# CHARLES UNIVERSITY

## FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

# Bachelor thesis

**2018**                           **Lukáš Bystřický**

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# Analysis of Chinese foreign direct investment to Europe

*Bachelor thesis*

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## Bibliographic note

## Abstract

Foreign direct investment (FDI) from China has been growing rapidly in the last decade and it has become a hotly debated topic. Some countries are actively trying to attract more, while others warn of dangers to local economy and even national security. Both, media and researchers have studied the problem extensively and the outcomes are not uniform. This thesis summarizes all available information and debunks common public misconceptions about Chinese FDI. It studies particular cases to provide a closer look into the innerworkings of investment decision-making. It studies the microeconomic factors and politics that influence the investors. Furthermore, it uses the gravity model to explore the macroeconomic determinants of Chinese FDI flows using the most recent data on 174 countries over 9 years. The results of this empirical part are similar to previous findings and contribute to the existing pool of literature. In addition, they confirm the notion from previous chapters which reappears throughout the thesis. In contrast with media and politicians' statements, Europe is not the primary target for Chinese FDI.

## Keywords

## Abstrakt

Přímé zahraniční investice (PZI) z Číny v posledním desetiletí rychle rostou a stávají se velmi diskutovaným tématem. Některé země se aktivně snaží přilákat ještě více investic, zatímco jiné varují před možným nebezpečím pro lokální ekonomiku, a dokonce národní bezpečnost. Média i vědečtí pracovníci rozsáhle studují tuto problematiku a jejich závěry nejsou jednotné. Tato práce shrnuje veškeré dostupné informace a vyvrací mylné představy veřejnosti o čínských PZI. Zkoumá konkrétní případy, aby poskytla bližší pohled do systému, jakým se rozhoduje o investicích. Studuje mikroekonomické faktory a politické vlivy, které ovlivňují investory. Dále tato práce používá gravitační model, aby prozkoumala makroekonomické ukazatele, které určují toky čínských PZI. Používá nejnovější data o 174 zemích za posledních 9 let. Výsledky této empirické části jsou v souladu s předchozími zjištěními a přispívají tak do současného fondu literatury. Navíc podporují názor z předcházejících kapitol, který se objevuje napříč celou prací. Navzdory médiím a politickým prohlášením, Evropa není primárním cílem pro čínské PZI.

## Klíčová slova

ČLR, Čína, PZI, investice, Evropa, gravitační model

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**Rozsah práce:** 38 stran

## 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, 10th May 2018 **Lukáš Bystřický**

## Acknowledgments

# Bachelor Thesis Proposal

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**Proposed Topic:**

Analysis of Chinese foreign direct investment to Europe

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**Preliminary scope of work:**

*Research question and motivation*
In the last few years there has been much written about Chinese investments in Europe. Media as well as researchers from different organizations have studied this topic extensively because it begins to considerably influence European economies. The goal of this thesis is to analyze the data concerning Chinese outward investment using econometric methods. Based on this analysis the reasoning of investors will be unraveled. It will become clear which determinants influence their decisions concerning the region they want to invest to. Political factors determining the flow of investment will be determined as well. Subsequently, it will be possible to put the investment to Europe into the world-wide perspective and determine whether the public attention is in place. In addition the advantages and disadvantages of increasing investment will be evaluated and, depending on the outcome, future steps will be recommended which could be taken in order to either draw even more attention to Europe or to divert some of it elsewhere.

*Hypotheses*
- Europe is a secondary or even tertiary target for Chinese investments. The overall impact of Chinese investment in Europe is small and the public excitement about it is unjustified.
- The Chinese could take advantage of Europe which is overly willing to receive investment. They could obtain know-how and use it in the future to destroy local firms thanks to incomparably cheap workforce.
- The flow of Chinese investment to Europe is highly influenced by political factors. A change in leadership in European countries could lead to a considerable shift in demand for it.

*Methodology*
An empirical analysis of the data provided by Chinese Ministry of Commerce in its annual bulletin will be conducted using the gravity model of international trade. Additional variables will be added in order to determine the political influence. The theoretical background as well as the exact methods and procedures can be found in: **The Gravity Model in International Trade Advances and Applications** and **China's outward foreign direct investment** (section 14.5), see bibliography. In order to determine overall impact of Chinese investment on Europe, the data from Eurostat will also be examined.

*Contribution*
This thesis is going to use the latest data about Chinese foreign direct investment to Europe, an issue which has been evolving very quickly in the last decade. Therefore, the conclusions may differ significantly from those published in the past. A complex analysis will be provided addressing these differences and forecasting future development.

*Outline*
1. Introduction and review of existing literature
2. Theory behind used methods
3. Empirical data analysis
    3.1. Chinese data
    3.2. Eurostat data
    3.3. Interpretation of results
    3.4. Forecast
4. Evaluation of proposed hypotheses
5. Conclusion and summary

**List of academic literature:**

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**Author**                                                  **Supervisor**

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# Introduction

Chinese total outward foreign direct investment (FDI) flows have been growing rapidly over the last decade and much attention has arisen towards this topic. Media as well as researchers have reported and studied Chinese investments extensively and from many points of view. Some focus on narrow aspects, such as particular cases of one-off investments or policy changes. Others provide a comprehensible summary and visualization of available data through tables and graphs. Still others burrow deep into the structure of the FDI flows using econometric methods and look for determinants which explain why certain countries receive more FDI than others. A great part of these studies is focused on the USA or the EU as these belong among the largest recipients of FDI worldwide as well as FDI from China in particular.

This attention is well deserved as the magnitude of total Chinese outward investments can now compete with formerly uncontested investor leaders such as the USA and the UK and it is expected to grow further. On the other hand, much of this investment is directed to Hong Kong, offshore financial centers and nearby Asian partners. This thesis examines Chinese investments to Europe which, while growing rapidly, are still relatively small. Despite this, it is still important to study this topic because FDI play an important role in the economy. They can create and maintain jobs, improve infrastructure, create new market opportunities, provide funds for research and development, generate tax revenues or introduce new technology. For these reasons, most European leaders welcome Chinese investors and they even actively try to attract more. However, the situation is not so simple. Many concerns have arisen along with these positive effects. FDI can have negative implications as well. For example, they can severely disrupt competition leading to bankruptcies and the overall influence on unemployment might not always be positive. These macroeconomic effects are surely important from the point of view of the EU or the individual member states. They must analyze impacts of FDI and adopt policies to either promote or discourage investors based on the outcome. In their analyses they must also take into account public opinions and politics. Some projects, although promising great improvements in employment or wealth, can be perceived negatively and may cost the leaders their leadership if agreed upon. These include deals which either are or at least seem to be (from the point of view of ordinary people) polluting the environment, related to weapons, or promoting the violation of human rights. In addition, public may worry

about foreign investors exploiting cheap workforce, stealing important know-how and technologies and so on.

The investors themselves, however, seldom care about the macroeconomic effects their investments have on the region or whether they may shift political power. They choose their investments predominantly on a microeconomic basis. They try to maximize their profit. Where is it most profitable to invest? Which branch of a sector would best suit our overall goals and portfolios? Is it better to produce domestically and export, or to produce abroad, closer to the final customer?

In case of Chinese investors one more factor can play a role both when they decide where to invest and when other countries decide on investment policies. Chinese investors are commonly directly owned by the government which introduces further political issues. Through FDI, Chinese government can gain some political influence in Europe. When controlling big companies and associated lobbies, China can meddle with politics in Europe. This also means that Chinese investment decisions are highly dependent on official policies and decisions of the Government.

This thesis aims to thoroughly analyze Chinese FDI to Europe from all the various points of view mentioned above. It starts with a chapter introducing the recent development in Chinese FDI and their regional and sectoral distribution. It visualizes data and puts Chinese FDI in the world-wide context. In Chapter 2 several individual investment transactions and policies are selected for a closer inspection. These provide a closer look into the microeconomic reasoning behind particular investments as well as the power (or lack of) which politicians have while negotiating these deals. Chapter 3 relates to the empirical analysis of the most recent data. A version of the gravity model is defined on the basis of microeconomic theory and taking into account the common practice among similar studies in the past. Relevant variables and sources of data are described and data adjustments are introduced. In Chapter 4 this carefully chosen model is estimated with the most recent data and an up-to-date addition to the pool of empirical findings is provided. Thus, this thesis connects to the existing chain of literature on Chinese investments. Chapter 5 concludes.

# Chapter 1 - Chinese FDI

This chapter aims to summarize the development and structure of Chinese outward FDI. It provides a comprehensible overview which serves as a framework for further analysis. The composition of Chinese outward FDI (by sector and by destination) is examined and recent changes and trends are discussed. China is further introduced as one of the world's largest investors, but on the other hand, this chapter attempts to put the figures into perspective. While China invests a lot indeed, the attention of media and researchers, especially in Europe, seems exaggerated. Especially considering the fact that in most European countries, as well as in the entire EU combined, investments from China only amount to less than 2 % of total inward FDI.

