CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

Institute of International Studies

Master thesis

2023 **Xiaoyi Xiong**

CHARLES UNIVERSITY IN PRAGUE

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Institute of International Studies

International Masters in Economy, State and Society

Xiaoyi Xiong

China's Outward Foreign Direct Investment in CEE Countries --Based on Gravity Analysis

Master thesis

Prague 2023

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Academic Year: 2022/2023

Bibliographic note

XIONG, X.Y. (2023) *China's Outward Foreign Direct Investment in CEE Countries—Based on Gravity Analysis*. Master thesis. Charles University, Fakulty of Social Sciences, Institute of International studies Supervisor M.Sc. Michael Paulus; Dr Yating Li. Unpublished essay

Abstract

Over the past decade, economic and trade co-operation between China and Central and Eastern European countries has developed at a high rate. In the year of 2022, China has developed into an important trading partner with most CEE countries in terms of the ranking and share of total trade volume. However, problems such as trade surpluses and economic downturns in the post-pandemic era have made future cooperation between China and CEE countries facing a lot of new challenges.

Based on the panel data of China and 16 selected countries in Central and Eastern European region from 2012 to 2021, this paper conducts empirical analyses and uses the extended gravity model to figure out the influencing factors of China's OFDI towards CEE countries. In addition, this paper also calculates the efficiency of China's OFDI based on Stochastic Frontier Gravity Model and finally give suggestions for the future.

Keywords

OFDI, China, CEE Countries, Gravity Model, Efficiency

Word count:

24228

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Abstract

V posledním desetiletí se hospodářská a obchodní spolupráce mezi Čínou a zeměmi střední a východní Evropy rozvíjela vysokým tempem. V roce 2022 se Čína stala významným obchodním partnerem většiny zemí střední a východní Evropy, pokud jde o pořadí a podíl na celkovém objemu obchodu. Problémy, jako jsou obchodní přebytky a hospodářský pokles v postpandemické éře, však způsobily, že budoucí spolupráce mezi Čínou a zeměmi SVE čelí mnoha novým výzvám.

Na základě panelových údajů o Číně a 16 vybraných zemích regionu střední a východní Evropy v letech 2012 až 2021 provádí tento článek empirické analýzy a využívá rozšířený gravitační model, aby zjistil faktory ovlivňující čínské OFDI vůči zemím střední a východní Evropy. Kromě toho tento článek také vypočítává efektivnost čínských OFDI na základě stochastického hraničního gravitačního modelu a nakonec uvádí návrhy do budoucna.

Keywords

OFDI, China, CEE Countries, Gravity Model, Efficiency

Word count:

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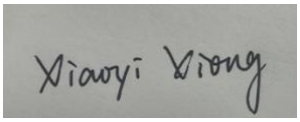
Declaration of Authorship

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 01/08/2023 **Xiaoyi Xiong**



Acknowledgments

Looking back on two years of graduate study, I am deeply grateful for every moment.

First of all, I am incredibly grateful for my supervisor M.Sc. Michael Paulus and Ph.D. Yating Li for their helpful guidance and enlightening advice during the dissertation writing.

I would like to convey my gratitude to my parents for two decades of love, support, inspiration, and continuous encouragement.

In addition, my thanks would go to friends I met in London and Prague. Thank you for being my unpaid therapists. Thank you to all my old friends who comforted me late at night with jet lag.

Finally, I wish to show my gratitude to Hendery. I've always remembered his words, "Never be thankful for the pain, only be thankful for who you were when you got through it."

Per aspera ad astra.

May the rest of my life sparkle.

Contents

Chapter 1 Introduction

1.1 Research Background

Following the onset of the global financial crisis in 2008, the growth rate of the world economy has continued to decline. and the ensuing debt and refugee crises have further led to the escalation of internal conflicts in the European Union, resulting a low growth in economic and trade development. Under this circumstance, Central and Eastern European countries chose to actively look for the new partners, hoping to re-open trade markets and trying to get out of the difficulties. At that moment, China's was developing rapidly in the field of trade and economy and finally became the focus of the CEE countries. Meanwhile, China is also actively seeking for the possible new areas of trade cooperation with European countries, given the increasing number of contradictions between China and Europe due to the sudden change in the EU's policy towards China. China and CEE countries are both emerging markets and at similar stages of development, and successful co-operation between two sides would lead to more efficient bilateral trade. The successful holding of the first China-CEE Economic and Trade Forum in 2011 laid the foundation of the cooperation, and the mechanism of "16+1 cooperation" has been formally opened between China and Central and Eastern European countries.

From then on, the level of bilateral cooperation has been greatly improved, and entered into a golden period after leaders of the two sides having held formal meetings for several times. The fourth meeting of the "16+1" leaders held in Suzhou, in November 2015, has become a milestone in the process of "16+1" mechanism. The meeting proposed to further realize connectivity by building the express transport network in both land and sea between China and Europe. In November 2016, the fifth leaders' meeting was held in Riga, Latvia, under the theme of "Interconnection, Innovation, Integration and Communion". The two sides issued a joint statement, indicating their

determination to further enhance strategic partnership and synergistic development. In the year of 2019, Greece joined the CEEC cooperation System, which indicates that the "16+1" mechanism was formally expanded to "17+1" mechanism.

At this moment, some western developed countries began to set off unilateralism, trade protectionism, and the deglobalization has begun. In 2016, the United Kingdom left the European Union. In January 2017, the United States withdrew from the Trans-Pacific Partnership (TPP). Then the trade war between China and the US began in May 2018, which led to a continuous decline in bilateral trade between two sides, and by the year of 2023, the United States had fallen to China's fourth largest trading partner. After the outbreak of the COVID-19 epidemic in 2020, the trade protection policies of the developed countries in the west have become even tougher. In the context of deglobalization and the intensification of trade friction between China and the United States, it has become an inevitable choice for China to strengthen its economic and trade cooperation with CEE countries.

On the other hand, the One Belt One Road initiative was launched in September 2013, which runs through Asia, Europe and Africa and the areas it covers can be divided into three parts: the core area, the extension area, and the expansion area. The expansion area mainly radiates the European Union, including Central and Eastern Europe countries. The included CEE countries are listed as follows: Hungary, Slovenia, Czech Republic, Lithuania, Latvia, Bulgaria, Estonia, Poland, Albania, Slovakia, Bosnia and Herzegovina, Croatia, Montenegro, Romania, Macedonia, and Serbia. So far, the Belt and Road Initiative has covered more than 150 countries and international organizations, and many countries in Central and Eastern Europe have joined one after another.

In retrospect, under the joint efforts of the "16+1" mechanism and the "OBOR" initiative, cooperation between China and CEE countries has been making remarkable progress. In terms of trade, the total volume of bilateral trade between China and the 16 countries in CEE amounted to only 4.3 billion U.S. dollars in the year 2001, however,

the total amount of bilateral trade grows into 404.17 billion U.S. dollars by the year of 2021, which indicates an increase of nearly 100 times over 21 years. In terms of investment, China's outward direct foreign investment in Central and Eastern European countries has been expanding rapidly. In the year of 2009, China's OFDI stock towards 16 CEE countries only amounted to 410 million U.S. dollars, while it increases into 3.02 billion U.S. dollars by the year of 2012, representing a growth rate of 636.6%. Although China's OFDI stock towards 16 CEE countries accounts for only 2.5% of the total OFDI towards the European Union, the overall trend is stably improving. In terms of infrastructure, Chinese enterprises signed engineering contracts with CEE countries amounting to $9.36 billion in the year of 2022. In addition, about 16,000 Trans-Eurasia Logistics were launched, representing a year-on-year increase of 9%. Besides, Mozura wind power project, Montenegrin highway, Pelješac Bridge, and Budapest–Belgrade railway have made successful completion.

In the first quarter of 2023, the total volume of bilateral trade between China and Central and Eastern European countries reached into 33.3 billion U.S dollars, indicating an increase of 1.6% compared to the same period of last year. What's more, China's OFDI towards Central and Eastern European countries in the whole industry has increased sharply by 148% year-on-year, leading to a strong willingness from Chinese enterprises make investment in CEE countries. At the conference of the 3rd China-CEE Expo held on 5 May 2023, Li Fei, Vice Minister of Commerce, said that since the establishment of the "16+1" cooperation mechanism in 2012, positive progress has been made in economic and trade cooperation between China and Central and Eastern European countries. Nowadays, China has become one of the important trade partners and sources of imports for CEE countries.

1.2 Research Objectives

In the context of the post epidemic era and the "16+1 cooperation" mechanism, this dissertation aims to figure out the factors which would influence China's OFDI towards

CEE countries based on the gravity model. And then it would calculate the efficiency of China's OFDI towards CEE countries with the help of the stochastic frontier gravity model. The aim of this research is trying to explore new possibilities of collaboration between China and countries in Central and Eastern Europe in the future.

This paper will be divided into five parts: the first part is the introduction. Firstly, the article will introduce the background of the research and point out the research objectives and the research framework.

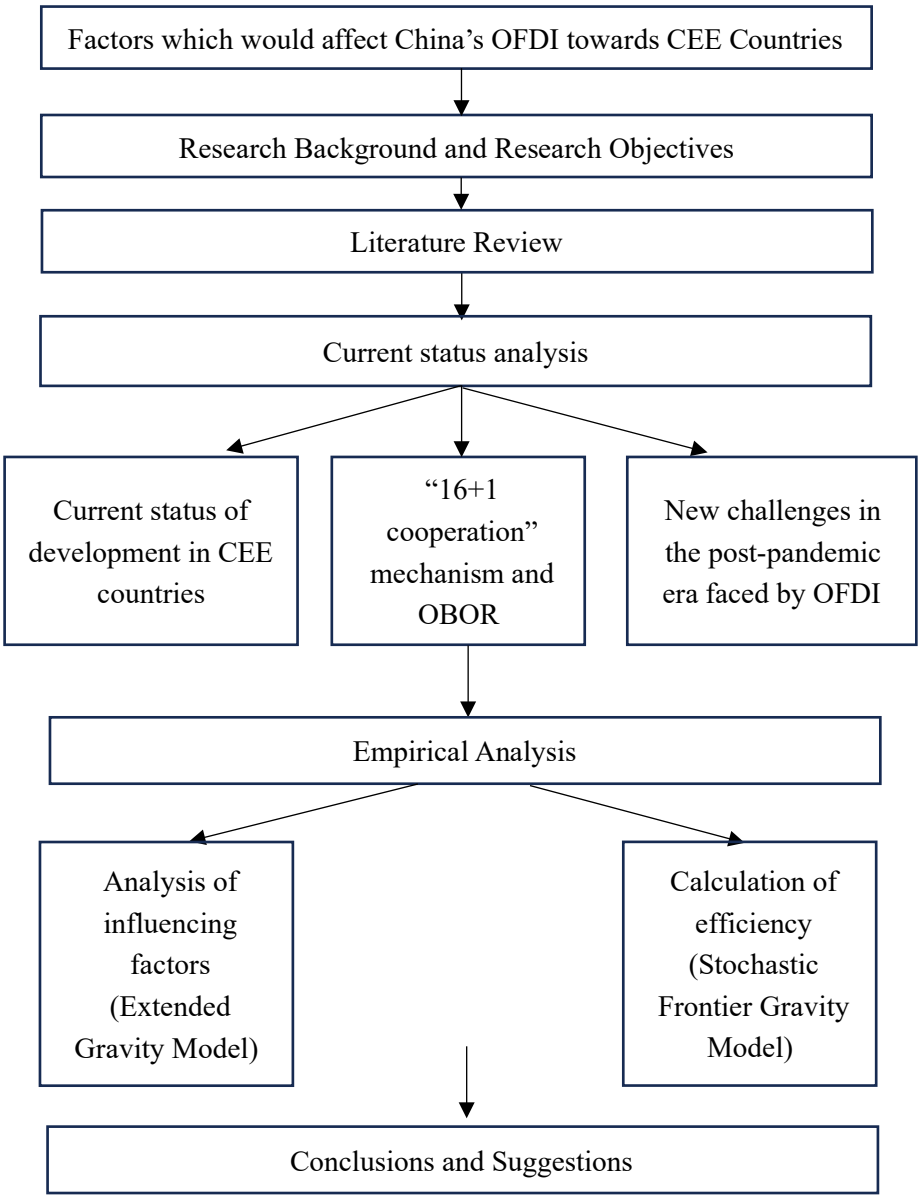
The second part is the analysis of the current situation. This part will be carried out mainly from three aspects, the first aspect is the development status of Central and Eastern European countries. The next part is mainly to introduce the development of the "16+1" mechanism and the "One Belt and One Road" policy and the pending problems they have. The third part will mainly focus on the development of global trade and the new challenges faced by foreign direct investment under the circumstance of post-pandemic era.

The next section is the literature review. In this part, the relevant literature and related theories will be sorted out mainly from five parts, including what is OFDI; why to make OFDI; how to make OFDI and the influencing factors of OFDI, then it will review the research methodologies which are utilized to figure out the factors which would affect a country’s OFDI.

The fourth part is the empirical analysis. The empirical analysis will be based on the extended gravity model, mainly exploring the influencing factors which would affect China's OFDI towards CEE countries. The next step is to calculate the efficiency of China's OFDI in Central and Eastern European countries based on the stochastic frontier gravity model.

The final part will focus on conclusion and policy suggestions. This part will give some

policy recommendations for China's OFDI towards CEE countries combining the results of previous analysis. To make a summary, the framework of the dissertation will be roughly as follows:



Chapter 2 Current Status Analysis

2.1 Current status of development in CEE countries

2.1.1 Economic development

The Central and Eastern European region is a geopolitical concept that broadly refers to the former socialist countries in the continental region of Europe that were under the control of the Soviet Union. Despite the many differences between these countries, they share one main thing in common: the growth that came with the emergence from communism. After the Eastern European upheaval, different countries chose distinct approaches to economic and political system transformations based on their own circumstances. Here we take Poland, the Czech Republic, and Hungary as examples.

Poland completed its privatization reformation through employee stock ownership. At the same time, the changes in the political system allowed it to quickly integrate into Western society and gradually become one of the fastest growing countries in Central and Eastern Europe. In 2022, Poland's economy reached 688.177 billion dollars, ranking among the top ten in the European Union and first among Central and Eastern European countries.

The Czech Republic was once one of the world's top ten industrial nations. After the transition process, the country rapidly privatized and shifted to market economy. By the end of 1992, the Czech economy rebounded, leading to sustained and rapid growth. In the year 2022, its GDP reached 290.923 billion dollars, placing it among the ranks of developed countries.

Hungary was a traditionally developed agricultural country in Europe before the World War II. To address the lack of domestic capital purchasing power, Hungary adopted a strategy that merged international financing with property reforms. Western

multinational corporations were allowed to lead Hungary's privatization process, transforming its medium-and-large-sized economy into foreign investment. In 2022, Hungary's economy reached 178.789 billion dollars, ranking third among Central and Eastern European countries.

Over the past three decades, the EU-acceding countries of Central and Eastern Europe have become one of the world's greatest success stories of growth, along with the Four Little Dragons of Asia and China. On a comparable level, no other region has achieved such high rates of GDP growth and social progress as the CEE countries. Although growth has been uneven, the overall trend is growing. To take an example, according to the report provided by CMS, the share of Central and Eastern European (CEE) countries' Gross Domestic Product (GDP) in Germany's GDP grows more than doubled, from 24.8% in the year 2000 to 50.2% in 2019. At the same time, the region's share of the world's GDP increased from 1.4% in 2000 to 2.2% in 2019.

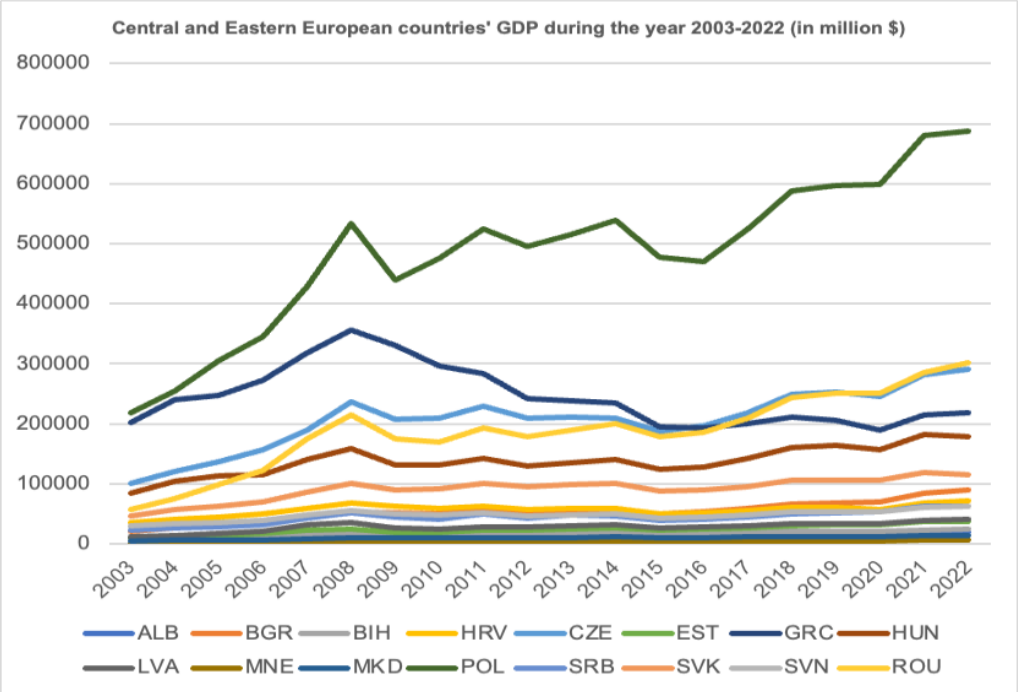


Figure 2.1.1.1 CEE countries' GDP during 2003-2022 (million $)

CEE countries produce goods and services with an annual value of approximately 1.9 trillion USD in 2022. Among them, Poland accounts for about 29%, while the Czech Republic and Hungary together make up 26%. These countries vary in size and are at

different stages of economic development, to some extent, highlighting the diversity of this region. For some countries, although their current operational complexity may be low and risks are at a high level, they hold enormous long-term potential as emerging markets. Meanwhile, some countries are already prepared to embrace an innovation-driven economy.

