, excludes the object of interest from estimation of the gravity model (i.e. to calculate the trade potential for CEEC with China, but exclude CEEC from the model). After estimating the regression, the coefficients are applied to estimate the potential trade relations between the EU and the new member state. In comparison to the out-of-sample trade potential estimator, the object of interest is included in the regression of the in-sample trade potential estimator (Benedictis and Vicarelli 2004).

Table 6 represent the results of the NAPR and TP for the food exports of CEEC to China (second and third column) and the potential for the food exports of China to CEEC (fourth and fifth column). The indices were computed by the average actual export and average potential export in the period 2014 to 2016.

CEEC	NAPR for CEEC's exports to China	TP for CEEC's export to China	NAPR for China's export to CEEC	TP for China's export to CEEC
BIH	-0.5115	0.6114	0.0732	-0.1613
LTU	-0.274	0.3782	-0.1659	0.2831
EST	-0.1395	0.2448	-0.2111	0.3472
CZE	-0.0849	0.1481	-0.1091	0.1967
SRB	-0.049	0.0657	-0.2553	0.4030
MNE	2.36E-06	-4.73E-06	-0.2132	0.3407
LVA	0.0578	-0.1235	-0.1418	0.2305
POL	0.2778	-0.8767	-0.1308	0.2311
BGR	0.304	-2.3130	-0.201	0.3308
HRV	0.3661	-3.8311	-0.1577	0.2723
SVK	0.4826	-2.2700	-0.1804	0.3046
MKD	0.5711	-4.0754	-0.4329	0.5664
SVN	0.5842	-2.9040	0.0533	-0.1357
HUN	0.6037	-4.2375	-0.098	0.1770
ROU	0.7404	-8.3011	-0.293	0.4516
ALB	-	-	-0.1737	0.2937

Table 6: ***Trade Potential Results for CEEC's Export of food products to China and vice versa***

One can see that five countries of the CEE have a negative NAPR, namely Bosnia and Herzegovina (-0.51), Lithuania (-0.27), Estonia (-0.14), Czech Republic (-0.08) and Serbia (-0.05). This means, that Bosnia and Herzegovina has the potential to increase its exports to China by 61.1%, while Serbia has the potential to increase it by 6.5%. Montenegro has a value close to zero, which means that the potential value is very close to the actual value. However, the exports of Montenegro to China were only reported once in the three years period. Albania did not report any SITC-0 exports to China between 2014 and 2016. The agricultural exports of the other nine countries already exceed the potential trade, which is shown by the positive NAPR and negative TP. This ranges between Latvia, where the actual trade is already 12% higher than the potential trade, and Romania, where the actual agricultural exports to China are 8 times higher than predicted.

The next column shows the trade potential for China in the CEE region. In total, China's potential export exceed the actual exports in 14 of the 16 countries. One can see, that China has the biggest trade potential in FYROM where potential trade exceeds the actual trade by 56.6%, followed by Romania and Serbia with a trade potential of 45.2% and 40.3%, respectively. On the other side, the actual trade is already higher than the potential trade in two CEEC. The actual exports to Bosnia and Herzegovina exceed the potential one by 16.1%, followed by Slovenia with 13.6%.

In conclusion and based on the calculations of the trade potential the third hypothesis cannot be proven completely. In the case of China, it is visible, that the Chinese agricultural exports are still below the calculated trade potential in 14 of 16 countries. It can be explained that, China is producing a lot of food products, but a big part of it is used for domestic consumption and not for the export. It is questionable whether China is going to use the whole potential and increase its exports to CEEC, especially since it is facing issues in self-sufficiency and is dependent on the import of food products. However, the hypothesis is true in China's case.

Since the 16 CEEC countries are very heterogeneous in their trade structure, geographical location, economic and political system, it is reasonable to expect that not all CEEC have potential to increase their food exports to China. Only five countries' actual exports are below the trade potential and therefore they could increase it, also with the help of deeper cooperation within the 16+1 framework. Thus, the hypothesis is true in the case of Bosnia and Herzegovina, Lithuania, Estonia, Czech Republic and Serbia. The food export of the other eleven countries exceed the trade potential already, which means that they are already exporting more to China than the value which was predicted.

Conclusion

The goal of the thesis was to analyse the following two questions: can the Chinese-led 16+1 cooperation framework with CEEC create new opportunities for the trade in food products between CEEC and China, and will CEEC become a potential new source for China in regard of securing the food issue by increasing imports from CEEC? Based on these questions, three hypotheses were stated and tested with the help of different methodologic approaches:

1. CEEC have revealed comparative advantages in the agricultural sector in comparison with China.
2. The membership of both countries in the 16+1 framework has a significant positive effect on agricultural trade.
3. The actual agricultural trade between CEEC and China is below the potential trade, therefore there are opportunities to increase trade.

To analyse the above stated questions and hypotheses, a detailed literature review was provided, which involved an overview of the OBOR initiative and the 16+1 cooperation framework and the development of the relations between China and CEEC. Furthermore, the food security issue was addressed, which was necessary to explain the motivation of choosing the agricultural sector as the object of interest in the following thesis. For several decades, food security is an important issue for China. It is facing a decrease in the quality and the size of arable land and changes in the socio-economic and demographic aspects of the population. The Chinese middle class is growing and is getting wealthier, which means that they are not only consuming more food but also their dietary preferences change towards a meat and dairy dominated diet. The consequence is that China is not able to be self-sufficient in the food

production and is dependent on imports from other countries. It was stated that free trade is helpful to overcome the food security issue.

The role of agriculture within the 16+1 framework and OBOR was examined and increasingly the food security issue is getting more attention. The Chinese MOA published a paper addressing agricultural challenges and opportunities within the OBOR initiative and it was repeatedly emphasized by Chinese and CEEC officials that the agricultural cooperation should be improved, however, it lacks concrete actions. Even though the trade in agricultural products between China and CEEC is relatively small in comparison with other sectors and other countries, it increased within the last decade. With the help of the RCA index, it was shown that many CEE countries have comparative advantages in comparison to China in the whole SITC-0 sector Food and Live Animals. China on the other hand, has a comparative disadvantage in almost every division, expect for fish products. With the calculation of the TCI, it was shown that the Chinese demand and the CEEC supply, and vice versa, are complementary in many cases. While the overall complementarity of China's exports decreases (2006 in comparison to 2016), it increased for CEEC exports. This can be associated with the shift in demand in China and changing dietary preferences, because an increasing complementarity was identified for meat and dairy products, as well as cereals. By looking at the average supply of SITC-0 from CEEC to China in 2016, Serbia and Lithuania had a positive TCI for Food and Live Animals, which means that the exports of these countries are especially complementary with China.

Following the calculation of the TCI, one can say that the importance of CEEC's products is increasing and is becoming more complementary with the Chinese demand, which can be based on the changing dietary preferences. It was shown that especially meat and dairy exports, as well as cereal exports are highly demanded and thus, new opportunities for trade in agricultural products between CEEC and China are plausible. The TCI and the RCA indicate that the role of CEEC is getting more important in the agricultural trade with China.