## *1.1 Inward vs. outward*

China got a lot of attention when it managed to attract a substantial portion of world's FDI during 1990s and 2000s. It has become the world's third largest recipient of FDI in 2003 and remained in the top 5 since. As seen in Figure 1, the inward FDI to China reached its peak around 2011 - 2013 and has been stagnating since then. This is consistent with slower growth of Chinese economy in recent years, increasing price of labor (especially in coastal provinces), depreciating Juan and a slight change in the Chinese government's attitude towards FDI (greater emphasis on control and regulation). Despite this, China claims third place in 2016 once again with only the USA and the UK receiving more FDI. This suggests that stagnation or moderate growth is a norm among developed countries rather than the explosive growth exhibited by China in the 2000s. In contrast with inward FDI, China has not traditionally belonged among the countries with high outward FDI. As seen from Appendix A, outward FDI was strongly discouraged by the government in the early stages. It was only in 1984, when the government first started to acknowledge outward FDI as a tool for development and it has gradually loosened the restrictions and even started encouraging investments in key sectors. Despite this, in 2000, when China had already firmly established its position regarding inward FDI in the top 10, it was still far down in the outward FDI ranking at the 33rd place. Following the introduction of the "Going Out" policy in 1999 the total outward FDI begun to increase steadily but timidly at first. This situation only changed in very recent years. During the global financial crisis of 2008, countries all over the world struggled with significant capital outflows as previous key investors retracted to their respective home markets. In

addition, many countries used privatization as a tool to overcome the crisis. This created a surplus of opportunities for investments. Previous (now aborted) investments could be renewed and privatized assets could now be bought. It was China that was first able to use this in its favor. While American companies were struggling on their own market, Chinese enterprises took a risk and dove into the suddenly reasonably priced foreign assets. This was partially made possible by the fact, that Chinese investors are predominantly state-owned and therefore less vulnerable. (Guerrero, 2017) As also seen from Figure 1, this allowed the growth of outward FDI to pick up the pace exponentially. Ever since, China has repeatedly occupied one of the top 5 spots in this category as well. In 2016, for the first time, China invested more than it received and surpassed all the rest of the world with a single exception - the USA. (UNCTAD, 2017)

In addition, Chinese total outward FDI stocks only represent about 10 % of their GDP whereas it is not uncommon for this figure to surpass 20 % in other developed countries. (Japan 28 %, USA 34 %, Germany 39 %, UK more than 50 %) (Seaman, Huotari, Otero-Iglesias, 2017) It is therefore probable that the growth will continue in the near future.

## *1.2 Recent restrictions and future development*

In contrast with the end of the previous section, the growth of Chinese FDI is being hindered by the current situation in China. In late 2016, China was forced to react to the instability of Juan and depleting of foreign currency reserves. Both these problems were largely blamed on irresponsible investments, which did not bring adequate returns. National Bank of Canada (2017) compares two examples of the recent Chinese investments (2016 acquisition of Legendary Entertainment by The Dalian Wanda Group of China and 2014 "purchase of several buildings in Manhattan" by Anbang Insurance Group) to investments made by Japan in 1990s. These non-strategic investments into "trophy assets" resulted in huge losses for Japan and contributed to the subsequent era of low economic growth. China sees early signs of worsening capital account and aims to prevent the same scenario.

The short-term solution of Chinese government was imposing strong capital outflow restrictions. The sectors for investments were divided into "prohibited", "restricted" and "encouraged" (McMillan LLP, 2017) and some investors suddenly faced much scrutiny and their planned ventures were being canceled or they needed to search for alternative ways of funding through "existing offshore pools of capital" (PERE, 2017). In addition,

several companies' CEOs (Anbang Insurance Group, CEFC Europe) are being investigated and have disappeared from public view.

In reaction to this, in 2017, especially in the first half, we can see a significant drop of FDI as the investors had to adjust to the new conditions. The second half however brought a resurgence and overall figures for 2017, while lower than 2016, are still second highest in history (Brown, Chen, 2018). In addition, the foreign currency reserves have regained their growing trend and Juan has stabilized, so the restrictions are probably about to be loosened. The government has already achieved its goal - it has much more control over what China invests into. Also, the investors have had enough time to adapt and so the previous growth will likely continue.

The end of this chapter stresses that at least for now the real economic impact of Chinese investments in Europe is almost negligible and that the attention from media and researchers is unjustified. But if the growth continues, after the brief slowdown described above, at current speed for some time, it might not be long before the importance of Chinese FDI catches up with what it is now perceived to be.

Figure 1: Total Chinese outward and inward FDI flows (current USD)
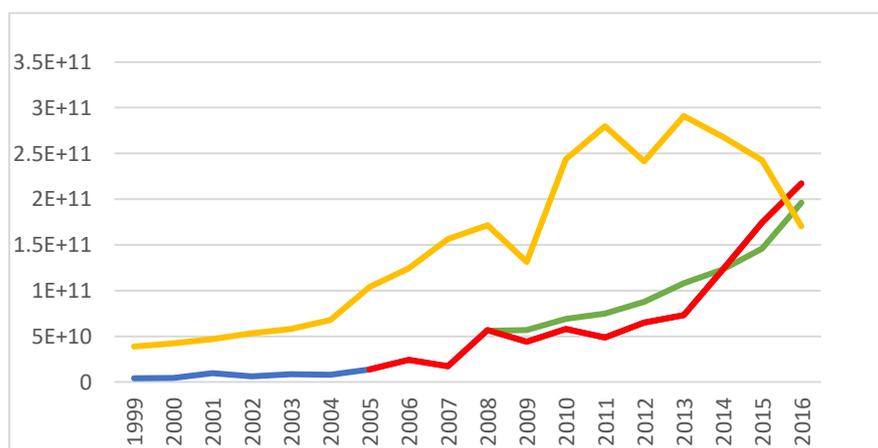


blue - World bank, red - OECD, green - Chinese Ministry of Commerce, orange - inflows

## 1.3 Regional distribution

In this and the following sections, data from Chinese Ministry of Commerce (MOFCOM) are used when not specified otherwise. The same source is used in the empirical part in chapter 4. As seen from Figure 2, the vast majority of Chinese FDI flows in 2016 was directed to Asia, followed by Latin America, North America, Europe, Oceania and Africa. As mentioned above, the greatest recipient of FDI from China is Hong Kong with almost

7 times more than the USA on the second place. Germany, the greatest Chinese partner in Europe for 2016 is further outmatched by Cayman Islands, British Virgin Islands, Australia, Singapore and Canada and ranks on the 8th place. The ranking and relative size of Chinese investments to these 8 countries is visualized in Figure 3. Within Europe, the other most important recipients were Luxembourg, France, UK and Netherlands in 2016. This will not soon change. On one hand, since 2017, there have been a lot of mentions about investments which target semi-peripheral European countries as well. It seems that some of them have developed their relations with China and expect big increases in future FDI. (Hungary, the Czech Republic, …) On the other hand, it is difficult to tell, whether these expectations are likely to be satisfied. Even if they are, big investments from the perspective of peripheral countries may seem little in comparison with the bulk of Europe and not change the overall figures much.

Figure 2: Regional distribution of Chinese FDI
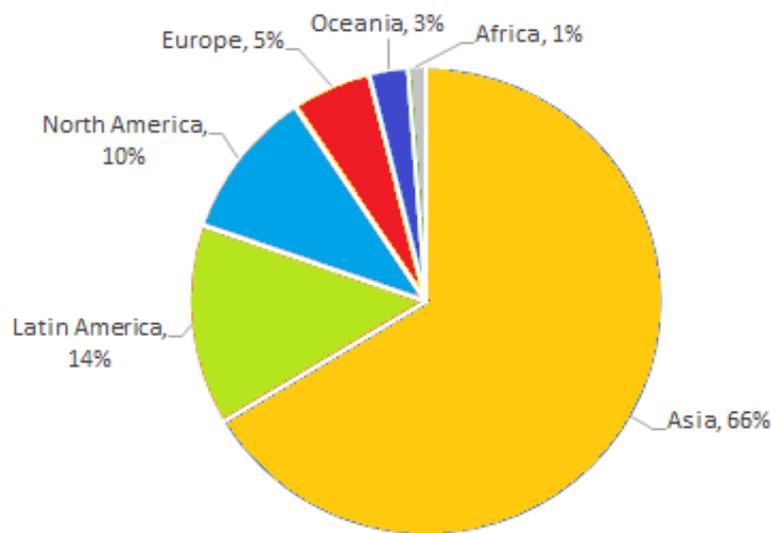
Figure 3: Top 8 recipients of Chinese FDI (USD mil.)
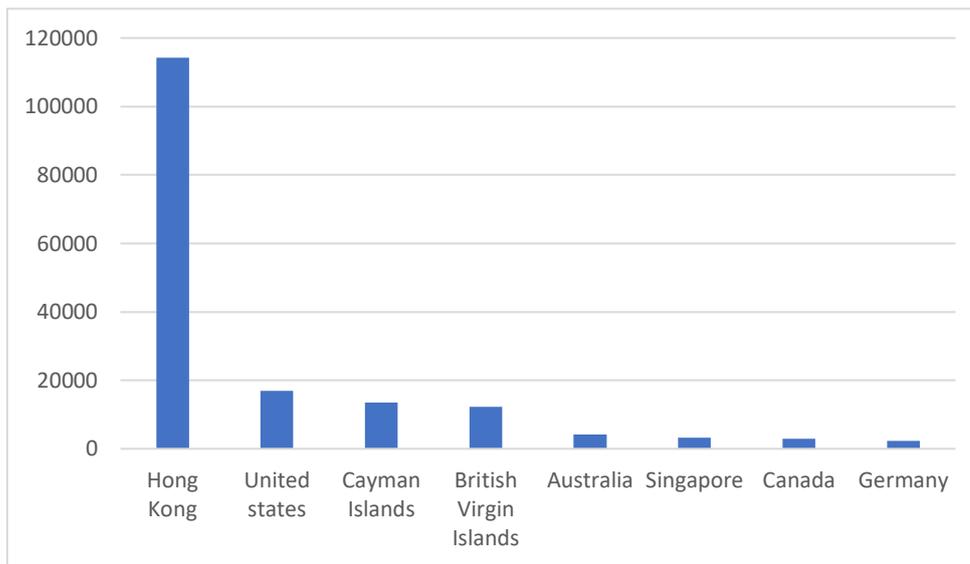


The situation described above was not always the same. The data in this thesis only capture the past as far as 2008 which is, unfortunately, exactly when the situation changed dramatically. Before 2008, the biggest recipient of Chinese FDI after Asia was traditionally Africa. Before the financial crisis and before the great growth of Chinese outward investments even started, Chinese investments into resource-rich African countries where the most prevalent. This can be partially seen from the beginning of Figure 4. China was a major political and economic partner for Africa in 20th century and in the beginning of the 21st. Chinese exports, financial aid and investments to Africa were crucial for its development. The growth in Chinese investments to Africa in Early 2000s inspired a wave of research papers and media articles very similar to the current hype about Chinese investments in Europe. However, the Chinese activities in Africa weakened after the financial crisis and were quickly lost behind the vast new projects which followed all over the world.