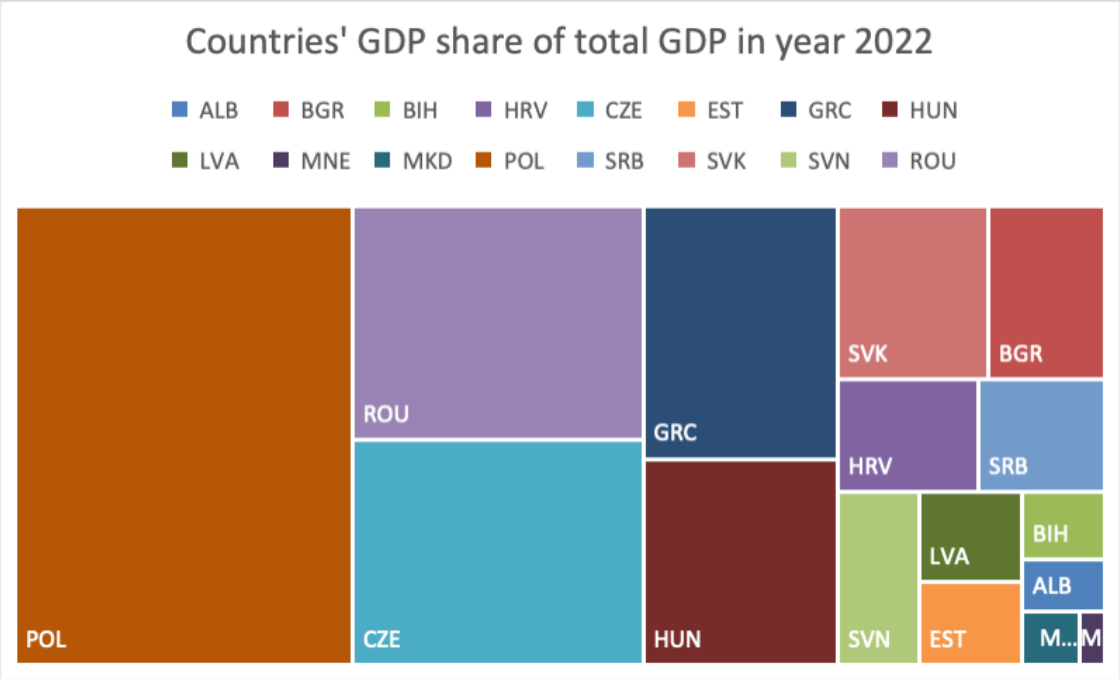


Figure 2.1.1.2 Countries' GDP share of total GDP in year 2022

In the past few decades, attractive labor costs and a favorable geographical location connecting Europe with Asia and the Middle East have continuously driven the growth of global capital expenditure towards CEE countries, resulting in foreign investment in various industrial operations has reached approximately 5 trillion US dollars and the creation of 1.8 million job opportunities.

Overall, the economic development of the CEE countries has achieved remarkable success in the past decade. On one hand, the factors that have contributed to the success of these countries in recent history still exist. On the other hand, with the continuous improvement of public governance, these countries will continue to maintain high attractiveness to foreign direct investment.

2.1.2 Advantaged industry in CEE countries attracting OFDI

On the one hand, the relationship between a country's dominant industries and foreign direct investment is often closely linked. A dominant industry is a sector in which a country has a comparative advantage, i.e., it is able to produce goods or services more efficiently or at a lower cost than other industries or other countries. On the other hand, OFDI can effectively stimulate economic growth in the home country by acquiring foreign proprietary technological advantages as well as production cost advantages (Shao & Shang, 2016). Therefore, it has become a mainstream trend to encourage investment in industries with advantages in host countries. Below are some of the traditional advantageous industries in CEE:

i. Automobile Industry

Czech Republic: The automotive industry, which has a history of more than 100 years in the Czech Republic, is the most important sector of the Czech processing industry and accounts for about 20 per cent of the total Czech economy. What's more, compact cars are the Czech Republic's primary export commodity, accounting for about 9% of its total exports. Take Škoda Auto as an example, it creates the Czech Republic's main automobile production base, producing over 500,000 vehicles annually and exporting them to more than 80 countries worldwide, making it a leading company in Czech. At the same time, Karosa, the country's largest bus manufacturer, ranks the top among European producers of buses. Since 2014, the Czech Republic has produced more buses per million inhabitants than any other country in the world. Nowadays, over 40 out of the world's 100 most important automotive companies have invested in establishing branches in the Czech Republic.

Poland: Since 1990, the Polish automotive industry has experienced rapid development by attracting significant foreign direct investment. Car production and export have continuously expanded, while the quality and technological level for the industry have made a significant progress. Nowadays, Poland has become the eighth-largest car

producer in Europe and one of the major centers for producing automotive engines and other components. The three largest automotive companies in Poland are Fiat Poland Automobiles Ltd., Opel Poland Ltd., and Volkswagen Poznań Ltd. High technical standards and wide range of types are the characteristics for the country when producing automotive parts. As a results, it provides renowned automobile brands like Opel, Volkswagen, Audi, Fiat, Škoda, Honda, and Toyota with engines, gearboxes, and so on.

Hungary: The automotive industry is a traditional sector in Hungary. Since the 1990s, the rapid development of automobile and auto parts manufacturing has made it the pillar of Hungarian automotive industry. In 1992, Suzuki Motor Company from Japan was the first to set up a factory in Hungary. Then, Germany Opel and Audi Motor Company entered the Hungarian market in 1994 and 1997 respectively. In addition to producing engines in Hungary, Audi started assembling complete vehicles in 1998. At the same time, American company Allison invests in producing automatic transmissions (mainly for buses and coaches) in Hungary, supplying numerous European car manufacturers, and exporting to China.

ii. Power Equipment Manufacturing:

Czech Republic: The Czech Republic is home to over 120 companies producing power generation equipment, including generators, transformers, transmission equipment, heat exchangers, power control devices, turbines, steam turbines, water turbines, electrical equipment, and nuclear reactor components. This industry attracts foreign direct investment of approximately 5 billion US dollars, with major foreign investors being multinational corporations such as Siemens and ABB. Škoda Power is the most famous and largest traditional power equipment manufacturing company in the Czech Republic. What's more, it also possesses the technology to produce equipment for nuclear power plants and has supplied equipment to over 800 power plants in 57 countries worldwide, including China.

Romania: In the 1980s, Romania began its independent production of various types of

steam turbines, water turbines, transformers, and nuclear reactor components. Major power equipment manufacturers include U.C.M Resita and Vulcan companies, with U.C.M Resita being Romania's largest producer of hydroelectric equipment. It can design, manufacture, and install complete sets of hydraulic power generation equipment and components, as well as conduct research and testing on water turbines, generators, control systems, and valves. Romania's largest manufacturer of power transformers is Electroputere, which produces rotating electric machines, power equipment, and transformers, capturing 80% of Romania's market, and about 59% of its products are exported. Nowadays, transformer is one of the main export products in Romania.

2.1.3 Cooperation between China and CEE countries.

i. Trade between China and Central and Eastern European countries

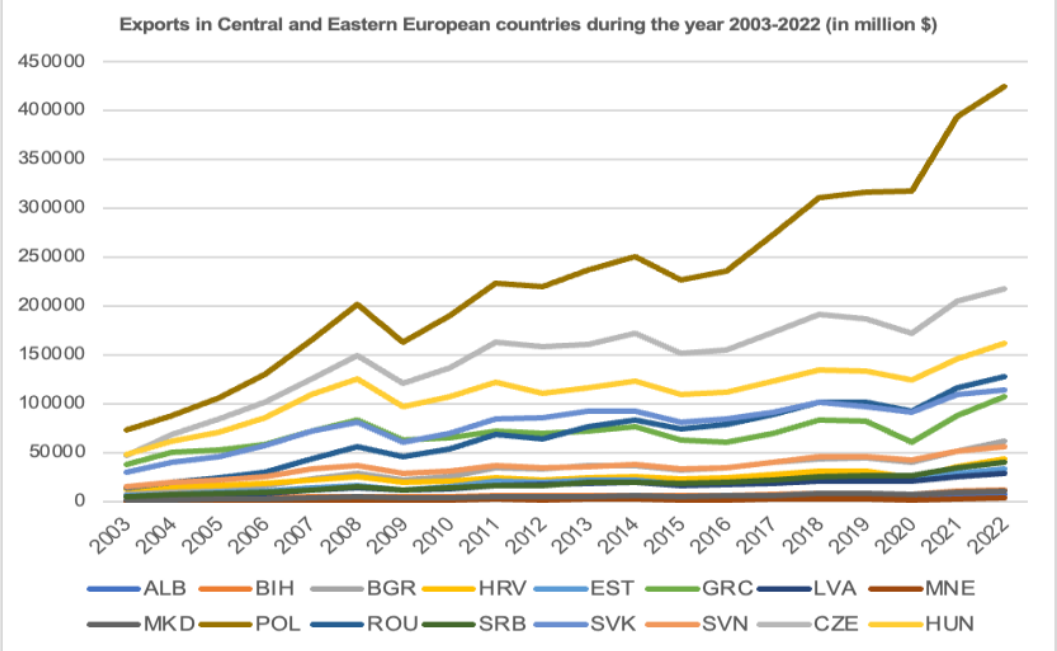


Figure 2.1.3.1 Exports in CEE countries during 2003-2022 (million $)

As what can be seen on the picture above, CEE countries collectively have experienced significant growth in exports over the years. In the year of 2022, Poland's exports of goods and services reached the amount of 424,730 million dollars, followed by Bulgaria and Hungary. And the total exports in selected 16 CEE countries reached the amount of 14472 billion dollars, a value that represents a 4.8-fold increase compared to the year 2003.

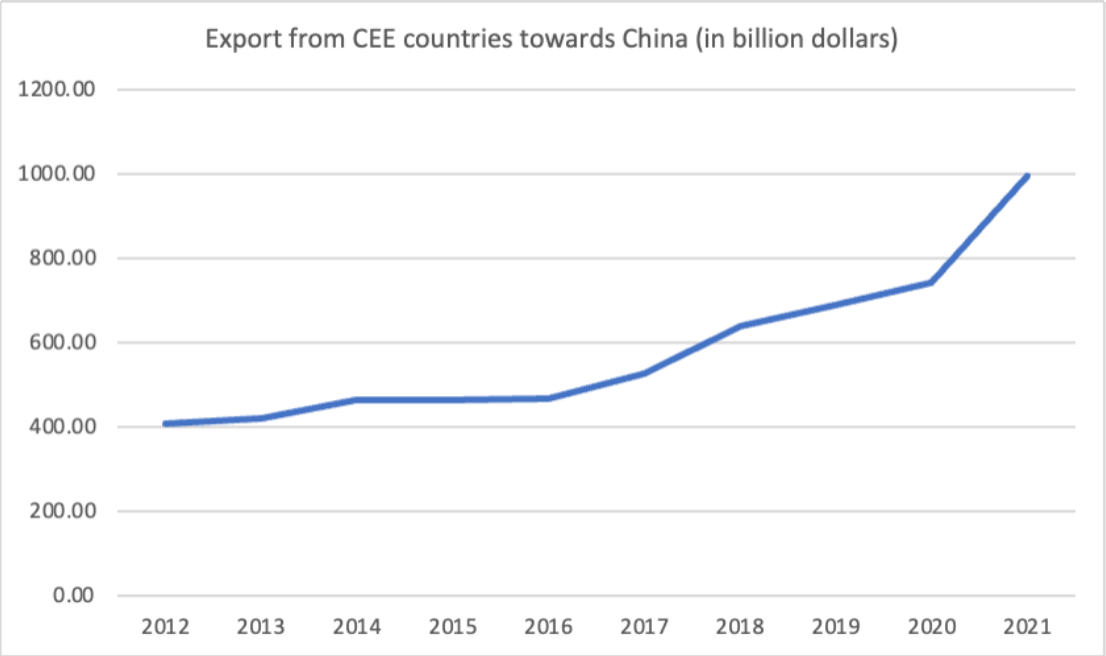


Figure 2.1.3.2 Exports from CEE countries towards China (in billion $)

Exports from Central and Eastern European countries towards China have also experienced significant growth during the past decade. It can be found from the picture above that the exports from selected 16 Central and Eastern European countries from China towards reached 993.62 billion dollars, which represents a 2.5-fold increase compared to year 2012. What's more, in 2021, the overall trade volume between China and the Central and Eastern Europe region reached 2.5 times that of 2012. And the average annual growth rate reached as high as 11.9 per cent, far surpassing China's average annual global trade growth rate of 5.1% during the same period, as well as the CEE countries' overall average annual global trade growth rate of 5.0%.

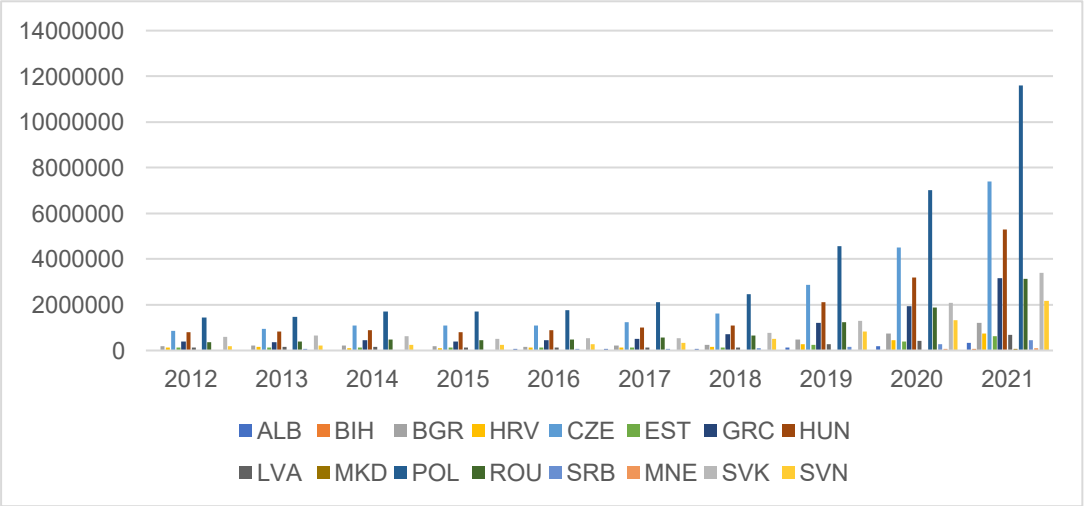


Figure 2.1.3.3 Total bilateral trade between China and CEE countries, year 2012-2021

From the perspective of bilateral trade relations, China has developed into an important trading partner with most CEE countries in terms of the ranking and share of total trade volume by the year 2021. And there are seven of them can be ranked in the top five of China's trading partners among all countries in CEE region. The rest of them, except for Croatia, are also ranked in the top ten. In the past ten years, except for Croatia and Albania, both China's trade partner status and the proportion of total bilateral trade in other CEEC have increased significantly. Moreover, comparing the partner country status of import trade and export trade, China is also a critical import-trade partner for the most CEE countries.

From the perspective of trade structure, during the year 2012 to 2021, China and the CEE countries primarily engaged in intermediate consumer goods trade. Over the course of the past decade, the proportion of consumer goods in the total bilateral trade between China and Central and Eastern European countries decreased by 1.3 percentage points, while the share of intermediate products, representing industrial connections, increased by 2 percentage points, which indicate a deepening integration of bilateral industrial chains. Furthermore, China's trade structure with most CEE countries has been optimized, but significant differences have been observed among the 14 countries. When sorting the data based on the magnitude of the decrease in the proportion of consumer goods, the leading countries are Croatia, Serbia, Romania, Bosnia and Herzegovina, Slovenia, North Macedonia, Poland, Czech Republic, Slovakia, and Bulgaria.

On the other hand, the countries where the trade structure worsened or, in other words, the proportion of consumer goods trade increased, are Greece, Hungary, Albania, and Montenegro. In addition, over 70% of China's bilateral trade with all CEE countries was related to production, particularly with countries like the Czech Republic, Slovakia, and Hungary, where the proportion of goods used for production reached around 90% by the year 2021. This implies a progressive enhancement in the interdependence of bilateral production systems.

However, at the same time, issues of trade imbalance and growth disparities in bilateral trade persisted.

ii. Problems in China and CEE countries' cooperation

Trade surplus: China has consistently maintained a trade surplus with many CEE countries, meaning that the value of China's exports to these nations exceeds the value of its imports from them. As we can see from the table above, China has maintained a relatively large trade surplus for the past decade in the course of trade with Central and Eastern Europe. In the year of 2021, the trade surplus reached 652.14 million dollars, which represents a 2.4-fold increase compared to 2012.

According to data released by the Chinese Ministry of Commerce in 2019, China only experiences a trade deficit with Slovakia and North Macedonia, amounting to approximately 3.05 billion dollars and 10 million dollars, respectively. However, with most other CEE countries, China maintains a high level of trade surplus. To be more specific, the trade surpluses with Poland, the Czech Republic, and Greece are significant, reaching 19.93 billion USD, 8.34 billion USD, and 7.01 billion USD, respectively. Except for countries listed above, the trade surpluses with the remaining

	Import	**Export**	**China's trade surplus**
2012	135.94	407.67	271.73
2013	148.83	420.52	271.69
2014	166.97	462.32	295.35
2015	142.17	462.32	320.15
2016	150.49	466.54	316.05
2017	186.69	526.33	339.64
2018	232.70	639.18	406.49
2019	243.85	689.40	445.55
2020	270.16	741.34	471.18
2021	341.48	993.62	652.14

countries in the region are all below 3 billion dollars. The trade between China and Poland is imbalanced, making it challenging for Polish products to enter the Chinese market. Local manufacturers in Poland, particularly those in the textile, clothing, metal products, leather, and other daily-use goods sectors, find themselves competing with Chinese imports in terms of quality and pricing. This competition has led to detrimental effects on Poland's industries and has even impacted the export capabilities of related sectors. The trade imbalance with China and the absence of investment reciprocity due to restricted access to the Chinese market have created uncertainty and could pose serious challenges in the future. Nowadays, this persistent trade imbalance raises concerns for the Central and Eastern European countries involved. In this way, addressing trade imbalances is crucial to foster a more sustainable and mutually beneficial trade relationship between China and CEEC. This may involve measures such as facilitating access to the China's market for exports from CEE countries, strengthening cooperation in the area of technology and innovation, and exploring ways to diversify the trade basket to achieve more balanced trade flows.

Trade imbalances: There are significant differences in trade cooperation with China from country to country. It has been a long time for Poland to be China's top trading partner in CEE countries, with total import and export trade reaching amount to about $42.1 billion in the year 2021. This value accounts for about 32% of China's total trade with other Central and Eastern European countries. Moreover, its total trade with China is more than that of Romania, Lithuania, Croatia, Serbia, Albania, Bosnia and Herzegovina, Montenegro, Northern Macedonia, Estonia, and Latvia combined. The countries in CEE region can be defined as heterogeneous, characterized not only by significant differences in land scale and population size but also by notable distinctions in language, ethnicity, social development, cultural history, and level of economic development. As what have been mentioned above, these countries adopted various transition and reform paths after the Cold War, leading to different development models and the emergence of various regional organizations such as the Vise grad Group, the New Central Europe Free Trade Agreement, and the Mediterranean Alliance, among

other sub-regional groupings (Long, 2014). These factors make it challenging for these countries to form a unified strategic demand, and they lack a collective identity as a group of 16 nations, each having distinct priorities (Feng & Song, 2016). For instance, the Vise grad Group primarily aims to attract more China's OFDI and try to address the existing trade imbalance by building economic cooperation with China. Serbia and other Balkan countries, which have not yet formally joined the European Union and therefore are unable to benefit from EU's financial assistance. They face a huge infrastructure gap and are eager to seek various forms of investment from China, including loans and private funding. What's more, economic incentive policies also differ among these countries. For example, Poland has established 14 special economic zones within its borders, which aims to implement investment incentives to promote development within these areas. In addition, the Czech Republic is continuously restructuring its economic development. On the one hand, it has increased support targeted at the investments in technology centers and business support services projects, while on the other hand it has gradually reduced incentives for the investments in manufacturing. Serbia, on the other hand, provides support to the state through FDI in manufacturing, services, and other specific sectors (Xu, 2016).

