Impact of China's Infrastructure Outward Foreign Direct Investment

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Abstract

China's infrastructure investment has seen considerable growth over the past 15 years. It's helping fill the existing global infrastructure gap by providing infrastructure facilities that are crucial for the recovery and stability of less developed countries. There is evidence of positive economic impact of China's infrastructure investment on recipient countries, in terms of lowering trade costs. However, China's overseas infrastructure investment drive is also criticised internationally for issues such as weak environmental concerns, low transparency and debt sustainability. Moreover, investment in infrastructure bears inherent risks due to large up-front costs and physical nature of investment (Bitsch, et al., 2010). These risks are inflated when combined with host country risks, especially if the infrastructure investment is in a developing country. Concerns are also arising about this huge amount of overseas infrastructure investment displacing domestic investment. These issues not only apply to China's domestic economy but also global economies. Therefore, it is important to conduct a thorough investigation regarding the impact of China's infrastructure OFDI.

The main participants of China's infrastructure OFDI drive are state-owned banks and state-owned enterprises. This arrangement provides Chinese government liberty to conduct infrastructure OFDI in an enclosed system that includes financing, construction, procurement and loan repayment. Consequently, Chinese firms often practice this autonomy and alter their strategy of conducting infrastructure OFDI to benefit from host countries unique features, such as geographical, cultural, political advantages etc. Therefore, China's infrastructure OFDI triggers unique outcomes for Chinese firms and other agents involved. These outcomes vary according to host country location choice. Hence, this thesis focuses on comparison of China's infrastructure OFDI between three different regions; Africa, Europe and Belt and Road

Initiative (BRI). The comparison between these three regions is also the main contribution of this thesis and is applied throughout the thesis.

The thesis commences by describing motivation, objectives and contributions in chapter 1. Chapter 2 contains the background information regarding China's journey in becoming a major overseas infrastructure investor. The next two empirical chapters (Chapter 3 & 4) analyse China's infrastructure OFDI from firm level perspective. In Chapter 3, I address the concerns caused by the rising scale of infrastructure OFDI by China which suggests that Chinese firms are investing for motives other than profitability. Using Heckman two step model, I first investigate whether Chinese firms are enhancing their profitability by investing in infrastructure OFDI in Africa, Europe and BRI. The empirical results show that China's infrastructure OFDI has a positive impact on Chinese firms' profitability. This impact holds true for infrastructure OFDI to all three regions. However, when the sample is split according to ownership status i.e. highly state-owned and low state-owned firms, the results suggest that infrastructure OFDI performed by firms with less state intervention has a positive and significant impact on firms' profitability.

In Chapter 4, I analyse the interactions between Chinese firm's infrastructure OFDI and its home country fixed investment. Using Heckman two step method and System GMM estimation technique, chapter 4 investigates whether infrastructure OFDI is crowding-in or crowding-out domestic investment. The results show that China's infrastructure OFDI has a positive impact Chinese listed firms' home country fixed investment. This result is also true for across all regions; Africa, Europe and BRI. Moreover, this thesis then identifies the channels through which this investment impacts Chinese firms' domestic investment i.e. the finance channel or production channel. Observing the impact through these channels can aid Chinese firms to make informed decisions, develop better production linkages and also encourage efficient use of finance. The results show that China's infrastructure OFDI does not

impact firm's domestic investment via the production channel. However, the positive impact of China's infrastructure OFDI on firm's domestic investment is reduced via the finance channel.

chapter 5 analyses host country issues that China's infrastructure OFDI is causing. Following the theme of this research, I analyse the impact of China's infrastructure investment in three regions (Africa, Europe and BRI) collectively and then separately. Moreover, I also compare the impact of China's infrastructure OFDI on low-income and high-income countries and countries that have low aid ties and high aid ties with China. Using system GMM, I document that China's infrastructure OFDI with Africa and BRI, low income and countries with close aid ties with China, economically benefit from Chinese infrastructure OFDI. Moreover, I also analyse how motivation of China's investment can alter the direct impact of China's infrastructure OFDI on host countries. Specifically, the results show that resources-seeking motivation reduces the direct positive impact of Chinese infrastructure OFDI on African countries, low income host countries, and countries that maintain high-aid connections with China. If China's infrastructure investment is market-seeking, then the intervening effect of investment motivation is negative for host countries in the BRI region. Finally, the intervening effect of the technology/strategic assets-seeking motivation is negative for European countries, high-income host countries and countries with weak aid ties with China.

In chapter 6, I conclude the thesis by discussing the motivation of this thesis and the significance of conducting this research. Finally, I discuss the main findings, policy implications and limitations.

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Chapter 1 Introduction

1.1 Motivation

Global infrastructure investment has seen considerable growth over the past 15 years as researchers recognise the importance of infrastructure in boosting economic growth. Access to basic infrastructure is critical for communities to progress as it enables trade, economic growth and encourages livelihood. However, Infrastructure investment gaps still exists. McKinsey Global Institute estimates that approximately $3.3 trillion infrastructure investment is needed every year to meet current forecasts for GDP growth (Woetzel, et al., 2016). This translates into an estimated gap of $350 billion per year (Haider & Jin, 2017). These figures highlight the importance of infrastructure investment for continuous global economic growth.

Global infrastructure investment is directed toward fulfilling two main agendas; (1) to reduce poverty and enhance stability in developing regions of the world and (2) to accelerate global economic growth. For example; Lack of proper sanitation and health facilities can lead to rise in infectious disease, underinvestment in transport infrastructure can put businesses at disadvantage and hinder economic growth, overlooking green energy or climate change mitigation can have dire consequences especially for cities built near coastal areas but also, globally. Leaders around the world have recognized that inadequate investment in infrastructure hinders not only economic growth but also stability in many parts of the world. This generated a range of responses from around the world regarding infrastructure investment including World Bank's Global Infrastructure Facility (GIF) established in 2014 and G20's Global Infrastructure Connectivity Alliance (GICA) established in 2016.

It seems that China recognized the importance of infrastructure investment earlier than its global counterparts. Currently, it is the highest infrastructure spender globally. As a percentage

of the Country's GDP, China's average infrastructure spending in 2018 was 10 times higher than that of the United States (Statista, 2021). In fact, China's global infrastructure investment journey started after the year 2005, when China's GDP growth (short of 10%) was supported by fixed-assets investment. Over investment remained a problem and most of the investment was aimed at relieving bottlenecks in energy production and infrastructure, which reduced the risks of overheating. However, in 2007, labour costs in China started rising sharply in the coastal areas which threatened the competitiveness of lower margin operators. Some companies chose to move inland where infrastructure facilities were improving (Dyer, 2007). Others preferred to venture overseas to avoid domestic competition. In the next couple of years, the global financial crisis of 2008-2009, accelerated China's overseas infrastructure investment including railways, ports, airports, water conservancy construction, upgrading of urban and rural power grids, etc. High domestic infrastructure production capacity and low internal demand led to a rise in overseas infrastructure investment by Chinese firms. These measures helped china sustain economic growth during the financial crisis. China's drive for infrastructure OFDI did not dampen after the financial crisis. In 2013 it announced a major overseas infrastructure investment initiative known as the Belt and Road Initiative (BRI), focused on improving infrastructure connectivity in the region. By the end of 2019, the world faced yet another challenge of a deadly global pandemic. This was followed by a decline in China's infrastructure investment (Scissors, 2020). As a part of post pandemic relief package, China has announced a new infrastructure plan that focuses on three key areas; innovative infrastructure, information infrastructure and integrated infrastructure. The idea is to develop next-generation products, upgrade traditional industries and integrate these new products and new technologies on a large-scale to develop the framework for smart cities across China (Wong, 2020). This investment in digital infrastructure is a key policy pillar of China's post-pandemic economic recovery.

Moreover, with the covid-19 crisis looming, basic infrastructure such as transportation and health facilities is crucial for the recovery and stability of less developed countries. Reviewing the impact of China's infrastructure OFDI is important now more than ever. There is increasing evidence that Chinese infrastructure investment, particularly China's Belt and Road Initiative (BRI) transportation projects, have generated positive economic results in terms of lowering trade costs (World Bank, 2019). On the other hand, China's overseas infrastructure investment is controversial. The criticisms are mainly related to four issues: weak environmental concerns, lack of social responsibilities, low transparency (regarding both public procurement and terms and conditions of loans), and debt sustainability (e.g., World Bank, 2019). Especially, China has been accused of new imperialism by creating debt dependence of recipient countries on China. Financial constraints faced by many developing host countries have been exacerbated by Covid-19, which further worsens their debt positions. A new wave of default and debt renegotiation with China may unfold.

Debt overhang has been discussed in the scientific literature (e.g. Hurley, et al., 2019; Horn, et al., 2019 Bandiera and Tsiropoulos, 2020). Public borrowing is central to development in countries. However, debt overhang occurs when this borrowing is not accompanied by enough economic growth and revenue generation to fully service the debt. This in turn can create a downward spiral that leads to debt restructuring or reduction. For example, only 9.3 percent of Pakistan's total external debt was owed to China in 2013. This debt has inflated to around 27.4 percent in 2021, according to the international monitory fund. Other countries in a similar situation (e.g. Sri Lanka, Greece) have been forced to give up control of their assets for a very long period of time, instead of debt repayment. Emerging economies risk loss of sovereignty over key assets, at the same time China could also use these debts to leverage economic, political and military power. These problems are especially associated with China's infrastructure OFDI because of state-ownership of investor firms. The Chinese

government considers the details of its overseas lending program to be a ‘state secret’ (Brautigam, 2009). This lack of transparency regarding investment raises suspicions amongst the western world. In comparison, the World Bank is similar to China in the overall scale and consequence of its lending to developing country government (Horn, et al., 2019). However, it is different from China’s lending program as the world bank has developed a set of policies and procedures that help it identify debt sustainability risks in borrower countries. It also provides guidance to loan pricing and appropriate mix of grants, to prevent sovereign debt crisis and help creditors (Morris, et al., 2020).