Figure 4: Development of Chinese FDI to regions (Asia not included for greater detail)
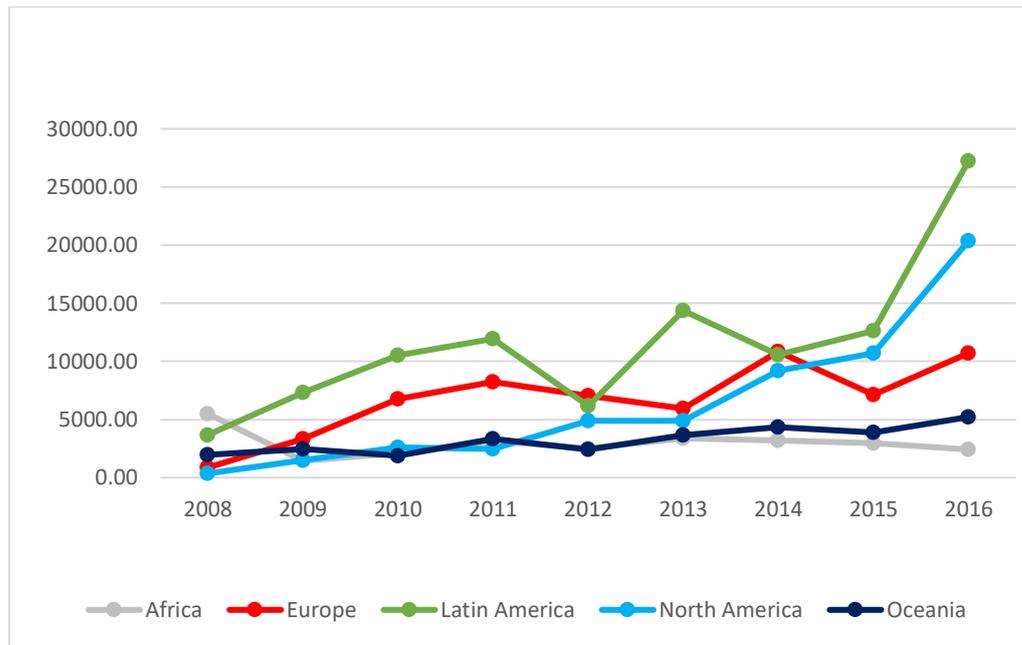


## *1.4 FDI by sector*

The sectoral distribution of Chinese FDI also underwent a major shift during the crisis. Before 2008, China invested predominantly to resources, energy and financial sector. According to Ma, Overbeek (2015), even in advanced Europe oil and gas refining accounted for more than 30 % of all investments. In Africa, the majority of Chinese investments was focused on mining minerals such as copper, zinc, aluminum and nickel as well as oil. Since 2008, this began to change drastically. Resources and energy have become less and less prevalent sectors in the Chinese FDI and instead China started to invest to high-end production sectors and services. Figure 5 shows the distribution for 2016 where 22 % of Chinese FDI flows to the manufacturing sector. Even here the shift is apparent from low-end products such as textiles to the high-end automotive industry (Volvo) or metallurgy and engineering (Žďas) which require high level of skill. The increased interest in information technology is also apparent from the pie chart. Apart from banking, real estate and retail, no other sectors surpass 4 % including the previously so dominant oil refining. This change is indeed very prominent. In chapter 2, two Chinese companies which invest in Europe are examined and both invest heavily in top technology, research and development and services. (High quality tires, airlines, genetically modified crops, tourism, …)

Figure 5: Distribution of Chinese FDI by sector
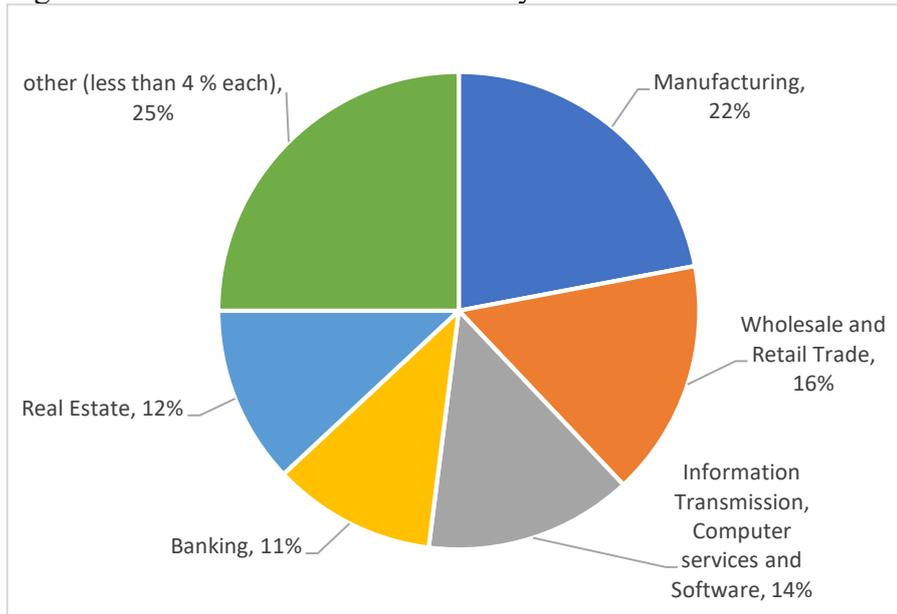


## 1.5 Exaggerated attention

As China became one of the world's top investors, it is not surprising, that during the last decade a lot of attention has arisen throughout the world towards investments from China. This public interest is further increased by the controversial nature of China with claims of oppression and exploitation of cheap workforce. Many people regard investments from China negatively. In a Bloomberg survey (Selzer & Co., 2016), the majority of respondents regarded an unspecified imaginary factory owned by Americans with 1000 employees as "better" than a similar factory owned by a Chinese company with 2000 employees. Similar findings are presented in Figure 6 which examines overall attitude towards Chinese companies by "opinion leaders from 12 European markets". We can see, that with no further questions asked, China still remains frowned upon by the western world. It is often associated with manufacturing cheap replicas of other brands and nothing else, which is now less true than ever when China ventures into high-end businesses all over the world. (Morgan, Battistella, 2017)

Figure 6: Attitude of "opinion leaders"



Source: APCO Insight research conducted December 27, 2016—February 5, 2017;
(n=200) among opinion leaders across UK, Germany, France, Italy, Spain, Netherlands, Sweden, Belgium, Poland, Czech Republic, Hungary, Finland

Furthermore, the relative importance of Chinese investments is exaggerated by the very statistics mentioned above. Chinese position in the world rankings would drop significantly if investments to Hong Kong were not included. According to Chinese Ministry of Commerce, around 60 % of all outward FDI has been flowing to Hong Kong during the most recent years. This means that from an ordinary country's perspective, there seem to be much less investment from China, than the statistics would let us believe. In addition, the effects of round-tripping, which is discussed in Chapter 3, also help overstate the volumes. Much of the media coverage and "hype" originates from this discrepancy. In particular, when an individual investment occurs, the media present it as another big investment from one of the biggest investors in the world even if the true share of Chinese investments in given country may be almost insignificant. Most of the media coverage focuses on particular incidents of one-off transactions often not because they are extraordinary in magnitude, but simply because they are Chinese and that is a hot topic. Simply put, when an average reader learns about a 1-billion-dollar investment, it seems unimaginably big. Without mentioning that this is in fact just a little fraction of the total investments, these articles, knowingly or not, inflate the importance of Chinese investments in their reader's minds. (Sheng (2016), Morgan, Battistella (2017), Maurice (2017), …) Understandably, Chinese officials enjoy the mentions of huge Chinese investments and of related economic power and aim to strengthen the notion as well.

# Chapter 2 - Particular cases

This chapter focuses firstly on some of the largest individual Chinese investments in Europe. Namely Chinese state-owned company China National Chemical Corporation, commonly called "ChemChina" seems to attract lots of media attention with its European acquisitions. Furthermore, the situation in the Czech Republic regarding the activities of CEFC is examined. These particular instances can show nicely the microeconomic and political reasoning behind the investments. Lastly, this chapter examines European policy towards FDI.

## *2.1 Individual transactions*

### 2.1.1 ChemChina

In March 2015, the Italian tire producer Pirelli was acquired by China National Chemical Corporation, a Chinese state-owned company commonly called "ChemChina". This acquisition worth more than EUR 7 billion was at the time the largest single Chinese investment to Europe. (Guerrero, 2017) With 30 000 employees and turnover of EUR 5.3 billion, Pirelli belongs among the top 5 tire producers globally. Furthermore, Pirelli is a well-known brand world-wide not least as a result of its long-lasting connection to the Formula 1 races. The investor, ChemChina, is China's largest chemical company. It ranks 211th among the Global Fortune 500. It has around 160 000 employees, with sales revenue reaching EUR 39 billion. According to its web (http://www.chemchina.com), it specializes in following segments: "new chemical materials & special chemicals; basic chemicals; oil processing; agrochemicals; tire & rubber products; chemical equipment".