The last part of the thesis comprised the methodological section and the application of the Gravity Model of International Trade. To estimate the Gravity Model, the Poisson estimator and the FEM were chosen, whereby the latter one showed more acceptable results. The FEM described almost 90% of all observations and the main findings of the model were that the membership in the 16+1 cooperation framework has a positive and significant effect on the agricultural exports by increasing those by 14.7% since 2012. Thus, the second hypothesis is true and has indeed a positive effect on the trade in food products.

Further findings are that bigger but poorer countries, i.e. high GDP and low GDP per capita, tend to export less food products and import more. This means, that small and relatively rich countries, i.e. low GDP and high GDP per capita, tend to export more food products to big countries with a relatively low GDP per capita (i.e. China). Based on the estimation, the increase of the GDP of the reporter by 1% leads to a decrease of exports by -0.92% and the increase of the GDP of the partner by 1% leads to increase of exports by 0.96%. The 1% increase of GDP per capita of the reporter and reporter lead to a change of exports by 1.10% and -0.23%, respectively. According to Bergstrand (1989) approach, a positive GDP per capita of the reporter indicates that the exported goods are capital-intensive.

In the next step, the trade potentials were calculated with the regression results generated by the FEM and based on an actual-to-potential trade ratio in-sample trade potential approach. The average trade potential was calculated for the years 2014-2016. The result was that China did not exceed its trade potential in only two countries, namely Slovenia and Bosnia and Herzegovina. In the other 14 CEE countries, China is already exporting more than predicted.

On the other side, only five CEE countries did not exceed their potential trade. Bosnia and Herzegovina is over 61% below its potential trade, followed by Lithuania, Estonia, Czech Republic and Serbia. These five countries still can increase their trade to China. The other countries are already exporting more to China than predicted by the gravity model. Which

shows that the CEEC are already exporting more than expected. Therefore, the third hypothesis, that the trade between CEEC and China is below the potential, is only partly true. It is true for China and five CEE countries. Since many the remaining eleven countries are above the potential, it means that they are already an important source for China. However, the other five countries are still having the opportunity to increase their exports to China. It is questionable, whether China is going to use its full potential and export more to the CEEC.

In conclusion, it was shown that the role of food products is becoming more important in the trade between CEEC and China. Not only the exports from CEEC to China are increasing, even though there is still a significant trade deficit, they also become more complimentary in their trade structure and get higher comparative advantages. CEEC can become an important partner for China to diversify its food imports and to decrease its overall dependence on particular countries. In fact, the agricultural sector it is getting more attention within the framework and the OBOR initiative and 16+1 cooperation framework. China aims to improve the cooperation and the trade in agriculture between the participating countries. However, it does not mean that China is going to export more food products. Instead it will rather export other goods, where it has higher comparative advantages, and import food products from other countries. Indeed, these countries could be a part of the CEEC, where a majority is exporting more than its potential.

Nevertheless, it is questionable, in how far the changes in the trade statics, the results of TCI, RCA and the estimation results of the gravity model, can be derived from the introduction of the 16+1 cooperation framework directly. In further research, it can be analysed what concrete projects, actions and agreements led to an increase in agricultural trade in general and regarding the 16+1 framework and OBOR initiative.

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List of appendices

Appendices

Appendix 1: Revealed Comparative Advantages and Normalized Revealed Comparative advantages for CEEC and China in the SITC-0 category (Food and live animals) and its ten two-digit divisions (2006 and 2016)

Source: UN Comtrade, own calculation

		2006		2016	
Country	**Good**	**RCA**	**NRCA**	**RCA**	**NRCA**
BGR	CEREALS,CEREAL PREPRTNS.	3.19888258	0.5236828	5.61130403	0.69748782
LVA	CEREALS,CEREAL PREPRTNS.	1.94429548	0.32072035	5.07168966	0.6706024
ROU	LIVE ANIMALS	4.94808071	0.66375708	4.99594917	0.66644147
SRB	CEREALS,CEREAL PREPRTNS.	6.72086773	0.74096176	4.89324736	0.66062853
HRV	SUGAR,SUGR.PREPTNS,HONEY	8.11731457	0.78063716	4.56846637	0.64083468
LTU	DAIRY PRODUCTS,BIRD EGGS	6.6271804	0.7377799	4.3299531	0.62476218
ROU	CEREALS,CEREAL PREPRTNS.	0.99526494	-0.00237315	4.13143961	0.61024583
HRV	LIVE ANIMALS	0.3551452	-0.47585661	4.03299681	0.60262244
LVA	DAIRY PRODUCTS,BIRD EGGS	5.30742189	0.68291324	3.95055795	0.59600513
MNE	MEAT, MEAT PREPARATIONS	0.62674591	-0.2294483	3.8239899	0.58540543
ALB	FISH,CRUSTACEANS,MOLLUSC	4.58894936	0.64215099	3.81101704	0.58428748
SRB	VEGETABLES AND FRUIT	4.78286739	0.65415081	3.61863555	0.56697168
LTU	CEREALS,CEREAL PREPRTNS.	1.80817063	0.28779257	3.5864336	0.56393133
SRB	SUGAR,SUGR.PREPTNS,HONEY	10.5155048	0.82632112	3.47059943	0.5526327
HRV	MISC.EDIBLE PRODUCTS ETC	4.8831056	0.6600435	3.3449486	0.53969536
LVA	LIVE ANIMALS	0.8255264	-0.0955744	3.31810597	0.53683397
POL	MEAT, MEAT PREPARATIONS	2.44079622	0.41873919	3.11399224	0.51385421
EST	COFFEE,TEA,COCOA,SPICES	3.01146636	0.5014292	2.7997395	0.47364813
LTU	FISH,CRUSTACEANS,MOLLUSC	2.2181354	0.37852211	2.77675486	0.47044485
HUN	LIVE ANIMALS	2.21724967	0.37835101	2.69695286	0.45901393
LTU	LIVE ANIMALS	3.09327632	0.51139385	2.69515292	0.45875041
MKD	VEGETABLES AND FRUIT	4.28296722	0.62142487	2.65888401	0.45338524
SVN	LIVE ANIMALS	1.16177584	0.0748347	2.56239295	0.43857962
SVN	ANIMAL FEED STUFF	1.46508748	0.18866977	2.48297331	0.42577797
BIH	SUGAR,SUGR.PREPTNS,HONEY	2.00616843	0.33470128	2.42669508	0.41634725
ALB	VEGETABLES AND FRUIT	0.64112819	-0.21867385	2.40032613	0.41182112
EST	DAIRY PRODUCTS,BIRD EGGS	3.09015307	0.51102074	2.39045101	0.41010798
SRB	Food and live animals	3.41645181	0.54714778	2.30208598	0.39432225
MNE	CEREALS,CEREAL PREPRTNS.	0.61885546	-0.23544075	2.29288359	0.39262961
SRB	ANIMAL FEED STUFF	1.51271905	0.20404949	2.26864779	0.38812618
SVK	LIVE ANIMALS	2.12777581	0.36056798	2.24128581	0.38296092
LTU	Food and live animals	2.40968761	0.413436	2.19540028	0.37410032
LTU	ANIMAL FEED STUFF	4.44307622	0.63256072	2.15591528	0.36626943
POL	DAIRY PRODUCTS,BIRD EGGS	2.69753605	0.45909926	2.13787358	0.36262569
HRV	CEREALS,CEREAL PREPRTNS.	1.27484268	0.12081832	2.11643439	0.35824094
SRB	LIVE ANIMALS	0.2910489	-0.549128	2.09077882	0.3529139
POL	COFFEE,TEA,COCOA,SPICES	1.47645457	0.19239383	2.04979496	0.34421821
LVA	Food and live animals	1.89625299	0.30945259	2.01105064	0.33578002
EST	LIVE ANIMALS	1.20853966	0.09442423	2.00610964	0.33468827
LVA	FISH,CRUSTACEANS,MOLLUSC	4.03033981	0.60241255	1.98200293	0.32930985
POL	MISC.EDIBLE PRODUCTS ETC	1.65589335	0.24695771	1.89988686	0.31031792
CZE	LIVE ANIMALS	1.43844992	0.17980682	1.87412789	0.30413674
HUN	ANIMAL FEED STUFF	1.73502949	0.26874646	1.87113657	0.30341175
SRB	MISC.EDIBLE PRODUCTS ETC	3.32788647	0.53788067	1.85245127	0.29884867
HRV	COFFEE,TEA,COCOA,SPICES	3.78912239	0.58238695	1.83670103	0.29495566
BGR	ANIMAL FEED STUFF	0.95635244	-0.02231069	1.82234442	0.29136927
EST	MISC.EDIBLE PRODUCTS ETC	0.86154098	-0.07437871	1.7680771	0.27747677
BGR	COFFEE,TEA,COCOA,SPICES	0.52065496	-0.31522275	1.75605818	0.27432591
BIH	CEREALS,CEREAL PREPRTNS.	0.80717122	-0.106702	1.71993065	0.26468714