Despite these concerns regarding China’s infrastructure OFDI, there is very little systematic evidence of the economic impacts of Chinese overseas infrastructure investments on host countries. The lack of evidence has induced a varying approach vis-à-vis Chinese infrastructure investments by host countries. For example, some countries that initially welcomed Chinese infrastructure investment are becoming reluctant to invest further, owing to security concerns or unfavourable terms of contracts (e.g. Nigeria, Pakistan). Experts argue that these loans are unlikely to be profitable for China because of costly debt resolution measures such as disposal of non-performing loans and debt-to-equity swaps (Wu, et al., 2017). This raises concerns regarding the intention of China’s infrastructure OFDI. If China is not benefiting from lending to emerging markets, then what is the rationale behind China’s overseas infrastructure investment drive? Some researchers argue that China’s infrastructure investment drive is a solution to excess capacity in China’s construction industry. Weak demand from developed countries due to the 2008 financial crisis led to Chinese government encouraging its firms to invest in emerging markets where there is a wider infrastructure gap (known as the BRI initiative). However, it is unclear how this approach is impacting Chinese firms. Some Chinese firms have raised concerns about challenges they face by investing in countries with high political risks and poor regulatory institutions. Especially, private firms

evade investment in these regions. Consequently, Chinese state-owned firms are required to participate in majority of BRI projects (Li & Zeng , 2019). This is because government control in these companies means that state owned enterprises (SOEs) can be pressurised to make economic decisions that do not solely focus on profit maximizing, rather they reflect Chinese governments broader political, social or economic objectives. Therefore, concerns are arising regarding the impact of China's infrastructure OFDI on Chinese firms' profitability. Additionally, infrastructure OFDI can also displace firm's domestic investment. It is important that China's infrastructure OFDI generates backwards and forward linkages that increases firm's domestic investment rather than replace it. The controversy surrounding China's overseas infrastructure investment calls for robust empirical analyses. This paper aims to fill the gap in the literature by rigorously examining the economic impact of Chinese overseas infrastructure investment on Chinese firms and on host countries.

Keeping the above issues in mind, I observe both, the micro and macro impact of China's infrastructure OFDI. First, this research focuses on the impact of China's infrastructure OFDI on Chinese firms' profitability. Literature suggests that most of China's infrastructure projects are initiated by China's SOE's (Scissors, 2020). This raises concern that these firms may be conducting infrastructure OFDI for Chinese government's benefits rather than seeking profitability. However, more often than not, these firms are operating on a profit basis (Buckley, et al., 2007). Previous studies have investigated impact of China's OFDI on firm's productivity (Zhao, et al., 2010; Huang & Zhang, 2017). However, none of these studies focus on firm profitability and especially infrastructure OFDI and its impact on profitability. Secondly, I also observe Chinese firm's investment behaviour. Studying this is important because investment decisions made by the firms are not only crucial to the firms but collectively, are important to the economic future of the country. This chapter explores how infrastructure OFDI impacts Chinese firms home country fixed investment. A firm's growth is

dependent upon its fixed investment because it increases the firm's capacity to fulfil increases in demand. If infrastructure OFDI decreases home country fixed investment, this will suggest that China's infrastructure OFDI crowd outs investment. Such a finding will impact the China's economy as economic development of a country depends on investment in home country fixed capital, especially in the long-run. Finally, I look at the impact of Chinese infrastructure OFDI on a macro-level. After discussing China's infrastructure OFDI's impact on Chinese firms in two chapters, the final chapter analyses this impact on host countries. Conducting both micro-level and macro-level studies will provide us with the entire perspective of the impact of infrastructure investment, including large-scale changes and trends to the wider economy along with small-scale, individual firm behaviour.

In all three chapters, the common subject is China's infrastructure OFDI. A large body of research exists regarding China's OFDI; it's impact (Cozza, et al., 2015; Fu, et al., 2020; Ameer, et al., 2017) and determinants (Gammeltoft, et al., 2010; Yao, et al., 2017). Surprisingly, despite an immense increase in China's infrastructure OFDI during the past two decades, empirical investigation of China's infrastructure OFDI is scarce. Previous studies on China's infrastructure OFDI have either been on China's investment activities in a specific geographical location in isolation, or on a particular industry positioned under the infrastructure umbrella. For example, China's OFDI of hydropower projects (Bosshard, et al 2009; Tan-Mullins, et al. 2017) and oil and natural resource extraction (Jiang 2009; Drogendijk & Blomkvist, 2013) in Africa has been discussed extensively in the literature. Similarly, literature regarding China's infrastructure OFDI to Europe is categorised by investment in ports (Karlis & Polemis 2018) and energy (Pareja-Alcaraz 2017). However, a recent development in this strand of literature is the emergence of a large body of literature related to China's BRI led OFDI. When China initially announced the BRI project in 2013, it was considered incoherent, confusing and too ambitious. After 7 years of substantial infrastructure investment to the

region, China has improved the quality and coordination of infrastructure investment and is still focused on delivering its ambitious plan. In the vast emerging literature on BRI, most studies examine the impact of OFDI to the Belt and Road Region. Haiyue & Manzoor (2020) empirically analyse the impact of OFDI on the performance of Chinese firms, along the BRI. They find that Chinese firms that had invested in BRI countries were more productive than those that had invested elsewhere. Liu et al (2017) examined the productivity and profitability of Chinese firms on their location choice of OFDI in the BRI region. Yu, et al (2019) find that Chinese OFDI increased substantially after the inception of BRI and that domestic push factors, such as overcapacity, GDP growth are found to affect Chinese OFDI. De Soyres et al. (2020) point out that financing for infrastructure projects increase public debt, which may result in higher taxes and lower real consumption, but overall BRI transport projects save shipping times and reduce trade costs. These studies are relevant to this research, with the exception that none of these are focused on infrastructure investment.

This research differs from these studies because the focus is on impact of Chinese infrastructure OFDI. Discussions around impact of infrastructure OFDI on firms has increased manifolds in the past decade but has rarely been a subject of empirical research. Moreover, it is dedicated to project level China's infrastructure OFDI data from the well reputed source; American enterprise institute and the Heritage foundation. Incorporating project level data in the research allows us to capture the dynamism of the Chinese economy, whilst offering reliable and accurate information. The firm level analysis consists of Chinese listed firms. In aggregate, their decisions steer the direction of travel for the Chinese economy. I also observe and compare China's infrastructure investment across three regions; Africa, Europe and BRI. Previous studies mostly focus on isolated regions or countries and a comparison of this scale is missing. This comparative study approach is justified because unique host country characteristics can impact; (1) the degree to which Chinese firms can profit out of these

investments (discussed in Chapter 3). For example, favourable tax policies, low cost labour etc. (2) it can impact the degree to which Chinese firm's infrastructure OFDI influence their domestic investment (chapter 4) and finally, (3) It can also impact the degree to which host countries benefit from Chinese infrastructure investment (chapter 5). These differences can arise for various reasons, for example due to host country's governments influence or unique production processes etc.

1.2 Objective

China's infrastructure OFDI is different from western practice in terms of scale, motivation and execution. It is characterised by loan re-payment flexibility, production and operational linkages with host countries and close participation of local economic agents. This is because the main participants in China's infrastructure OFDI drive are the state-owned enterprises (SOEs) and state-owned banks (SOBs). This enables the Chinese government to conduct infrastructure OFDI in an enclosed system that includes financing, construction, procurement and loan repayment. These unique features enable Chinese firms to venture out in regions that are deemed too risky by their western counterparts. For example, Chinese firms negotiate infrastructure OFDI contracts with African countries with high loan repayment risk. They agree payment via natural resources in exchange for infrastructure investment (known as 'Angola model'). Moreover, the enclosed operational system of China's infrastructure OFDI provides Chinese government with a great degree of discretion. This in turn allows Chinese firms to benefit from host regions unique features by developing economic linkages. For example, a Chinese firm investing in Europe may develop linkages through capital, market opportunities, acquiring skilled labour, technology etc. However, a Chinese firm investing in Africa will not develop the same economic linkages. This is because most OFDI to Africa is in the resource extraction sector and often there is little value-added processing of the resources. For example,

Chinese firms in the timber-processing sector in Africa are primarily concerned with exporting. They employ unskilled labour but offer very few local linkages (Morrissey, 2012). Therefore, China's infrastructure OFDI triggers unique outcomes for Chinese firms and other agents involved. These outcomes vary according to host country location choice. Hence, it is important that any research regarding China's infrastructure OFDI also incorporates the effect of the unique characteristics of the host country. This thesis focuses on comparison of China's infrastructure OFDI between three different regions; Africa, Europe and BRI. The intuition behind choosing these regions is that (1) China's infrastructure OFDI to these regions is significant. (2) These regions are all very distinct in terms of China's motivation of infrastructure OFDI. For example, Chinese firms seek natural resources from Africa, technology from Europe and access to market from BRI.

The scale of infrastructure OFDI to these regions and a high degree of government intervention in Chinese firms, raises concerns regarding Chinese firms investing for motives other than profitability. China has been accused of using infrastructure OFDI as a tool to achieve its political objectives. Moreover, investing in different regions with unique economic linkages provides different outcomes for Chinese firms. Therefore, the first objective of this research is to investigate whether Chinese firms are enhancing their profitability by investing in infrastructure OFDI. I find the impact of infrastructure OFDI on Chinese firms' profitability for all three regions combined and then compare, the impact of infrastructure OFDI on Chinese firms' profitability in three regions separately (Africa, Europe and BRI). This comparison is important because of geographical, political and cultural differences that exists between these regions which can influence Chinese firms' profitability. One common issue in OFDI studies is sample selection bias. It is caused by choosing non-random data for a statistical analysis. In this research the sample consists of only firms that have conducted OFDI. Therefore, the analysis may be subject to sample selection bias. In order to mitigate this issue, I have applied

Heckman two stage estimation. Moreover, in order to ensure robustness of the results, I have also applied system GMM estimation method which addresses endogeneity issue.