China has recently acquired some power in the European automotive industry through the acquisition of Volvo by Chinese Geely (in 2010) and a big investment of EUR 800 mil. by Dongfeng Motors in PSA Peugeot Citroen (in 2014). After this, it was expected, that Chinese investors will also aim for major suppliers in this sector. Pirelli, due to its size and value, was a surprisingly bold choice, but one that has achieved far more than what could have been achieved by acquiring another, perhaps more reasonable, supplier. Through such a recognizable brand a tire making subsidiary of ChemChina, China National Tire & Rubber Company (CNTR), gained access to world's top car manufacturers and even more importantly it gained access to European tire replacement

market. Up to the acquisition, this sector was firmly controlled by European (Michelin, Pirelli) and Japanese (Bridgestone) tire producers but the CNTR-Pirelli cooperation means a great Chinese opportunity on European and even world-wide market. This tie-up is also not without advantages for Pirelli. The openness of market works both ways and it provides Pirelli with opportunities in China as well. Both Michelin and Bridgestone have been trying to expand on the Chinese market with moderate success, but with the help of Pirelli's know-how and technology, the two companies under ChemChina can now threaten their progress and climb to the front. Especially the truck tire expertise of Pirelli is very welcome because the truck tire market in China is booming. In fact, as of March 2017, Pirelli was able to completely abandon their industrial tire production and focuses on the domestically more profitable consumer tires while CNTR excels in Chinese high demand market for industrial tires. (Cool, 2018)

As important as this acquisition surely is, ChemChina has still more to offer. Whereas the Pirelli takeover of 2015 was "only" the biggest Chinese investment to Europe to date, the more recent (2017) acquisition of Swiss pesticides and seeds group Syngenta is even greater. Costing ChemChina USD 43 billion, it is China's greatest foreign takeover in history. Sadly, the most recent data which are used in the empirical part of this thesis only provide figures up to 2016 so this huge transaction will not appear in the dataset.

While the takeover of Pirelli was very much a profit maximization effort from ChemChina, the case of Syngenta is different. Obviously, it is not the aim of ChemChina to lose money, but this acquisition is certainly driven by government decisions. According to Colvin (2017), China has historically struggled with food security. There have been countless catastrophic famines which killed millions, the last and worst of which occurred as recently as 1961. This is not too surprising considering that China currently has 19 % of world population and it must feed all these people from just 7 % of world's fertile land. In addition, some of the rural parts of China are very poor and agriculture in those parts is ineffective. So far Chinese government tried to raise food production mainly via extensive use of chemicals and fertilizers which in turn polluted the region even worse than industries. The new plan involves genetically modified seeds (GMOs), which promise much higher yields with less pollution. The acquisition of Syngenta serves exactly this purpose. It is number 3 in worldwide production of seeds for agriculture and a world leader in advanced, less harmful herbicides and pesticides. Not only does the ownership of such a company guarantee access to these high-quality seeds with favorable

conditions, but further investments in this technology are going to increase food production all over the globe. Chinese government admits, that despite its huge food reserves a possibility of another food shortage still exists. In that case, China wants to be absolutely sure, that it will be able to buy food for its residents abroad. Even if the probability of another famine is very low, the government still need to raise the food production as most of the population starts demanding protein rich meals such as pork. Chinese already consume half of the world's pork production and this ratio is growing rapidly. In order to produce a kilogram of pork one needs 2 - 4 kilograms (depending on source) of grain to feed the pigs. Fortunately, the government is aware of this stress on the agriculture and has begun to react.

## 2.1.2 CEFC

The activities of CEFC in the Czech Republic became well known in 2016 when Chinese president, Xi Jinping, visited the Czech Republic for the first time. In a meeting with the Czech president, Zeman, they discussed possible investments in the Czech Republic and they agreed that a private Chinese company, CEFC China Energy, will make Prague the "headquarters" of their European fraction. Zeman considers this his major achievement as the relations between the Czech Republic and China have indeed been much improved by his politics. In cooperation with the last government, Zeman promoted the Czech Republic in China by several visits. Furthermore, he displayed his fondness to China by attending the 2015 celebrations of the anniversary of the end of the Second World War which included a military parade, despite being the only western country leader who accepted this invitation. Domestically he prided himself with various business deals that he helped creating and the 2016 CEFC plans were to be the culmination of his work. Huge plans were made. Zeman appointed the CEO of CEFC, Ye Jianming, his special advisor for China and promises were made of investments totaling CZK 95 billion, or about EUR 3.7 billion just in the year 2016.

Now, two years later, we can say that these plans were not fulfilled. Czech Television reported in its investigative series "Reportéři ČT" on 26th March 2018 that to this day CEFC bought assets and shares worth more than CZK 30 billion. These investments include majority shares in Lobkowicz Group breweries, Football club SK Slavia Prague and a metallurgical company ŽĎAS as well as minority shares in Travel Service airlines and J&T Finance Group. They also own several other properties such as football stadium Eden Aréna. This is still far from what was promised. In addition, Ye Jianming is being

investigated for "economic reasons" and CEFC is far from prospering optimally. In recent months it became clear, that CEFC seriously lacks liquidity, when it agreed to approach shadow bankers for short-term loans with interest rates as great as 36 %. Even more recently, since March 2018, Chinese government attempts to save the cooperation by partially nationalizing CEFC. State owned CITIC Group gained 49 % share in CEFC and is going to try to help it in completing all the planned investments. (ČTK, 2018)

Once again, the exaggerated attention must be stressed here. In the Czech Republic this is very apparent. Thanks to the president's statements, much of the public perceives Chinese investments as enormous and absolutely vital for our economy. Almost every day, there is a news story about CEFC. In truth, these investments are not that impressive. According to the Czech national bank, in 2016 the Chinese FDI flows accounted for mere 5 % of the total in the Czech Republic. In previous years it was far less and the preliminary data for 2017 also suggest a drop, rather than an increase. Plus, because China historically invested little, the stock of its investments here is only about 0.5 % of the total stock of FDI. Investments from European partners, such as Czech neighbors, Italy, France, Cyprus or Netherlands are far more significant and even investments from the Korean Republic are greater than those from China in most years. Nevertheless, these come quietly without anyone noticing outside the parties involved. Of course, they are recorded by statisticians, but ordinary people who do not look up these statistics are mislead by media only focusing on China.

It is also fitting to mention that the Czech Republic is not the only European country which systematically attempts attracting investments from China and is unsatisfied. The most profound is the situation in Hungary. According to Matura (2018), the Hungarian government aims heavily at improving relations with China. Since 2010, through a series of policies and gestures they managed to develop the cooperation with China to the level of "comprehensive strategic partnership". In fact, in many ways, Hungary is the perfect partner through which China could enter to the Central and Eastern European (CEE) market. They host the headquarters of Bank of China for CEE, they have a large Chinese community and even a Chinese-Hungarian bilingual school. In reality, however, there have been little investment occurring since 2010. Similarly to the Czech Republic, there have been megalomaniac promises including a highly medialized case of Belgrade-

Budapest rail road, however these were not completed or, in case of the rail road, are very delayed.

This illustrates an interesting point. While China can definitely gain access to political influence in Europe through investments, as was mentioned above, it can in fact also gain this influence in another way, which is far less costly. It can promise infeasible amounts of investments without actually realizing them. In both, the Czech Republic and Hungary, the political attitude towards China remains full of expectations even though the past suggests otherwise.

## 2.2 European policy

Currently there is no single treaty between EU and China, so all Chinese investments are governed by bilateral agreements with individual states. This leads to different attitudes towards Chinese investments in different parts of Europe. As seen above, most of CEE tries to attract investments at all costs. Only very recently, have there appeared concerns about possible exploitation which have existed in western Europe for some time. In Germany, for example, the Ministry of Economics has been carefully investigating all new incoming investments. Some such inspections may take up to four months during which the investment cannot take place. The ministry has so far prohibited no transactions, but this tool is very important for Germany non the less. Germans fear the possibility of losing too much cutting-edge defense technology to Chinese investors which would threaten their national security. (Scheuer, Stratmann, 2018) Similar fears begin to put serious obstacles between China and the USA as there some investments have already been canceled due to these protectionist measures. For example, China Zhongwang Holdings' proposed USD 2.3 billion acquisition of Aleris was canceled over economic and national security concerns. (Li, 2018)

In this climate of differing opinions on the Chinese investments, the European parliament is working on a unifying EU-China Comprehensive Agreement on Investment (CAI). The work began in 2012, but it is still far from over. The aim of this treaty is to completely replace the individual conflicting bilateral investment treaties and in addition, to provide market access provisions for the investors even before they enter the market to ensure that foreign investors have the same market access as domestic investors. This agreement hopes to provide new opportunities while simultaneously unify and simplify the regulation processes. It also wants to guarantee fair treatment for all parties involved, eliminating discrimination or exploitation.

In this section, it is also fitting to mention the policies between China and Europe which do not directly influence FDI. The overall relations between EU and China are governed by EU-China Trade and Cooperation Agreement from 1985 which is also currently being updated by the parliament. Representatives of EU and China meet annually at summits and discus future cooperation. In 2013 EU-China Comprehensive Strategic Partnership was established, and EU-China 2020 Strategic Agenda for Cooperation was adopted.

Through these policies Europe and China express their support for one another and ley the basis for their alliance. China is EU's second greatest trade partner and EU is the greatest partner for China so diplomatic agreements are very important.

On the other hand, there are also some measures in force on both sides which contradict this partnership to some extent. The arms embargo, which was imposed by the EU as a reaction to suppression of the Tiananmen Square protests of 1989 is still in place and prohibits EU members to sell weapons to China. In addition, several anti-dumping policies protect European market from cheap Chinese imports, especially steel. (Vincenti, 2016) In the past the anti-dumping measures were often a problem for Chinese exporters, which might be another reason to invest directly in Europe.

In the opposite direction China also imposes some barriers for European exporters and investors. These are annually summarized in "European Business in China Position Paper" by the European Union Chamber of Commerce in China.

# Chapter 3 - Methodology

This chapter introduces the gravity model as a powerful empirical tool in explaining various international economic processes including FDI flows. There exists a vast literature on both the theoretical background and the practical use of the model. By reviewing this literature, a proper model is specified. Individual variables are discussed and sources of data are introduced. Furthermore, a section is devoted to problems with data which are very common in applied work. As a reaction, several necessary data adjustments are described and explained.

## *3.1 The gravity model*

The gravity model was first used by Tinbergen (1962) in order to estimate international trade flows with little to no economic background. Following this paper, multiple studies started using the gravity model as it was especially good at predicting and explaining trade flows. The results were significant, the R-squared was usually big and the coefficients made sense when carefully interpreted. It was therefore considered a somewhat valid approach, even though a formal economic theory was not available.