HRV	FISH,CRUSTACEANS,MOLLUSC	2.35106767	0.40317529	1.70675688	0.26110837
HRV	Food and live animals	1.89244592	0.30854368	1.70518975	0.26068033
BGR	Food and live animals	1.17620624	0.08096946	1.6946275	0.25778238
BGR	SUGAR,SUGR.PREPTNS,HONEY	1.05186043	0.02527483	1.66370764	0.24916685
POL	Food and live animals	1.71744601	0.26401482	1.65217962	0.24590326
LTU	SUGAR,SUGR.PREPTNS,HONEY	1.67110368	0.25124584	1.6452906	0.2439394
MKD	CEREALS,CEREAL PREPRTNS.	1.25296987	0.11228285	1.64349291	0.24342525
LTU	COFFEE,TEA,COCOA,SPICES	1.74580823	0.27161701	1.63277406	0.24034499
LVA	ANIMAL FEED STUFF	1.63096278	0.23982201	1.63237329	0.24022934
POL	CEREALS,CEREAL PREPRTNS.	1.06832697	0.0330349	1.62829353	0.23904999
HUN	MEAT, MEAT PREPARATIONS	1.61701013	0.2357691	1.56810254	0.2212149
HUN	CEREALS,CEREAL PREPRTNS.	1.74924984	0.27252883	1.53551155	0.21120454
BIH	MEAT, MEAT PREPARATIONS	0.3453689	-0.48658112	1.49960316	0.19987299
MNE	VEGETABLES AND FRUIT	1.25640709	0.11363512	1.49451885	0.19824218
HRV	ANIMAL FEED STUFF	1.07374008	0.03555898	1.46752111	0.18946995
LTU	VEGETABLES AND FRUIT	2.13107858	0.36124248	1.44812836	0.18304937
EST	CEREALS,CEREAL PREPRTNS.	0.53910799	-0.29945398	1.44225059	0.18108321
BIH	DAIRY PRODUCTS,BIRD EGGS	1.45402661	0.18501291	1.42620739	0.17566816
BGR	LIVE ANIMALS	1.46566202	0.18885882	1.36253628	0.15345216
LTU	MEAT, MEAT PREPARATIONS	1.36718714	0.15511538	1.30700914	0.13307669
MNE	Food and live animals	0.56407598	-0.27871026	1.30369316	0.13182882
EST	FISH,CRUSTACEANS,MOLLUSC	2.21557174	0.37802663	1.30169209	0.13107404
LTU	MISC.EDIBLE PRODUCTS ETC	1.18277097	0.08373346	1.29680729	0.12922603
SVN	DAIRY PRODUCTS,BIRD EGGS	1.28578202	0.12502593	1.29130944	0.12713666
BGR	DAIRY PRODUCTS,BIRD EGGS	0.89256619	-0.05676621	1.26668598	0.11765458
LVA	COFFEE,TEA,COCOA,SPICES	1.22739501	0.10209011	1.26595517	0.11737001
HRV	MEAT, MEAT PREPARATIONS	0.72143809	-0.1618193	1.26416898	0.1166737
SRB	DAIRY PRODUCTS,BIRD EGGS	1.6082781	0.2332106	1.25994082	0.11502107
POL	SUGAR,SUGR.PREPTNS,HONEY	1.77444356	0.27913473	1.21848262	0.09848291
HRV	DAIRY PRODUCTS,BIRD EGGS	0.99943363	-0.00028326	1.21614308	0.0975312
EST	Food and live animals	1.16189488	0.07488564	1.19362228	0.08826601
BIH	VEGETABLES AND FRUIT	1.08221026	0.03948221	1.18249383	0.08361711
ALB	Food and live animals	0.88606462	-0.06040905	1.15136367	0.07035708
CHN	FISH,CRUSTACEANS,MOLLUSC	1.40341897	0.16785212	1.14167428	0.06615118
POL	VEGETABLES AND FRUIT	1.85780728	0.30016275	1.1396748	0.06527852
POL	FISH,CRUSTACEANS,MOLLUSC	1.07399506	0.03567755	1.13321354	0.06244735
HUN	SUGAR,SUGR.PREPTNS,HONEY	1.25549962	0.1132785	1.12983444	0.06095987
MKD	Food and live animals	1.64112907	0.2427481	1.11214893	0.05309708
BIH	Food and live animals	0.80893891	-0.10562053	1.0834687	0.04006237
BGR	MEAT, MEAT PREPARATIONS	1.24644412	0.1097041	1.05646558	0.02745759
LVA	VEGETABLES AND FRUIT	0.65073595	-0.21158081	1.04674257	0.02283754
SVK	COFFEE,TEA,COCOA,SPICES	0.98467849	-0.00771989	1.04142747	0.02029338
ROU	Food and live animals	0.45084113	-0.37851068	1.01069593	0.00531952
LVA	MISC.EDIBLE PRODUCTS ETC	1.06098188	0.02958875	1.00381295	0.00190285
CZE	DAIRY PRODUCTS,BIRD EGGS	1.38542184	0.16157387	0.98546297	-0.0073217
SVK	SUGAR,SUGR.PREPTNS,HONEY	2.0828832	0.35125664	0.98407516	-0.0080263
SRB	COFFEE,TEA,COCOA,SPICES	2.21299764	0.37752833	0.98084533	-0.0096699
HUN	Food and live animals	1.0281852	0.01389676	0.96476146	-0.0179353
LVA	MEAT, MEAT PREPARATIONS	0.86427637	-0.07280231	0.94293029	-0.029373
MNE	COFFEE,TEA,COCOA,SPICES	0.2377716	-0.61580699	0.91641006	-0.043618
HUN	DAIRY PRODUCTS,BIRD EGGS	0.63876508	-0.22043118	0.88620106	-0.0603324
POL	ANIMAL FEED STUFF	0.83504979	-0.08988868	0.88493962	-0.0610419
CZE	CEREALS,CEREAL PREPRTNS.	0.74653769	-0.14512272	0.87636863	-0.0658886
SVN	MISC.EDIBLE PRODUCTS ETC	0.78070969	-0.12314771	0.86638739	-0.0715889
SVK	CEREALS,CEREAL PREPRTNS.	1.31865639	0.13743149	0.86347727	-0.0732624
HUN	MISC.EDIBLE PRODUCTS ETC	0.59157944	-0.25661337	0.85852842	-0.0761202
BGR	VEGETABLES AND FRUIT	1.06509865	0.03152327	0.82366525	-0.0966925
MKD	MISC.EDIBLE PRODUCTS ETC	1.654229	0.24648551	0.81813755	-0.1000268
CZE	SUGAR,SUGR.PREPTNS,HONEY	1.2846923	0.1246086	0.81435887	-0.1023178
CZE	COFFEE,TEA,COCOA,SPICES	0.60330084	-0.24742653	0.80047908	-0.1108155
SVK	DAIRY PRODUCTS,BIRD EGGS	1.4360556	0.17900068	0.77921488	-0.1240913
CHN	VEGETABLES AND FRUIT	0.86309425	-0.073483	0.7544733	-0.1399433
ROU	ANIMAL FEED STUFF	0.22693578	-0.63007716	0.74236059	-0.147868
SVN	Food and live animals	0.53152288	-0.30588973	0.73992429	-0.1494753
CZE	ANIMAL FEED STUFF	0.51662474	-0.31871778	0.73211474	-0.1546579