Based on the perception of China, CEE countries can be specifically categorized into three groups (Song & Wang, 2013). The first category is the "normative adherents", represented by countries of the Czech Republic, Poland, and Slovenia. The second category can be called the "moderate mercantilists", which are represented by Hungary, Romania, Bulgaria, and Slovakia. The third group is the "European Union's followers", represented by Montenegro and Macedonia. These countries and different organizations in the region have shown different reactions to the "OBOR" initiative advocated by China. Among them, Hungary took the lead in signing a memorandum of understanding with China in June 2015, while the some of the countries have yet to form a formal text referring to the OBOR construction. The difficulty of CEE countries to form a unified demand will create resistance to future cooperation in areas such as trade and economy (Qu, 2016). To make a conclusion, the varying development paths, regional

organizations, and economic policies in Central and Eastern European countries make it essential for China to understand and respect their diverse needs and priorities in order to foster successful economic cooperation in the region.

Unitary structure of traded products: According to the research conducted by Zhang (2014), China's bilateral trade with CEE countries mainly revolves around machinery and transportation equipment, as well as miscellaneous manufactured products. China primarily exports high-value-added products to the CEE countries, while its imports from the region consist mainly of raw materials, primary processed products, and other low-value-added products. To be more specific, China's trade with CEE countries is primarily characterized by inter-industry complementarity, especially in the areas of technology-intensive and labor-intensive products. And this inter-industry trade is mainly concentrated on goods where China has a competitive advantage, while Central and Eastern European countries' competitive products are less represented in exports towards China (Xu, 2016). Zhang (2013) pointed out that from the perspective of export product structure of China and CEE countries, the machinery and transportation equipment industry, where China has a competitive advantage, is not only China's largest export to CEE countries but also the product category where China imports the most from CEE countries. This implies that China may lack the deeper exploration of CEE countries' distinctive and advantageous industries. For instance, China's proportion of imports of food and live animals, where Central and Eastern European countries have a comparative advantage, is relatively low, indicating that there is still room for further adjustment and optimization of the trade structure. The current trade structure between China and CEEC results in a concentration of trade products in a single category. The lack of diversified trade product structure and limited complementary relationships between industries further contribute to a significant trade surplus for China with Central and Eastern European countries and a severe imbalance in imports and exports (Long & Shi, 2016). From the CEE countries' perspective, they concern about China's market access. Taking agricultural products as an example, most Central and Eastern European countries are producers' agricultural producers, which

makes them eager to export these products to China. However, from the point of China's view, the agricultural products from the CEE countries within the Central European Economic Area have unique characteristics but limited volume and low visibility. While China has purchased a certain quantity of agricultural products from Central and Eastern European countries through the China-Europe freight trains and e-commerce platforms, these products face challenges in entering the Chinese market in large volumes.

To make a summary, China needs to further explore and tap into Central and Eastern European countries' characteristic and their advantageous industries better. The trade structure should be further adjusted and optimized, for example, by increasing the import share of food and live animals, where the CEE countries have a comparative advantage.

In addition to the problems mentioned above, China's trade co-operation with CEE countries is facing the challenge caused by growing interventions from the EU. On the one hand, the view that European Union believes that the cooperation between China and Central and Eastern Europe may differ from the EU's laws and regulations was stated in the report "China, 16+1 Cooperation and the EU" published in 2017. This divergence could further erode the EU's coherence, leading to divisions within the Union. Based on the EU's views and attitudes towards EU-China relations and China-Central and Eastern European countries' cooperation, a series of strategic measures have been put in place. In 2016, the European Union issued the "EU Strategy on China: Elements for a New Strategy." While the report emphasizes the important role of cooperation between China and Europe in areas such as trade, global governance, and others, it also stresses the principle of overall coherence in engaging with China. Whether it is one-on-one interactions between individual EU member countries and China or group interactions within the "16+1" mechanism, they are expected to remain consistent with EU laws, rules, and policies. In 2017, the majority of EU countries began to strengthen security reviews of the investments from China. The EU Investment

Review Regulation came into force in 2019, largely impacting Chinese companies' investments in the region. Later, the European Commission classified China as an "economic competitor" and a "systemic adversary" according to published Strategic Outlook for China-EU Relations. In general, the EU has adjusted its policy towards China for multiple times over the past years. While stressing continued cooperation with China on global governance, climate change and regional conflicts, the EU has also increasingly emphasized the competitive character of its relationship with China. In addition, the complexity of China-EU relations stems from the EU's continued intervention in China's BRICS Initiative and its important cooperation projects with Central and Eastern European countries. On the other hand, through its policies, the EU has set tighter rules on co-operation between China and the Western Balkan countries. Eight years after the launch of China-CEEC cooperation, China's investment has made an impressive progress in the fields of infrastructure and energy in the Western Balkans, which has raised skepticism in the European Union. Furthermore, the EU's rhetoric has reflected its dissatisfaction with China-CEE cooperation and, in an attempt to hedge against the influence that China has developed in CEE countries, it released a document in 2018 titled "A credible enlargement perspective for and enhanced EU engagement with the Western-Balkans" as a way of reaffirming the importance of the stability of the six countries in the Western Balkans for Europe's future; and also plans to address the challenges faced by the region through investment and to promote reformations in the countries of the region and improved relations with their neighbors (Wang, 2018). The document also highlights the geopolitical importance of the accession negotiations, trying to urge the Western Balkan countries to manage any "negative impact" that may be made by third countries. It's an obligation for countries in the Western Balkan to provide the EU with evidence that they have made credible efforts to handle with the negative impacts. Although not explicitly named, this is clearly a reference to China and Russia. Although there's not explicitly specification, the statement was clearly referring to China and Russia.

Although European governments have strengthened scrutiny of Chinese investments, which has affected China's acquisitions of strategic assets such as European semiconductor companies and critical infrastructure, overall, Europe's political attitude towards China remains more open than that of the United States. There is still significant potential for the cooperation between China and Central and Eastern Europe in the future.

iii. China's outward foreign direct investment towards CEE countries

According to the data from China Statistical Bulletin, China's OFDI towards Central and Eastern European countries has reached more than 30 billion dollars, which represents a value of 2.3-fold compared to the number in 2012.

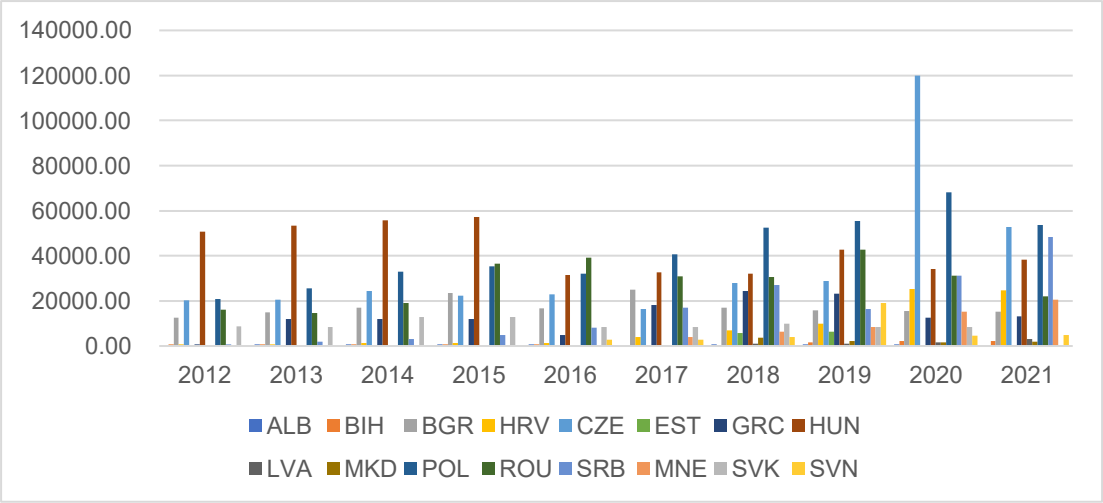


Figure 2.1.3.4 Stocks of Chinese OFDI in 16 CEE countries, year 2012-2021

As what we can see from the picture above, China's OFDI towards Hungary ranked the highest among the selected 16 countries of Central and Eastern Europe during the year from 2012 to 2016, followed by Poland, Romania, and the Czech Republic. After 2017, China's OFDI investment towards the selected 16 CEE countries mainly flowed to Romania, Poland, Hungary, the Czech Republic, and Bulgaria, etc. What's more, the volume of bilateral trade increased rapidly since 2012, and the highest volume of bilateral trade in the 2012-2021 period was in Poland, followed by the Czech Republic and Hungary.

From the perspective of industry, China's OFDI towards CEE countries covers infrastructure and construction, Energy, Manufacturing, Agriculture and Food Processing and so on. Take Greece as an example, In the year of 2008, COSCO Shipping signed a 35-year concession agreement with Greece. Later in 2010, COSCO Shipping Ports Piraeus Terminal Ltd (PCT) was established. Nowadays, with the continuous outward direct investment from China made to upgrade infrastructure, the Port of Piraeus is not only one of the leading container ports in the Mediterranean region, but also the new hub of the transport corridor between Europe and Asia. This investment not only provides many jobs opportunities for Greece and promotes local economic development, but also strengthens the company's competitiveness in the global market. In March 2023, the Belgrade-Novi Sad section of the Hungarian-Serbian railway officially marked its one-year anniversary of operation. As a highlighting project of China-Central and Eastern European countries cooperation, the railway has transported a total of more than 2.93 million passengers in the first year of operation, opening up a new era of high-speed railway in the Balkan region.

From the perspective of investment method, China adopted the outward foreign direct investment in a variety of ranging from greenfield investment to cross-border mergers and acquisitions, but with great variations among different countries. China has established new wholly owned subsidiaries or joint ventures in CEE countries to develop new projects, factories, and facilities from the ground up. These greenfield investments often involve the construction of manufacturing plants, infrastructure projects, and technology centers. For example, most of the investments in the Hungarian electric car factory, the Bulgarian locomotive factory, and the Croatian real estate development have been made through greenfield investments. In 2022, LINGLONG Tire established its first European factory in Serbia with a total investment of up to $990 million, which made the project the largest greenfield investment project under China-Central and Eastern European cooperation. According to the 2022 report on China's FDI in Europe, which was jointly released by Rhodium Group and the independent research institute MERICS, China's direct investment in Europe is shifting

from mergers and acquisitions to greenfield investments, with a key focus on investments in electric vehicle batteries. This annual report summarizes China's investment footprint in the 27 EU countries and the United Kingdom in the year of 2022. It shows that in 2022, China's greenfield investments in Europe increased by 53%, accounting for 57% of China's total direct investment in Europe, surpassing M&A for the first time since 2008. It indicates the significant shift in China's investment approach towards European countries and has made Chinese companies becoming major participants and key contributors in Europe's green transition.

2.2 “OBOR” initiative and “16+1” mechanism

The OBOR initiative, also known as the Belt and Road Initiative (BRI), is a significant global development strategy proposed by China. It was announced by Chinese President Xi in 2013 with the aim of promoting connectivity and cooperation among countries in Asia, Europe, and Africa. The initiative seeks to build infrastructure, enhance trade, and foster economic and cultural exchanges along two main routes: the Silk Road Economic Belt and the 21st Century Maritime Silk Road. In this process, China has been actively promoting the participation of CEE countries in the construction of the Belt and Road.

The 16+1 mechanism, also known as the China-CEEC cooperation, was established in the year of 2012. It aimed to enhance cooperation and strengthen ties between China and 16 Central and Eastern European countries. The 16+1 format included China and Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, North Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia, and Slovenia. In March 2021, Lithuania announced its withdrawal from this mechanism. And later in August 2022, both Latvia and Estonia also announced their withdrawal from the mechanism after the negotiations. They stated that the mechanism did not provide them with what they wanted, but they would continue to engage in cooperation through bilateral channels and within the framework of the European

Union. With the exit of the Baltic States, it can be said that the mechanism has changed from "17+1 cooperation" mechanism to "14+1 cooperation" mechanism.

The main objective of the original “16+1” mechanism was to promote trade and investment, enhance connectivity through infrastructure projects, and deepen cooperation in various sectors such as finance, agriculture, education, and culture. The initiative aimed to facilitate economic development in both China and the CEE countries, contributing to the implementation of the OBOR.

To make it clearer, the whole development of “OBOR” construction and “16+1” mechanism can be divided into three stages.

The period of active layout (2012-2015): China's cooperation with 16 CEE countries was officially launched in 2012, which preceded the introduction of the "Belt and Road Initiative" in 2013. In the "Bucharest Guidelines for China-CEE Countries' Cooperation" issued in 2013, the participating countries unanimously agreed to actively explore the construction of international transportation railways between China and Central and Eastern European countries and further promote the establishment of bonded zones and material distribution centers along the railways. The construction of the China-Europe OceanRail Logistics was proposed at the Bucharest Summit in 2013, which is an extension and upgraded version of the Hungary-Serbia Railway. This express line starts from the Greek port of Piraeus in the south and extends to Hungary, passing through Skopje, North Macedonia, and Belgrade, Serbia, covering a population of over 32 million people. This indicates that when the construction of the express line is completed, there will be a more efficient and convenient route for bilateral trade.

The period when achievements are continuously realized (2016-2019): The year from 2016 to 2019 was the period when achievements in China's cooperation with CEE countries in connectivity are continuously realized. However, it was also a period that the external environment for China-CEEC cooperation began to deteriorate. The

comprehensive outbreak of the 2017 US-China trade war and the strengthening of Europe's increased security review of China's investments, along with the EU's designation of China as a "systemic rival," all of which have made the external environment for cooperation more complicated. Despite these challenges, the solid foundation laid in the earlier phase allowed China-CEE cooperation to continue achieving significant results under the framework of the OBOR Initiative and “16+1” mechanism.

During this period, China and CEE countries opened multiple direct flight routes, such as direct flights from Beijing, Shanghai, Sichuan, and Xi'an to Warsaw, Prague, Budapest, and Athens. Meanwhile, infrastructure projects like Serbia's E763 highway, Montenegro's North-South highway, Miladinovic-Stip, and Kicevo-Ohrid highways were successfully completed.

The China Railway Express is another highlight of cooperation with CEE countries under the OBOR initiative and “16+1” mechanism. It is organized by China Railway Corporation, and operates international intermodal trains between China, Europe, and countries along the OBOR initiative. Prior to its construction, China planned to establish 43 hub nodes and develop 43 routes to improve the efficiency for transportation. The train route of the China Railway Express crosses the Eurasian continent and passes through several Central and Eastern European countries, including Poland, Czech Republic, Hungary, and Latvia. In the year of 2011, China Railway Express only operated 17 trains for the entire year. However, since then, the number of trains has steadily increased, reaching over 1,000 trains in 2016 and surpassing 8,000 trains in 2019.

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Numbers	17	42	80	308	815	1702	3673	6300	8225
Growth rate	0	15%	90%	285%	165%	109%	116%	72%	31%

Table 2.2.1 Numbers of China Railway Express

The Budapest–Belgrade Railway is another key project of the OBOR initiative and “16+1 cooperation” mechanism in Europe. The governments of China and Hungary signed the "Agreement on the Development, Construction, and Financing Cooperation of the Hungarian Section of the Budapest–Belgrade Railway" on November 24, 2015. According to the agreement, a joint venture company, consisting of China Railway International, China Railway Corporation, and the Hungarian State Railways, will act as the general contractor. On April 12, 2016, the Hungarian Parliament approved the decision to upgrade the Budapest-Belgrade railway in Hungary. Compared to the Hungarian section, the railway construction in Serbia has progressed relatively faster. The groundbreaking ceremony for the Belgrade-Old Pazova section of the Budapest–Belgrade railway Project in Serbia took place on November 28, 2017.

The period with both challenges and achievements (2020-): The construction of the One Belt and One Road initiative in Europe has faced formidable challenges, but progress has been made despite the severe impact of the COVID-19 epidemic and the Russian-Ukrainian conflict.

Firstly, the construction of the Budapest–Belgrade Railway continues to make progress. The Belgrade-Novi Sad section in Serbia was officially launched for operation in March 2022, and the Novi Sad-Sombor section held its groundbreaking ceremony in November 2021. The southern section project in Hungary started the construction in May 2022. To make a conclusion, despite facing various challenges, the Hungary-Serbia Railway construction has been actively advancing.

Secondly, the container throughput at the Port of Piraeus has increased from 880,000 TEUs in 2010 to 5.437 million TEUs in 2021, rising from the 93rd to the 29th position in the world ranking, making it one of the most promising container terminals globally. However, the COVID-19 pandemic has significantly impacted operations of the port, especially the cruise business. In the year of 2020, the overall performance of the port declined by around 20%. With the easing of pandemic control measures, the port's

operations have gradually recovered. In September 2022, the number of cruise ship dockings at the Port of Piraeus returned to around 700, with tourist numbers reaching approximately 600,000. Moreover, in the first half of 2022, the OceanRail Logistics, centered at the Port of Piraeus, transported 88,000 TEUs, a 38.3% increase compared to the previous year, and operated 1,262 trains, a 26% increase year on year.

Thirdly, Contemporary Amperex Technology (CATL) invested in Hungary. The largest investment project in the history of China-Central and Eastern European cooperation, the CATL project, held its commencement ceremony on September 5, 2022, with plans to complete the factory construction by 2025. The project is primarily located in Debrecen, Hungary, and there are some investments flowing into Poland. The estimated investment budget for the project amounts to 7.34 billion euros and is expected to directly create 9,000 new job opportunities. This investment by CATL is one of the five largest "greenfield investments" in Europe during the past decade and also the largest greenfield investment in the history of Hungary. Furthermore, CATL had already signed battery supply agreements with companies like BMW in Germany before investing in the construction of the factory in Hungary.

However, the Central and Eastern European co-operation under the OBOR initiative also face many challenges. In addition to the pending problems in trade co-operation between China and CEE mentioned above (refer to 2.1.3), the outbreak of the Russo-Ukrainian war has also caused negative impact.