The basic version of the gravity model for trade is this: $X_{ijt} = a \frac{GDP_{it}^{q} \cdot GDP_{jt}^{r}}{D_{ij}^{s}}$ where $X_{ijt}$ is the trade flow from country *i* to country *j* in time *t*, *GDP* measures the economic size of the countries and *D* measures the geographical distance of the two countries therefore proxying transportation costs, management costs and other trade frictions, such as different languages and overall foreignness of distant markets. This simple relationship resembling Newtons formula for gravitational force explains data very well and consistently across studies with R-squared often greater than 0.8. It is therefore clear that some economic process must exist governing the flows according to gravity.

## *3.2 Theory*

It is remarkable, that several studies have derived a satisfactory theoretical basis for the model while each using a different approach. Leamer and Stern (1970) is one of the earliest attempts to put the gravity model into the framework of economic theory. Their paper starts with probability model. Another study, Anderson (1979), introduces Cobb-Douglas and CES utility functions. Still another paper, Bergstrand (1989), used monopolistic competition model as the basis while Evenett and Keller (2002) derived

gravity from both Hecksher-Ohlin model and increasing returns to scale hypothesis. Indeed, it seems no matter the starting point, the same simple gravity equation is always derived. Even theories, which compete with each other agree on this fundamental relationship.

Carr, Markusen and Maskus (2001) and Bergstrand and Egger (2007) further develop the theory to include FDI as the dependent variable. Their theoretical model of multinational enterprises' foreign investment decisions lends credibility to gravity equations explaining FDI, provided several adjustments. They recommended changes to the version of the gravity model in order to capture the "vertical" incentives for FDI.

Other studies have since linked the gravity model with a variety of different dependent variables in addition to trade and FDI flows. It has been used, among others, to estimate migration - Karemera, Oguledo, Davis (2000) and traffic - Jung, Wang, Stanley (2008).

For this thesis, the most important literature is the collection of studies examining the determinants of Chinese FDI using various versions of the gravity model. Sadly, there is still little consensus on which variables to use in the model. The above-mentioned studies have only suggested a few key variables, which should appear in every gravity equation, however every researcher adds his or her own variables to examine their own research questions. The pure gravity model as proposed by Bergstrand and Egger (2007) is therefore seldom used in practice.

## 3.3 Practice

### 3.3.1 Variables

As Blonigen, Piger (2014) points out, the methodology is indeed very inconsistent. In their paper, they examined 8 studies that had used the gravity model to explain FDI. In these 8 studies, the total number of different explanatory variables is 47 with no variables present in all 8 and each individual variable only present in 1.7 studies on average. It is concerning, therefore, that all these studies claimed significant results from their substantially different models. The same paper "uses Bayesian statistical techniques that allow one to select from a large set of candidates those variables most likely to be the determinants of FDI". It inspects the set of all possible specifications of the gravity model and assigns probability to each variable reflecting how likely that variable is to be part of the "true" model that generated the data. The results are not very surprising. High

probability variables are the original variables of the gravity model whereas including variables such as institutions, business costs, infrastructure and others is not justified. Blonigen, Piger (2014) recommends using the original variables - distance, GDP as well as some measure of Endowment - both labor and resource. Furthermore, a measure of cultural proximity is to be used. A measure of national development and wealth is also justified as well as trade openness proxy in log-models. Despite Blonigen, Piger's (2014) large sample there are other variables which appear in empirical studies they did not recognize. One such example is inflation rate used in Hu (2013) further referencing Buckley et al. (2007).

Considering all the literature above the variables used in this thesis to explain FDI are: GDP, GDP per capita, distance, share of trade in GDP, share of resources in exports, inflation rate and the share of ethnical Chinese in the population.

## 3.3.2 Logarithms

It is also not clear whether to use the logarithmic form of the model or not. The original version did use logarithms and according to Blonigen, Piger (2014) it is the most common practice. However, level approach is also present in the literature. (Chakrabarti, 2001, Kolstad, Wiig, 2012) In this thesis, the log-model is preferred because it directly follows from the theory and, in addition, Blonigen and Davies (2004) shows that the residuals from log-model are better-behaved in the presence of skewness typical for FDI flows. (Řezáč (2014), Blonigen et al. (2007))

Sadly, the log-linear approach also introduces a problem. In presence of zero or negative values in the variables, which are to be log-transformed, these observations must be either disregarded or substituted by small but non-zero values. Neither of these methods is very good and both lead to bias as the observations lost from the sample are far from random. Fortunately, Chinese investments are so universal, that there is not many zero and negative values in the actual dataset. Nevertheless, the results should be interpreted carefully, because some level of bias will probably be present.

All variables, which report levels, will therefore be transformed in the log-form. Binary variables as well as percentage shares will be left unchanged. Binary variables cannot be transformed for obvious reasons and the shares should remain untransformed, because the changes in FDI are likely to be explained by changes in percentage points (levels), rather than percentages (log-form). In addition, log-transforming inflation would mean

disregarding countries with deflation which are not very rare in recent years and even the interpretation of the results would be somewhat counterintuitive.

### 3.3.3 Estimation methods

In the literature, it is once again not clear which estimation method should be used. The available data are often in the form of slightly unbalanced panels which allows 3 basic approaches which are examined bellow.

The simplest of the three and according to Kepaptsoglou, Karlaftis, Tsamboulas (2010), the most common method of estimation across empirical studies of trade flows is "Pooled OLS". However, there are serious problems with this method. The log-linearization process of the gravity equation violates the conditions of OLS because it disregards nonrandom units and in addition the mean of logarithms is not the same as the logarithm of the mean. Silva, Tenreyro (2006) proposes the use of "Poisson pseudo-maximum-likelihood estimator" (PPML) which performs better under these conditions and furthermore, it allows for zero values in the dependent variable, so it does not disregard as many observations. In this thesis, both methods are used and reported with heteroskedasticity-robust standard errors. Similarities in coefficients could lend credibility to these approaches.

The other two methods, "Fixed-effects" and "Random-effects", are also frequently used in the empirical work and several tests can determine which of the methods is the most suitable. Borrowing a table from Park (2010), see Figure 7.

Figure 7: Model selection scheme

| | Fixed effect (F test or Wald test) | Random effect (Breusch-Pagan test) | Selected model |
|---|---|---|---|
| $H_0$ rejected? (type of effect present) | NO (no fixed effect) | NO (no random effect) | →Pooled OLS (poolable data) |
| | YES (fixed effect present) | NO (no random effect) | →Fixed effects model |
| | NO (no fixed effect) | YES (random effect present) | →Random effects model |
| | YES (fixed effect present) | YES (random effect present) | Random effects model is generally more efficient, but can be rejected by Housman test |

The results of these test are, however, somewhat open to interpretation. Sometimes the tests recommend one method, while it can be reasonably argued in favor of the other based on the logic of the model. For example, if the researcher is particularly interested in the role of time-invariant variables, such as distance, the fixed effects model will not provide an answer as it disregards all the time invariant variables and only tries to explain FDI by temporal changes in the variables.

In addition, very low explanatory power is predicted for fixed effects. Temporal changes in GDP might not even be significant in fixed effects model, because FDI surely depends on the absolute size of the economy, but when the size increases a little, there is no guarantee that FDI will grow as well. In this model, the unobserved fixed effects (historical and cultural proximity) and the time dummies will surely explain much variation in FDI, but the contribution of the variables of interest will likely appear insignificant. Nevertheless, this thesis estimates the equation by all four methods and then, seeing the results, we can compare and conclude which model gives us the most relevant results. Even if some models suffer from serious problems, the similarity of coefficients from different models can lend credibility and show the robustness of the model used. (Dreger, Schüler-Zhou, Schüller (2015), Buckley et al. (2007))

## *3.4 Exact specification of model for empirical use*

After reviewing literature and determining the proper variables, form and estimation methods, the following basic model is specified:

$$\log(FDI_{it}) = \beta_1 \log(\text{GDP}_{it}) + \beta_2 \log(\text{GDPpc}_{it}) + \beta_3 \log(\text{distance}_i)$$
$$+ \beta_4 \text{border}_i + \beta_5 \text{Chinese}_i + \beta_6 \text{resources}_{it} + \beta_7 \text{Europe}_i$$
$$+ \beta_8 trade_i + \beta_9 \text{inflation}_{it} + \varepsilon_{it}$$

where index *i* changes over cross-sectional units (countries) and index *t* changes across time. The fixed and random effects are not explicitly mentioned in this equation for the sake of brevity. This model is estimated by all the methods mentioned above (Pooled OLS, PPML, FE and RE) in Chapter 4 using the data on 174 countries all over the world. The results are compared, and test results are provided to determine which method is best in our case.

## *3.5 Data*

This section introduces the data used in the analysis as well as their structure and sources. Serious problems are detected while comparing different sources and implications are discussed. Each variable is briefly described, and arguments are given why it is used. Furthermore, necessary adjustments are described which had to have been performed as a result of missing data and outliers.

### 3.5.1  Definition and measurement of FDI

Foreign direct investments are formally defined in Balance of Payments Manual: Sixth Edition (BPM6) (Washington, D.C., International Monetary Fund, 2009) and Detailed Benchmark Definition of Foreign Direct Investment: Fourth Edition (BD4) (Paris, Organisation for Economic Co-operation and Development, 2008). These definitions are very detailed in order to capture all possible nuances in classification and their concise review is provided by UNCTAD. (http://unctad.org/en/Pages/DIAE/Foreign-Direct-Investment-(FDI).aspx)

A simplified version of the definition is this:

"FDI refers to an investment made to acquire lasting interest in enterprises operating outside of the economy of the investor. Further, in cases of FDI, the investor´s purpose is to gain an effective voice in the management of the enterprise." The "effective voice in the management" is important in distinguishing FDI from portfolio investments. According to BPM6, a 10 % or larger share in equity is necessary for FDI, although BD4 allows exceptions in cases where the share is large, but the investor still has no power or on the other hand, where the share is small, yet the investor maintains an effective voice. Once a transaction has been recognized as a direct investment, all other transactions between the same entities are also considered FDI. This includes loans and reinvested earnings, which can be particularly difficult to track.