The second objective of this research is to analyse how infrastructure OFDI impacts Chinese firm's investment behaviour. When a firm performs infrastructure OFDI it can either increase domestic investment, if home country inputs are used to produce output in the host country by foreign affiliates. Or it can decrease domestic investment if financial resources that are required to conduct overseas infrastructure investment displaces Chinese firm's fixed domestic investment. There are concerns regarding Chinese government spending huge amounts of financial capital overseas. The impact China's infrastructure OFDI has on firm's domestic investment will in aggregate, be the impact it will have on whole of the Chinese economy. Therefore, it has become important to analyse how Chinese infrastructure OFDI is affecting Chinese firms' domestic investment. Subsequently, I identify the channels through which this investment impacts Chinese firms' fixed investment i.e. finance channel and production channel. Observing these channels is useful for Chinese firms to take future decisions, develop better production linkages and also promote efficient use of finance. Finally, I compare the impact of infrastructure OFDI on Chinese firms' domestic investment in three different regions (Africa, Europe and BRI). As discussed earlier this comparison is important as Chinese firms' production linkages in all three regions are different. For example, Chinese firms may take advantage of lower labour lcosts in Africa and conduct infrastructure OFDI to produce input for home country. However, the same approach cannot be applied to Europe as labour costs are higher. Therefore, the production linkages will be different for investment in both these regions and consequently, the impact of infrastructure OFDI on domestic investment will also be distinctive. This analysis is also conducted using Heckman two stage estimations and system GMM estimation.

The third objective of the research is to observe how China's infrastructure OFDI is impacting host countries' economies. China's enclosed operational system of conducting infrastructure OFDI, where Chinese state-owned banks and firms are involved in procurement, construction and financing the project provides autonomy to Chinese government and raises concerns of neo-colonialism in host countries. Therefore, I first observe whether China's infrastructure OFDI is enhancing host countries' GDP growth. Following the theme of this ~~research~~ thesis, next I compare the impact of China's infrastructure investment in three separate regions (Africa, Europe and BRI). The comparison is important because Chinese governments' motivation of conducting infrastructure OFDI in various regions is different. For example, it is common perception that China's motivation of investment in Africa is to seek natural resources (Jiang, 2009) and in Europe it is to seek strategic assets (Kirchherr & Matthews, 2018). This means that Chinese firms may alter their strategy of investment according to their motivation of investment and host country unique characteristic. This in turn can affect how Chinese infrastructure OFDI impact host country profitability. Therefore, this research's objective is to also to examine the intervening impact of infrastructure OFDI. Taking motivation of investment into account is important to analyse the impact of OFDI (Driffield & Love, 2007).

1.3 Research Questions

FDI literature suggests that firms perform OFDI to maximize profits (Buckley and Casson, 1976; Dunning, 1980). Literature on emerging market enterprises (EME) suggests that weak institutional environment and government intervention in EMEs differentiate their behaviour as compared to multinational corporations (MNC). The main differentiating factor for Chinese firms is government intervention. Infrastructure investment requires high up-front costs and foreign investment of infrastructure assets often requires the government of both

countries to be involved. Therefore, typically, Chinese firms that perform infrastructure OFDI are state-owned enterprises (Scissors, 2019). The political connection of these firms raises concerns whether Chinese SOEs are burdened to meet government needs from a social welfare standpoint (Lin, et al., 2020). In such a case, the infrastructure projects that Chinese firms are involved in may not generate profit. Moreover, due to the nature of SOE reforms in China, some firms are more politically connected than others. This may also have an impact on the profitability of firms because low politically connected firms ~~may~~ have more autonomy than high politically connected firms to choose projects. Therefore, the first research question of this thesis is

Does China's infrastructure OFDI generate a positive impact on Chinese firm's profitability? Do different levels of state ownership generate the same impact on the profitability of Chinese SOEs?

Another issue that concerns Chinese citizens is that due to the surge in China's infrastructure OFDI, large amount of capital is flowing outside China. When firms engage in infrastructure OFDI, capital is shifted abroad. In such a case a similar type of investment at home is unlikely (Lipsey & Stevens, 1992). Chinese infrastructure OFDI, especially after the BRI, results in a substantial amount of capital shifting abroad, which raises concerns. A firm engaging in infrastructure OFDI may prevent or prolong fixed investment in the firm's home country. In aggregate, this would displace home country fixed investment. However, infrastructure OFDI can also enhance home country fixed investment if the infrastructure OFDI complements home country's export. Therefore, in this thesis, it is important to discuss the interaction between foreign and domestic activities of the firm. The second main research question is

Does China's infrastructure OFDI enhance firm's home country fixed investment?

In case China's infrastructure OFDI enhances firms home country fixed investment. This means that Chinese infrastructure OFDI is generating essential production linkages that enables firms at home to expand its production. In such a scenario, China's economic growth will follow. However, the international community is concerned regarding production linkages that only benefit China. If China's OFDI develop linkages with Chinese firms at home, how will that impact the local communities in the host country? OFDI benefits host countries if host country labour is employed and production linkages are developed with local communities. If these linkages are developed with the home country then the benefit to the host country is minimum. For example, Chinese infrastructure investment in Africa often develop few local linkages as high skilled labour, machinery and investment is imported from China (Morrissey, 2012). These issues, coupled with Chinese government involvement in infrastructure OFDI raises concerns in host countries. As discussed above, Chinese government involvement in infrastructure OFDI signals that Chinese firm may have motives other than profitability, such as resource (Jiang, 2009), market or technology seeking (Yu, 2014). This means that government may pressurize these firms to invest in non-profit projects to fulfil wider government's objectives. These motivations may alter the impact of Chinese infrastructure OFDI on host country. Therefore, the last research question of this thesis is

Does China's infrastructure OFDI generate a positive impact on host country economic growth? Does this impact vary according to the motivation of investment?

The rapid and significant increase in China's infrastructure OFDI has raised concerns amongst both, China's domestic and international community. Therefore, it is imperative to analyse the impact of China's infrastructure OFDI. The answers to these three research questions provides us with a broad perspective of the impact of China's infrastructure OFDI from both, micro-level and macro-level perspective.

1.4 Contribution

This thesis will contribute to the existing literature by providing fresh insight regarding the impact of China's infrastructure OFDI. The findings from Chapter 3 offer evidence that China's infrastructure OFDI has a positive impact on firm profitability regardless of the location choice of investment. Similar to western Multinational Corporations (MNEs), Chinese firm's infrastructure OFDI is also motivated by profitability and not by political incentives. However, the impact varies when the sample is split according to the level of Chinese firm's state ownership i.e. firms with high state-ownership have an insignificant impact of infrastructure OFDI on firm's profitability. Whereas, firms with low state-ownership have a positive impact of infrastructure OFDI on firm profitability. This finding is important as it suggests that firms that are highly connected with Chinese government may engage in unprofitable overseas infrastructure projects to fulfil state objectives. While firms that have low-state ownership enjoy more autonomy and therefore are able to choose profitable projects for infrastructure OFDI (Sun, et al., 2002). These results have implications for the host country of Chinese infrastructure OFDI. Host countries need to develop policies that monitor the ownership status of firms investing. It is likely that highly state-owned firms are investing for motivations other than profitability, which may not always align with host country's interests. Chapter 4 provides insights regarding Chinese listed firm's investment behaviour. It assesses how infrastructure OFDI impacts firms home country domestic investment. This chapter contributes to the literature because; (1) the focus of this chapter is the impact of Chinese *infrastructure* OFDI on firm's home country investment. Discussions around impact of infrastructure OFDI on home country firms has increased during the past decade but has rarely been a subject of empirical research. (2) Most of the literature concerning OFDI's impact on home country domestic investment is conducted on the country and industry-level. Whereas, this study provides firm level analysis, which is considered to be more accurate. (3) This study

considers the importance of host country locations and compare results across different regions. These differences can arise due to the unique motivations, production processes and government influence in the Chinese firms performing OFDI. (4) Finally, in Chapter 4, I also shed light on the two channels through which home country domestic investment is affected i.e. the finance channel and production channel. The results confirm that China's infrastructure OFDI has a positive impact on Chinese firm's fixed investment. However, this positive impact is reduced via the finance channel. This suggest that China's infrastructure OFDI increases Chinese firms' fixed investment but this positive effect is dampened because sources of finance that could have been used for the firm's home country fixed investment are shifted overseas.

Chapter 5, provides insight regarding China's infrastructure OFDI's impact on host country and how China's motivation of investment may influence the effect of China's infrastructure OFDI on the host country. The main contribution in this chapter is the comparison of the impact of Chinese overseas infrastructure investment across three different regions; Africa, Europe and BRI. This is important because the degree to which host countries can benefit from Chinese infrastructure investment depends on the host country characteristics. The effects of host country characteristics can be exposed by comparing the empirics across different regions rather than within the region. Moreover, the motivations of Chinese infrastructure investment differ across regions which may influence how China's infrastructure OFDI impacts host country. Overall, China's infrastructure OFDI generates a positive impact on host country economic growth. However, the results vary across different regions. The positive effect is generated in Africa and BRI but not in European countries. Further analysis shows that Chinese infrastructure investment in low-income countries is positive. This impact is also positive for host countries having close aid ties with China. In contrast, the impact of Chinese infrastructure OFDI is insignificant for both high-income countries and countries having low aid ties with China.

1.5 Thesis Structure

Chapter 2 of this thesis focuses on the background of China's infrastructure OFDI. It highlights China's journey from nearly negligible overseas infrastructure investment to more than 80 billion dollars during its peak in 2016. In Chapter 2, I discuss China's development of its overseas investment in three stages; a cautious open-door policy, to introduction of friendlier policies, to finally encouraging OFDI by lifting restrictions on private investors. The focus of the chapter then moves on to infrastructure OFDI and I discuss the steep rise in China's infrastructure OFDI especially after the global financial crisis in 2008 and the introduction of China's Belt and Road Initiative in 2013. This is followed by a detailed examination of China's infrastructure financing. The section begins with an explanation of financing China's infrastructure OFDI and then moves on towards China's three main infrastructure financing institution; China Export Import Bank, China Development Bank and the Asian Infrastructure Investment Bank. The next section of chapter 2 discusses Chinese state-owned enterprises reforms. This section highlights the importance of these reforms and the role state-ownership plays in infrastructure OFDI. The following section highlights China's infrastructure OFDI across the three regions; Africa, Europe and BRI. China's infrastructure OFDI to Africa is characterised by China's quest for natural resources and political support. It is mainly financed by national government of African nations and external funding from China. Europe's political stability, legal security and an advanced technological infrastructure encourages Chinese firms to invest in its infrastructure. Finally, I discuss the events that led to China's inception of the BRI and the main sources of finance for the initiative.