At the beginning of 2022, the sudden deterioration of Russia-Ukraine relations had made an impact on transnational projects, including China-Europe Railway Express and other interconnectivity projects between China and Europe. Some international media even predicted a possible interruption of the China-Europe Railway Express transit through Poland. On March 14, 2022, the European Union approved a series of new sanctions against Russia, which led to a significant decline in the operation of the China-Europe Railway Express. For instance, in the first quarter of 2022, the number

of China-Europe Railway Express trains from Xi'an decreased to 568, compared to 606 during the same period of the previous year, and from Chongqing to 265, compared to 724 in the previous year's same period. What's more, the Russia-Ukraine conflict also led to high inflation, soaring prices, and an energy crisis in Europe, which resulted in increased costs of raw materials used in the construction of the Budapest–Belgrade Railway project, affecting the normal progress of the cooperation between China and CEE countries.

2.3 The post-pandemic era

Since the outbreak of the COVID-19 pandemic in the year of 2020, many countries around the world have implemented measures such as travel restrictions, border closures, limitations on residents' movement, social distancing, and even temporary shutdown of businesses, which have had certain impacts on China's outward foreign direct investment towards CEE countries. According to statistics from the Ministry of Commerce, from January to October 2020, China's non-financial outward foreign direct investment amounted to 86.38 billion US dollars, a decrease of 3.2% compared to the same period in last year. In terms of investment methods, overseas mergers and acquisitions reached a ten-year low. According to Ernst & Young's report, in the first half of 2020, Chinese companies announced a total of 14.6 billion US dollars in overseas merger and acquisition projects, a decrease of 40% compared to the same period last year, with a total of 248 acquisitions, a decrease of 17%. Among them, Asia was the top destination for Chinese companies' mergers and acquisitions, with transaction value amounting to 7.06 billion US dollars, a decrease of 31%.

It can be said that the global economy is entering a new period of downturn. The post-pandemic era will bring about significant changes in the international landscape, world order, and global economic and trade patterns, leading to increased uncertainty in global economic and trade policies. On December 26, 2022, the official notice from China's National Health Commission indicated that China's pandemic era had ended, and the

China-CEEC cooperation mechanism entered a new stage. In the first quarter of 2023, bilateral trade reached 33.3 billion US dollars, an increase of 1.6%, showing overall stability at the beginning of the year. Investment cooperation has become increasingly close, with China's direct investment in the CEE countries experiencing a significant increase of 148% year on year in the first quarter of 2023, indicating a strong willingness of Chinese companies to invest in the CEE region. Up to now, the scale of two-way investment between China and the CEE countries has reached nearly 20 billion US dollars.

However, the COVID-19 pandemic will have long-lasting impacts on countries' industrial structures and industrial policies (Wu, 2021). The impact of the pandemic on the economies can be multi-faceted. For countries with a service-oriented industrial structure, their economic resilience would be weaker, making them more vulnerable to the long-term pandemic's impact. Countries with a robust manufacturing sector and a more diversified industrial structure would have stronger economic resilience and can better withstand the shocks caused by the pandemic. Additionally, countries with a strong ICT industry and digital service sector are likely to benefit from changes in demand patterns resulting from the pandemic's impact (Wu, 2021). Under this circumstance, global trade relations may undergo the following changes in the post-pandemic era.

Firstly, the global trade growth rate is likely to slow down. The 2008 financial crisis already caused significant changes in the trend of globalization, leading to a decline in global trade growth rates. After the pandemic, both developed and emerging market countries may face the impact of derivative risks. Enormous debt and currency issues could lead to a longer period of economic stagnation or even recession after a temporary recovery.

Secondly, global supply chains will be restructured. The outbreak of the COVID-19 pandemic disrupted global supply chains, prompting multinational corporations and

governments to rethink the current system of global industrial division based on comparative advantage and economies of scale. More countries prioritize ensuring supply chain security, focusing on sensitive areas highly relevant to national security and development potential, such as healthcare, food security, essential energy resources, advanced technologies, and high-end manufacturing. This will have a significant impact on China's foreign trade industry, which is deeply involved in global division of labor, has complex industrial structures, and relies heavily on global logistics networks.

Moreover, digital transformation in global trade will accelerate. The pandemic has promoted the integration of the Internet, big data, and traditional foreign trade industries, accelerating the digitalization process of service trade and diversifying trade patterns. Digital technology not only changes the international trade structure and mode but also significantly alters the content of international trade. In the post-pandemic era, global digital trade will continue to grow.

Additionally, "carbon neutrality" will reshape the global trade landscape. As countries worldwide set "carbon neutrality" goals and the US rejoins the Paris Agreement, "carbon neutrality" has become an important factor in adjusting the global trade pattern. In the post-pandemic era, the impact of "carbon neutrality" on global trade mainly manifests in two aspects. First, carbon tariffs will increase the cost of high-carbon traded goods, leading to higher trade costs for exporting countries of high-carbon products. Second, "carbon neutrality" will drive the growth of new energy equipment and low-carbon product trade, creating new trade advantages for technologically advanced countries.

With the global spread and impact of the COVID-19 pandemic, countries are paying more and more attention to digital transformation and sustainable development. In the post-pandemic era and beyond, public health, digital economy, energy conservation and emission reduction will become important factors which would influence cross-border investments. Financial and investment resources will increasingly tilt towards green

and low-carbon sectors (Wang, 2021).

At the same time, the public health crisis triggered by the pandemic has led countries to focus more on international investment rules related to labor, environmental protection, and resources. Changes in lifestyles and work patterns, such as remote work and home-based living, have accelerated the development of service-oriented and digitized manufacturing industries, driving reforms in international investment rules. Sustainable development and inclusive growth have become the core concepts of the new generation of international investment rules (Wu, 2023).

Overall, the post-pandemic era will witness significant changes in the global trade and cross-border investment. To adapt to the trends of economy and trade in the post-pandemic era in Central and Eastern European countries and to adjust China's investment industry layout with these countries, it is crucial to strengthen China's economic and trade cooperation with Central and Eastern European countries in the future.

Chapter 3 Literature Review

3.1 What is Outward Foreign Direct Investment (OFDI)?

Outward Foreign Investment (OFI) refers to the international capital flows with the objective of increasing productivity and capital appreciation. To be more specific, it can be treated as an economic activity in which a transnational corporation (TNC) makes investment with all of its industrial or financial capital abroad in order to achieve value growth. It can also be termed as a business strategy, which refers to the expansion of business abroad by firms in the home country.

According to the division of investment subject, Outward Foreign Investment can be divided into two categories: government investment and private investment. According

to the division of the nature of Outward Foreign Investment, it can be divided into Outward Foreign Direct Investment and Outward Foreign Indirect Investment. For a long time, international private investment has been dominant in international investment, and more and more government investments are also carried out in the form of overseas investment by state-owned funds or state-owned enterprises, so the extension of Outward Foreign Direct Investment from China referred to in this paper can be regarded as consistent with the Outward Foreign Direct Investment of Chinese enterprises (Wang, 2016).

3.2 Why making Outward Foreign Direct Investment (OFDI)?

3.2.1 Macro theories of international direct investment

a. OFDI Theory from a Socialist Perspective

Since the Industrial Revolution, OFDI has begun to appear dramatically in the pursuit of capital multiplication in the context of capital surplus. Marx & Moore (1998) believed that capitalism harbored contradictions of long-term consumption insufficiency and production surplus. In such circumstances, capital was exported to absorb excess savings and prevent a falling rate of profit in domestic, and foreign markets were utilized to alleviate domestic contradictions. Furthermore, due to the international division of labor in production, capital would inevitably engage in international mobility. On the basis of Marx's perspective, Lenin (1970) pointed out that the concentration of production and capital would inevitably lead to monopolies, coupled with the fusion of banking and industrial capital, which would inevitably give rise to international financial oligarchies. These financial oligarchies would replace commodity exports with capital exports.

The direction of capital flows studied by Marx and Lenin was singular, i.e., from the imperialist countries to the colonial countries (Wang, 2016). However, after World War II, with the decolonization of many colonies and semi-colonial countries, developed

countries began to export capital to developing countries according to their own economic needs. Simultaneously, developing countries sought to utilize foreign capital to alleviate their domestic capital shortages and foster economic development. Marx and Lenin's research primarily emphasized the political effects of foreign direct investment, and their theories were influenced by historical limitations, making them insufficient to fully explain China's current behavior in outward foreign direct investment in today's globalized economy. However, based on the studies of Marx and Lenin, it can be argued that political factors are also likely to influence China's outward foreign direct investment.

b. The Theory of Investment Development Cycle

Based on the two-gap model conducted by Chenery & Strout, Dunning (1981) proposed the theory of investment development cycle. The basic idea of the theory is that a country's level of economic development will have a significant impact on determining the status and condition of its outward foreign direct investment.

Dunning (1981) takes GDP per capita as an indicator of the level of economic development, divides economic development into four stages, and points out the flow of outward foreign direct investment at each stage. At the first stage, the value of GDP per capita is below 400 USD. Countries at this stage have no direct investment output since they have not developed an ownership advantage, and only a small amount of direct investment inflows because the poor investment climate. At the second stage, with GDP per capita between 400USD and 1,500USD, countries in this stage have become significantly more attractive to foreign capital, resulting in large inflows of foreign capital, but outward capital exports are still very limited due to the low level of domestic economic development. At the third stage, the per capita GDP is between 2,000-4,750USD. Countries in this stage have a substantial increase in outward investment, and their development is likely to be faster than the inflow of FDI, but the net outward investment is still negative. At the fourth stage, the per capita GDP is more than 4,750USD, and the countries in this stage are the developed countries, which have

a strong ownership advantage, therefore the net outward investment grows positively. The investment development cycle theory suggests that, for developing countries, outward investment from developing countries occurs because of their own growing ownership advantages (Liu, 2008).

However, although Dunning attempted to correct the discrepancy between the theory and practice by adding a fifth stage, the conclusion was still of poor accuracy (Wang, 2016). According to World Investment Report 1999 (2000), the development of a country's OFDI does not necessarily follow the process of the net flow of OFDI from negative to positive. And from the actual data on the flow of OFDI of various countries in recent years, it is more of a process of going from unidirectional absorption and utilization of foreign investment to the parallel process of utilization of foreign investment and OFDI.

Dunning's cycle of investment development theory is the result of a study of selected host countries based on the UK context. The theory is a sign of the maturation of OFDI research (Wang, 2016). The theory is able to explain the growth of China's OFDI to a certain extent, however, it needs to be revised according to the global economic environment and China's economic situation.

Based on Dunning's theory, Ozawa & Kenen (2014) proposed that improving economic competitiveness was the basic reason for developing countries to move from purely attracting foreign investment to investing abroad. The outward investment of developing countries should be combined with national industrialization strategies. His theory, which is conditional on export orientation, not only stresses the need for developing countries to participate in transnational investment, but also proposes principles of selection and steps for its realization, which further enriches the theory of international direct investment.

3.2.2 Micro theories of international direct investment

a) Monopolistic Advantage Theory of Direct Foreign Investment

The Monopolistic Advantage Theory was first proposed by Hymer (1976). Through the study of the investment behavior of multinational corporations, he pointed out that the motivation for enterprises to make multinational investments is mainly from two aspects: on the one hand, multinational enterprises prefer to make overseas investments in order to domesticate the enterprises' external transactions, thus effectively preventing the risk losses brought about by imperfect information from the external market. On the other hand, enterprises have a monopoly advantage over host country enterprises in terms of technology, management, and capital. Under this circumstance, multinational investment can make the enterprise effectively bypass the industrial barriers to entry set by the host country, reduce the compulsory entry costs. Kindelberger (1975) suggested that incomplete product market, incomplete factor market and market distortions caused by trade barriers are the main motivations for making OFDI by enterprises. Caves (1970) introduced intellectual capital into the Monopolistic Advantage Theory. He pointed out that firms can reduce the cost of intellectual capital through OFDI and make it flow between global subsidiaries at a lower cost. Knickerbocker (1973) pointed out in his study that the main reason for firms to make OFDI is to follow the behavior of oligarchs.

The Monopolistic Advantage Theory pioneered the systematic study of the direct investment behavior of multinational corporations. It takes imperfect competition as a precondition, frees the theory of OFDI behavior from the constraints of traditional neoclassical theory, and explains the generating motives of OFDI from the micro point of view of multinational corporations in developed countries (Wang, 2021). However, this theory is based on the study of the economic behavior of developed countries in the 1960s, therefore, it has no explanatory power for the OFDI of firms that lack monopoly advantages and firms from developing countries.

b) The Theory of Localized Technological Change

According to Lall (1991), the application and improvement of mature technologies can enable developing country enterprises to form and develop their own specific advantages and thus implement outward investment. Thus, firms in developing countries can develop their specific international competitive advantages through the improvement of mature technologies. In this case, they can produce products that enable to meet the market demands and consumer preferences of developing countries, and also enable to develop differentiated products.

Tolentino & Lall (1994) have analyzed the stage-by-stage dynamic evolution of outward investment from developing countries in the perspective of technological progress and technological accumulation. The main point of the theory is that the improvement of developing countries' technological capabilities is directly related to the accumulation of their outward investment, and that the accumulation of technological capabilities would affect the amount and growth rate of their outward investment. Through OFDI, developing countries can strengthen technological innovation, thereby optimizing industrial structure and enhancing international competitiveness.

This section provides a brief overview of outward investment theory, with the aim of clarifying the motivations for a country and an enterprise to make outward foreign direct investment.

3.3 How to make Outward Foreign Direct Investment (OFDI)?

Outward Foreign Direct Investment can be realized in the following three ways: cross-border mergers and acquisitions, greenfield investments, and strategic alliances (Wang, 2023). Mergers and acquisitions refer to Outward Foreign Direct Investment made by investors through the purchase of equity in the surviving enterprise in the host country. As for the greenfield investment, according to the definition given by United Nations,

it generally refers to the establishment of a new business in a foreign country by a parent company that builds a new operating facility from the ground up. Except for building new facilities, a majority of parent companies also create new permanent jobs in foreign countries by hiring new employees.

It is very critical for enterprises to choose the way to make the outward foreign direct investment. The reason why choosing the right mode of international entry is important is that the correct setting of the firm's boundaries can have a significant impact on firm performance (Brouthers, 2013). What's more, according to the research from Pedersen & Benito (2002), once the entry mode has been identified, it would be difficult to change or correct, which implies that the selection of entry mode would make a long-term impact on the enterprise and to some extent the further investment. Brouthers & Hennart (2007) stated that the institutional environment of a country would affect the way in which TNCs makes outward foreign direct invest, as it reflects the "rules of the game". Cheng (2008) also argued that the host country's institutional environment and resource endowment are critical factors which would influence transnational corporations' choices when selecting the entry mode. An enterprise which trying to enter a foreign market will be accepted and recognized by the host country more quickly and easily only if it meets the needs and expectations of the host country (Yiu & Makino, 2002). By constructing a two-stage dynamic game model, Pi et al. (2016) compared and analyzed the returns of home country's enterprises under the approaches of greenfield investment and cross-border mergers and acquisitions, respectively. It can be found that when the market size is larger, the stronger the trend of cross-border mergers and acquisitions is better than greenfield investment. In this case, enterprises would be more likely to choose the cross-border M&A method. Pan & Tse (2000) found that OFDI by enterprises takes the ability to reduce transaction costs as a criterion when choosing investment modes. When enterprises enter a foreign market for the first time, they tend to choose the cross-border merger and acquisition mode when lacking experience in cross-border operations and understanding of the host country, which indicates a greater uncertainty. Based on the research conducted by Yu & Tian (2023),

nowadays, the development of the digital economy has strongly contributed to the evolution of the financial system. Therefore, it can be argued that information technology and digital finance have become important factors influencing the cross-border investment decisions of enterprises. In addition, the industry in which the firm operates is also a critical factor that influences the firm's preference for the mode of entry. For industries with strong intangible assets and R&D intensity, firms prefer cross-border M&As because they can capture the intangible assets and R&D technology of the acquired firm in the fastest time (Delios & Beamish, 1999). However, it is more likely to make the greenfield investment if the firm is still in the initial stage of the industry (Larimo, 2003). According to Xiao et al. (2021)'s study, it shows that China's enterprises' outbound investments in the field of energy are mainly in the form of cross-border mergers and acquisitions, and that the effect of cross-border M&A investments is significantly higher than that of greenfield investments. There are also many scholars conducting analysis at the micro level. After conducting the Logit regression analyses based on a large sample of Chinese firms, Harzing (2002) argues that large firm size would significantly motivate multinational firms to invest in the way of cross-border M&As. The study of Zhou et al. (2015) reveals that the cross-border mergers and acquisitions procedures are cumbersome, so the risk would be higher compared to greenfield investment. In this way, only enterprises who have higher productivity and stronger management ability tend to choose cross-border mergers and acquisitions methods. According to Li (2009), firms with high productivity should choose outward foreign direct investment rather than trade. At the same time, firms with higher productivity tend to prefer cross-border mergers and acquisitions, and conversely, firms with lower productivity tend to choose greenfield investment. Nocke & Yeaple (2007) analyzed the ways in which enterprises enter the international market by establishing a general equilibrium framework, and the results proved that the greenfield investment approach is more favorable to the development of the home economy, while cross-border mergers and acquisitions is more favorable to the host country.

This section attempts to understand a fundamental issue, namely, how to make outward

foreign direct investment. When analyzing the factors influencing China's outward investment towards Central and Eastern Europe, the consideration of the enterprise, as the investment subject, is a part that cannot be ignored. We found a number of papers examining the influencing factors on whether enterprises make outward foreign direct investment and the methods of it. These influencing factors that are important to enterprises will also significantly influence China's OFDI in a way, which provides us with inspiration. Based on what we have learned above, we will analyse them in more detail in the next section.

3.4 The influencing factors of OFDI

Wang (2016) argued that the factors affecting OFDI can be divided into direct and indirect categories. Direct factors are those that can be classified as market oriented. It includes the factors of resources, capital, labor, technology, and intellectual property rights, the presence of which can directly influence the OFDI. The presence of direct factors in an investing country can generate comparative advantages which can motivate OFDI in the host country, while the presence of direct factors in the host country can induce the investing country to undertake OFDI in order to acquire specific factors. Indirect factors refer to those who are not market oriented, mainly including, on the one hand, indirect factors in the home country, such as the existence of policies encouraging OFDI investment, international agreements with the host country, etc. On the other hand, it also includes indirect factors of the host country, such as political stability, tax policies, and laws.

Many scholars have conducted research trying to find out how direct factors contribute to outward foreign direct investment. Based on the data of China's outward foreign direct investment flows to 74 countries from 2003 to 2007, Li (2011) used the GMM estimation for dynamic panel data. The study concluded that host country’s technology level did not significantly attract Chinese OFDI. However, (Pantelidis & Kyrkilis, 2005) showed that modern technology would affect efficiency and direct OFDI flows to

technologically advanced countries. Yang (2016) presented another conclusion through his study that Chinese firms have significant technology-seeking motives for investment in developed countries, however, not for investment in developing countries.