The exact definitions serve as international standards for computing and reporting both inward and outward FDI, however not all the countries comply with these rules. Two studies have been performed by IMF in order to monitor and enforce the correct use of the methodology. Sadly, there is no information on Chinese practice, because Chinese "details of compilation practices are available only to national compilers and staff of international organizations". (IMF, 2001) According to Jin, Ostaszewski (2016), MOFCOM records FDI flows from China on the basis of the first country into which the

money flows as opposed to the international standard of recording the final destination for the investment. This can be particularly misleading considering the following:

Even if two countries use the same methodology, they can report significantly different totals. This effect is well-known and often influences the "mirror statistics" in international trade, but it can definitely influence FDI statistics as well. In short, when goods travel in complicated patterns, it is often difficult for the authorities to accurately report the country of origin. For example, if Chinese goods are loaded to ships and transported to Europe then they will inevitably end up in one of the major ports such as Amsterdam. It is often difficult to track the goods after unloading from the ships and continuing throughout Europe as the intra-EU transport is not sufficiently supervised, because of open borders in the Schengen area. Therefore, the authorities are forced to record a large portion of the incoming trade as imports to Netherlands whereas China officially records exports to another country. It is clear that, in case of FDI, it is even more difficult to accurately reveal the complicated paths. After all, instead of physical goods the statisticians have to track movements of virtual money. As a result, much of Chinese investments to Europe might be performed through "Special purpose entities". Money can flow in mysterious ways through tax havens and offshore financial centers and a single Chinese investment to Italy might in reality be recorded as a Chinese investment to Hong Kong, a Hong Kong's investment to Virgin Islands, a Virgin Islands' investment to Belgium and a Belgian investment to Italy. In addition, FDI statistics should also contain reinvested profits which can also leave the country for a round-trip to a tax haven and back. This further complicates the tracing.

In fact, many researchers rely on alternative measures by Rhodium group who compile their own datasets using different methods of recording FDI. They do not use the official statistics at all and instead, they add up all the individual investments they can find. This method, while reporting very different figures, can provide interesting data, because it can track the country of origin more accurately.

## 3.5.2 FDI data

The variable of interest is net flows of outward FDI from China to Europe. These data are difficult to obtain from a non-Chinese source, unlike for instance international trade data which are conveniently provided by Comtrade for all countries. Neither Eurostat nor the World Bank nor even the European Central Bank gathers the information regarding FDI

in sufficient granularity and frequency. The OECD data, while sufficiently detailed, are not up to date. The latest data available here are for 2013. Rhodium group, an independent research provider from the USA, performs annual studies on Chinese FDI to Europe, but sadly, only the reports of those studies are published, not the underlying datasets. From the reports, we can get important aggregated figures, but no detailed data. Much more detailed database exists for American data. Rhodium group gathers all the important data on Chinese investments to the USA in "China investment monitor" and publish it on their web. (https://rhg.com/impact/china-investment-monitor/). For Europe, there is no good internet source. Fortunately, there exists a publication by Chinese Ministry of Commerce: "2016 Statistical Bulletin of China's Outward Foreign Direct Investment" which contains annual data on Chinese net FDI flows to 184 countries for the time period of 2008 - 2016 measured in millions of USD. This dataset reports similar overall figures as Rhodium group. For example, both agree that the sum of all Chinese FDI in 2015 is about USD 140 billion and in 2016 it is about USD 200 billion. However, a major discrepancy arises in European data. Rhodium group only reports aggregates for the EU whereas Chinese Ministry of Commerce reports aggregates for whole Europe, including Russia. Despite this, Rhodium group's figures are far higher. Its report of FDI to EU valuing EUR 20 billion and 35 billion in 2015 and 2016 respectively dwarfs Chinese official statistics of USD 7 billion and 11 billion to the entire Europe. Rhodium group even records the greatest investment transactions, such as the above mentioned USD 7 billion acquisition of Italian Pirelli, which, probably for the reasons mentioned above, left no trace in the Chinese data. The total FDI for Italy that year is only reported to be USD 91 million in the Chinese publication. This thesis uses the Chinese data none the less. It is simply the only way to get a reasonable dataset. Obtaining the figures one by one from individual countries would prove to be in vain. Many do not report inward FDI by country of origin and those which do, may use different methodologies of classification. In addition, as seen above, even with the same methods the data would hardly be compatible. In our case the data are at least complied by one particular complier and we can expect the same methodology for all the countries.

### 3.5.2.1    Negative values, missing values, outliers

Now that we established the source and meaning of the dependent variable, we need to make a few transformations regarding zero and negative values, missing values and outliers. Firstly, there are some negative values in the data. Although the statistics on

outward and inward FDI are separated, not all transactions, where money flows to China are recorded as inward FDI. Indeed, the outward - inward distinction is based on the investor's location. Therefore, when a Chinese based company invests in Europe and next year it retracts some of the funds back, it is recorded as negative outward flow in the second year. In extreme cases the company can withdraw more, than it initially invested, so even the stocks may be negative. Secondly, when taking into account the common methodology of computing these statistics, it is clear, that in this thesis, the missing values should be treated as zeroes. This might seem incorrect and in general data this is indeed wrong. The missing values in our data, however, do not report that the value was not measured, but rather that there was nothing to measure in that particular case. In accordance, values 0.00 are very rare, because these have the rare meaning of some investment occurring, but not reaching the minimal value of USD 5000.

Thirdly, from a simple scatterplot we can clearly see one huge outlier. It is Hong Kong. Chinese FDI to Hong Kong is an order of magnitude bigger than even the closest contestants. In addition, Hong Kong's position cannot be explained by any feasible explanatory variables - it is simply a matter of historical proximity and past experience, that China tends to invest extensively here. For these reasons, Hong Kong will not be included in the analysis as it would greatly distort the regression results and explanatory power. Furthermore, from a closer look it becomes clear, that two other countries exhibit similar behavior as Hong Kong. These are Cayman Islands and British Virgin Islands. These territories are known as offshore financial centers and tax havens. The level of FDI here is very high, but once again it can be expected, that the motives for investing here differ from the motives driving FDI in the rest of the world. These two countries are also dropped from the analysis.

Finally, as mentioned above, there is the issue of log-transforming the negative and zero values. Choosing between disregarding these values or substituting a low non-zero value is rather arbitrary. In addition, when the latter is chosen, the low non-zero value must again be chosen arbitrarily. This substitution choice alone can change the results significantly and there is no tool or general consensus on which value to substitute. The most common substitution of 1, while useful sometimes, is clearly inadequate for our data as the flows are measured in millions of USD and therefore many observations are between 0 and 1. Substituting 1 would report greater flows into countries which receive no flows at all, than to others, which do. Substituting a lower value (like 0.001) is too arbitrary indeed, especially considering, that the difference between 0.001 and 0.0001

substitutions can completely change the entire outcome of the model. It is therefore best to drop all the zeroes and negative values from the dataset for all the log-models. At least, in that way, the direction of the bias can be predicted. This approach is also common in existing literature. The zero values will only be present in the PPML estimation, where the explanatory variable is not log-transformed. Even PPML does not allow for negative figures, so these are disregarded completely. In this way 132 negative observations out of 1547 are lost completely (8.5 %) and further 249 are only present in the PPML estimation (16 %).

### 3.5.3  Explanatory variables

### 3.5.3.1     GDP

Firstly, real GDP is obtained from World bank's "World development indicators" databank. GDP is the most common gravity variable used in practice and theory and is always associated with a strongly positive coefficient. In fact, the coefficient should be in theory close to 1 because GDP measures the size of an economy. It is quite clear that larger countries with higher GDP tend to interact internationally relatively more. This is true for both trade flows and FDI. Here, another obstacle is encountered as data for some of the countries in the original dataset are missing. This issue can be partly resolved by plugging missing data from other sources, but GDP for some countries, especially for later years, is impossible to find or it can be found but it does not comply with previous figures. This is mainly the case for small developing countries, disputed territories and countries that are experiencing wars or oppression. Because obtaining other independent variables concerning these states would be even more difficult (GDP is one of the most basic indicators) and because data on these countries are not reliable, the following states are further dropped from the analysis: Palestine, British Aguilla, Cook Islands, North Korea, Syria, Niger and Lichtenstein. In addition, 20 observations are dropped as well, mainly from 2016, where official statistics on latest GDP are not yet published.

After dropping the outliers, negative observations and missing GDP datapoints, we are left with a dataset which can be viewed as 1166 observations for pooled OLS, 1415 observations for PPML or a slightly imbalanced panel set of 174 cross-sectional units (countries) over 9 years for FE/RE.

## 3.5.3.2    Other variables

Other variables include:

- GDPpc - GDP per capita. Measures the development and wealth of the country.

- trade - (imports + exports) as percentage of GDP. Countries, that trade more, should be generally more open to investments.

- inflation - Inflation rate (in %) based on consumer price index. Low inflation signals stability.

- distance - Geographical distance between capitals. (in km) Traditional variable of gravity models. Recently often found insignificant as the costs associated with distance diminish through globalization.

- resources - Natural resources as percentage of exports. There is some evidence, that China might be exploiting resources-rich countries through FDI and effectively withdrawing resources for its home use.

- Chinese - Percentage of Chinese in population. Serves as a proxy for cultural proximity.

- border - Binary variable indicating common border with China.

- Europe - Binary variable equal to 1 for European countries.