Chapter 3 investigates the relationship between Chinese firms' infrastructure OFDI and firm's profitability of Chinese listed firms. I examine whether Chinese listed firms increase profitability by engaging in infrastructure OFDI and also, whether the impact is different in

highly state-owned firms versus low state-owned firms. A common issue that arises in OFDI research is sample selection bias. As the sample consists of only firms that have performed OFDI, a sample selection bias may be present. This problem arises because the sample consists only of larger and more productive firms that have engaged in OFDI. In order to solve this issue, I begin the estimation by using Heckman two step method. The first step estimates the selection equation and the variable the inverse mills ratio obtained from the first step is included in the second step. The results suggest that Chinese firms that perform infrastructure OFDI increase profitability. These results are consistent across different regions. The results of the high state-owned versus low state-owned firms suggest that low state-owned firms also generate a positive impact of infrastructure OFDI. However, infrastructure OFDI does not positively impact the highly state-owned firms. To check the robustness of the earlier estimation, I support the above findings by applying system GMM analysis. This estimation method solves endogeneity issues by using a series of internal instrumental variables based on lagged values of dependent and independent variables. System GMM estimations results reinforce the main result that infrastructure OFDI has a positive impact on firm profitability. Chapter 3 concludes by explaining that Chinese listed firms are performing well in delivering infrastructure stock/services to different geographical locations. However, firms with high state-ownership are pressurized into fulfilling state agenda and therefore cannot generate the same positive impact as firms with low state-ownership.

Chapter 4 explores how the recent surge in Chinese firm's infrastructure OFDI affected the investment behaviour of the Chinese listed firm. I examine whether Chinese firms' engagement in infrastructure OFDI increases or decreases listed firms' domestic investment. I also analyse in detail, the two channels through which Chinese firms' home country fixed investment can be affected i.e. the finance channel and the production channel. Using Heckman two step estimation to eliminate selection bias, I document a positive impact of Chinese firms'

infrastructure OFDI on their home country fixed investment. However, I find that China's infrastructure OFDI does not increase Chinese listed firms' domestic investment via the production channel. The results suggest that the positive impact of infrastructure OFDI on home country fixed investment is reduced via finance channel. Similar to chapter 3, I check the robustness of the estimation by applying GMM analysis. All findings are robust to alternative estimation methods. The results, in particular for the financial channel, confirms that to a certain extent, the finances used for infrastructure OFDI displaces firms' home country fixed investment.

In chapter 5, I provide a macro level perspective of China's infrastructure OFDI. I empirically examine the impact of Chinese overseas infrastructure investment on recipient countries based on 101 host countries, which involves 1060 infrastructure investment projects. Applying system GMM estimation technique, the results suggest that the impact of China's infrastructure investment on host country GDP growth is overall positive. However, further investigation reveals that this differs across Africa, Europe and BRI region. I also discover that the impact of China's infrastructure OFDI is positive on Africa and BRI but insignificant on Europe. Further analysis shows that Chinese infrastructure OFDI in low income countries and countries that have close aid ties with China is positive. The evidence obtained suggests that China's infrastructure OFDI benefit countries that contain infrastructure gaps. European, high income or countries that do not have close aid ties with China does not significantly benefit from China's infrastructure OFDI. I also take this analysis a step further by not only investigating the impact, but also the intervening effect of China's motivation of investment. I find that when China's motivation of investment is to seek resources, this reduces the direct positive impact of Chinese infrastructure OFDI on these countries. These results hold true for African countries, low income countries and countries that maintain high-aid connections with China. This result supports the view that when China's infrastructure OFDI is directed to grab natural

resources, it reduces the benefit to the host country. I also discover that when China invest to seek technology, the direct positive impact of China's infrastructure OFDI reduces for Europe, high income countries and countries with weak aid ties with China. This suggests that when China's motivation of investment is to gain access to technology from a country with superior technological prowess, there is a decline in the positive impact that China's infrastructure OFDI causes. These results, are logical and provide further proof that China's infrastructure OFDI does not impact all countries in the same way.

In chapter 6, I conclude this thesis with a summary of the findings and discuss the implications and limitations.

1.6 Data

The data used in this thesis is obtained from three main sources. China's infrastructure OFDI data is obtained from China Global Investment Tracker (CGIT) by American Institute & the Heritage Foundation database. It is a comprehensive public dataset covering China's global investment and construction. The data is collected by Derek Scissors at the American Enterprise Institute and the Heritage Foundation. Sources include companies involved and open source link for each transaction such as, disclosure to stock exchange, press release, website content or direct quote from company official. CGIT data is authentic and has a crucial advantage for this research compared to the official investment data published by China's Ministry of Commerce (MOFCOM). (1) Individual transactions are available for use which means that each transaction can be tracked to the country and company of investment. For this research, it is important to track the recipient country of investment in order to fulfil the research objective of finding how China's infrastructure OFDI is impacting recipient countries and comparing this impact across various regions. (2) the data is divided into two types; investments and construction contracts. The fundamental difference between the two is

that investment involves ownership and indefinite presence in a host country. For example, China may own few assets in a country, yet it may sign contracts worth billions to build rail lines, dams and more which are then locally owned. The contracts to build in a foreign country are known as construction contracts in CGIT dataset. Construction contracts are often long term but temporary, as is supporting loan finance. Usually China's private firms drive overseas investment, whereas, more SOEs are involved in construction contracts. These SOE's are supported by huge amounts of concessionary finance from the state banks (Scissors, 2019). In this research, the projects that are placed under the category of overseas construction contracts are considered to be China's infrastructure OFDI. This is because construction contracts are essentially overseas infrastructure projects conducted by Chinese SOE's using loan financing. This database is used in all three Chapters.

For chapter 3 & 4, CGIT data is merged with firm level dataset obtained from CSMAR China's Listed Firm Financial Statement and Financial Ratio database. The data provided by CSMAR, short for China Stock Market & Accounting Research Database, is a comprehensive research-oriented database focusing on China's Finance and Economy. CSMAR was developed by Shenzhen CSMAR Data Technology Co., Ltd. The data is widely used and is mainly derived from periodic and ad-hoc announcements from listed companies, including financial statements, financial ratios management information, shareholder information, corporate behaviour and analyst forecasts.

Using three different data sources required careful organization of the data to ensure compatibility across various data sources. Several steps were taken in this regard. The first step involved converting CGIT's monthly infrastructure overseas investment data, into quarterly data to match the CSMAR's firms' financial statements. Converting into quarterly data meant that some companies had two or more investment transactions in the same quarter. These transactions created duplicates that couldn't be combined with CSMAR's

firms' financial dataset. Therefore, the second step involved combining the amount of China's overseas infrastructure investment for such transactions and entering it in the data as a single observation. Finally, the two datasets were merged by matching Chinese firm's stock exchange codes and quarterly date. This final dataset was used in Chapter 3 and 4, covering the sample period from 2005-2019. In both these chapters, Heckman two stage estimation was performed using all the listed firms' data from CSMAR. The sample firms used in these chapters are non-financial, listed firms. An advantage of using listed firm data in our research is that it is more reliable and accurate than unlisted firms since these firms have to meet higher regulatory standards.

In Chapter 5, along with the CGIT data, I introduced macro-level variables obtained from the World Bank and the International Monetary Fund (IMF). To ensure compatibility across the two data sources, total amount of yearly Chinese overseas infrastructure investment was calculated for each country from the CGIT dataset. This total investment amount was then merged with the world bank and IMF's macro-level, yearly data. A separate spreadsheet was maintained for project level details. This spreadsheet helped with analysing country/region level project information. For example, the number of Chinese infrastructures OFDI's made in Algeria, in 2013. For Chapter 5, the sample period covers the year 2005-2017. This sample period covers two important events in the last two decades that could have impacted the amount of China's infrastructure OFDI to recipient countries. The first is the global financial crisis in 2008 and the second is the announcement of belt and road initiative in 2013. Moreover, the country level data is obtained from well-known and reliable sources making the research robust.

Chapter 2 Background

The objective of this chapter is to provide a background of the Chinese economic system and its journey from a foreign direct investment receiver to one of the highest overseas infrastructure foreign direct investment providers in the world. Chinese economy's transformation from a centrally planned economy to a hybrid market capitalist economy is important to understanding the behaviour of Chinese firms. Therefore, this chapter is organised as the follows. In section 2.1, I look at China's economy prior to reforms. Section 2.2 discusses the institutional changes in the economy after the initial reforms. Section 2.3 provides a detail discussion regarding China's state-owned enterprises reforms. In section 2.4, I discuss the events that led up to an increase in China's infrastructure OFDI. In section 2.5, I explain how COVID-19 has impacted China's infrastructure OFDI. Section 2.6 discusses the financing of China's infrastructure OFDI and finally, section 2.7 discusses China's infrastructure OFDI specific to three different regions i.e. Africa, Europe and BRI.

2.1 China's economy prior to reforms

Between 1949 and 1978, China was a command economy subject to direct government control and national development strategies. A large share of the country's economic output was directed and controlled by the state, which set production goals, controlled prices and allocated resources. The behaviour of the firms was completely dependent on the government's development plans. The period 1953-1957 marked the beginning of China's rapid industrialization. A First Five-Year Plan was modelled on Soviet's experience, and the Soviet Union provided the material aid and extensive technical advice on its planning and execution. Under this plan, the build-up of heavy industry was prioritized. Most of the investments were aimed at increasing China's (heavy) industrial growth and decisions were directed and controlled at the government level. As a result, the industrial growth increased

11.5 per cent every year from 1952 to 1978. However, market mechanisms were still missing. Chinese industries were wholly owned by the government. The prices of the products were set by the state. Private enterprises and foreign-invested firms were barred. A central goal of the Chinese government was to make China's economy relatively self-sufficient. Foreign trade was limited to importing goods that could not be made domestically. Due to the lack of market mechanisms to efficiently allocate resources, there were few incentives for firms, workers and farmers to become more productive or be concerned with the quality of what they produced. Chinese financial system was also controlled by the government which was dominated by a single powerful bank that acted as both, the central and commercial bank.