ROU	MEAT, MEAT PREPARATIONS	0.21545428	-0.64547531	0.72173488	-0.161619
EST	MEAT, MEAT PREPARATIONS	0.64366926	-0.21678981	0.71550332	-0.1658386
BGR	MISC.EDIBLE PRODUCTS ETC	0.64546054	-0.21546519	0.70872627	-0.1704625
SRB	MEAT, MEAT PREPARATIONS	1.80022891	0.28577268	0.70733584	-0.1714157
SVN	MEAT, MEAT PREPARATIONS	0.79916616	-0.11162607	0.70322684	-0.1742417
BIH	COFFEE,TEA,COCOA,SPICES	0.65892792	-0.20559789	0.69703924	-0.1785231
MKD	SUGAR,SUGR.PREPTNS,HONEY	0.94232393	-0.02969436	0.67967066	-0.1907096
SVN	VEGETABLES AND FRUIT	0.25383818	-0.59510217	0.64096038	-0.2187985
MKD	MEAT, MEAT PREPARATIONS	1.20578282	0.09329242	0.63797695	-0.2210184
CZE	MISC.EDIBLE PRODUCTS ETC	0.96526104	-0.01767651	0.63233575	-0.2252381
POL	LIVE ANIMALS	3.23122251	0.52732337	0.62223303	-0.2328685
ROU	MISC.EDIBLE PRODUCTS ETC	0.21934875	-0.64021983	0.61249128	-0.2403168
HUN	VEGETABLES AND FRUIT	0.89212596	-0.05701208	0.60069512	-0.2494572
ROU	SUGAR,SUGR.PREPTNS,HONEY	0.5854983	-0.26143308	0.59308184	-0.2554283
SVK	MISC.EDIBLE PRODUCTS ETC	0.85948813	-0.07556481	0.55390474	-0.2870802
HRV	VEGETABLES AND FRUIT	0.35395107	-0.47715825	0.55133782	-0.2892099
LVA	SUGAR,SUGR.PREPTNS,HONEY	1.57702436	0.2239111	0.5455771	-0.294015
CZE	Food and live animals	0.58349282	-0.26303067	0.54506125	-0.2944471
MKD	COFFEE,TEA,COCOA,SPICES	0.99067656	-0.00468355	0.53447297	-0.3033791
SVK	Food and live animals	0.77366501	-0.12760865	0.50926841	-0.3251453
MKD	DAIRY PRODUCTS,BIRD EGGS	0.61838869	-0.23579707	0.50319086	-0.330503
HUN	COFFEE,TEA,COCOA,SPICES	0.65538497	-0.20817818	0.49146043	-0.3409675
BIH	ANIMAL FEED STUFF	0.5555448	-0.28572318	0.48897403	-0.3432068
BIH	MISC.EDIBLE PRODUCTS ETC	0.63287567	-0.224833	0.47991434	-0.3514296
SVN	SUGAR,SUGR.PREPTNS,HONEY	0.83377586	-0.09064583	0.47150203	-0.3591554
ALB	CEREALS,CEREAL PREPRTNS.	0.02983842	-0.94205222	0.46570503	-0.364531
CHN	Food and live animals	0.54725331	-0.29261317	0.44449842	-0.3845636
SVN	CEREALS,CEREAL PREPRTNS.	0.17239646	-0.70590758	0.42845404	-0.400115
BIH	LIVE ANIMALS	0.05781056	-0.89069771	0.41943047	-0.4090158
EST	VEGETABLES AND FRUIT	0.28015518	-0.56231059	0.40988083	-0.4185596
ROU	DAIRY PRODUCTS,BIRD EGGS	0.15251936	-0.73532876	0.40040436	-0.4281589
CHN	SUGAR,SUGR.PREPTNS,HONEY	0.29615432	-0.54302615	0.36657193	-0.4635161
SVK	MEAT, MEAT PREPARATIONS	0.42671308	-0.40182356	0.34482348	-0.487184
CHN	MISC.EDIBLE PRODUCTS ETC	0.4410387	-0.38788778	0.33694562	-0.4959472
CZE	MEAT, MEAT PREPARATIONS	0.27936744	-0.56327254	0.32405568	-0.5105105
ROU	COFFEE,TEA,COCOA,SPICES	0.18108037	-0.69336486	0.32162451	-0.5132891
SVK	ANIMAL FEED STUFF	0.32242412	-0.51237411	0.31866748	-0.5166826
MNE	MISC.EDIBLE PRODUCTS ETC	0.10035803	-0.81759023	0.31043716	-0.5262082
CHN	COFFEE,TEA,COCOA,SPICES	0.29308929	-0.5466836	0.30940272	-0.527414
BGR	FISH,CRUSTACEANS,MOLLUSC	0.14567759	-0.74569183	0.30336874	-0.5344852
SVN	COFFEE,TEA,COCOA,SPICES	0.16361203	-0.71878594	0.30091119	-0.537384
CHN	ANIMAL FEED STUFF	0.19863978	-0.668558	0.29454179	-0.5449482
ALB	LIVE ANIMALS	1.11519901	0.05446249	0.27657212	-0.5666957
EST	SUGAR,SUGR.PREPTNS,HONEY	0.35628323	-0.47461825	0.27595043	-0.567459
EST	ANIMAL FEED STUFF	0.24526245	-0.60608713	0.27016129	-0.5746032
CHN	LIVE ANIMALS	0.28574514	-0.55551823	0.24912482	-0.601121
MNE	DAIRY PRODUCTS,BIRD EGGS	0.06325355	-0.88101887	0.23250874	-0.6227065
CZE	VEGETABLES AND FRUIT	0.28927176	-0.55126333	0.20118868	-0.6650174
ROU	VEGETABLES AND FRUIT	0.32864383	-0.50529431	0.19890315	-0.6681915
MNE	ANIMAL FEED STUFF	0.01198278	-0.97631821	0.1912797	-0.6788669
BIH	FISH,CRUSTACEANS,MOLLUSC	0.40885325	-0.41959427	0.18949101	-0.6813914
SVK	VEGETABLES AND FRUIT	0.3988644	-0.42973114	0.161564	-0.7218164
MKD	LIVE ANIMALS	0.02529258	-0.95066272	0.14632998	-0.7446983
CHN	MEAT, MEAT PREPARATIONS	0.3161508	-0.51958271	0.14527669	-0.7463029
ALB	MEAT, MEAT PREPARATIONS	0.30071181	-0.53761962	0.13610193	-0.7604054
CZE	FISH,CRUSTACEANS,MOLLUSC	0.10366682	-0.8121411	0.13499181	-0.7621273
SVN	FISH,CRUSTACEANS,MOLLUSC	0.09224121	-0.83109737	0.12329753	-0.7804722
ALB	DAIRY PRODUCTS,BIRD EGGS	0.04562995	-0.91272257	0.11825754	-0.7884968
SRB	FISH,CRUSTACEANS,MOLLUSC	0.06975537	-0.86958632	0.1085843	-0.8041028
MNE	LIVE ANIMALS	0.01098794	-0.97826296	0.10382143	-0.8118873
ALB	MISC.EDIBLE PRODUCTS ETC	0.00772387	-0.98467066	0.08755001	-0.8389959
ALB	COFFEE,TEA,COCOA,SPICES	0.46555631	-0.36466951	0.08154151	-0.8492124
CHN	CEREALS,CEREAL PREPRTNS.	0.23565854	-0.61857013	0.07085683	-0.8676633
ALB	SUGAR,SUGR.PREPTNS,HONEY	0.05062672	-0.90362568	0.06390384	-0.8798691
MKD	ANIMAL FEED STUFF	0.0410073	-0.92121611	0.05921859	-0.8881844