As for the factor of the economic development, Ahmad & Yang (2018) stated that a higher per capita income in a country indicates a higher change point in demand, which leads to a higher propensity to innovate in products. This, in turn, will increase the propensity for foreign direct investment. And it is consistent with the results conducted by Shahriar, Kea & Qian (2020). The research found that GDP and per capita income are important determinants which would influence China's OFDI. Li et al. (2019) found that overall Economic Freedom and GDP have a significant influence on OFDI along the BRICS countries. The factor of economic development is also a critical factor for Singapore when making outward foreign direct investment (Lee et al., 2016). Based on the gravity model, Cheng & Ruan (2004) found that the sum of the economic sizes of the home and host countries is positively correlated with the flow of international direct investment between two sides. In addition, the more similar the economic development level of the two countries are, the greater the international direct investment flows between them. Based on the static panel model, Li (2007) used the panel data of 55 countries during the period 1980-2004 to test the various influencing factors on the OFDI of a country or region and found that the per capita GDP of the home country would significantly influence the outward investment from the home country. Mumtaz & Smith (2018) investigated the determinants of China's outward foreign direct OFDI in 67 countries over the period 2006-2015 based on FGLS method. The findings have shown that China's OFDI in different developing and emerging countries is driven by various factors, and that the determinants of China's OFDI differ between countries with lower and higher per capita incomes.

Increased OFDI is also associated with the enrichment of labor. According to Pantelidis & Kyrkilis (2005), As a country's human resources increase, so does the level of FDI. However, the situation would be various among different countries. For example,

developed European countries specialize in foreign direct investment of human resources, while non-European countries are more on technology concentrated (Ahmad & Yang, 2018). Xiong (2018) conducted an empirical analysis using panel data on China's ODI in 48 key countries along the Belt and Road during the period over 2005-2015, confirming that the labor force of the host country has a significant impact on China's outward direct investment.

Many scholars also focus on the relationship between transport distance and OFDI. Alam et al. (2019) conducted a panel regression with a random effects model and made the estimation based on the data of 27 Asian countries over the period 2006 to 2015. The findings imply that distance is a critical factor to be considered for China's enterprises to make the outward direct investment decision. Using a gravity model, Hassan (2001) suggests that the investment may decrease with distance after analyzing the trade within the South Asian Association.

As for the factor of resource, there is no consensus on the relationship between resources and OFDI. An empirical analysis by Buckley et al. (2007) of China's outward FDI in 49 countries from 1984 to 2001 found that the outward FDI by China's enterprises is strongly associated with the host country's natural resource endowment. According to Ross (2015), the access to natural resources in host country is a major determinant of Chinese OFDI in Africa. Xiong (2018) also proved that host country's natural resources would have a significant impact on Chinese OFDI.

OFDI is also associated with the trade between the home country and the host country. The research conducted by Alam et al. (2019) considers 27 Asian countries over the period 2006-2015, and the results show that the investment decisions of China's enterprises are influenced by the import and export trade between home and host countries. Padilla-Perez & Nogueira (2016) explored the determinants of OFDI in small developing economies and found a positive link between international trade and OFDI in host economies. After analyzing the determinants of China's OFDI towards EU,

Dreger (2017) finds that trade volume between two countries are critical factors which would promote OFDI in the EU. Li, Huang & Dong (2019) also found that bilateral trade would significantly affect China's OFDI along the BRICS countries.

Many studies have also focused on the impact of indirect factors on Outward Foreign Direct Investment. As what have been illustrated above, policy is always a critical influencing factor to be considered. Elshamy (2015) argues that liberalization policies have a significant positive impact on Chinese OFDI in Egypt. In examining the analysis of factors affecting Chinese firms' outward investment towards different industries in Europe, Lv & Spigarelli (2016) stated that politically stable countries will attract investment in services. Yang, Liu & Zhang (2016) conducted an empirical analysis based on the data of Chinese enterprises' outward FDI from 2005 to 2014, and the results proved that friendly bilateral political relations would help to promote the scale and the success rate of its investment and the success, but it would be various among different industries. However, contrary to what have been mentioned above, Yang et al. (2015) note that China tends to invest in developing economies with significant political risks. The authors further report that seeking political relations are the main motivations for China to make outward investments. It can be concluded that China prefers to undertake OFDI activities to countries with imperfect institutions (Kolstad & Wiig, 2009). Miniesy & Elish (2017) also note that weak governance of host country is an important determinant for China to make outward foreign direct investment. Wang, Du & Wang (2014) found that China is less concerned about the political stability of the host country it would make outward foreign direct investment in. According to the review on OFDI research results over a period from 1993 to 2000 published by Paul & Benito (2017), there is no unanimous conclusion on the determinants of China's OFDI. It would be a mistake to treat all OFDI from China the same, given the uniqueness of China's institutional environment, which profoundly affects the OFDI characteristics of Chinese firms under different ownership structures. (Torres et al., 2018).

Yuan (2018) conducts an empirical study based on the data of China's OFDI flows to

136 regions from the period from 2005 to 2014. The results of the study show that the impact of the host country's tax factors on China's cross-border capital flows is country-specific. In the process of investing in developed countries, China's cross-border capital flows are more likely to go to countries with simple tax structures and low effective tax rates. In the case of investment in developing countries, this does not seem to be of much concern to our enterprises. Yang (2021) mention that when the host country's policy fluctuations are unstable, the host country's tax policy would fluctuate. And enterprises, in order to maintain a stable cash flow, tend to reduce their direct investment in the host country, thus reducing the risk of investment.

This part sorts out the relevant literature that examines the factors which would influence the outward foreign direct investment. And it can be found that there is less literature on OFDI and unemployment rate of in the host country, which somehow reflects the instability. This paper prepared to take unemployment rate as a factor that may affect OFDI and explore the relationship between the two, which to some extent can make up for the lack of existing research.

3.5 Gravity Model

When predicting activities between two or more locations, GM is always a popular mathematical model. The traditional gravity model reveals that the force of attraction between 2 objects, and the force of gravity is directly proportional to the mass of the objects and inversely proportional to their distance.

The gravity model of bilateral trade between two countries is developed by Tinbergen in the year of 1962. According to his argument, the geographical disparity between the two countries and the economy measured by GDP had a significant effect on the trade. What’s more, gravity relationship can arise in almost any trade model that includes trade costs that increase with distance. At the beginning, the bilateral or multilateral gravity model only contains the geographic distance between two countries and the host

country's market size as influencing factors. The volume of trade between two countries is directly proportional to the total volume of their economies and inversely proportional to the distance between them. The traditional trade gravity model is illustrated as follows:

$$X_{ij} = A(GDP_i \times GDP_j)/D_{ij} \quad (1)$$

In the equation above, X_{ij} represents the bilateral trade volume between country i (exporter) and country j (importer). GDP_i represents the gross domestic products of country i and GDP_j represents the gross domestic products of country j. D_{ij} represents the distance between two countries and A is a constant. Taking logarithms on both sides of the formula, then we can get a new one as follows:

$$lnX_{ij} = \alpha_0 + \alpha_1 lnGDP_i + \alpha_2 lnGDP_j - \alpha_3 lnD_{ij} + \mu_{ij} \quad (2)$$

In the equation 2, the minus sign before $\alpha_3 lnD_{ij}$ is considered to be an impediment to the value of exports due to the distance variable. Then we may convert this equation into a more common way：

$$lnX_{ij} = \alpha_0 + \alpha_1 lnGDP_i + \alpha_2 lnGDP_j + \alpha_3 lnD_{ij} + \mu_{ij} \quad (3)$$

Equation 3 is the classical expression of the trade gravity model, from which most studies have been extended. However, it's obvious that national income, political environment, and trade policies, etc. will also influence the scale of the trade between countries. As a result, many researchers are increasingly adding more influencing factors to the equation and creating an extended gravity model. The model has been shown to work well in foreign direct investment stocks. Head & Ries (2008) construct a gravity model which matches the data well. In this way, gravity analysis would be the best one to be applied to this paper since it tries to figure out the influencing factors

which would affect China's OFDI towards CEE countries.

3.6 Stochastic Frontier Gravity Model

To explore the technical efficiency in the function of production, Meeusen & Broeck (1977) combined panel data with stochastic frontier analysis and classified the stochastic disturbance term ε into stochastic shocks ν and technological inefficiency term μ. The is widely used in various fields, particularly in economics, agriculture, and healthcare. Later, Battese & Coelli (1992) refer to stochastic frontier analysis in the gravity model of trade, which is not only effective in estimating the trade potential and efficiency, but also able to analyze the natural and man-made factors affecting trade. The primary goal of the stochastic frontier model is to separate observed output (production) into two components: the "efficient" component, which represents the output that can be achieved with the best use of available inputs, and the "inefficient" component, which represents the deviations from the best production practices due to factors such as managerial inefficiencies, technological constraints, or external factors. To make a summary, the stochastic frontier model is useful for various reasons: 1) It allows for the identification and measurement of inefficiency in production processes. 2) It helps in comparing the relative performance of different units within a sector or industry. 3)It can be used for policy analysis and efficiency improvements. Researchers often use the stochastic frontier model to analyze the production efficiency of trading, thereby providing insights into resource allocation, managerial practices, and policy recommendations.

The basic setup of the stochastic frontier gravity model is set as follows:

$$T_{ijt} = f(x_{ijt}, \beta) \tag{1}$$

In the equation (1), T_{ijt} represents denotes the trade level of country i and country j at time t. When there exists obstacle for trade between the two countries, the trade level

of country i and country j can be analyzed. When there is impediment to trade between the two countries, the gravity model is expressed as follows:

$$T_{ijt} = f(x_{ijt}, \beta) exp(v_{ijt}) \exp(-u_{ijt}), u_{ijt} \geq 0 \quad (2)$$

Take a logarithmic number on both sides of the equation (2), then we can get the model as follows:

$$lnT_{ijt} = lnf(x_{ijt}, \beta) + v_{ijt} - u_{ijt}, u_{ijt} \geq 0 \quad (3)$$

In equation (3), x_{ijt} is the core explanatory variable of T_{ijt}; β is the parameter that need to be estimated, and $f(x_{ijt}, \beta)$ is the deterministic production function that relates input to output; $v_{ijt} - u_{ijt}$ represents the composite error term, in which v_{ijt} is a random error term obeying the normal distribution with mean 0 and σ^2 variance, which represents unobservable factors which would affect the level of trade, and u_{ijt} represents the trade inefficiency term obeying the half-normal truncated distribution, which covers the human factors which would hinder trade between two sides. When $u_{ijt} \geq 0$, it implies that factors of trade resistance exist, and there exists an inhibitory effect on trade, and when $u_{ijt} = 0$, it would indicate that there is no resistance when the trade happens. And when $u_{ijt} = 0$, the model would be as follows:

$$T^*_{ijt} = f(x_{ijt}, \beta) exp(v_{ijt}) \quad (4)$$

In the equation (4), the item of T_{ijt} represents the potential of trading, that is, to maximize the level of trade between two sides. At this point, on the basis of equation (2) and equation (4), the trade efficiency would be set as follows:

$$TE_{ijt} = \frac{T_{ijt}}{T^*_{ijt}} = exp(-u_{ijt}) \quad (5)$$

In the equation (5), when the item of u_{ijt} equals to 0, it implies that the trade efficiency would be in the maximum level and value of TE_{ijt} would equal to 1. When $u_{ijt} \geq 0$,

it indicates that there exists a loss in trade efficiency, therefore, $TE_{ijt} \in (0,1)$.

At the early stage, the models don't change over time and therefore they were called as time-invariant models. However, the original setting that the efficiency won't change doesn't fit the reality when there's a long time-dimension. In this way, the time-varying model comes into being and it's set as follows (Wu, Hu & Zhao, 2023):

$$u_{ijt} = \{\exp[-\eta(t-T)]\}u_{ijt}, u_{ijt} \geq 0 \quad (6)$$

In the equation (6), T represent the time dimension and η represents the parameters which need to be estimated. When $\eta > 0$, the resistance of trade would become smaller over time; when $\eta < 0$, the resistance of trade would become bigger over time; when $\eta = 0$, the trade efficiency would stay the same over the time. And at that time, the model would become the time-invariant model.

What's more, early literature utilized a two-step approach to study the specific factors which would affect trade inefficiency, but the two-step approach would suffer from biased parameter estimations and conflicting assumptions. In 1992, Battese and Coelli constructed a model, in which the trade inefficiency term would be substituted into the stochastic frontier gravity model, where the trade inefficiency term u_{ijt} is set as:

$$u_{ijt} = \alpha z_{ijt} + \varepsilon_{ijt} \quad (7)$$

In the equation (7), z_{ijt} represents the factors which would affect trade inefficiency; α is the parameter to be estimated. When α is more than 0, z_{ijt} would have positive effect on u_{ijt} and when α is less than 0, z_{ijt} would have negative effect on u_{ijt}. α is a random disturbance. Then we can get the equation after substituting equation (7) into equation (3):

$$lnT_{ijt} = lnf(x_{ijt}, \beta) + v_{ijt} - (\alpha z_{ijt} + \varepsilon_{ijt}) \quad (8)$$

Regressing equation (8) with stochastic frontier analysis, we can get the estimates of the factors which would affect trade inefficiency, and then we can figure out the relationship between these factors and trade inefficiency items.

Many scholars utilize Stochastic Frontier Gravity Model when trying to calculate the efficiency. Wu, Hu & Zhao (2022) selected a sample of 16 countries along the Belt and Road from 2008 to 2019 and used a stochastic frontier gravity model to empirically analyse the trade efficiency between China and the countries along the Belt and Road. Wang (2021) calculate the investment efficiency of 20 target countries of China's outward FDI from year 2011 to 2019 based on the stochastic frontier gravity model. Under this circumstance, this paper would also utilize the Stochastic Frontier Gravity Model to make the calculation on China's investment efficiency towards 16 CEE countries.

Chapter 4 Empirical Analysis

Two components will be included in this part. First, we would make assumptions on the main factors which may influence China's decision on outward foreign direct investment towards CEE countries according to existing literature. Then we would make the empirical analysis, trying to find out the overall influencing factors, get a comprehensive understanding of the different investment motivations and comparing the results with the hypotheses we made in the previous part.

4.1 Assumptions and Variables

When making analysis on the factors which may influence the OFDI, scholars have always focused on two perspectives: home country and host country. However, the conclusions are highly differentiated due to the different selection in research objects,

data sources, variables, and research methods. In this paper, when studying the influencing factors of China's outward foreign direct investment towards Central and Eastern European countries, variables such as the level of economic development of the home country, the level of economic development of the host country, the level of trade dependence of the host country, the bilateral trade between two sides, the host country's resource endowment, the investment cost, the level of technological exports, the labor force, the unemployment rate of the host country and the host country's political environment are selected to be the influencing factors which may affect China's OFDI. Based on the existing literature and the specific development situation of each CEE country, we make the following assumptions, as shown in the table below.

Hypotheses	Independent Variable	Correlation between China's OFDI and Independent Variable
1	Economic development: home country (China)	+
2	Economic development: host countries (CEE)	+
3	Economic development: trade dependence	+
4	Market size: Total bilateral trade between China and CEE countries	+
5	Investment cost: transport distance	-
6	Investment cost: tax rate	+
7	Total labor force in the country	+
8	Resource endowment of the host country	+
9	Technology Exports of the host country	+
10	Unemployment rate of the host country	-
11	Political environment of the host country	+
12	Common official language	+
13	Common boundary	+

4.2 Model Setting

4.2.1 Data resources

Considering the availability of data, 16 countries in the CEE region were selected for the study and they are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Estonia, Greece, Hungary, Latvia, Montenegro, North Macedonia, Poland, Romania, Serbia, and Slovak Republic. Then we collect panel data of China and selected CEE

countries from year 2012 to year 2021 to draw the analyze. The data of dependent variable-stocks of China's OFDI towards CEE countries is obtained from *Statistical Bulletin* on *China's Outward Foreign Direct Investment* issued by the National Bureau of Statistics of China. For the data of independent variables-China's GDP, GDP of host countries, Total tax rate (% of profit), High-technology exports (% of manufactured exports), Unemployment rate (% of total labor force), Total labor force, Political Stability and Absence of Violence/Terrorism and Total natural resources rents (% of GDP) are all obtained straightly from World bank database. The data of dependent variable-total bilateral trade between China and CEE countries comes from UN Comtrade database. For the variable trade dependence, this article first extracts the trade volume (goods and services) of CEE countries from the World Bank database. The trade volume as a share of overall GDP was calculated and then set as a measure of trade dependence. For the dependent variable transport distance, this part uses airline distances obtained from the CEPII database multiplied by the current year's crude oil price as the transport distance. The reason for this is that it provides a better measure of the transportation costs involved in trade (Shu, 2021). The dependent variable-whether having common official language and common boundary are obtained from CEPII database.