Despite the rapid industrialisation during this period, China's economic system was subject to many inefficiencies. Often the government failed to realise fundamentals of the economy. For example, during 1958-1962 China's economy suffered significant economic downturn as a result of Great Leap Forward campaign. Private ownership of land was abolished and all households were forced into state-operated communes. Industrialization drive led to increase in urban workforce, at the expense of rural work force which resulted in lack of food supply Even in the 1970s, the problems with food supply and production still lingered. The growth in household consumption and services were not able to keep up with the growing pace of the fixed investment. Unemployment was prevalent in the economy, because of lack of development of the service sector. Moreover, the Cultural Revolution from 1966-1976 caused widespread political chaos and greatly disrupted the economy. Overall, the pre-reform era was based on a planned economic system and was filled with inefficiencies.

2.2 Changes during the reform and the opening

In December 1978, the decision on the "reform and opening" was made at the meeting of Central Committee of the Communist Party of China, which marked an important milestone

in China's economic development. The economic reforms from this era can be divided into two phases.

The first phase is from 1978 to the early 1990s. Gradually, the government established incentives and competitions in the economy. The central government-initiated price and ownership incentives for farmers, which allowed them to sell a portion of their crops on the free market. Local government were given more power in local developments. Governments at the township and village level owned and managed the township and village enterprises (TVEs). The entry of TVEs created competition within the SOEs in industrial sectors. An important institutional change during the period was the introduction of market in the state sector through the dual track approach. Under this approach, the central government allowed some enterprises which had fulfilled their planned production quotas, to sell their surplus output at market prices, while their planned quota production was sold at state-set prices. These measures allowed firms to have more autonomy in decision-making and become more profit oriented.

The second phase of the economic reforms started in the 1990's. It emphasised the replacement of the old system with a market system. The focus was to build a rule-based market system that incorporates international best practice. Dual track system was out-dated and abolished. Decentralization of economic policymaking was carried out in many sectors, especially trade. Privatization was encouraged as additional coastal regions and cities were designated as open cities and development zones, which allowed the government to experiment with the free-market reforms and offer tax and trade incentives to attract foreign investment. The government also started privatizing and restructuring the SOEs during this phase. A portion of the larger SOEs shares were sold and became public listed firms and the smaller, unprofitable and troubled SOEs were disposed of. Trade liberalization was also a major element of the reform. Under trade liberalization trade barriers were removed,

encouraging greater competition and attracting FDI inflows. Overall, during 1978 to 1990's, China experimented with different reforms. Its gradual implementation of economic reforms identified the policies that produced favourable outcomes. Quick to learn from its mistakes, China implemented only the successful reforms in other parts of the country.

2.3 China's State-Owned Enterprise (SOE) reforms

China's SOEs reforms took place gradually. During the 1980s Chinese government focused only on boosting performance by improving SOEs internal governance and the market environment in which they operated. The government introduced a contracting system into the state industrial sector, requiring SOE managers to meet sales targets, profitability, rate of investment etc in return for the enterprise retaining a share of the profit. Studies have found that the contracting system improved firm performance (Li, 1997). Private shareholding was first introduced in 1986 when some state-owned firms' employees were allowed to buy 30% of their firms shares. The opening of two stock exchanges, Shenzhen Stock Exchange in 1990 and Shanghai Stock Exchange in 1991 led to a few SOEs issue shares to the public.

In 1995, China's central government decided to implement "keep the large and let the small go" policy. This meant that the government will retain ownership of only 500 to 1000 large state-owned firms and allow smaller firms to be sold. Commencing from "keep the large and let the small go" policy came the term 'gaizhi' which meant "changing the system". This term was used to describe any form of structural change to a firm including public offering of shares, internal restructuring, bankruptcy and reorganization, employee shareholding, open sales and leasing and joint ventures. In short, gradual necessary changes implemented to the SOEs to improve performance. Through 'gaizhi' more than 40% of SOEs were privatized during the period 1996-2002 (Garunaut, et al., 2006).

After 2003, Chinese government focused on reforming the large and important SOEs. The government needed to establish a system with which central and local government could assume responsibility of shareholders on behalf of the state. For example, the central government should be responsible for large SOEs that are crucial to the national economy and security such as, steel, construction or natural resource productions, whilst local government could be responsible for smaller and less important SOEs. To address this issue, in March 2003, China established State-owned Assets Supervision and Administration Commission (SASAC). SASAC implemented reforms to bring China's SOEs closer to market, for example board reforms were launched to increase the number of outside directors in SOE board. By the end of 2018, 90% of the central SOEs had completed or were in the process of completing the board reform.

In 2005, Chinese government initiated the split share reforms in the Chinese stock market. Under these reforms, the stocks of Chinese listed firms were split into tradable and non-tradeable shares. All Chinese publicly traded firms had a split share structure in the domestic (A share) market. Under this structure all shares had the same voting rights, but not all shares could be traded in the secondary market. Around one-third of the firms' shares were tradable shares and around two-thirds of the shares were non-tradable shares held by state, SOEs, founders, strategic investors or employees (Allen, et al., 2018). Among the tradable shares, class A were shares issued to Chinese investor and class B shares are issued to foreign investors including Taiwan and Hong Kong. Class H shares can be listed and traded on the Hong Kong Stock Exchange.

These reforms proved beneficial for the Chinese financial system. Under this structure standard corporate governance mechanisms were weak for listed firms. The listed firms had two-tiered board structure. Including a board of Supervisors and board of directors. The board of supervisor ranked above the board of directors and were usually chosen from

government branches or parent companies. Moreover, due to non-negotiable shares, the external governance mechanism was also week as hostile takeovers and risk of bankruptcy was insignificant.

In 2012, Chinese government launched an anti-corruption campaign along with an increasingly comprehensive and thorough reform of SOEs. The idea was that the reforms should be guided by one core policy and supplemented by supporting policies. The reforms were taken place according to SOE classification. SOEs were classified as commercial SOEs and public service SOEs. The commercial SOEs were further divided into perfect competitive sectors and strategic sectors. Strategic sectors included key industries such as infrastructure. This allowed the government to reduce its support to commercial SOEs and allow them to compete freely with the private sector and provide more services to the public service SOEs. Under this campaign even the central SOEs were reorganized. After 2013, government stepped up its merging of large SOEs. From 2012-2018 SASAC facilitated merger of 20 central SOEs. As a result of these reforms, the number of central SOEs in China dropped from 189 in 2002 to 96 at the end of 2018 (Lin , et al., 2020). Following the successful reforms, SOEs are being positioned as primary drivers of China's economic and technological future. Especially after COVID-19, the focus of Chinese government is on technological innovation by SOEs to encourage innovation and develop advanced manufacturing sectors (EY, 2020).

2.4 Events leading up to China's infrastructure OFDI

Although, China's infrastructure OFDI journey began as early as 1960's from Africa. After the launch of 'Going out' strategy in early 2000's, China's global infrastructure OFDI increased substantially. Rodriguez & Bustillo (2011) divides China's overseas investment pattern in three periods. The first period ranged from the year 1980 to 1991 when China

started its cautious open-door policy and OFDI increase. During this period, overseas investment was made simpler for Chinese State-owned Enterprises (SOEs), although private investors still had to face many restrictions. Firms had limited access to foreign currency and their competitiveness was low. Decision-making regarding investment was decentralized to local government. The second period, from 1991 to 2003, saw a gradual increase in OFDI due to introduction of friendlier policies by the Chinese government. The state sector was downsized with the policy of 'grasping the big and letting go the small'. This meant that private firms' number and significance increased in the economy. Banking reforms and the launch of two Chinese stock exchanges ensured easier access to finance for private firms. However, the main chunk of overseas investment was still conducted by the SOEs. Finally, from 2003 to 2008, OFDI increased dramatically because restrictions on private investors were lifted. Private investors were officially permitted to invest overseas (Buckley, et al., 2007). Economic growth accelerated due to rapid increase in exports and inward FDI, which helped Chinese government generate a large balance of payment surplus and accumulate foreign exchange reserves. Initially, much of this was held in US Treasury securities, of which China has been the largest holder in recent years. However, the return on these was very low and therefore, China sought to diversity its overseas holdings and encourage investment in assets that generate higher returns (Jenkins, 2018).

In an attempt to diversify its overseas holdings, Chinese government encouraged their firms to 'go global' through OFDI. Domestically, China saw further growth in the private sector and SOEs were encouraged to focus on profitability. China's domestic infrastructure investment increased as well. However, this period of extraordinary growth was obstructed by the 2008 financial crisis. Chinese firms saw a decline in demand for exports, which left firms that previously ran at full capacity, now suffering excess capacity. Excess capacity occurs when the production capacity formed in advance exceeds the needs of equilibrium

quantity, and then leads to the situation where there is idle surplus of production factors (Liu, et al., 2017). To counter the slow-down of domestic economic growth due to the financial crisis, Chinese government also announced a major stimulus package (RMB 4 trillion) in hope to maintain the pre-crisis level economic growth. Infrastructure made up majority of the stimulus package. In the short run, the stimulus package helped Chinese government reinvigorate the economy, prevent recession and avoid the credit crunch. However, the stimulus spun quickly out of control. Easy credit availability fuelled an asset bubble that sent prices of land and housing steeply upwards. Local government debt also rose at an alarming rate. Investment in fixed assets and infrastructure rose sharply, worsening an already severe production overcapacity which was created due to a sudden collapse in exports (Yongding, 2009).