ALB	ANIMAL FEED STUFF	0.06753222	-0.87347976	0.04812371	-0.9081717
ROU	FISH,CRUSTACEANS,MOLLUSC	0.01716726	-0.96624497	0.04693106	-0.9103455
MNE	FISH,CRUSTACEANS,MOLLUSC	0.2666804	-0.57893025	0.03722957	-0.9282134
MNE	SUGAR,SUGR.PREPTNS,HONEY	0.93951503	-0.03118562	0.03216665	-0.9376716
CHN	DAIRY PRODUCTS,BIRD EGGS	0.04759699	-0.9091311	0.02724141	-0.946962
HUN	FISH,CRUSTACEANS,MOLLUSC	0.00450984	-0.99102081	0.02558364	-0.9501091
MKD	FISH,CRUSTACEANS,MOLLUSC	0.49305874	-0.33953203	0.02526566	-0.9507139
SVK	FISH,CRUSTACEANS,MOLLUSC	0.02961157	-0.94248011	0.01545516	-0.9695601

Appendix 2: Trade Complementarity Index for China and the 16 CEEC for SITC-0 and its ten two digits divisions (2006 and 2016)
Source: UN Comtrade, own calculation
i=CHN: China is exporting to CEE; j=CHN: China is importing from CEE

		2006		2016	
Country	**good**	**TCI i=CHN**	**TCI j=CHN**	**TCI i=CHN**	**TCI j=CHN**
ALB	ANIMAL FEED STUFF	0.30512783	0.03984587	0.3269191	0.02434055
ALB	CEREALS,CEREAL PREPRTNS.	0.31468478	0.0050751	0.23201251	0.20979937
ALB	COFFEE,TEA,COCOA,SPICES	0.15434748	0.03521806	0.52999171	0.015002
ALB	DAIRY PRODUCTS,BIRD EGGS	0.09044244	0.00796986	0.02395706	0.05486382
ALB	FISH,CRUSTACEANS,MOLLUSC	1.69718269	2.78116077	1.24991804	2.03677219
ALB	***Food and live animals***	***0.4781802***	***0.2306462***	***0.7305126***	***0.5441086***
ALB	LIVE ANIMALS	0.3314699	0.07433697	0.95065618	0.05551276
ALB	MEAT, MEAT PREPARATIONS	0.18736614	0.04171934	0.15714073	0.10375548
ALB	MISC.EDIBLE PRODUCTS ETC	0.60479854	0.00205761	0.5483954	0.06075685
ALB	SUGAR,SUGR.PREPTNS,HONEY	0.17625175	0.01596958	0.98781827	0.02148029
ALB	VEGETABLES AND FRUIT	0.82193357	0.13136129	0.93288428	0.89374948
BGR	ANIMAL FEED STUFF	0.37622396	0.5642743	0.30236135	0.92172591
BGR	CEREALS,CEREAL PREPRTNS.	0.31986779	0.54408483	0.05355212	2.52788353
BGR	COFFEE,TEA,COCOA,SPICES	0.02707675	0.03938613	0.71981173	0.32307949
BGR	DAIRY PRODUCTS,BIRD EGGS	0.03191349	0.15589823	0.04517332	0.58766003
BGR	FISH,CRUSTACEANS,MOLLUSC	0.99472947	0.08828879	0.45938539	0.16213337
BGR	***Food and live animals***	***0.9667382***	***0.3061713***	***0.5332552***	***0.8008428***
BGR	LIVE ANIMALS	0.29441737	0.09769814	0.17913165	0.27348438
BGR	MEAT, MEAT PREPARATIONS	0.36767521	0.1729258	0.23681198	0.8053824
BGR	MISC.EDIBLE PRODUCTS ETC	1.56652676	0.17194843	0.42016251	0.49183287
BGR	SUGAR,SUGR.PREPTNS,HONEY	0.31067234	0.33179658	0.73191314	0.55922971
BGR	VEGETABLES AND FRUIT	3.40554546	0.21822896	0.75551712	0.30668765
BIH	ANIMAL FEED STUFF	0.22497527	0.32778674	0.74578278	0.2473188
BIH	CEREALS,CEREAL PREPRTNS.	0.12046024	0.13728844	0.21107639	0.77482602
BIH	COFFEE,TEA,COCOA,SPICES	0.28138855	0.0498461	0.88590357	0.12824124
BIH	DAIRY PRODUCTS,BIRD EGGS	0.04213826	0.25396455	0.05652221	0.6616676
BIH	FISH,CRUSTACEANS,MOLLUSC	9.10415851	0.24778801	0.50792241	0.10127218
BIH	***Food and live animals***	***0.3118398***	***0.2105701***	***0.9420419***	***0.5120229***
BIH	LIVE ANIMALS	0.23588452	0.00385354	0.75796237	0.08418688
BIH	MEAT, MEAT PREPARATIONS	0.47505187	0.04791486	0.34229449	1.14320239
BIH	MISC.EDIBLE PRODUCTS ETC	0.63470917	0.16859586	0.99789891	0.33304487
BIH	SUGAR,SUGR.PREPTNS,HONEY	0.47146888	0.63282144	1.33745172	0.81569619
BIH	VEGETABLES AND FRUIT	0.77369678	0.22173497	0.98781531	0.44029569
CHN	ANIMAL FEED STUFF	0.12642326	0.11720295	0.14897667	0.14897667
CHN	CEREALS,CEREAL PREPRTNS.	0.28344636	0.04008219	0.03192089	0.03192089
CHN	COFFEE,TEA,COCOA,SPICES	0.05711147	0.0221714	0.0569239	0.0569239
CHN	DAIRY PRODUCTS,BIRD EGGS	0.04048094	0.00831343	0.01263825	0.01263825
CHN	FISH,CRUSTACEANS,MOLLUSC	0.28448084	0.85055063	0.61016007	0.61016007
CHN	***Food and live animals***	***0.6339113***	***0.1424523***	***0.21006***	***0.21006***
CHN	LIVE ANIMALS	0.54994691	0.01904721	0.05000362	0.05000362