4.2.2 Full-sample model

This paper adopted an extended gravity model to figure out the factors which may influence China's OFDI towards Central and Eastern European countries. According to Bevan & Estrin (2004), gravity model can be adopted as a useful and efficient analytic method to understand FDI and identify its co-determinants across countries. The gravity model is considered to be an admirable way when trying to assess the significance of variables in attracting FDI. Under this circumstance, this paper adopted the extended gravity model as follows:

$$OFDI_{ijt} = \alpha + \beta X_{ijt} + \gamma X_{ij} + \mu_{ij}$$

In the equation above, $OFDI_{ijt}$ represents China's outward direct foreign direct

investment towards country j in the year t. X_{ijt} represents dependent variables which would make effect on China's OFDI in CEE countries changing over time while X_{ijt} covers the variables that would influence China's OFDI towards host countries but doesn't changing over the time. α is the constant and β includes regression coefficients for each variable. μ_{ij} represents the random variables. And since i only represents China, it would be better to move it from the model. The detailed description of variables is listed as follows:

	Long name of the variables	Short name of the variables	Description
X_{ijt} : the variables changing with time	China's GDP	CGDP	China's GDP can reveal the economic development as well as the market size of the home country
	Host countries' GDP (CEE countries)	HGDP	Host countries' GDP can reveal the economic development as well as the market size of the 16 CEE countries
	Total bilateral trade between China and host countries	TRA	Total bilateral trade can reveal the level of trade between two sides
	Transport distance between China and host countries	DIS	Transport distance is calculated as the airline distance multiplied by the crude oil price at the reported year, indicating that transport costs may vary with the distance between two sides and with the price of crude oil
	Total labor force in the host countries	LAB	Total labor force can measure the productivity capacity of the host country
	Tax rate in the host countries	TAX	Total tax and contribution rate (% of profit). It measures the share of taxes and compulsory contributions payable by an enterprise in business profits after accounting for allowable deductions and exemptions.
	Trade dependence in the host countries	EXPOG	Trade dependence is calculated as the export trade volume as a share of overall GDP, which can reflect the degree of dependence on foreign trade for economic development in 16 CEE countries
	Percentage of high-technology exports	TEC	High-technology exports percentage measures the level of R&D and manufacturing capacity of the host country's high-tech industry
	Unemployment rate in the host countries	UNE	Unemployment rate is an important indicator of economic depression and one of the basic indicators of a country's economic situation
	Political Stability and Absence of Violence/Terrorism in Percentile rank	STA	Political stability and absence of violence/terrorism measures perceptions of the probability of political instability and/or politically motivated violence happening. Percentile ranks indicate the country's position

			among all countries covered by the composite indicator, with 0 representing the lowest rank and 100 the highest.
	Total natural resources rents (% of GDP)	NRE	Accounting for the contribution of natural resources to economic output is important when trying to measure the sustainability of economic development.
X_{ij} : the variables changing with time	Whether two countries share common official or primary language	LAN	1 if two countries speak English/Chinese, otherwise the variable equals to 0
	Whether two countries share common boundary	BON	1 if two countries share common boundary, otherwise the variable equals to 0

When attempting to figure out what the major factors are determining a country's trade volume and its willingness to trade, the most common instrument used by economists in trade research is the gravity model, which is the workhorse making international trade analysis. Gravity models have traditionally been estimated using linear estimates such as OLS (Larson et al., 2018). Linear estimation, however, can be problematic due to the multiplicative functional form of the theoretical gravity model (Silva & Tenreyro, 2006). Silva and Tenreyro (2006) provide an overview of the log-linearized version of the gravity model and its subsequent estimation associated with the use of a linear estimator and explored the prospects for non-linear estimation. Each observation in PPML model is given the same weight in the estimation and is thus preferable when there's not much available information on the heteroskedasticity nature of the trade data. According to the simulation evidence provided by Santos Silva and Tenreyro (2006), PPML performs well in a wide range of scenarios and is able to deal with specific types of measurement error in the dependent variable. What's more, PPML can also deal with the situation when there are zero trade flows in the estimation as a non-linear estimation method. Poisson pseudo-great likelihood estimation is an admirable method for finding and validating a consistent and robust method for estimating the gravity equation, which is highly valuable in international trade analysis. However, since there's no value of China's OFDI equals to 0, the PPML model may not so suitable. To perform a standard regression analysis, the general multiplicative gravity equation needs to be transformed into a log-linear equation. As a result, the specific extended gravity model in this paper is set as follows:

$$lnOFDI_{jt} = \alpha + \beta_1 lnCGDP_t + \beta_2 lnHGDP_{jt} + \beta_3 lnTRA_{jt} + \beta_4 lnDIS_{jt} + \beta_5 lnLAB_{jt} + \beta_6 TAX_{jt} + \beta_7 UNE_{jt} + \beta_8 TEC_{jt} + \beta_9 STA_{jt} + \beta_{10} NRE_{jt} + \beta_{11} EXPOG_{jt} + \gamma_1 LAN_{ij} + \gamma_2 BON_{ij} + \delta_j + \varepsilon_j$$

4.3 Model Estimations

4.3.1 Descriptive Statistics

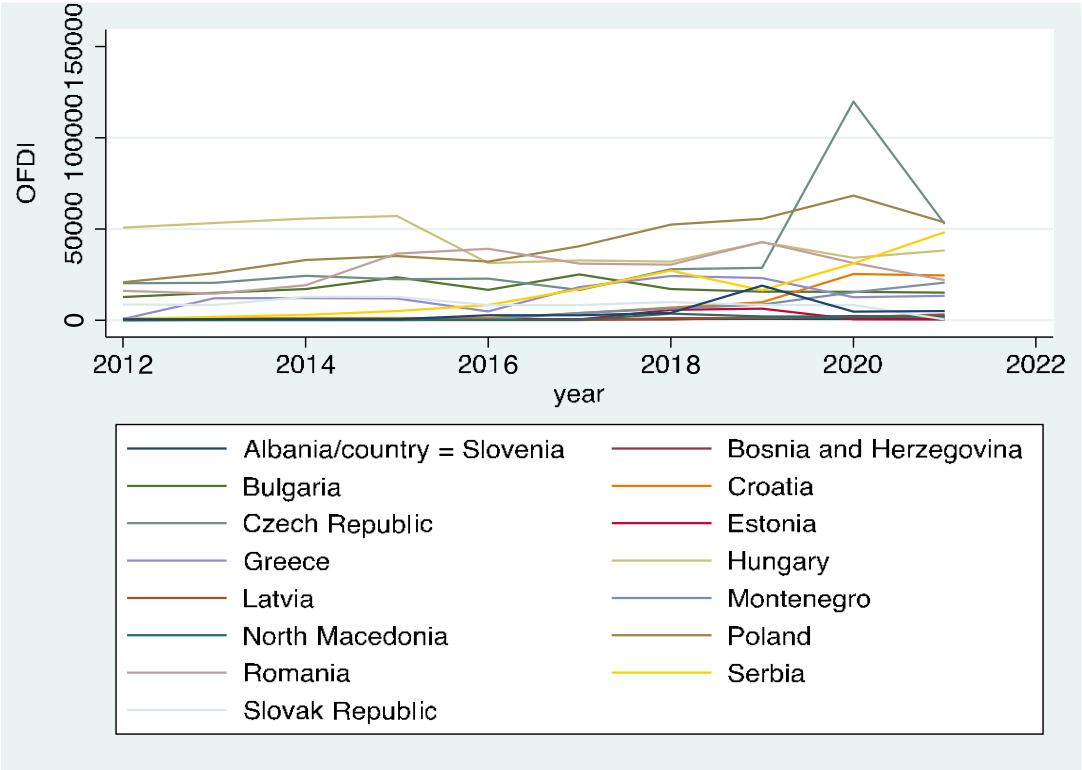


Figure 4.3.1.1 OFDI changing over time

The graph above depicts the trend of the dependent variable over time. And to better analyze the basic characteristics of each variable, this section utilizes Stata software for descriptive analysis of the variables mentioned above:

Variable Name	Obs	Mean	SD	Min	Median	Max
lnOFDI	160	14099.656	17907.645	26.000	7588.000	119843.000
lnCGDP	160	20.915	0.212	20.565	20.885	21.301
lnHGDP	160	15.533	1.246	12.921	15.503	17.909
lnTRA	160	12.428	1.630	9.235	12.478	15.816
lnDIS	160	13.082	0.334	12.492	13.056	13.607
lnLAB	160	14.613	1.031	12.441	14.634	16.730

TAX	160	34.946	11.862	7.400	36.600	66.600
UNE	160	11.833	7.054	2.010	10.040	31.200
TEC	160	5.865	4.849	0.012	4.542	23.018
STA	160	59.936	15.026	28.436	61.849	89.100
NRE	160	0.965	0.771	0.039	0.792	3.799
EXPOG	160	56.952	19.662	22.658	52.402	95.836
LAN	160	0.000	0.000	0.000	0.000	0.000
BON	160	0.000	0.000	0.000	0.000	0.000

In order to eliminate the effect of missing and extreme values on the model calculations, missing values and outliers in the raw data need to be dealt at first. As a result of the processing, this paper obtains panel data for 16 countries for the period 2012-2021. The above table is the descriptive statistics of the variables in the model, which demonstrates the number of observations, mean, standard deviation, minimum, median, and maximum values of each variable.

What can be seen from the table is that the stock of Chinese investment in the 16 countries of Central and Eastern Europe varies considerably from country to country and year to year. The minimum value of the dependent is 26 while the max value equals to 119843. Most of the independent variables have relatively small ranges from the mean to the minimum/maximum values while some variables such as TAX, STA, UNE, TEC and EXPOG have large differences between countries.

For the variable TAX, the mean value is 34.9 while the range of variation is from 7.4 to 66.6. To be more specific, Greece has the highest level of taxation, which is maintained at around 50%, while Northern Macedonia has the lowest level of taxation, which is at around 10%.

For the variable STA, the mean value is 39.9 while the range of variation is from 28.4 to 89.1. It can be found that Czech & Slovak Republic have the highest ratings of political stability compared to other CEE countries, while Bosnia and Herzegovina and Northern Macedonia have low ratings of political stability.

For the variable UNE, the mean value is 11.8 while the range of variation is from 2.0 to 31.2. To be more specific, the unemployment rate in North Macedonia and Bosnia and Herzegovina are relatively high while the value in Czech Republic, Poland and Hungary are relatively low compared to other CEE countries.

For the variable TEC, the mean value is 5.9 while the range of variation is from 0.01 to 23.02. To be more detailed, Hungary and Czech Republic have the highest share of high-tech exports, while Albania and Montenegro have the lowest share among CEE countries. The Global Innovation Index 2022 shows that Hungary's high-tech manufacturing output as a proportion of the country's total output ranks fifth on the list.

For the variable EXPOG, the mean value is 56.9 while the fluctuation is from 22.7 to 95.8. To be more detailed, Slovak Republic has the highest level of dependence on trade, while Albania has the lowest. The automotive industry is the main pillar industry of Slovakia, with a characteristic of export-orientation. The gross value of the Slovak automotive industry in 2019 accounted for 15% of Slovakia’s GDP. The automobile production in Slovakia exceeded 1.1 million units in 2019, and the per capita production of automobiles steadily ranked the first in the world. What’s more, the share of the automobile industry in exports reached 46.6%. In 2021, Slovakia's exports amounted to €88.3 billion, representing an increase of 16.3% compared to last year. It is worth noting that the growth in export value is mainly due to the automotive industry.

It should be noted that since none of the Central and Eastern European countries researched in the article share a common official language and boundary with China, the values of the dummy variables are all equal to 0. To summarize, the variables LAN and BON will not be put into the model anymore. Besides, as we can see from the table above, the number of observations is 160, which indicates a relatively small sample size. And. This may lead to less precise estimates, which is a shortcoming of this paper.

4.3.2 Correlation test

	lnOFDI	lnCGDP	lnHGDP	lnTRA	lnDIS	lnLAB	TAX
lnOFDI	1.0000						
lnCGDP	0.2185	1.0000					
lnHGDP	0.6543	0.0726	1.0000				
lnTRA	0.6580	0.3419	0.8712	1.0000			
lnDIS	-0.1400	-0.4974	-0.0152	-0.1315	1.0000		
lnLAB	0.6634	0.0028	0.9200	0.7086	-0.0008	1.0000	
TAX	0.3057	-0.0431	0.5544	0.5974	-0.0558	0.4036	1.0000
UNE	-0.4832	-0.3800	-0.5066	-0.7167	0.3027	-0.3563	-0.4254
TEC	0.5188	0.0555	0.5179	0.6116	-0.1103	0.3440	0.5311
STA	0.2675	-0.0183	0.4311	0.6040	0.0180	0.2022	0.4234
NRE	-0.1129	-0.2892	-0.1088	-0.2263	0.2608	0.0595	-0.0162
EXPOG	0.1902	0.0644	0.2462	0.4298	-0.0541	0.0222	0.4093

	UNE	TEC	STA	NRE	EXPOG
UNE	1.0000				
TEC	-0.6327	1.0000			
STA	-0.6827	0.6621	1.0000		
NRE	0.0838	-0.2201	-0.1573	1.0000	
EXPOG	-0.5713	0.7145	0.6817	-0.3632	1.0000

The correlation between the independent variables of the model needs to be considered before the regression analysis to determine if there exists a multicollinearity problem. The above table shows the matrix of correlation coefficients of the listed variables. As what can be seen from the table, the correlation coefficients between most of the variables are relatively low, but the correlation coefficients between certain variables are relatively high. For example, the correlation coefficient between lnHGDP and lnTRA variables is 0.87 and the correlation coefficient between lnLAB and ln lnTRA variables is 0.71. Therefore, the model may have a multicollinearity problem and needs to be further tested.

4.3.3 Multicollinearity test

	VIF	1/VIF
lnHGDP	23.664	.042
lnTRA	13.854	.072
lnLAB	13.332	.075
UNE	4.303	.232
STA	4.052	.247
EXPOG	3.366	.297
TEC	3.028	.33
lnCGDP	2.968	.337
TAX	2.2	.455
NRE	1.847	.541
lnDIS	1.664	.601
Mean VIF	6.753	.

To avoid covariance in the data, it is necessary to conduct a multicollinearity test. Generally, the presence of multicollinearity is detected by Variance Inflation Factor (VIF), which is the ratio of the variance when multicollinearity exists between the independent variables to the variance when multicollinearity does not exist. The larger the VIF, the more serious the model covariance problem is. According to the empirical judgment method: when 0<VIF<10, the model does not have multicollinearity problem; when 10≤VIF<100, the model would have strong multicollinearity problem; when VIF equals to or greater than 100, the model would have very serious multicollinearity problem. The above table shows the results of the multicollinearity test. What can be seen from the table is that the VIF value of each variable is less than 10, while the VIF of lnHGDP, lnTRA and lnLAB are greater than 10. In this way, the covariates should be eliminated. And the final format of the model is set as follows:

$$lnOFDI_{jt} = \alpha + \beta_1 lnCGDP_t + \beta_2 lnHGDP_{jt} + \beta_3 lnDIS_{jt} + \beta_4 TAX_{jt} + \beta_5 UNE_{jt} + \beta_6 TEC_{jt} + \beta_7 STA_{jt} + \beta_8 NRE_{jt} + \beta_9 EXPOG_{jt} + \delta_j + \varepsilon_j$$

4.3.4 Hausman specification test

	Coef.
Chi-square test value	18.197
P-value	0.033

From the table above, it can be found that the Hausman test results is 18.197, and p-value equals to 0.03, which is less than 0.05. Therefore, the original hypothesis should be rejected, and the fixed effects model should be chosen. Considering that there are inherent attributes in the variables that do not change with individuals, and to avoid the exclusion of covariates due to time effects, this article will use the Least Squares Dummy Variable estimation method: dummy variables for individuals or time are set before regression.

4.3.5 Full sample test of model

VARIABLES	Mixed effect OFDI	One-way effect OFDI	Two-way effect OFDI
lnCGDP	0.089	0.498	0.581
	(0.48)	(0.89)	(1.26)
lnHGDP	0.777***	0.836	0.581
	(6.20)	(0.96)	(0.61)
lnDIS	0.010	-0.188	-1.428***
	(0.06)	(-0.63)	(-3.50)
TAX	-0.012***	0.023**	0.031***
	(-4.18)	(2.00)	(2.80)
UNE	-0.045***	-0.004	0.064**
	(-3.35)	(-0.17)	(1.97)
TEC	0.068***	0.176***	0.129***
	(2.87)	(3.95)	(2.61)
STA	-0.035***	-0.005	-0.003
	(-5.68)	(-0.54)	(-0.46)
NRE	-0.074	-0.036	0.225***
	(-1.35)	(-0.42)	(2.71)
EXPOG	0.009	0.037	0.079***
	(0.98)	(1.61)	(4.47)
Constant	-2.831	-15.220*	-1.081
	(-0.62)	(-1.88)	(-0.31)

Observations	160	160	160
R-squared	0.691	0.840	0.876
country	NO	YES	YES
year	NO	NO	YES

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As what we can see from the table above, the R-squared value for mixed effect model, one-way effect, and two-way effect equal to 0.69, 0.84 and 0.88 respectively. An R-squared of 69% represents that 69% of the variability observed in the target variable is explained by the mixed effect model. An R-squared of 84% represents that 84% of the variability observed in the target variable is explained by the one-way effect model. An R-squared of 88% represents that 88% of the variability observed in the target variable is explained by the two-way effect model. What's more, Two-way linear fixed effects regression on panel data has become the default method used to estimate causal effects. Many scholars prefer two-way linear fixed effects regression estimators, which can simultaneously adjust for unobserved unit-specific and time-specific confounders (Imai & Kim, 2021). Therefore, it may be concluded that the data fit best when using two-way effect model. Therefore, we may conclude that the final format of the full-sample model should be set as:

$$\begin{aligned} lnOFDI_{jt} = \ & -1.081 + 0.581lnCGDP_t + 0.581lnHGDP_{jt} - 1.428lnDIS_{jt} \\ & + 0.031TAX_{jt} + 0.064UNE_{jt} + 0.129TEC_{jt} - 0.003STA_{jt} \\ & + 0.225NRE_{jt} + 0.079EXPOG_{jt} \end{aligned}$$

Among the full-sample test results, it can be found that the relationship between the relationship between China's OFDI towards CEE countries and China's GDP is positive but not significant. Looking through the existed literatures, conclusions on the relationship between GDP and OFDI are unsettled. Karimi and Yusop's (2009) conducted research based on the data from year 1970 to 2005 in Malaysia. According to the result after the Toda-Yamamoto test and bounds testing (ARDL), there's no evidence of two-way causality and long-term relationship between two objects.

However, there are also many scholars find that the home country's GDP is significantly positively related to its outward foreign direct investment towards host countries. In the case of Malaysia, gross domestic product (GDP) is the main driver of outward FDI (Saad, Noor & Nor, 2014). In accordance with the path theory of investment development proposed by Dunning (1981), total OFDI increases gradually as the GDP of the home country rises, indicating that economic development would stimulate home country participation in OFDI. Considering that the relationship between China's OFDI towards CEE countries and China's GDP, the paper may conduct further sub-sample in the next part.

As for host country's GDP, the effect that the host country's GDP makes on China's OFDI is significantly positive, which is consistent with the hypothesis we made in the former part. It indicates that when the GDP of host countries increase, China's OFDI towards CEE countries would increase. However, the relationship is not significant. Many researchers mention that the host country's GDP would significantly influence home country's outward foreign direct investment in it. Bevan & Estrin (2004) argued that host country's GDP would make positive effect on FDI towards them based on the panel data. To investigate the feature and factors of China's OFDI in 138 countries, Chang (2014) used the augmented gravity model of spatial correlation during the year from 2003 to 2009. The final empirical results indicate that the economic scale of host countries has a significant positive effect on stimulating China's OFDI. From my point of view, it's reasonable that high host country's GDP would attract more foreign direct investment from others since a high GDP typically indicates a large consumer market with significant purchasing power. Foreign investors may be attracted to countries with a high GDP as it offers a substantial customer base for their products or services. By establishing FDI in these countries, investors can access a larger market.

As for the distance between home country and host country, or more accurately transportation costs, there exists a significant negative correlation between it and the independent variable. It suggests that when the transportation cost between home

country and host country rises, the foreign direct investment from China decreases, which is in accordance with the findings of existed literatures. Distance is often seen as a hinder when making trade (Ji & Zhou, 2018). Hassan (2001) used a gravity model to examine trade within the South Asian Association for Regional Cooperation (SAARC) and found that trade volume may decline as distance increases. A study conducted by Alam et al. (2019) considered 27 Asian countries over the period 2006 to 2015 based on a random effects model concluded that China's investment decisions are significantly affected by geographical distance, and they are negatively correlated. In this article, we define the variable distance as the airline distance multiplied by the crude oil price at the reported year, and the use of dynamic distances better captures the impact of the transportation cost on trade. Generally speaking, a higher transportation cost may be detrimental to China's exports in the host country. Shu (2021) used gravity model to investigate the factors affecting China's trade with CEE countries and found that there is a negative correlation between transportation costs and China's outward foreign direct investment in CEE countries. Grosman & Helpman (2004) discover that FDI would be promoted when the trade cost is in a low level, however, depending on the characteristics of the industry. Besides, from my points of view, it’s reasonable for host country who have low transport costs to attract more foreign direct investment since high transport costs can significantly increase the cost of importing raw materials, components, and finished goods. For foreign investors considering FDI, these increased production costs can erode profit margins and make the investment less financially attractive.