Extra financing in the economy, coupled with government promotion of the going out policy, led to an increase in OFDI by Chinese firms. For the government, infrastructure OFDI became the only plausible solution to China's excess capacity problem. Therefore, China's Infrastructure OFDI increased especially after the 2008 global financial crises. To further address these issues and generate overseas demand for domestic firms, China proposed the Belt and Road Initiative (BRI) in 2013. Since its inception, China's general OFDI to BRI member countries has experienced an upward trend. Indeed, a vast majority China's infrastructure OFDI is directed toward the BRI region and in 2016, infrastructure OFDI in BRI countries exceeded the share of non-BRI countries (Chen & Lin, 2018). During the year 2016-2017 Chinese infrastructure OFDI activity peaked. The peak was an unsustainable drain on China's foreign currency reserves and as a result the country tightened controls on foreign investment. Thereafter, BRI countries experienced a steady decline in China's infrastructure OFDI.

Insert chart (2.1) & table (2.1)

To conceptualize the extent of Chinese firms' overseas infrastructure investment, I shed light on the sample data used in Chapter 1 and 2. Chart 2.1 displays the average total assets of the 68 Chinese listed firms used in the sample. Table 2.1 lists the name of the firms in each quartile. The 68 firms are divided into four quartiles in descending order, i.e. firms with the highest average total assets are in quartile 1 and the firms with the lowest average total assets are in quartile 4. Firms in quartile 1 of chart 2.1 are some of the largest listed companies in China. Three of these firms; China national petroleum corporation (CNPC), Sinopec and China State Construction Engineering are state-owned and rank amongst top five by annual revenue. Fortune Global 500 (2021. Even the small firms in the data (quartile 4) have an average total assets of 2627 million yuan, which is consistent with the view that large firms invest in infrastructure OFDI.

Insert chart (2.2-2.6)

Firms in Chart (2.2-2.6) displays the average percentage of 68 Chinese firms' infrastructure OFDI to their total assets for the period 2005-2019. Chart (2.2) shows the lowest percentage of overseas infrastructure investment to total assets and Chart (2.6) shows the largest percentage. As we can observe, half of the sample firms have invested more than 5% of their total assets in overseas infrastructure investment and a quarter of the firms have invested more than 20% of their total assets. The five largest overseas infrastructure investors as a percentage of their total assets are listed in Chart (2.6). Even the firm investing the lowest amongst these (State Grid), is investing more than two and a half times their total assets. These statistics show that infrastructure OFDI contains a major proportion of these firms' assets. Moreover, we can see that four of the five firms in chart 2.6 are ultimately controlled by the state. From the whole sample, around 68% (46 firms of 68 firms are ultimately controlled by a state entity). This means that the majority of firms conducting overseas

infrastructure operations are state owned. Which is consistent with the view that Chinese government plays a significant role in overseas infrastructure investment.

Overall, this section discusses the circumstances, from early 90's to the period before the global pandemic, that led to a massive surge in China's infrastructure OFDI drive. In the past few decades, infrastructure OFDI has increasingly become an important element in China's economic and political policy. The sample of Chinese listed firms used in this research indicates that 68% of these firms are ultimately controlled by the state and heavily engage in infrastructure OFDI.

2.5 China's infrastructure OFDI since COVID-19

End of the year 2019 was marked by a global pandemic (COVID-19), which not only disrupted China's infrastructure OFDI but also adversely impacted world-wide economic activity. Demand and supply shocks resulted in construction interruptions or delays due to lack of labour, supply chain disruptions or government approvals. Project risks such as termination, insolvency or contracts breaches also increased. Additionally, travel restrictions on foreign workers, especially Chinese workers who were commonly employed on BRI projects was a contributing factor to project slowdown. Moreover, further disruptions were caused because the nature and extent of lockdown varied from country to country. The long-term impact of the pandemic on China's infrastructure OFDI, especially the BRI projects is troubling. Huge amount of resources spent by the developing BRI countries on pandemic recovery means that various projects will be delayed. Moreover, the main source of funding for infrastructure projects is provided by Chinese Development banks, the Silk Road Fund, the New Development Bank and Asian Infrastructure Investment Bank. These banks may decide not to continue some projects if their long-term profitability is compromised (Wu, et al., 2020). Most of the developing countries are already face high debt levels and receive

China's assistance to afford essential infrastructure in the form of aid, concessional loans and other mechanisms. The pandemic may exacerbate these issues.

COVID-19 also represents an opportunity for China to recalibrate relations with these countries. China can focus on local capacity building, rely more on local labour and resources, consider debt flexibility and increase knowledge sharing. It is still too early to declare the long-term impact of COVID-19 pandemic on Chinese infrastructure OFDI. However, in order to avoid a major set-back, China needs to generate a quick response regarding its infrastructure OFDI policy, especially in the BRI. Careful evaluation of each project is essential and China's response needs to be tailored according to the host region. Overall the COVID-19 pandemic has forced China and its infrastructure OFDI recipient countries to divert their finances to more urgent issues such as health care, economic recovery and growth. With limited finances, there is a pressing need to evaluate the impact of infrastructure OFDI on Chinese firms and also the recipient countries.

2.6 Financing China's infrastructure OFDI

Over the years, China has become one of the world's major foreign investors. In 2017, Chinese enterprises invested the highest amount ever (over 196 Billion-dollars) in foreign investments. This colossal scale of spending has raised questions about how these investments are being financed? In order to understand this, I begin this section with a brief history of China's financial system.

During the early 1980s, China operated under a planned economy system with only a single bank. Since 1993, China's banking sector experienced a huge transformation. The country began to formally establish a system of market regulation and commercialise its large state-owned banks. The single bank system needed reforms to support the unprecedented growth rate of the Chinese economy. Therefore, the single bank was split into four banks known as

"Big Four" state-owned commercial banks and allocated special mandates. The Bank of China (BOC) was given the mandate to handle foreign transactions. The China Construction Bank (CCB) handled fixed investment project financing. The Agriculture Bank of China (ABC) dealt with rural areas banking needs and The Industrial and Commercial Bank of China (ICBC) took over commercial transaction in urban areas. Further reforms saw shares of the "Big Four" banks being traded on the Shanghai Stock Exchange and the Hong Kong Stock Exchange. This shifted the state-owned banks towards market-oriented banking system, encouraging transparency and providing extra liquidity. Historically, Chinese household savings rate have also been high which, along with unusually low yields on bank deposits, led to high bank liquidity. Moreover, China's policy led exports and overall economic growth also contributed to China's strong build-up of foreign exchange reserves. This extra liquidity in the banks was quickly transferred to SOE's. This was because SOE's enjoyed a special connection with SOBs due to China's past planned economy system. SOEs expended the extra liquidity to finance their investments, often in high risk and low-quality projects. Moreover, such a system raised issues such as corruption and inefficient management of both Banks and SOE's. China has been trying to address these issues by implementing further reforms. For example, in 2012, President Xi launched an anti-corruption campaign to relieve companies of corrupt executives. Nevertheless, more is required from the Chinese government to develop a banking system mirroring western economies.

China's infrastructure OFDI is also funded via the same channels. However, it is impossible for a single country to finance such a large scale of infrastructure OFDI alone. Therefore, in majority of the cases, China collaborate with other (usually host) countries to finance infrastructure projects. For example, in 2013, China established a Central and Eastern European fund (CEE) with a commitment of USD 435 million, which focuses on

infrastructure and technology investments in Central and Eastern European countries. This fund is mutually sponsored by China EXIM bank and Hungarian Export-Import Bank. Most of the infrastructure projects are partly funded by China and the other part funded by the local government.

Recently, Chinese private firms have also participated in China's infrastructure OFDI. These firms have a high savings rate by retaining profits because of poor access to the formal financial system. This, coupled with government's relaxation of overseas financing regulations following the BRI initiative, has attracted China's small and medium scale firms to engage in infrastructure OFDI (Ng & Wei, 2017). Such projects are sometimes initiated through public-private partnerships (PPPs). PPPs are long-term contracts between a private party and the host government to provide a public asset or service. These types of contracts help alleviate pressure on the Chinese government.

Another source of finance for infrastructure OFDI are China's capital markets. Since the creation of the two stock exchanges in Shanghai and Shenzhen, these stock markets have become important in financing SOEs. As part of the financial system reforms, Chinese government listed the SOEs in these stock exchanges and partially sold their shares to new and diverse owners. This resulted in China's capital markets not only becoming a source of additional capital for the SOEs, but also encouraged transparency and high accountability amongst the SOE's.

Finally, another significant source of finance for China's infrastructure OFDI drive are policy banks. China Export Import Bank (China Exim) and China Development Bank (CDB) are now major development finance institution in the world (Gu & Carey, 2019). These banks are financed by capital injections from Chinese state budget along with the Chinese bond market. In simple words, these policy banks are intermediating between bond market and their

borrowers. Policy banks play a significant role in financing China's infrastructure OFDI drive and each bank differs from the other by lending to a specific region or sector. There are three main types of policy bank that engage in majority of infrastructure investment contracts in Africa, Europe and BRI. These include;

2.6.1 China Export Import (Exim) Bank

China Export Import (Exim) Bank mainly deals with investment in Africa. Established in 1994, the bank is owned by the Chinese government[1] and plays an important role in supporting the economic relationship between China and Africa. The bank's specific role is to finance projects related to infrastructure required for transport and extraction of energy and minerals in Africa (Bosshard, 2007). Exim bank also lends soft loans which strengthen the political relations between China and Africa. Additionally, it facilitates an important and increasingly popular mode of finance, known as the "Angola mode" or "resource for infrastructure". As the name suggests, re-payment of the loan for infrastructure is made in terms of natural resources. This type of finance bodes particularly well with countries that cannot provide adequate financial guarantees (Foster, et al., 2009).

2.6.2 China Development Bank (CDB)

China Development Bank (CDB) is the financial institution that deals with funding a significant part of China's infrastructure OFDI in Europe. Established in 1994, CDB is one of the largest banks in the world with 1.3 trillion U.S. dollars in total assets. Almost 50% of the bank is controlled by China's Ministry of Finance and the remaining is Controlled by Central Huijin Investment Ltd. The bank is mostly financed by domestic bonds, and has a significant role in international lending especially in the infrastructure sector. With averaging, more than 20% annual loan portfolio growth since late 1990s, CDB has sustained a steady and strong

[1] However, the loans are not formally guaranteed by the government.

growth pattern. Being such a huge bank, its International lending operation are not limited to Europe but are spread worldwide (Humphrey, 2015).