CHN	MEAT, MEAT PREPARATIONS	0.53963635	0.04386128	0.11074974	0.11074974
CHN	MISC.EDIBLE PRODUCTS ETC	1.21178055	0.11749117	0.23382925	0.23382925
CHN	SUGAR,SUGR.PREPTNS,HONEY	0.1710447	0.09341828	0.12321751	0.12321751
CHN	VEGETABLES AND FRUIT	1.58504503	0.17684011	0.28092437	0.28092437
CZE	ANIMAL FEED STUFF	0.07539736	0.30482283	0.24407851	0.37029724
CZE	CEREALS,CEREAL PREPRTNS.	0.14282229	0.12697554	0.03509978	0.39480267
CZE	COFFEE,TEA,COCOA,SPICES	0.35826425	0.04563806	0.38886932	0.1472721
CZE	DAIRY PRODUCTS,BIRD EGGS	0.04139112	0.24198184	0.02712203	0.45719082
CZE	FISH,CRUSTACEANS,MOLLUSC	0.98979553	0.06282791	0.28862937	0.07214546
CZE	***Food and live animals***	***0.1272997***	***0.1518856***	***0.3395441***	***0.2575837***
CZE	LIVE ANIMALS	0.42570471	0.09588424	0.11330951	0.37616958
CZE	MEAT, MEAT PREPARATIONS	0.0647764	0.03875813	0.14911487	0.24703951
CZE	MISC.EDIBLE PRODUCTS ETC	1.24487372	0.25714216	0.29290227	0.43882035
CZE	SUGAR,SUGR.PREPTNS,HONEY	0.46702848	0.40524057	0.23377428	0.2737342
CZE	VEGETABLES AND FRUIT	2.50887435	0.05926913	0.5975838	0.0749116
EST	ANIMAL FEED STUFF	0.17158684	0.14471161	0.27771157	0.13664522
EST	CEREALS,CEREAL PREPRTNS.	0.4123431	0.09169467	0.04971146	0.64973159
EST	COFFEE,TEA,COCOA,SPICES	0.38196957	0.2278092	1.07074431	0.51509593
EST	DAIRY PRODUCTS,BIRD EGGS	0.03919085	0.5397352	0.02732205	1.10901402
EST	FISH,CRUSTACEANS,MOLLUSC	1.13433984	1.34276078	1.11146695	0.6956805
EST	***Food and live animals***	***0.0759234***	***0.302446***	***0.5501327***	***0.564079***
EST	LIVE ANIMALS	0.32023987	0.08055887	0.10776164	0.40266058
EST	MEAT, MEAT PREPARATIONS	0.19284387	0.08929965	0.14861861	0.54545437
EST	MISC.EDIBLE PRODUCTS ETC	0.40251262	0.2295115	0.53714031	1.22698774
EST	SUGAR,SUGR.PREPTNS,HONEY	0.57438855	0.11238521	0.38527105	0.09275649
EST	VEGETABLES AND FRUIT	0.88534464	0.05740123	0.81398273	0.15261709
HRV	ANIMAL FEED STUFF	0.1255237	0.63353624	0.66877311	0.74225937
HRV	CEREALS,CEREAL PREPRTNS.	0.273443	0.21683277	0.09581175	0.95345032
HRV	COFFEE,TEA,COCOA,SPICES	0.06302499	0.28663676	0.66899588	0.33791616
HRV	DAIRY PRODUCTS,BIRD EGGS	0.05245958	0.17456401	0.05929254	0.56421141
HRV	FISH,CRUSTACEANS,MOLLUSC	1.968798	1.42487891	0.84935005	0.91216463
HRV	***Food and live animals***	***1.2574103***	***0.4926114***	***0.7559271***	***0.8058343***
HRV	LIVE ANIMALS	0.58713131	0.02367328	0.90366718	0.80949156
HRV	MEAT, MEAT PREPARATIONS	0.31310098	0.10008893	0.32409024	0.9637223
HRV	MISC.EDIBLE PRODUCTS ETC	2.2931817	1.30084224	0.59449166	2.32128504
HRV	SUGAR,SUGR.PREPTNS,HONEY	0.8774046	2.56050819	0.77516834	1.53561963
HRV	VEGETABLES AND FRUIT	0.79943572	0.07252133	1.04655165	0.20528789
HUN	ANIMAL FEED STUFF	0.34177864	1.02371522	0.31304275	0.94640455
HUN	CEREALS,CEREAL PREPRTNS.	0.17293308	0.29752274	0.03837588	0.69174551
HUN	COFFEE,TEA,COCOA,SPICES	0.87411473	0.04957808	0.24889291	0.09041886
HUN	DAIRY PRODUCTS,BIRD EGGS	0.04809705	0.11156858	0.02599718	0.41113974
HUN	FISH,CRUSTACEANS,MOLLUSC	1.43696443	0.00273322	0.13772465	0.013673
HUN	***Food and live animals***	***0.3228945***	***0.2676408***	***0.299235***	***0.4559246***
HUN	LIVE ANIMALS	0.33859267	0.14779749	0.3691291	0.54132465
HUN	MEAT, MEAT PREPARATIONS	0.76366622	0.22433639	0.11078976	1.19542198
HUN	MISC.EDIBLE PRODUCTS ETC	0.03336337	0.15759469	0.380993	0.59579067