As for the independent variable of tax rate, it measures the share of taxes and compulsory contributions payable by an enterprise in business profits after accounting for allowable deductions and exemptions. What can be seen from the table above is that the correlation between host country’s tax rate and China’s OFDI is negative, which is opposite from what we hypothesize. However, there is no uniform conclusion in the existed literature about the relationship between the two. On the one hand, many researchers argued that the high tax rate would hinder the country getting foreign direct

investment from others. Bellak & Leibrech (2009) applied a panel gravity model to figure out the role of taxation as the determinant of FDI. It turns out that the low-tax strategies of governments in CEE countries appear to have a significant and positive impact on the location decisions for foreign investment. In this way, policymakers may create favorable tax regimes to attract FDI, such as tax abatement policies, indicating that the level of tax rate would affect the location choice of foreign direct investment (Helcmanovská & Andrejovská, 2021). After investigating eight papers explicitly dealing with FDI in CEE countries, Bellak et al. (2009) calculated the tax rate elasticities. The results reveals that the median tax rate elasticity is around 1.45 (semi-elastic), which implies that each percentage reduction in the tax rate will increase FDI inflows by 1.45%. While many empirical results show a strong negative correlation between host country taxes and FDI, others have not. These figures can be a bit deceiving, however. The after-tax advantages of FDI do not fully rely on the level of taxation in the host country. Whether a foreign investor can directly benefit from these tax incentives also depends on the tax laws of the investor's home country. (Liu, 2021). Besides, what has been recognized as a key issue is that low tax burdens in host countries cannot inherently make up for a generally weak or unattractive FDI environment. What's more, some large OECD countries with relatively high tax rates have been more successful in attracting FDI. Considering the unsettled conclusions illustrated above, the paper may conduct further sub-sample in the next part.

There exists a positive correlation between host country's unemployment rate and China's OFDI towards it. The possible explanation is that high unemployment rates often lead to a surplus of available labor, which can drive down wages. This can make the cost of labor more attractive for foreign investors seeking to establish operations in a country, particularly in labor-intensive industries. Lower labor costs can help reduce production expenses and increase competitiveness, making FDI more appealing. According to Temouri & Driffield (2009)'s study on German multinational corporations, it can be found that no negative correlation exists between overseas investment and domestic employment. Chang (2007) used a VAR model to study the relationship

between FDI and unemployment in Taiwan, showing that there is no inevitable link between inward FDI and unemployment. There are less available literatures regarding the possible effects of unemployment rate on FDI inflow, therefore, the empirical results derived here may be an innovation to this paper.

Considering the total natural resource's rents, the result shows a strong and positive correlation. It implies that the host country can attract more FDI inflow from China when it has a high total resource rent. China's OFDI has grown significantly over the past decade, and host country resources are a common driver of Chinese OFDI (Ahmad & Yang, 2018). To figure out the factors determining the location selection of OFDI, Song & Xu (2012) conducted the research based on the data of China and 51 host countries during the period 2005 to 2009. The results of the study show that the natural resources of the host country have a significant and positive influence on the location choice of China's OFDI. From my point of view, it's reasonable for country who has high natural resource rents to attract more foreign direct investment from China. Extracting and exporting natural resources typically require significant infrastructure development, such as pipelines, ports, refineries, or transportation networks. Foreign investors may be attracted to countries with natural resource rents to invest in the necessary infrastructure projects, which is China's good at. Foreign direct investment from China can contribute to the development of infrastructure that benefits both the investors and the host country. What's more, while natural resources are often exported in their raw form, countries with natural resource rents can incentivize foreign investors to establish value-added activities locally. This includes processing, refining, manufacturing, or research and development related to natural resources. While many researchers suggest that a high-level of total natural resource rent can promote attracting foreign direct investment from other countries, a theory of "FDI-natural resource curse" was conducted. Using the systematic GMM estimation method, Asiedu (2006) tried to estimate a linear dynamic panel data model. The analysis uses panel data for 99 developing countries over the period 1984-2011 and considers six measures of institutional quality from two different sources and two measures of natural resources.

The outcomes demonstrate that natural resources have a negative impact on FDI and that the FDI-resource curse remains even after controlling for the quality of institutions and other important determinants of FDI. According to the study aimed find out the impact of natural resources on FDI based corporate-level data for Dutch TNCs conducted by Poelhekke & van der Ploeg (2010). The results show that natural resources promote FDI in resource sectors but crowd out FDI in non-resource sectors, and that the latter effect dominates. Therefore, total FDI is always lower in countries that are resource rich. Considering the unsettled conclusions illustrated above, the paper may conduct further sub-sample in the next part.

As for the variable of exports share of high technology, the results demonstrate that it would significantly and positively influence China's OFDI towards host countries. It indicates that China's OFDI would be more likely to go into the places where have a higher level of high-tech exports, which is in accordance with the findings of existed literatures. As international trade grew, capital flows between countries also accelerated, as did the speed of technological progress. A recent study by Kılavuz & Topcu (2012) examined the influence of different classifications of exports and imports on economic growth for 22 developing countries over the period 1998-2006. The findings show that high-technology manufacturing exports is one of the only categories that have a positive and significant impact on economic growth. Under these circumstances, exporting high-tech products can contribute to the country's competitiveness in the international market. Today, one of the most important goals of countries around the world is to export high-tech products (Saray & Hark, 2015). High-tech exports somehow measure the scientific and technological level of a country. Nowadays, modern technology would have an impact on efficiency and guides OFDI flows to technologically high countries (Pantelidis & Kyrkilis, 2005). From my point of view, it's reasonable for country who has high level of high-tech exports to attract more foreign direct investment since high-tech exports indicate the presence of advanced technological capabilities and expertise within a country. Foreign investors may be attracted to countries with strong high-tech export sectors to gain access to advanced technologies,

knowledge, and innovation. However, some voices counter that the influence should depend on whether the host country is a developed or a developing country. Considering that, the paper may conduct further sub-sample in the next part.

Speaking of the variable of Political Stability and Absence of Violence, the model reveals that there exists a negative but not significant relationship between political stability and China's outward foreign direct investment towards host countries. It implies that to some extent China is more likely to invest in countries that are politically unstable, which stands against what the article hypothesizes in the former part. However, there do exists some findings which proves the negative correlation between China's OFDFI and host country's political stability. China is inclined to invest in developing economies with significant political risks, and the writers further report that the search for political connections is the main motivations for China's investment decisions on these economies (Yang et al., 2015). Miniesy & Elish (2017) note that weak host country's governance is an important determinant when China decides where the outward foreign direct investment should flow into. However, some researchers hold an opposite view. In examining the determinants of China's enterprises' OFDI towards services and manufacturing industries in the EU, Lv & Spigarelli (2016) demonstrate that politically stable countries will be more attractive to the investment. A government officer stated that investing in Iraq may have high potential returns, however, Petroleum company may be reluctant to invest there because of the following situations: 1) The risk of terrorist action. If terrorist action happens, the cost of equipment and lives would be huge. 2) Political instability could lead to a run on the exchange rate, for example, political instability caused the collapse of the Russian ruble in the early 1990s. He also emphasized that the country may experience difficulties in areas such as communications since businesses need investment and good infrastructure to make foreign direct investment worthwhile. To make a summary, the relationship between host country's political stability and home's outward foreign direct investment may depend on the specific situation. Considering that, the paper may conduct further sub-sample in the next part.

Concerning the variable of trade dependence (exports/GDP%), it can be found that the relationship between host country's trade dependence and China's outward foreign direct investment is significantly positive. It indicates that China's outward foreign direct investment is more willing to flow into the country which depend more on exports, which is consistent with what the article hypothesizes in the former part. Jaffee & Stokes (1986) conducted a research based on the cross-national data for 65 countries during the period of 1960-1977, finding that there exists a significantly positive correlation between trade dependence and foreign direct investment. From my point of view, it's reasonable for country who has high trade dependence to attract more foreign direct investment since countries with high trade dependence rely heavily on international trade to realize the economic growth. Foreign investors may be attracted to these countries because they are provided with access to large and interconnected markets. What's more, high trade-dependent countries often have well-developed supply chains and logistics infrastructure to facilitate trade flows. Foreign investors may see value in integrating their operations into these supply chains, leveraging existing trade networks and infrastructure to streamline their production and distribution processes. Through the existing literature, it can be found that few scholars have directly studied the relationship between trade dependence and OFDI. Therefore, the results of this part can, to some extent, make up for the lack of existing studies.

To make a summary, it can be concluded that the main determinants which would significantly affect China's OFDI are transportation costs, tax rate, unemployment rate, high-technology exports (%GDP), total natural rents and trade dependence. China's OFDI would be more likely to flow into CEE countries who have lower transportation costs, higher tax rate, higher unemployment rate, larger high-tech exports, higher level of total natural rents and higher level of trade dependence.

4.3.6 Sub-sample test of model

a. Sub-sample test I - developed country vs. developing country:

VARIABLES	Developed country OFDI	Developing country OFDI
lnCGDP	6.013***	1.037
	(2.78)	(1.05)
lnHGDP	-4.688	-0.803
	(-1.25)	(-0.50)
lnDIS	-3.274***	-1.146**
	(-4.02)	(-2.20)
TAX	-0.079	0.024
	(-1.25)	(1.44)
UNE	0.456***	0.021
	(2.95)	(0.42)
TEC	0.033	0.092
	(0.43)	(1.64)
STA	0.018	-0.003
	(1.11)	(-0.44)
NRE	6.095***	0.259*
	(3.53)	(1.81)
EXPOG	0.112***	0.081***
	(2.84)	(2.86)
Constant	-26.510*	7.509
	(-1.74)	(1.61)
Observations	50	110
R-squared	0.944	0.880
country	YES	YES
year	YES	YES

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

According to international investment theory, outward foreign direct investment motives mainly cover three parts: market-seeking motives, resource-seeking motives, technology-seeking motives, labor-seeking motives, etc. (Dunning, 1998). Among them, outward foreign direct investment towards developed countries may be mainly based on technology-seeking motives and market-seeking motives, while investment in developing countries may be primarily based on market-seeking motives, resource-

seeking motives, and labor-seeking motives. To estimate the potential factors of foreign direct investment in developed and developing countries, Saini & Singhania (2018) utilize static and dynamic models based on panel data for 20 countries (including 9 developing country and 11 developed country) during the period from 2004 to 2013. The results imply that the situation vary from country to country. In developed countries, FDI depends to a large extent on policy-related factors, while in developing countries it is positively associated with economic determinants. Therefore, in this paper, we will categorize host countries by their degree of development to make further research. In this part, we divide host countries into developed and developing countries using the International Monetary Fund (IMF) classification for empirical analysis. The developed countries include 5 countries, namely Estonia, Czech Republic, Slovakia, Slovenia and Greece, and the developing countries include 11 countries such as Albania and Bulgaria. The results of model estimation are shown in the table above.

As what we can see from the results, the R-squared value for the developed country model and developing country model equal to 0.94 and 0.88 respectively, which are close to 1. An R-squared of 94% represents that 94% of the variability observed in the target variable is explained by the model. An R-squared of 84% represents that 84% of the variability observed in the target variable is explained by the model. The two numbers indicate that the model is well fitted. Therefore, we may conclude that the format of two sub-sample model should be set as follows:

For developed host country in Central and Eastern Europe:

$$lnOFDI_{ijt} = -26.510 + 6.013lnCGDP_{it} - 4.688lnHGDP_{jt} - 3.274lnDIS_{jt} - 0.079TAX_{jt} + 0.456UNE_{jt} + 0.033TEC_{jt} + 0.018STA_{jt} + 6.095NRE_{jt} + 0.112EXPOG_{jt}$$

For developing host country in Central and Eastern Europe:

$$lnOFDI_{ijt} = 7.509 + 1.037lnCGDP_{it} - 0.803lnHGDP_{jt} - 1.146lnDIS_{jt} + 0.024TAX_{jt} + 0.021UNE_{jt} + 0.092TEC_{jt} - 0.003STA_{jt} + 0.259NRE_{jt} + 0.081EXPOG_{jt}$$

In the model of developed host country in CEE region, it can be found that the determinants of China's GDP, transport costs, unemployment rate, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment.

In the model of developing host country in Central and Eastern Europe, it can be found that the determinants of transport costs, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment.

In this way, we can make a summary that the variable of transport distance, total natural resource rents and trade dependence would significantly influence investment from China to developed country as well as developing country. The variable of China's GDP and unemployment would significantly influence China's investment on developed country while they wouldn't on developing country.

Considering the variable of China's GDP, From the company level, it's efficient for Chinese companies who want to expand their global footprint and diversify their customer base to invest in CEE countries so that they can access new markets. Investing in CEE countries allows Chinese firms to tap into the European market and cater to the diverse preferences and demands of European consumers. From the country level, by acquiring enterprises or purchasing shares in industrially developed and technologically advanced countries and regions and operating them directly or participating in their management, it is possible to assimilate the advanced technology therein and learn effective management experience and methods, which will help to raise the country's overall technological level (This could also explain no matter which kind of country is, China is more likely to invest in countries who have higher high-tech exports). In this way, we believe that China has a strong willingness to invest in developed CEE

countries. China's high GDP signifies a large and rapidly growing consumer market with substantial purchasing and investing power. Therefore, it' reasonable that more investment would flow into developed host countries when the home country's economy grows, and this influence is significant. What's more, high unemployment rates can result in a surplus of available labor, which can drive down wages. This can make the overall cost of doing business more attractive for foreign investors, particularly in higher labor costs countries. This may explain why the relationship in developed country model is significant while it doesn't in developing country model.

b. Sub-sample test II – resource-rich country vs. resource-poor country:

VARIABLES	Resource rich OFDI	Resource poor OFDI
lnCGDP	1.719	-0.435
	(1.49)	(-0.44)
lnHGDP	0.242	0.879
	(0.21)	(0.51)
lnDIS	-2.443***	-0.837
	(-3.02)	(-1.54)
TAX	0.019	0.055***
	(0.71)	(2.75)
UNE	0.139**	-0.107
	(2.16)	(-1.16)
TEC	-0.448	0.167**
	(-1.53)	(2.45)
STA	-0.025**	0.016
	(-2.03)	(1.23)
NRE	0.200	0.208***
	(0.64)	(3.13)
EXPOG	0.107*	0.055**
	(1.84)	(2.02)
Constant	0.696	11.948
	(0.05)	(1.06)
Observations	70	90
R-squared	0.815	0.933
country	YES	YES
year	YES	YES

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As China's economy grows rapidly, so does its demand for resources, and resource-seeking is becoming one of the most important drivers of China's outward foreign direct investment (Salidjanova, 2011). The rapid growth of Chinese investment in resource-rich countries has been driven by this. Therefore, this article uses the World Bank's World Development Indicators (WDI) indicator of total natural resource rents as a percentage of GDP to differentiate between relatively resource-rich countries and relatively resource-poor countries. Among them, 7 countries with relatively abundant resources include Albania, Bulgaria, Bosnia and Herzegovina, Romania, North Macedonia, Greece, and Serbia; 10 countries with relatively average resources include Estonia, Poland, Montenegro, Czech Republic, Croatia, Latvia, Slovakia, Slovenia, and Hungary. The results of the model estimation are summarized in the table above.

As what we can see from the results, the R-squared value for the resource-rich country model and resource-poor country model equal to 0.815 and 0.933 respectively, which are very close to 1. An R-squared of 81.5% represents that 81.5% of the variability observed in the target variable is explained by the model. An R-squared of 93.3% represents that 93.3% of the variability observed in the target variable is explained by the model. The two numbers indicate that the model is well fitted. Therefore, we may conclude that the format of sub-sample model should be set as follows:

For resource-rich host country in Central and Eastern Europe:

$$\begin{aligned} lnOFDI_{ijt} = {} & 0.696 + 1.719lnCGDP_{it} + 0.242lnHGDP_{jt} - 2.443lnDIS_{jt} \\ & + 0.019TAX_{jt} + 0.139UNE_{jt} - 0.448TEC_{jt} - 0.025STA_{jt} \\ & + 0.200NRE_{jt} + 0.107EXPOG_{jt} \end{aligned}$$

For resource-poor host country in Central and Eastern Europe:

$$\begin{aligned} lnOFDI_{ijt} = {} & 11.948 - 0.435lnCGDP_{it} + 0.879lnHGDP_{jt} - 0.837lnDIS_{jt} \\ & + 0.055TAX_{jt} - 0.107UNE_{jt} + 0.167TEC_{jt} + 0.016STA_{jt} \\ & + 0.208NRE_{jt} + 0.055EXPOG_{jt} \end{aligned}$$

In the model of resource-rich host country in CEE region, what can be found that the determinants of transport costs, unemployment rate and political stability would significantly influence China's outward foreign direct investment.

In the model of resource-poor host country in Central and Eastern Europe, it can be found that the determinants of tax rate, high-tech exports, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment.

From the chart above, it can be found that high China's GDP would lead to an increase OFDI in resource-rich country but a decrease in resource-poor country, and the relationship is not significant. According to Fu (2021)'s research, China is more inclined to countries with rich resource and abundant labor resources. First, investing in resource-rich countries can benefit from lower input costs for raw materials and energy. Having proximity to natural resources can significantly lower transportation and logistics costs. By reducing input costs, companies can improve profit margins and enhance their competitiveness in the market. What's more, investing in a resource-rich country often facilitates vertical integration opportunities. Investors can establish operations along the entire value chain, from extraction or production to processing and distribution. By controlling multiple stages of the supply chain, companies can capture a larger share of the value-added and potentially achieve higher profits. Therefore, we can argue that it is more cost-effective to invest in resource-rich countries when there is sufficient capital. When China's economy grows, the amount of outward FDI may be more skewed towards resource-rich countries, which to some extent can explain why the coefficients of variable China's GDP in two models are opposite.

Considering the host country's GDP, what can be found in two models is that higher GDP of host country leads to and increased in China's OFDI. It indicates that China prefers to make the investment towards the country with high level of economic growth and a big size of market, which is consistent with what reveals in the full sample.

Transport cost has negative association with China's outward foreign direct investment in resource-rich country as well as in resource-poor country, which is in accordance with the results we get from the full sample.

Tax rate level has a positive influence on China's OFDI towards resource-rich country as well as in resource-poor country, and it is consistent with the results revealing the relationship between tax rate level and China's OFDI in full sample.

The unemployment rate has a positive influence on China's OFDI towards resource-rich country but a negative influence in resource-poor country. As what has been said above, China prefers to invest in host countries who have more natural resources and lower labor costs, which means resource-rich countries would be in the priority position. When the unemployment rate increases, the labor costs would decline. With the dual role of resource and labor advantages, China is more willing to invest in relatively resource-rich regions for higher returns than resource-poor host countries in Central and Eastern Europe. And this may explain to some degree why the influence the independent variable made on the dependent variable is opposite in the two models.