2.6.3 Asian Infrastructure Investment Bank (AIIB)

The-Asian Infrastructure Investment Bank (AIIB) provides the largest fund set up for the BRI. It is a medium sized bank and China is the largest investor from amongst its 57 members. Even though the World Bank and Asian Development Bank (ADB) targets poverty elimination through infrastructure investment, both have been unable to meet infrastructure gap in the Asian region. (Hubbard, 2016). On paper, AIIB have the same objectives as the World Bank, i.e. to eliminate poverty through infrastructure investment. However, analysts believe China's motives of forming AIIB are more political than any others (Yu, 2017; Hubbard, 2016). It's considered to be a response to China's frustration of its insignificant role in the decision-making process of ADB, the World Bank and the International Monetary Fund (IMF). At AIIB, China has kept control of the bank's decision-making process by retaining the largest voting share at 26.06% as major decisions require a super majority of 75%. This suggests that China is willing to sacrifice its capital to enhance its presence in world affairs (Yu, 2017; Hubbard, 2016). Moreover, the AIIB differs in approach from western financial institutions by avoiding detailed prescriptions on how to manage the processes. This leads to fast implementation of project without wasting time and resources on insignificant details (Dollar, 2016). Due to these characteristics of Chinese investment, developing countries that have significant need of infrastructure investment prefer Chinese policy banks over other financial institutions. However, AIIB and other Chinese policy banks are also notorious for lacking transparency, reduced quality control and also financing investment projects to fulfil China's political motives. Therefore, recipient countries need to carefully evaluate the drawbacks of receiving investment from these banks.

Overall, in this section, I discuss how China's infrastructure investment drive is financed. The main source of investment is China's large amount of foreign exchange reserves. Increasingly, external finance and China's policy banks are also playing an important role in financing China's infrastructure OFDI. Countries that receive China's infrastructure OFDI are often carefully selected and serve political purposes of the investor. In the next section, I will discuss the regions, where China's infrastructure investment has had a significance presence or has seen significant growth.

2.7 Regions of China's infrastructure OFDI

Over the past two decades, China's infrastructure OFDI has increased sharply. At a glance, it may seem like a haphazard investment spree. However, this is far from true as majority of the recipient countries are carefully chosen for infrastructure OFDI. They are chosen because they may fulfil China's political and economic objectives, or provide natural resources to China. Although, the underlying motivation to initiate an overseas infrastructure project is to make profit, the regions that Chinese firms choose to invest in, also contain some form of unique characteristics from which China intends to benefit. Sometimes, firms may even be forced to forego profitability to fulfil government objectives. To understand the motivations and the impact of China's infrastructure investment, I further examine these regions. China's infrastructure OFDI is split in three regions (Africa, Europe and BRI) and their unique characteristics, historical ties with China, China's infrastructure OFDI in these regions are discussed.

2.7.1 Africa

Even before China's accumulation of wealth, political connections with Africa had been very important. In the 1960's-1970's, China's Cultural Revolution resulted in China providing significant foreign aid to Africa, despite its own domestic economic difficulties. This helped

develop deep-rooted political ties with the country. More recently, China's political agenda to gain support for one China policy has enhanced the importance of African states. Majority of the African states consider Beijing as opposed to Taipei as the only lawful representative of Taiwan. This long-standing special political connection has led to increasing Chinese OFDI to Africa. Chinese investors have more experience of investing in Africa than any other region. This coupled with support from Chinese government, following the launch of the 'going out' policy has made Chinese firms very competitive in the region. Moreover, China's demand for natural resource extraction to fuel its fast-paced economic growth makes Africa an important destination for infrastructure OFDI as it can guarantee China's continued natural resource supply. China's significant presence in the region has also made it realise that lack of infrastructure is a major detriment to Africa's economic growth. Even before the inception of BRI, Chinese investment in African infrastructure amounted to roughly at $13.9 billion a year between 2011 to 2013 (Plessis, 2016). However, this effort is still is far from enough as recent estimates by African Development Bank (AfDB) suggests that only half of Africa's minimum infrastructure needs is currently funded (African Development Bank, 2018). Characteristics such as a number of small landlocked countries with limited port access and poor and inadequate infrastructure hinders economic development in Africa. This is mainly due to a lack of streamlined and efficient transport routes. China's infrastructure investment targets to fill this gap in the economy. It offers easier access to funds by investing without traditional western practices such as political and environmental conditions. Moreover, since the inception of BRI in 2013, China's infrastructure OFDI to Africa has increased further. By investing in Africa's infrastructure, China aims to revive crucial trade routes that may help diversify its supply chains. 54 countries in Africa provide a huge market for China as Africa is an important end user of China's industrial overcapacities such as steel, coal, cement etc. For example, import of Chinese cement increased tenfold in Kenya while the Nairobi-Mombasa railway was being

built in 2016 (Nantulya, 2019). However, from Africa's perspective, such investments do not help Africa develop beneficial economic linkages. Local manufacturers complain of China bringing in their own labour and importing construction materials. These claims also raise concern amongst western countries who accuse China of 'new imperialism' in Africa and other BRI countries by contributing to their debt distress. In some cases, China attached more importance to acquiring strategic assets than debt repayment. For example, when Sri Lanka could not pay back its loans, China negotiated a 99-year lease of the port (Stacy, 2017). The port had struggled heavy losses for seven years until the contract was renegotiated. This also raises concerns that China initiates projects such as these without considering firm profitability but rather to enhance its regional political power. Moreover, issues of debt repayment are exacerbated by the COVID-19 pandemic. Financial pressure on most African countries to fight the pandemic has raised concern amongst Chinese official regarding these countries' debt repayment ability. Also, the highly ambitious BRI initiative has already dried up a large chuck of China's financial reserves. Therefore, after the COVID-19 crises, Chinese infrastructure OFDI to Africa has dropped significantly. Supply chains also halted or slowed during the pandemic, which further decreased infrastructure investment to Africa. The true impact of the pandemic on African countries is not known yet, however, Beijing needs to work closely with its partners to ensure economic growth and financial stability in host countries to avoid debt relief.

Overall, China has helped to meet Africa's financing needs and is one of the largest financers of African infrastructure. Chinese infrastructure OFDI is fulfilling infrastructure gap in African countries, without which it is impossible for these countries to ensure economic growth. However, China's infrastructure projects in Africa are criticised for developing minimum local economic linkages. This coupled with rising debt distress in Africa's is raising doubts about China's infrastructure OFDI drive in Africa.

2.7.2 Financing China's infrastructure OFDI in Africa

Most of China's infrastructure OFDI to Africa is financed through Chinese SOEs, although private investment is also gaining popularity. Chinese official finance has become the most important external source of infrastructure finance for Africa. This includes infrastructure financed by China's institutional banks, for example Ex-Im Bank and the China Development bank. The Ex-Im bank plays a substantial in financing African infrastructure as it provides 92% of the recorded Chinese infrastructure finance commitments in Sub-Saharan Africa in 2001-07 (Foster, et al., 2009). Another important and increasingly popular mode of finance, through the EX-IM bank, is the use of deal structure, known as the "Angola model" or "resource for infrastructure". In simple words, under this mode of finance, China accepts natural resources as a mode of payment for infrastructure. Foster, et al (2009) suggests that this type of finance bodes particularly well with countries that cannot provide adequate financial guarantees. Typically, an agreement is signed with the host country government and a framework is developed. The projects are then allocated to Chinese construction companies (contractors), who take the responsibility of building the infrastructure. At the same time Chinese oil companies are also given the task to begin production. Credit is provided by China Ex-Im bank to the contractors to begin the necessary infrastructure work. The payment is received by Ex-Im bank in the form of natural resources. An interesting point to note is that the price of these natural resources is not fixed. This is contrary to the general opinion that Chinese government deals are a hedge against the future price of oil, in-fact, they are a unique method to provide a steady supply of natural resources to the nation (Foster, et al., 2009). However, this also means that decline in oil prices can negatively impact the African countries.

2.7.3 Europe

The initial success in China's 'going out' strategy led to Chinese firms reach out to international markets and invest overseas. China's continuous trade surplus and positive saving-investment gap encouraged it to further expand and invest in locations that provide access to mature markets and benefits such as technological advances (Hong & Sun, 2006). European Union's (EU's) political stability, legal security and an advanced technological infrastructure encouraged Chinese firms to invest in the region (Corre & Sepulchre, 2016). Central and Eastern European (CEE) countries' growth potential, institutional stability and market size especially attracted Chinese companies because CEE had less political expectations and economic complaints as compared to the developed economies in the EU. Besides, CEE provides a back door to the Chinese firms to access the EU common market. This increased China's infrastructure OFDI in the EU, particularly after the 2008 financial crisis. (Ferchen, et al., 2018).

Additionally, by investing in Europe's infrastructure China hopes to access its superior technology. China understands that research and development is an essential ingredient for sustainable growth and therefore, most of China's OFDI to Europe is directed towards scientific and technical research (Casaburi, 2015). Countries equipped with sound industrial base (e.g. Germany and UK) are popular destination for Chinese infrastructure OFDI and provide Chinese firms access to the host country's highly skilled, trained labour and latest technology (Casaburi, 2015). However, the EU is cognizant to its superior Research and Development (R&D) and eyes China's motivation to invest in the region with suspicion. As a response, numerous tariffs and restrictions are placed to curb Chinese investment, especially in the infrastructure sector. Many countries in the EU see technology transfer to China as a potential hazard to renounce their competitiveness in the long run. They especially consider investment in the energy sector to be a threat to national security (Conrad & Kostka , 2017).