HUN	SUGAR,SUGR.PREPTNS,HONEY	0.60492851	0.39603209	0.32540316	0.37977645
HUN	VEGETABLES AND FRUIT	2.20504271	0.18278844	0.36983157	0.22366583
LTU	ANIMAL FEED STUFF	0.1402463	2.62153743	0.43662554	1.09044313
LTU	CEREALS,CEREAL PREPRTNS.	0.49520621	0.30754433	0.04795644	1.61568263
LTU	COFFEE,TEA,COCOA,SPICES	0.37031129	0.13206562	0.55846462	0.30039769
LTU	DAIRY PRODUCTS,BIRD EGGS	0.00870962	1.15752277	0.04686594	2.00881702
LTU	FISH,CRUSTACEANS,MOLLUSC	3.82538511	1.3443145	2.64912474	1.48401779
LTU	***Food and live animals***	***1.3442817***	***0.6272515***	***0.6586344***	***1.0374968***
LTU	LIVE ANIMALS	0.11387225	0.20619171	0.19591752	0.54096337
LTU	MEAT, MEAT PREPARATIONS	0.36546485	0.18967712	0.15286941	0.99638092
LTU	MISC.EDIBLE PRODUCTS ETC	1.74943977	0.31508605	0.48856472	0.89994188
LTU	SUGAR,SUGR.PREPTNS,HONEY	0.09658956	0.52712934	0.3682964	0.5530391
LTU	VEGETABLES AND FRUIT	4.09033121	0.43663849	1.29175789	0.53920338
LVA	ANIMAL FEED STUFF	0.27278901	0.96231299	0.63162472	0.82564016
LVA	CEREALS,CEREAL PREPRTNS.	0.38355213	0.33069725	0.12415608	2.28478812
LVA	COFFEE,TEA,COCOA,SPICES	0.55783833	0.09284908	0.5986541	0.23291037
LVA	DAIRY PRODUCTS,BIRD EGGS	0.06956778	0.92700988	0.05892055	1.83280231
LVA	FISH,CRUSTACEANS,MOLLUSC	5.91415836	2.44261205	1.80430004	1.05926801
LVA	***Food and live animals***	***0.5488195***	***0.4936024***	***0.7627906***	***0.9503773***
LVA	LIVE ANIMALS	0.29396915	0.05502796	0.20223042	0.66600072
LVA	MEAT, MEAT PREPARATIONS	0.50083374	0.11990564	0.21910608	0.71883028
LVA	MISC.EDIBLE PRODUCTS ETC	0.72510996	0.28264186	0.56940412	0.69661339
LVA	SUGAR,SUGR.PREPTNS,HONEY	0.36530896	0.49745316	0.60096225	0.18338734
LVA	VEGETABLES AND FRUIT	3.44437256	0.13332984	1.22807652	0.38974938
MKD	ANIMAL FEED STUFF	0.26012677	0.02419544	0.24926175	0.02995225
MKD	CEREALS,CEREAL PREPRTNS.	0.16426613	0.21311251	0.0973636	0.74039094
MKD	COFFEE,TEA,COCOA,SPICES	0.32059537	0.07494198	0.59190618	0.09833231
MKD	DAIRY PRODUCTS,BIRD EGGS	0.04430769	0.10800958	0.04599437	0.23344788
MKD	FISH,CRUSTACEANS,MOLLUSC	0.56550148	0.29882126	0.41761146	0.01350306
MKD	***Food and live animals***	***0.8335266***	***0.4271926***	***0.6156156***	***0.5255766***
MKD	LIVE ANIMALS	0.30045994	0.00168595	0.13260034	0.02937094
MKD	MEAT, MEAT PREPARATIONS	1.13881762	0.16728464	0.33640656	0.48635319
MKD	MISC.EDIBLE PRODUCTS ETC	0.3005432	0.44068082	0.69394755	0.56776073
MKD	SUGAR,SUGR.PREPTNS,HONEY	0.16796084	0.29724463	0.92399342	0.22846083
MKD	VEGETABLES AND FRUIT	4.10698706	0.87754076	0.68677588	0.99002222
MNE	ANIMAL FEED STUFF	0.24228577	0.00707017	0.53305098	0.0967476
MNE	CEREALS,CEREAL PREPRTNS.	0.17978405	0.10525859	0.2048554	1.03294041
MNE	COFFEE,TEA,COCOA,SPICES	1.07599728	0.01798677	0.84956659	0.16860108
MNE	DAIRY PRODUCTS,BIRD EGGS	0.05448361	0.01104805	0.14171925	0.10786895
MNE	FISH,CRUSTACEANS,MOLLUSC	1.05376674	0.16162328	1.08135771	0.01989709
MNE	***Food and live animals***	***0.0930801***	***0.1468313***	***1.3078514***	***0.6160961***
MNE	LIVE ANIMALS	0.43772353	0.00073243	1.94704986	0.02083874
MNE	MEAT, MEAT PREPARATIONS	0.62018754	0.08695178	0.8003181	2.91516751
MNE	MISC.EDIBLE PRODUCTS ETC	0.51076458	0.02673503	1.14949428	0.21543325
MNE	SUGAR,SUGR.PREPTNS,HONEY	0.46221113	0.29635859	0.69320509	0.01081233
MNE	VEGETABLES AND FRUIT	0.40651044	0.25742631	1.51317441	0.55647665

POL	ANIMAL FEED STUFF	0.3467436	0.49270239	0.5160127	0.44759474
POL	CEREALS,CEREAL PREPRTNS.	0.02457542	0.18170736	0.04052317	0.73354364
POL	COFFEE,TEA,COCOA,SPICES	0.67541018	0.11168975	0.55191843	0.37712117
POL	DAIRY PRODUCTS,BIRD EGGS	0.06573117	0.47115956	0.02922041	0.99183449
POL	FISH,CRUSTACEANS,MOLLUSC	8.12710866	0.65090126	1.51742077	0.60563828
POL	***Food and live animals***	***0.5832607***	***0.4470582***	***0.5090273***	***0.7807829***
POL	LIVE ANIMALS	0.78524122	0.21538693	0.64717963	0.12489283
POL	MEAT, MEAT PREPARATIONS	0.2353851	0.3386246	0.14803526	2.3739103
POL	MISC.EDIBLE PRODUCTS ETC	0.25738703	0.44112419	0.36174529	1.3184594
POL	SUGAR,SUGR.PREPTNS,HONEY	0.32230608	0.55972665	0.30520714	0.40957417
POL	VEGETABLES AND FRUIT	1.65535072	0.3806477	0.76762759	0.42435223
ROU	ANIMAL FEED STUFF	0.01324094	0.13389837	0.378414	0.37547951
ROU	CEREALS,CEREAL PREPRTNS.	0.24231107	0.16928053	0.11090593	1.86120697
ROU	COFFEE,TEA,COCOA,SPICES	1.09061175	0.01369824	0.40895015	0.05917246
ROU	DAIRY PRODUCTS,BIRD EGGS	0.05107877	0.02663948	0.03616718	0.18576162
ROU	FISH,CRUSTACEANS,MOLLUSC	2.9676398	0.01040432	0.45211484	0.02508198
ROU	***Food and live animals***	***0.6793693***	***0.1173558***	***0.5288945***	***0.4776322***
ROU	LIVE ANIMALS	0.07438062	0.32982931	0.40464598	1.0027726
ROU	MEAT, MEAT PREPARATIONS	0.25476311	0.02989111	0.17919796	0.55020492
ROU	MISC.EDIBLE PRODUCTS ETC	1.31349682	0.05843374	0.40415015	0.42504894
ROU	SUGAR,SUGR.PREPTNS,HONEY	0.73920107	0.18468832	0.53817046	0.19935533
ROU	VEGETABLES AND FRUIT	0.15075057	0.06733611	0.87220597	0.0740606
SRB	ANIMAL FEED STUFF	0.20196587	0.89254593	0.17902001	1.14746226
SRB	CEREALS,CEREAL PREPRTNS.	0.8383344	1.14312484	0.03134977	2.20440014
SRB	COFFEE,TEA,COCOA,SPICES	0.48672934	0.16740723	0.49093224	0.18045587
SRB	DAIRY PRODUCTS,BIRD EGGS	0.04838233	0.28090657	0.01546366	0.58453071
SRB	FISH,CRUSTACEANS,MOLLUSC	0.3738659	0.04227566	0.4617448	0.05803214
SRB	***Food and live animals***	***1.0927298***	***0.8893163***	***0.3488486***	***1.087914***
SRB	LIVE ANIMALS	0.24248894	0.01940075	0.13094713	0.41965513
SRB	MEAT, MEAT PREPARATIONS	0.16036817	0.2497553	0.08125514	0.53922801
SRB	MISC.EDIBLE PRODUCTS ETC	0.1517792	0.88653731	0.40625261	1.28554065
SRB	SUGAR,SUGR.PREPTNS,HONEY	0.09918018	3.31698814	0.23820737	1.16658857
SRB	VEGETABLES AND FRUIT	4.28443213	0.97996573	0.78125085	1.34738092
SVK	ANIMAL FEED STUFF	0.0626585	0.19023911	0.17687417	0.16117923
SVK	CEREALS,CEREAL PREPRTNS.	0.47640978	0.22428486	0.03831848	0.38899514
SVK	COFFEE,TEA,COCOA,SPICES	0.23015514	0.07448824	0.43168599	0.19160177
SVK	DAIRY PRODUCTS,BIRD EGGS	0.04670018	0.25082568	0.02863305	0.3615051
SVK	FISH,CRUSTACEANS,MOLLUSC	2.38472861	0.01794627	0.18039818	0.00825991
SVK	***Food and live animals***	***0.5372846***	***0.2013881***	***0.3288186***	***0.2406688***
SVK	LIVE ANIMALS	0.67740099	0.14183334	0.20561443	0.44986447
SVK	MEAT, MEAT PREPARATIONS	0.18173187	0.05920017	0.15020737	0.26287157
SVK	MISC.EDIBLE PRODUCTS ETC	0.16169597	0.22896463	0.28859662	0.38439179
SVK	SUGAR,SUGR.PREPTNS,HONEY	1.02307283	0.65702018	0.19351223	0.33078172
SVK	VEGETABLES AND FRUIT	1.02780005	0.08172366	0.52556581	0.06015755
SVN	ANIMAL FEED STUFF	0.31366706	0.86444199	0.94797941	1.25586623
SVN	CEREALS,CEREAL PREPRTNS.	0.2158539	0.02932221	0.06918678	0.19301786