The variable of high-tech exports has a negative influence on China's outward foreign direct investment in resource-rich country but a negative influence in resource-poor country. Since the demand for European integration, Central and Eastern European countries have benefited from an increase in capital transfers. Meanwhile, foreign direct investment (FDI) has also risen significantly, mainly because of the liberalization of capital flows. The impact of these funds and the reduction of financial costs can be perceived as a phenomenon similar to the so-called "Dutch disease". In other words, the inflow of financial transfers is also seen as a curse (Andrade & Duarte, 2017). The phenomenon known as the "Dutch Disease" can occur in resource-rich countries with high technology exports. When a country experiences a surge in revenues from natural resource exports, its currency can appreciate significantly. This appreciation makes non-resource exports, including high-tech products, less competitive in international

markets. Therefore, it’s reasonable to have negative association between high-tech exports and investment from China in resource-rich CEE countries.

Considering the variable of political stability, it can be found that the political stability has a negative influence on China’s OFDI in resource-rich country but a positive influence in resource-poor country. The result in resource-rich model is consistent with the findings of the full sample and we would like to discuss more about why China is more willing to invest in CEE countries who are politically stable but resource-poor. First, investing in resource-poor but politically stable countries enables China to use these locations as manufacturing hubs for exports. Chinese companies can take advantage of lower labor costs and other operational efficiencies to produce goods for export to global markets. Second, there’s good chance for resource-poor but politically stable countries to require substantial infrastructure development. China is known for its expertise in infrastructure projects, and investing in these countries can present opportunities for Chinese companies to participate in and benefit from infrastructure development projects. What’s more, China's "Belt and Road Initiative" (BRI) is a significant driver for its investments in politically stable but resource-poor countries. The BRI aims to enhance connectivity and cooperation with countries along its trade routes. As part of this initiative, China seeks to invest in various infrastructure and development projects in resource-poor but politically stable nations to improve regional connectivity and trade.

Total natural resource has a positive influence on China’s outward foreign direct investment in resource-rich country as well as in resource-poor country, and it is consistent with the results revealing the relationship between tax rate level and China’s outward foreign direct investment in the full sample.

As for the variable of trade dependence, it has a positive influence on China’s outward foreign direct investment in resource-rich country as well as in resource-poor country, and it is in accordance with the results revealing the relationship between tax rate level and China’s OFDI in full sample.

c. Sub-sample test III – OECD country vs. non-OECD country:

VARIABLES	OECD country OFDI	Non-OECD country OFDI
lnCGDP	-0.732	2.197*
	(-0.63)	(1.83)
lnHGDP	3.672***	-0.553
	(2.66)	(-0.35)
lnDIS	-1.373***	-2.082**
	(-2.73)	(-2.11)
TAX	0.038**	0.017
	(2.21)	(0.61)
UNE	0.068	0.114*
	(0.58)	(1.82)
TEC	0.147	-0.452**
	(1.62)	(-2.30)
STA	-0.000	-0.031***
	(-0.01)	(-2.61)
NRE	0.181***	-0.005
	(3.98)	(-0.02)
EXPOG	0.069***	0.088
	(2.98)	(1.59)
Constant	-28.235**	-8.825
	(-2.45)	(-0.74)
Observations	70	90
R-squared	0.928	0.796
country	YES	YES
year	YES	YES

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The Organization for Economic Cooperation and Development (OECD) is an intergovernmental international economic organization comprising 38 market economies, which aims to work together to address the economic, social, and governmental governance challenges posed by globalization and to seize the opportunities the opportunities brought about by globalization. In this part, we divide 16 Central and Eastern European countries into two categories: OECD countries and non-OECD countries. There are 7 OECD countries among Central and Eastern Europe countries: Czech Republic, Hungary, Poland, Slovakia, Slovenia, Estonia, Latvia are 7 OECD countries. And the rest belong to non-OECD countries.

As what we can see from the results, the R-squared value for the OECD country model and non-OECD country model equal to 0.928 and 0.796 respectively, which are very close to 1. An R-squared of 92.8% represents that 92.8% of the variability observed in the target variable is explained by the model. An R-squared of 79.6% represents that 79.6% of the variability observed in the target variable is explained by the model. The two numbers indicate that the model is well fitted. Therefore, we may conclude that the format of two sub-sample model should be set as follows:

For OECD host country in Central and Eastern Europe:

$$\begin{aligned} lnOFDI_{ijt} = {} & -28.235 - 0.732lnCGDP_{it} + 3.672lnHGDP_{jt} - 1.373lnDIS_{jt} \\ & + 0.038TAX_{jt} + 0.068UNE_{jt} + 0.147TEC_{jt} - 0.001STA_{jt} \\ & + 0.181NRE_{jt} + 0.069EXPOG_{jt} \end{aligned}$$

For non-OECD host country in Central and Eastern Europe:

$$\begin{aligned} lnOFDI_{ijt} = {} & -8.825 + 2.197lnCGDP_{it} - 0.553lnHGDP_{jt} - 2.082lnDIS_{jt} \\ & + 0.017TAX_{jt} + 0.114UNE_{jt} - 0.452TEC_{jt} - 0.031STA_{jt} \\ & - 0.005NRE_{jt} + 0.088EXPOG_{jt} \end{aligned}$$

In the model of OECD host country in Central and Eastern Europe, it can be found that the determinants of host country's GDP, transport costs, tax rate, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment.

In the model of non-OECD host country in Central and Eastern Europe, it can be found that the determinants of China's GDP, transport costs, unemployment rate, high-tech exports, and political stability would major influence China's outward foreign direct investment.

From the above chart, it can be found that high China's GDP would lead to an increase OFDI in non-OECD country but a decrease in OECD country. However, the relationship is not significant. From my point of view, the reason for China to put more

investment in non-OECD country when economy grows is that China's ambitious Belt and Road Initiative aims to enhance connectivity and cooperation with countries along its trade routes. Many non-OECD countries are part of the BRI, and China seeks to invest in these countries to improve regional connectivity and strengthen economic ties. What's more, investing in non-OECD countries allows China to strengthen its geopolitical influence and build strategic partnerships. It can enhance China's diplomatic ties with these nations and foster positive diplomatic relations. However, this trend may not be significant since there's no strong relationship between two variables.

Considering the variable of host country's GDP, it can be found that the independent variable has a significant positive influence in OECD country, while a negative influence on China's outward foreign direct investment in non-OECD country but not significant. The result in OECD model is consistent with the findings of the full sample. And the reason why China is more willing to invest in CEE countries who doesn't belong to OECD and have a low GDP can be considered as an economic diplomacy, which aims to foster positive diplomatic relations, strengthen ties with partner countries, and promote mutual economic cooperation. Comparing to OECD countries, non-OECD countries may have limited access to international capital markets. What's more, non-OECD countries generally have the characteristics of higher poverty rates, higher unemployment rate, lower GDP per capita, and limited access to quality healthcare and education. According to the Speaker of the Serbian National Assembly, Serbia has achieved significant breakthroughs in important areas such as infrastructure, mining, and energy, which have greatly contributed to the development of the Serbian economy and the creation of new job opportunities, thanks to the Belt and Road Initiative which brings substantial foreign direct investment into Serbia.

Transport cost has negative association with China's outward foreign direct investment in OECD country as well as in non-OECD country, which is in accordance with the results we get from the full sample.

Tax rate level has a positive influence on China's OFDI towards OECD country as well as in non-OECD country, and it is consistent with the results revealing the relationship between tax rate level and China's OFDI in full sample.

The unemployment rate has a positive influence on China's OFDI in OECD country as well as in non-OECD country, and it is consistent with the results revealing the relationship between tax rate level and China's OFDI in full sample.

Considering the variable of high-tech exports, it can be found that the independent variable has a negative influence on China's OFDI in non-OECD country but a positive influence in OECD country. Here the article still considers it as an economic diplomacy, and here's no more on that.

The political stability has a positive influence on China's OFDI in OECD country as well as in non-OECD country, and it is consistent with the results revealing the relationship between tax rate level and China's OFDI in full sample. According to what we illustrated above, China is inclined to invest in developing economies with significant political risks, and the writers further report that the search for political connections is the main motivations for China's investment decisions on these economies (Yang et al., 2015). Miniesy & Elish (2017) also note that weak host country's governance is an important determinant when China decides where the outward foreign direct investment should flow into.

Considering the variable of total natural resource rents, it can be found that the independent variable has a negative influence on China's OFDI in non-OECD country but a positive influence in OECD country. The result in OECD model is consistent with the findings of the full sample. It's interesting to see a negative coefficient in non-OECD country's model, although the result is not significant. In most circumstances, China would prefer to make investment in countries who have rich natural resources. According to what we mentioned above, host countries' resources are a common driver of Chinese OFDI (Ahmad & Yang, 2018). What's more, Feng & Ge (2022)'s paper

contributes to emphasizing the role of the natural resource of the host country in attracting China's OFDI based on a country-level panel data set of China's outward foreign direct investment (OFDI) during 2003–2015. In this way, the result may need further discussion.

As for the variable of trade dependence, it has a positive influence on China's outward foreign direct investment in OECD country as well as in non-OECD country, and it is in accordance with the results revealing the relationship between tax rate level and China's outward foreign direct investment in full sample.

Chapter 5 Efficiency Calculation

In this chapter, we would like to further estimate the efficiency and potential of China's outward foreign direct investment in CEE countries. Based on the existed literatures mentioned in Chapter 3, here the article would set the stochastic frontier gravity model as:

$$lnOFDI_{ijt} = \beta_0 + \beta_1 lnCGDP_{it} + \beta_2 lnHGDP_{jt} + \beta_3 lnTRA_{jt} + \beta_4 lnDIS_{jt} + \beta_5 lnLAB_{jt} + \beta_6 lnTAX_{jt} + \beta_7 lnNRE_{jt} + \beta_8 lnEXPOG_{jt} + v_{ijt} - u_{ijt}$$

Where,

$$u_{ijt} = \gamma_0 + \gamma_1 lnUNE_{jt} + \gamma_2 lnTEC_{jt} + \gamma_3 lnSTA_{jt} + \varepsilon_{ijt}$$

For the variables mentioned above, please refer to Chapter 4 for detailed explanation, which will not be repeated here.

5.1 Model testing

To correctly choose the form of the equation for the stochastic frontier gravity model, it is necessary to test the applicability of the model with the maximum likelihood ratio

LR statistic (Wu, Hu & Zhao, 2023). The null hypothesis (H0) of LR test is that the smaller model is the "best" model and it would be rejected if the test statistic is large. In other words, if the null hypothesis is rejected, then the larger model is a significant improvement over the smaller one. Then, compare the calculated LR statistic with the critical value from the chi-squared distribution at a chosen significance level. If the calculated LR statistic exceeds the critical value, then the null hypothesis is rejected, and it can be concluded that the "larger" model provides a significantly better fit to the data than the smaller one.

In this part, two tests are set for the stochastic frontier gravity model based on Wu et al. (2023)'s research. Test 1 is applied to examine whether the trade inefficiency terms exist or not, and test 2 is applied to examine whether the trade inefficiency terms are time-varying or not. And the test results are as follows:

Null Hypothesis	Constrained model	Unconstrained model	LR	1% critical value	Test conclusion
No inefficiency terms exist	-255.148	-239.296	31.7	14.325	refuse
Inefficiency terms do not change over time	-239.296	-232.895	12.802	12.483	refuse

It can be found from the results that the stochastic frontier gravity model applies and also that trade inefficiencies are time varying.

5.2 Results

Based on equation (5), the China's outward foreign direct investment efficiency can be calculated after regressing the stochastic frontier gravity model. The results of the calculation are illustrated as follows:

eff.-est.	country							
year	Albania	Bosnia and Herzegovina	Bulgaria	Croatia	Czech Republic	Estonia	Greece	Hungary
1	0.8882	0.2075	0.5851	0.2994	0.6347	0.5070	0.2822	0.4091
2	0.8576	0.2223	0.5111	0.2483	0.6308	0.5233	0.3410	0.4564
3	0.9277	0.2292	0.5782	0.2612	0.6898	0.6095	0.3183	0.6327
4	0.7817	0.1897	0.6693	0.2754	0.7635	0.6864	0.2973	0.6871
5	0.8677	0.2194	0.7345	0.3106	0.8403	0.6519	0.2917	0.7717
6	0.9503	0.1875	0.8190	0.5280	0.8859	0.7737	0.3987	0.8420
7	0.9607	0.2137	0.8440	0.7065	0.9123	0.8474	0.4653	0.8528
8	0.9512	0.2880	0.8826	0.8185	0.9185	0.8890	0.5207	0.8677
9	0.9238	0.3192	0.8372	0.7388	0.9019	0.6832	0.4287	0.8030
10	0.9045	0.3063	0.8234	0.7598	0.8883	0.7381	0.5417	0.8213
Total	0.9013	0.2383	0.7284	0.49468	0.8066	0.6909	0.3885	0.7144

eff.-est.	country								
year	Latvia	Montenegro	North Macedonia	Poland	Romania	Serbia	Slovak Republic	Slovenia	Total
1	0.3136	0.5970	0.0644	0.6651	0.7834	0.1997	0.4243	0.6610	0.4701
2	0.3581	0.6743	0.0837	0.5994	0.7869	0.2763	0.3695	0.5566	0.4685
3	0.3579	0.5897	0.1067	0.6371	0.7773	0.3750	0.4048	0.5930	0.5055
4	0.3940	0.5586	0.1217	0.7013	0.7762	0.4465	0.4609	0.6191	0.5268
5	0.4292	0.8165	0.1718	0.7762	0.8053	0.5485	0.5435	0.7334	0.5945
6	0.4712	0.8702	0.1291	0.8497	0.8451	0.6767	0.6313	0.8092	0.6667
7	0.6012	0.9006	0.1711	0.8873	0.8701	0.7036	0.7424	0.8659	0.7216
8	0.7497	0.8554	0.2084	0.9082	0.8508	0.7629	0.7959	0.8934	0.7601
9	0.6064	0.7400	0.2257	0.9123	0.7603	0.7749	0.7351	0.8485	0.7024
10	0.7081	0.8036	0.2232	0.9048	0.7175	0.7421	0.6236	0.8666	0.7108
Total	0.4989	0.7406	0.1506	0.7841	0.7973	0.5506	0.5731	0.7447	0.6127

Then we can obtain the following table by ranking the countries in descending order of efficiency:

Country	Efficiency	Rank
Albania	0.9013	1
Czech Republic	0.8066	2
Romania	0.7973	3
Poland	0.7841	4
Slovenia	0.7447	5
Montenegro	0.7406	6
Bulgaria	0.7284	7
Hungary	0.7144	8
Estonia	0.6909	9
Slovak Republic	0.5731	10
Serbia	0.5506	11
Latvia	0.4989	12
Croatia	0.4946	13
Greece	0.3886	14
Bosnia and Herzegovina	0.2383	15
North Macedonia	0.1506	16

The top-5-rank countries are Albania, Czech Republic, Romania, Poland, and Slovenia, and the last 5 countries are Latvia, Croatia, Greece, Bosnia and Herzegovina and North Macedonia. The high efficiency value indicates that the home country can make profit after making outward foreign direct investment towards the host country. In the future, China should maintain its co-operation and investment in countries with high efficiency and explore a better way to make outward foreign direct investment towards countries with low efficiency.

Chapter 6 Conclusions and Suggestions

6.1 Conclusions

Over the past decade, there has been a rapid development of economic and trade co-operation between China and CEE countries. At this moment, bilateral trade is also facing new challenges and opportunities. This paper aims to clarify the factors affecting China's OFDI towards CEE countries, and to provide some opinions for promoting the development of economic and trade between the two sides.

Based on the extended gravity model conducted above, it can be concluded that the main determinants which would significantly affect China's OFDI are transportation costs, tax rate, unemployment rate, high-technology exports (%GDP), total natural rents and trade dependence. To be more specific, China's outward foreign direct investment would be more likely to flow into CEE countries who have lower transportation costs, higher tax rate, higher unemployment rate, larger high-tech exports, higher level of total natural rents and higher level of trade dependence.

For developed countries in CEE region, it can be found that the determinants of China's GDP, transport costs, unemployment rate, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment. While for developing in CEE region, the determinants of transport costs, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment.

For resource-rich host country in CEE region, it can be found that the determinants of transport costs, unemployment rate and political stability would significantly influence China's outward foreign direct investment. While for resource-poor host country, the determinants of tax rate, high-tech exports, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment.

For countries who joined OECD in CEE region, it can be found that the determinants of host country's GDP, transport costs, tax rate, total natural resource rents and trade dependence would significantly influence China's outward foreign direct investment. While for countries who didn't, the determinants of China's GDP, transport costs, unemployment rate, high-tech exports, and political stability would major influence China's OFDI.

After the calculation of efficiency based on stochastic frontier gravity model, it can be found that the top-5-rank countries in CEE region are Albania, Czech Republic, Romania, Poland, and Slovenia, and the last 5 countries are Latvia, Croatia, Greece, Bosnia and Herzegovina and North Macedonia. In the future, China should maintain its co-operation and investment in countries with high efficiency and explore a better way to make outward foreign direct investment towards countries with low efficiency.

6.2 Suggestions

6.2.1 Developing markets in a targeted way

The 16 countries in CEE region have different national conditions, in which developing and developed countries co-exist, and the advantageous industries in each country are also different. It's necessary for China to develop the market in a planned and targeted manner based on the national conditions of each country and adopt different economic and trade cooperation programs according to the size and characteristics of each country's market, rather than treating the 16 countries in Central and Eastern Europe as a whole. In terms of investment, with the support of financing preferences and risk prevention of relevant platforms such as the China Development Bank and the Export-Import Bank, enterprises should draw on the existing investment experience in China and conduct feasibility analyses and planning before making cross-border investment. In terms of bilateral trade and economic cooperation, it would be preferable to fully cooperate with countries who have strong resource endowment and increase the import of their resource-intensive products. As for countries with large economic volume such as Poland, the Czech Republic, Hungary, trying to deepen the co-operation in high and new-tech industries under the premise of political stability and permission is the future

goal. At the same time, enterprises should strengthen pre-investment environmental assessment and post-investment operation tracking management to effectively prevent investment risks.

6.2.2 Focusing more on cross-border e-commerce

For SMEs, it is difficult to participate in large-scale infrastructure and financing projects, in which case cross-border e-commerce is the best way to enter the cross-border market. In this way, China could further promote existing domestic e-commerce platforms to enter Central and Eastern European countries, such as Alibaba, T-mall International, and Jing-dong Global Shop. At the same time, for individual enterprises, through the establishment of Shopee independent station, and through Instagram and other social networking sites to attract attention from consumers, they are able to get more B2B or B2C orders.

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