The sources of data for all of these variables are summarized in Appendix B

## 3.5.3.3    Adjustments

Most of these variables required some manipulation. Missing data were plugged from other sources where possible. In cases, where no data were available for a particular variable, simple methods of missing data imputation are used to preserve the sample size. It would be wasteful to disregard perfectly valid data on FDI, GDP and other important variables, just because one variable is missing for a particular country. These methods may, in general, lead to further bias in the results, but in our case, the adverse effects are not so severe. Firstly, no values are now missing from GDP - the variable which is expected to have the most explanatory power. Secondly, there are very few values missing compared to the sample size even in the less important variables.

For some variables (trade, resources, democracy, freedom), means were plugged in in cases where the data were missing. Also, missing data for year 2016 were approximated

by 2015 as no clear trend was found and therefore the last year is the best possible predictor. In case of inflation, in each year a different value was plugged in the missing spots equal to the sample mean of that year. By using annual means, we approximately use world inflation rate in each year which is surely better, than using the average over all years. Again, this issue is diminished by the size of the sample and few manipulations in comparison.

# Chapter 4 - Results

## *4.1 Limitations of the model*

In this chapter, the results of the estimated models are reported. As mentioned in Chapter 3, these results should be interpreted with great caution. There are some violations of important underlying assumptions which were partially introduced above. In particular, the problems described in section 3.3.3 violate the assumption of randomness of the sample and discourage from using simple OLS. These issues can be solved by PPML. The assumption of strict exogeneity is also probably unrealistic. There are two main reasons for possible endogeneity. Firstly, there might be some important omitted variables in our model. This possibility should not be too serious because the variables were carefully chosen on a sound basis. Secondly, the model may suffer from simultaneity. This means that one or more variables, while influencing FDI, are in turn also influenced by FDI. For example, several studies have shown, that increases in FDI significantly increase GDP. (Li et al. (1998), Liu et al. (2002)) In this situation, when FDI studies find positive effect of GDP and GDP studies find positive effect of FDI, it is not clear whether the causality is this way or that or, in the worst case, both ways. Encinas-Ferrer, Villegas-Zermeño (2015) studies this very question and they find no effect of FDI on GDP in general and in case of China they find the direction of causality which supports our model.

All these problems are very common in literature. In fact, the gravity model is almost always used in settings, which produce the same violations of assumptions. However, thanks to historical success and usefulness of gravity model, few studies even mention these problems. It has been shown by the robustness of the literature and by successful predictions, that these issues, even if possibly present, are not altering the results in such magnitude to be threatening for the results' credibility. As mentioned above, especially the PPML method is generally considered sufficiently reliable. Despite this, some papers which are more theoretical try to offer an alternative approach, which eliminates the above-mentioned problems. Some recommend using "Generalized method of moment" (Kimura, Todo (2010), Selaya, Sunesen (2012)) or "two-stage GLS" (Villaverde, Maza (2012)). However, the authors themselves point out, that these methods have their own drawbacks and this thesis follows the majority of literature by only using the four methods determined earlier, even though the assumptions may be violated to some extent. After

all, the model in our current form has been very successful even before the theoretical framework was established and with no adjustments necessary for the assumption violations.

## *4.2 Expected results*

To sum up before the actual results:

The model:

$$\log(FDI_{it}) = \beta_1 \log(GDP_{it}) + \beta_2 \log(GDPpc_{it}) + \beta_3 \log(distance_i)$$
$$+ \beta_4 border_i + \beta_5 Chinese_i + \beta_6 resources_{it} + \beta_7 Europe_i$$
$$+ \beta_8 trade_{it} + \beta_9 inflation_{it} + \varepsilon_{it}$$

*(again, the FE, RE are omitted for the sake of brevity)*

is estimated by pooled OLS, PPML, RE and FE using data on 174 countries over 9 years. The assumptions of the model are expected to be somewhat violated, but researchers have not agreed upon a method which would solve this problem and still preserve the explanatory power of the original model. The following results may be flawed from econometric point of view, but they are computed according to a long tradition of successful applications in explaining FDI and trade flows. Most of the issues come from incomplete and unreliable data and correcting this only via econometric methods is impossible. Maximum effort was given to creating the dataset with as few problems as possible and taking into account the size of the sample, possible bias should be small. In addition, the results from different models might strengthen each other by being similar. This is especially true for PPML which uses a completely different distribution as a basis for the estimation. If PPML estimates are close to OLS, RE and FE, then the bias cannot be too severe.

From both literature and microeconomic theory, the estimates are expected to have following signs:

Figure 8: Expected signs of parameters

| | |
|---|---|
| lnGDP | + |
| lnGDPpc | + |
| lndistance | - |
| border | + |
| Chinese | + |
| resources | + |
| Europe | - (?) |
| trade | + |
| inflation | - |

The parameter for Europe is of great interest. There exists much literature claiming that investments to Europe are growing more than to other parts of the world and that Europe is becoming a primary target for China. However, no study has confirmed this view empirically and indeed from our data this seems very unlikely. As discussed in Chapters 1 and 2, the role of Chinese investments in Europe as well as Europe's importance to China are being exaggerated by media and politicians. Therefore, the parameter on Europe is expected to be negative or close to zero rather than positive. Ceteris paribus a European country does not seem to have any advantage over African or Asian countries. Maybe, there exists some advantage over high protectionist USA, but overall, it is predicted that Europe is no better than average.

## *4.3 Results*

Figure 9 shows the results of our four estimations. All estimations also include time dummy variables in accordance with the "Wald joint test on time dummies" which rejects the null hypothesis of no time effects (p-value 0). Estimates of their parameters are not reported as they are of little to no interest to us.

Figure 9: Estimation results (p-values in parentheses - using robust standard errors)

|  | Pooled OLS | PPML | RE | FE |
|---|---|---|---|---|
| *lnGDP* | 0.706 (0.000)*** | 0.615 (0.000)*** | 0.663 (0.000)*** | -1.772 (0.168) |
| *lnGDPpc* | -0.141 (0.011)* | 0.234 (0.000)*** | -0.170 (0.122) | -0.078 (0.957) |
| *lndistance* | -0.354 (0.002)** | 0.267 (0.011)* | -0.555 (0.026)* | |
| *border* | 1.462 (0.000)*** | 1.307 (0.000)*** | 1.448 (0.002)** | |
| *Chinese* | 2.059 (0.014)* | -0.001 (0.998) | 4.529 (0.002)** | |
| *resources* | 0.022 (0.000)*** | 0.006 (0.129). | 0.022 (0.009)** | 0.020 (0.067). |
| *Europe* | -1.366 (0.000)*** | -0.871 (0.001)** | -1.206 (0.003)* | |
| *trade* | 0.008 (0.000)*** | 0.008 (0.000)*** | 0.002 (0.575) | -0.006 (0.099). |
| *inflation* | 0.009 (0.335) | 0.011 (0.140) | -0.011 (0.270) | -0.016 (0.093). |
| *Constant* | -9.898 (0.000)*** | -15.319 (0.000)*** | - 8.227 (0.014)* | 46.925 (0.033)* |
| *Adj. R-squared* | 0.42 | | 0.41 | 0.25 |

$* P \leq 0.05, ** P \leq 0.01, *** P \leq 0.001$

The most basic and also most commonly used method, OLS, is reported first. Most parameters have the predicted signs. Only *lnGDPpc* and inflation have unexpected signs. Inflation is insignificant but the sign of *lnGDPpc* is strange. There seems to be no micro or macroeconomic theory that would explain why GDP per capita should globally influence FDI negatively. However, there exists some explanation for Chinese FDI in particular. Buckley et al (2007) as well as Kolstad, Wiig (2012) find surprising negative relationship between the quality of institutions and FDI from China. This goes against economic theory which suggests that good institutions as well as high GDP per capita,

which are strongly correlated, should increase FDI. Both these papers conclude that China is exceptional in this regard. It chooses poorer, less developed, countries for its investments and the papers even suggest China trying to exploit those partners. Kolstad and Wiig also interact institutions with resources and discover that the poorer the institutions are, the more is China interested in resources, suggesting that China targets less developed countries with lots of resources and attempts to gain access to those resources unfairly cheaply. This relationship was discovered in quite old data and it is not clear, whether it is still present, but at least the negative sign of *lnGDPpc* is not completely nonsensical.

Other than this, we can see from the table that *lnGDP* is a very strong variable which predicts much of the overall variation. It is very significant and, although the parameter is only moderately large, the actual *lnGDP* data are the very diverse ranging from 18 to 30. Only the percentage variables (trade, inflation, resources) are more spread, but their parameters are very low. The largest parameters, *Chinese, border* and *Europe* are associated with variables which only range between 0 and 1.

From this first model, we can preliminarily conclude that the new data follow similar patterns to those examined before in literature and that Europe is not the primary target for Chinese investments or indeed not even better than average. The high significance of estimates is largely due to the size of the sample but that does not necessarily mean that these estimates are good. They might still be biased. In addition, the R-squared shows that less than half of the variation in *lnFDI* is explained by our variables. This was expected as our macroeconomic variables cannot explain much of the microeconomic decision-making influencing the FDI flows. Considering the result of "robust F-test for differing group intercepts" which soundly rejects (p-value 0) the null hypothesis that there exist a single common intercept for all the countries, we can safely say that the results of the remaining three models will be much more convincing.


In the next column, the results of the PPML estimation are reported. Here, *lnGDPpc* has the expected sign, but another one of the significant variables is problematic. The positive sign of *lndistance* with its lower significance, however, is not so inexplicable. Buckley and Casson (1981) suggests that according to internalisation theory, companies are more likely to export to proximate countries, but more likely to invest to more distant ones. They only chose to invest abroad and produce there if exporting to such distance is too costly. This theory is in direct contrast to arguments from Chapter 3 and it is not clear

which effect is more prominent. PPML model suggests the positive effect of distance. Importantly, the main explanatory variable from OLS, *lnGDP*, is still very significant with a very similar coefficient. Considering that these two models work with completely different distributions, this similarity is encouraging for both models' results.