SVN	COFFEE,TEA,COCOA,SPICES	0.1304472	0.0123768	0.32421343	0.05536162
SVN	DAIRY PRODUCTS,BIRD EGGS	0.05524047	0.22457846	0.03332253	0.59908371
SVN	FISH,CRUSTACEANS,MOLLUSC	1.52726835	0.05590335	0.47744042	0.06589553
SVN	***Food and live animals***	***0.3432789***	***0.1383576***	***0.5331597***	***0.3496716***
SVN	LIVE ANIMALS	0.22029252	0.07744169	0.18802307	0.51431617
SVN	MEAT, MEAT PREPARATIONS	0.38568988	0.11087256	0.16901293	0.53609557
SVN	MISC.EDIBLE PRODUCTS ETC	1.79515662	0.20797833	0.44318213	0.60124454
SVN	SUGAR,SUGR.PREPTNS,HONEY	0.73720076	0.26300446	0.34151875	0.15848815
SVN	VEGETABLES AND FRUIT	1.62864678	0.05200912	0.9755729	0.2386584

Appendix 3: List of Countries used for the Gravity Model Estimation

Albania	Ecuador	Lebanon	Philippines
Argentina	Egypt	Sri Lanka	Poland
Australia	Spain	Lithuania	Portugal
Armenia	Estonia	Luxembourg	Paraguay
Austria	Ethiopia	Latvia	Qatar
Azerbaijan	Finland	Morocco	Romania
Burundi	Fiji	Moldova	Russia
Belgium	France	Mexico	Saudi Arabia
Bulgaria	Gabon	Madagascar	Senegal
Bangladesh	United Kingdom	Maldives	Singapore
Bahamas	Georgia	FYROM	Sierra Leone
Bosnia and Herzegovina	Ghana	Mali	Serbia
Belarus	Greece	Malta	Slovakia
Belize	Hong Kong	Myanmar	Slovenia
Brazil	Honduras	Montenegro	Sweden
Brunei Darussalam	Croatia	Mongolia	Swaziland
Bhutan	Hungary	Mozambique	Seychelles
Botswana	India	Mauritania	Togo
Central African Republic	Indonesia	Mauritius	Thailand
Canada	Ireland	Malawi	Tajikistan*
Switzerland	Iran	Malaysia	Turkmenistan*
Chile	Iceland	Namibia	Trinidad and Tobago
China	Israel	Niger	Tunisia
Cameroon	Italy	Nigeria	Turkey
Congo	Jordan	Nicaragua	Tanzania
Cyprus	Japan	Netherlands	Uganda
Czech Republic	Kazakhstan	Norway	Ukraine
Germany	Kenya	Nepal	Uruguay
Dominica	Kyrgyzstan	Oman	United States of America
Denmark	Cambodia	Pakistan	Uzbekistan*
Algeria	Kuwait	Panama	Vietnam
Dominican Republic	Lao	Peru	United Arab Emirates

* *only partner countries*

Appendix 4: Fixed Effects Model with 171842 observations with the dependent variable being Export + 1

Fixed-effects, using 171842 observations
Included 15622 cross-sectional units
Time-series length = 11
Dependent variable: l_EXPplus1

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−8.08286	4.14320	−1.951	0.0511	*
l_gdpcapitaP	−0.389990	0.190881	−2.043	0.0410	**
l_gdpcapitaR	2.46718	0.188941	13.06	<0.0001	***
l_gdpreporter	−0.813595	0.177647	−4.580	<0.0001	***
l_gdppartner	0.732166	0.179544	4.078	<0.0001	***
ceecchina	0.0490509	0.134593	0.3644	0.7155	
dt_2	−2.92148	0.0424619	−68.80	<0.0001	***
dt_3	−1.52869	0.0481942	−31.72	<0.0001	***
dt_4	−0.882978	0.0455266	−19.39	<0.0001	***
dt_5	−0.559297	0.0498363	−11.22	<0.0001	***
dt_6	−0.448194	0.0565442	−7.926	<0.0001	***
dt_7	−0.336112	0.0584191	−5.753	<0.0001	***
dt_8	−0.0722126	0.0615946	−1.172	0.2410	
dt_9	−0.198589	0.0637931	−3.113	0.0019	***
dt_10	0.0809082	0.0603361	1.341	0.1799	
dt_11	0.202262	0.0617364	3.276	0.0011	***

Mean dependent var	7.540356	S.D. dependent var	7.679287
Sum squared resid	1970796	S.E. of regression	3.552003
LSDV R-squared	0.805521	Within R-squared	0.085458
LSDV F(15636, 156205)	41.37834	P-value(F)	0.000000
Log-likelihood	−453447.6	Akaike criterion	938169.2
Schwarz criterion	1095389	Hannan-Quinn	984749.4
rho	0.191830	Durbin-Watson	1.456144

Joint test on named regressors -
Test statistic: F(5, 156205) = 165.8
with p-value = P(F(5, 156205) > 165.8) = 1.82598e-176

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(15621, 156205) = 19.6527
with p-value = P(F(15621, 156205) > 19.6527) = 0

Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(10) = 7781.01
with p-value = 0