Lastly, there are two columns reporting the results of RE and FE. Both tests, F-test for differing group intercepts and Breusch-Pagan test, strongly recommend not using OLS. In this case, and in accordance with Figure 7 in section 3.3.3, the Hausman test should decide which one is more suitable. On the other hand, the results confirm the hypothesis from the same section that FE has very little explanatory power. The time-fixed variables disappear and the rest of the variables are at best marginally significant. In addition, the within R-squared is only 0.25 which means that the variables of interest explain much less variance in the data. Even though Hausmann test prefers FE to RE, the fixed effects' results are very weak and do not provide any interesting interpretation. The random effects, though rejected by Hausmann test, are still interesting, again, especially considering the similarities between the parameters and the pooled OLS. They are really almost identical and even the insignificant inflation is negative.

The difference between random and fixed effects is a little puzzling, because in most of the literature where both methods are used, the results generally do not differ too much. On the other hand, these papers often include many more time-variant explanatory variables and for that reason, the results are doubtful, even though similar.

To sum up, of the four estimation methods, FE is probably the least problematic from econometric point of view. Sadly, it is also the most useless for our purposes and if there were serious reasons not to use RE and PPLM, this thesis would not be able to provide any results what so ever. Fortunately, the possible issues of RE and PPLM seem not to be too serious. For this reason, these two methods are considered superior to FE and simple OLS and only these results are further interpreted. All methods are inevitably a little problematic, but this has not stopped the gravity model from being frequently used by many. OLS, RE, FE and PPLM are the four most common approaches and the more complicated methods usually only appear in one particular study. The entire research community seems to stick with the simple four methods, even with their known problems. They are still the best possible way to discover the determinants of FDI.

## *4.4 Interpretation*

Even after performing the estimation, using the relevant tests and examining the results, some effects are still not clear. It is difficult to decide whether to believe PPML or RE more. Both methods have been criticized and both have been recommended and widely used. While previously mentioned papers generally prefer PPML, it would not be wise to completely ignore RE, due to the enormous amount of literature using RE only. Skipping for now the two problematic variables (*lnGDPpc* and *lndistance*), we can safely conclude that FDI is strongly tied with partner's GDP as the original gravity model would suggest. Ceteris paribus, a 1 % increase in GDP translates to approximately 0.6 - 0.7 % increase in FDI flows from China. This strong positive effect is consistent with previous findings of Hu (2013); Kolstad, Wiig (2012); Buckley, et al. (2007). Having a common border with China multiplies FDI by 2.6 - 3.2 on average

(% change in FDI = $100*(\exp(\beta_4) - 1)$). Such effect is also expected. One percentage point of Chinese population increases FDI by 4 % according to RE, while PPML found zero influence with a huge standard error. The confidence intervals overlap at around 1.5 - 2 %.

1 p. p. increase in *trade* openness brings about 2 % increase in FDI while 1 p. p. in *resources* increases FDI by less than 1 %. *inflation* has no effect on FDI and Europe is certainly confirmed not to be a primary target for Chinese investments. In fact, according to these results, European countries receive ceteris paribus about 60 % less FDI than non-European countries.

The two problematic variables are a bit difficult to put into perspective. The confidence intervals from PPML and RE do not overlap, so we cannot conclude whether the effects of distance and GDP per capita are positive or negative. The confidence intervals contain values close to zero for both model's parameters of both variables, so we can at least expect that the effects are either nonexistent or ambiguous.

# Chapter 5 - Conclusion

This thesis provides a thorough analysis of Chinese foreign direct investments to Europe. It tries to introduce the issue of Chinese investments to ordinary reader and provide all available information summarized in one paper. It focuses on debunking public misconceptions and creating a clear, true view of the situation. It provides an econometric model, inspired by gravity, which can be used to explain FDI flows and even predict Chinese FDI potentials for individual regions.

In Chapter 1, the reader learns important statistics about the temporal development and structure of Chinese FDI. The data are visualized to help the reader understand the relative magnitudes. China is introduced as one of the world's leaders in both inward and outward FDI. Furthermore, it is clear from this Chapter, that media and politicians mislead the population into thinking that FDI from China is relatively much more important, than it actually is.

Chapter 2 examines two Chinese companies which invest in Europe. ChemChina and CEFC were chosen as two interesting cases. ChemChina was inspected, because it is currently the largest Chinese investor in Europe, whereas CEFC was examined because it operates in the Czech Republic, where the author lives, and because it provides interesting insights into the politics involved in sealing the investment deals. The reader can learn that state-owned ChemChina has recently performed two large investments which dwarf all previous Chinese investments to Europe. Through these acquisitions, ChemChina gained access to European supply chain for automotive industry and it gained control of a world-leading expert in agricultural development to promote its own food security and quality. CEFC is a private company which pursues various investments in the Czech Republic. It buys real estate, shares in airlines, breweries, engineering sector, a football club and others. These investments do not seem to have much strategic value for the company. They have been, to some extent, prepared and orchestrated by Czech president and their most important effect on the Czech Republic is therefore political. A large inflow of capital is a great achievement of the president in the eyes of many, even though the real implications are otherwise neglectable. In addition, problems of CEFC have brought further investment initiatives to a holt and it is unclear, whether the plans will continue in future.

The goal of the remaining two chapters is to empirically analyze the FDI flows using econometric methods. In this way, this thesis hopes to join in the chain of existing

empirical literature on Chinese FDI and provide new up-to-date results. The existing literature is outdated. A three-year-old paper, while accurate does not take into account the rapid development of last years and it is interesting to see, whether the determinants of FDI still have the same effects or whether something has changed. Chapter 3 focuses on laying the necessary foundations. It describes the gravity model and reviews existing literature for theoretical framework and also for examples of practical use. It discusses different approaches and finally specifies a model which is in accordance with all the literature. Once the model is specified, sources of data are introduced. Several problems arise as a result of difficult data collection and compilation, differing methodology of different sources and unavailability of some recent or obscure datapoints. Throughout section 3.5, various difficulties are explained and resolved with as little disturbance to the model as possible. Chapter 4 briefly points out some flaws in the model. These problems can in general be quite serious and lead to bias. All possible precautions were made in order to diminish the negative effects, but some uncertainty remains as the data themselves are somewhat unreliable. After all, every econometric model can ever only be as good as the data behind the estimation. Fortunately, the final results are reasonable and two very different methods yield very similar estimates. This increases the credibility of the model and most of the variables have clear effects on FDI that were unraveled by both models. In addition, the effects are consistent with previous empirical work, showing that the determinants of FDI did not significantly change in the last few years. Another important conclusion is rejecting the common European perception that Europe is premium target for Chinese investments. According to the results, the European countries attract ceteris paribus significantly less FDI than average, not more. This observation again shows the discrepancy between public perception and reality.

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# Appendix A

## *Timeline of Chinese policy towards OFDI up to 2015*

**Phase 1: Tight Controls (1979—1983)**

Restrictive attitude toward OFDI due to ideological skepticism, inexperienced, and low foreign exchange reserves. Only specially designated trade corporations could apply for OFDI projects. No regulatory framework was existent; firms had to apply for direct, high-level approval from the State Council on a case-by-case basis.

**Phase 2: Cautious encouragement (1984—1991)**

As global markets gained more importance, the government gradually started to encourage OFDI projects that generated foreign technology, control over resources, access to overseas markets, and foreign currency. The first regulatory framework for OFDI was drafted in 1984-85, allowing companies other than trading firms to apply for OFDI projects. However foreign exchange reserves were still at a low level and only firms that earned foreign exchange from overseas activities could qualify for OFDI projects.

**Phase 3: Active encouragement (1992—1996)**

The post-Tiananmen decision to accelerate economic reforms and global integration led to a policy of more active encouragement of OFDI. The goal was to increase the competitiveness of Chinese businesses, with a special focus on 100 plus state-owned national champions. The foreign exchange regime shifted from an "earn-to-use" to a "buy-to-use" policy and the OFDI approval procedures were gradually eased and localized.

**Phase 4: Stepping back (1997-1999)**

Government tightened regulatory processes for OFDI projects and recentralized foreign exchange acquisition against the backdrop of the Asian financial crisis, which revealed that many firms had used OFDI projects for illegal and speculative transactions, leading to heavy losses of state assets and foreign exchange reserves.

**Phase 5: Formulation & implementation of the "Go-out" policy (2000—2006)**

In anticipation of WTO accession and growing competition in domestic markets, policymakers returned to their previous stance of encouraging OFDI and announced a

policy package aiming at supporting Chinese firms from various sectors to "go abroad". In 2004, the regulatory process was reformed and foreign exchange controls were further eased and localized. Central officials and local governments begun to provide broad and active political and practical assistance for firms with overseas expansion plans.

**Phase 6: Growing political support for transnational corporations and a new push for liberalization (2007—2009)**

Policymakers' support for outbound FDI further increased both because of China's massive foreign exchange reserves (surpassing $2 trillion in 2009) and the need to build up competitive transportation corporations to sustain a change in China's economic growth model. A new regulatory framework implemented in May 2009 further eased and decentralized the approval procedures. New rules proposed by SAFE in the same month will significantly ease the foreign exchange management for overseas projects and broaden the sources of financing available for outbound investment.

**Phase 7: Accelerating the "Go-out" strategy during the new "12th Fiveyear Plan" period**
**(2010—2015)**

In the "12th Five-year Plan", the government emphasised to accelerate the implementation of the "Go Out" strategy. The new outline encourages Chinese enterprises to expand overseas under policy guidance based on the principals of market orientation and corporate autonomy. It implies a shift to a more balanced weighting of both inward and outward FDI. Meanwhile, the "go out" policy is also linked with the ongoing process of RMB internationalization.

Source: Zhigang, Schwartz, Xu (2011)

# Appendix B

## Sources of data

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- GDPpc - http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators, https://www.ceicdata.com/en/indicator/taiwan/gdp-per-capita

- trade - http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

- inflation - http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

- distance - cepii.fr, http://www.thetimenow.com/distance-calculator.php

- resources - http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

- Chinese - http://www.newworldencyclopedia.org/entry/Overseas_Chinese

- Europe - no source needed