Member states have been deploying investment screening mechanisms to protect their interests through national legislation for many years, still a coordinated pan-European strategy had been lacking. Huang (2017) suggests that the EU is an easier market to penetrate for China despite the restrictions because it offers a greater choice of partners. Chinese companies can always access the bloc's market via a different member country, if a country chooses to block access. After the COVID-19 pandemic, Chinese infrastructure OFDI to Europe decreased due to severe economic disruptions. During this time European governments have also taken significant economic policy action to forestall harmful foreign investments. Recently, a new regulation came into force to enhance coordination and cooperation between member states and discuss issues regarding proposed investments or takeovers amongst the bloc. With the new regulation, member states that previously didn't have the investment screening mechanisms in place, now have to submit reports of inward FDI activities. For EU, this is a major step in protecting its interest from harmful foreign investments and takeovers. These measures show that members of the EU are taking further steps to halt foreign investments that can become a threat to European sovereignty and economic prosperity.

Overall, China's motivation of infrastructure investment to the EU is to seek access to technology and a large market. Not all the members state welcome China's infrastructure OFDI; for some it provides essential funding for infrastructure investment whereas others perceive it as a threat to national security. However, after the COVID-19 pandemic, Europe has further tightened its control over foreign investment which will potentially decline China's infrastructure OFDI in the region.

2.7.4 Financing China's infrastructure OFDI in Europe

Investment in Europe has been attractive for Chinese investors because it provides Chinese firms with an opportunity to gain access to strategic assets and a large market. Therefore, Chinese government has been playing an active role in promoting infrastructure investment to

the region. This means that SOE's that are funded by Chinese government are also actively involved in infrastructure OFDI to the region. An increasingly popular choice for Chinese investors to finance infrastructure investment to the EU is via Public Private Partnership or PPP (Wagenvoort, et al., 2010). A typical PPP is a contract between the host country government and the Chinese entity to take the responsibility of constructing, maintaining and operating infrastructure facilities. A single long-term contract (usually 20-30 years) provides financial investment and services after the end of which the infrastructure asset is transferred back to the government. Chinese firm receive payment in the form of a steady flow of income, that covers initial payment and operation and maintenance expenses. These types of contracts ease financial pressure on the Chinese investor and also provide it with the opportunity to enter the European market.

2.7.5 Belt and Road Initiative (BRI)

Belt and Road Initiative is a mega infrastructure project headed by China announced in 2013. The idea of the belt was the rebirth of the 16th century historic silk road that once interconnected China to the countries of Asia, Africa, Middle East and Europe. The aim of this initiative was to forge a closer relationship among these countries by connecting them by land and by sea. Officially, connection through the sea is referred to as the Maritime Silk road. This route which connects the South China Sea, Indian Ocean and the South Pacific Ocean (Jinchen, 2016; Ng, 2015).

Before the year 2008, Chinese economy relied on an investment-led growth model, which saw China's construction and manufacturing industries operating at full capacity. After the financial crises in the year 2008, China struggled to accomplish its previous growth rate. Infrastructure related industries such as steel, construction, aviation etc. saw a sharp decline in demand. China's president Xi Jingping launched the BRI initiative in September 2013, as a solution to

this problem. In the hope that implementing the BRI, Chinese firms' excess capacity will being utilized and the troubled Chinese firms experiencing low demand for their products will gain access to overseas markets. Rising labour costs in China also encouraged firms to venture overseas as increase in these costs threatened Chinese firms' competitive edge. Other countries, e.g. Hong Kong, Taiwan etc. faced the same problems until they relocated their production lines to Pearl Delta River. Huang (2016) suggests that China is following the footsteps of these countries by investing in places with low labour costs. The World bank (2019) report suggests that BRI can enhance trade, increase foreign investment and reduce poverty by lowering trade costs. However, it also highlights risks associated with infrastructure projects. One of the risks is debt sustainability, which is a material threat to many low-income countries in the BRI region. Most of these countries already face elevated debt levels and hence large infrastructure investment financed with debt can put them at high default risk.

Due to the fact that BRI is an ongoing and flexible process, there is still lack of clarity as to how it will unfold. Some analysts suggest that BRI is designed to lay the foundation for an inclusive globalization policy (Liu & Dunford, 2016). Others argue that China's grand strategy for BRI is to challenge existing world orders (Leverett & Bingbing, 2017). However, there is consensus among researchers that BRI is aimed to strengthen China's political influence and promote closer economic integration in the region (Yu, 2017). According to the Chinese government sources, 140 countries are part of the BRI (Belt and Road Portal, 2021).

After the COVID-19 pandemic, in 2020, Chinese infrastructure OFDI decreased globally and also impacted the BRI. Progress on a number of BRI infrastructure projects were stalled due closing borders and lockdowns. Supply chains were severely affected and restriction on the flow of Chinese workers and construction supplies created slowdowns or suspension of projects. Beijing has described this slowdown as only a small hiccup and remains fully

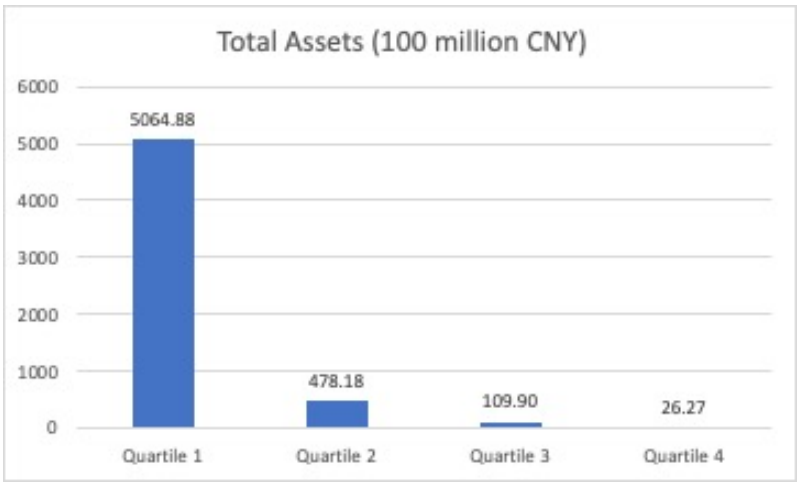
committed to the initiative. Following the global trends, China is focusing more on renewable energy, health infrastructure and innovation & technology as COVID-19 recovery plan.

2.7.6 Financing China's infrastructure OFDI in Europe

The World Bank estimates that BRI investment is worth US$575 billion. Around half of the funding of BRI projects was provided by the big four state owned commercial banks. China's policy banks, e.g. China Development Bank, the Export-Import Bank of China and the Silk Road fund have provided most of the rest (Wildau & Ma, 2017). On project level, BOT (build operate transfer) and BOO (build operate own) are popular methods of infrastructure investment in BRI. In some cases, private companies are given contracts to plan, construct and even develop feasibility reports for infrastructure projects (Dias, et al., 1996). Especially along the BRI, Chinese firms acquire projects from the local government and engage in BOT contracts. There is demand for this type of financing because many recipient countries involved are developing countries where there is a shortage of public funds to finance new infrastructure projects. Moreover, it is difficult for a single country to finance a massive project like the BRI. Therefore, China foster's third-party cooperation in developing and financing BRI projects. Many developed economies have expressed their interest in co-financing BRI projects (Liu, et al., 2020). Regrettably, BRI is also causing public debt and corporate debts to rise and exceed historic levels in emerging market economies. Similarly, debt default risks have risen substantially in recent years in low-income developing countries. The World Bank reports that countries at high risk of debt distress has doubled since 2013 after the BRI was launched (World Bank, 2019). China needs to consider debt repayment ability of recipient countries before signing infrastructure OFDI contracts. Often, China needs to renegotiate debt contracts or consider debt forgiveness if recipient countries are unable to repay.

To summarize, Chinese infrastructure investment in Africa is to capture sources of natural resources to provide energy security to China's growing demand. There is also indication of geopolitical gains from investing in Africa, as China looks to draw support for its One China policy. China has even established a tailored mode of payment for African firms in the form of natural resources, known as the Angola model, which shows China's determination to invest in the region. However, Chinese infrastructure investment in the EU is not welcomed in some countries. There are concerns that Chinese firms invest in the EU to gain technological know-how. These concerns make it difficult for China to access the region. Despite the negativity, Chinese firms take advantage of incoherent investment policies amongst the countries in the EU and access the bloc from countries where it is easier to invest. However, in 2020, the EU has further toughened the rules and increased coherence amongst the member countries to prevent any hostile investment by Chinese companies. In BRI, Chinese infrastructure investment targets to solve China's excess production capacity issue. Moreover, some analysts discuss BRI as China's attempt to display political supremacy in the region. This is different from Chinese investment in Europe. Majority of infrastructure projects in BRI are financed by the local government.

Chart 2.1



See Appendix 1: for stock codes and names of companies in quartiles.

Chart 2.2

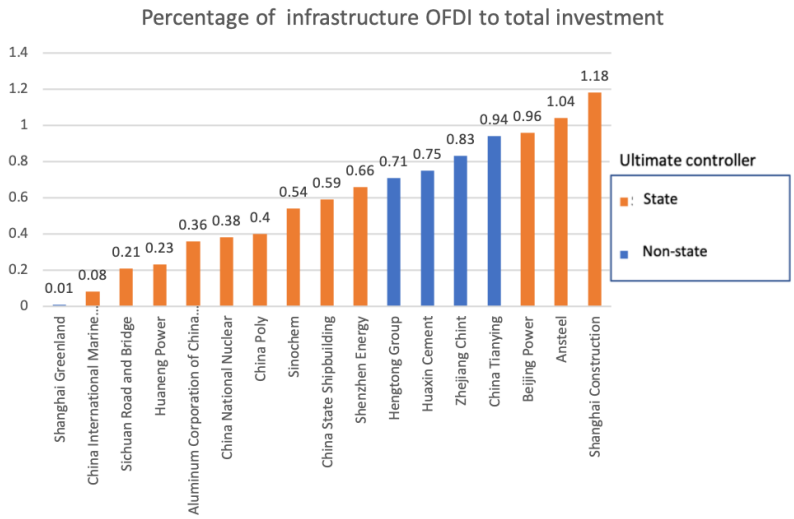


Chart 2.3

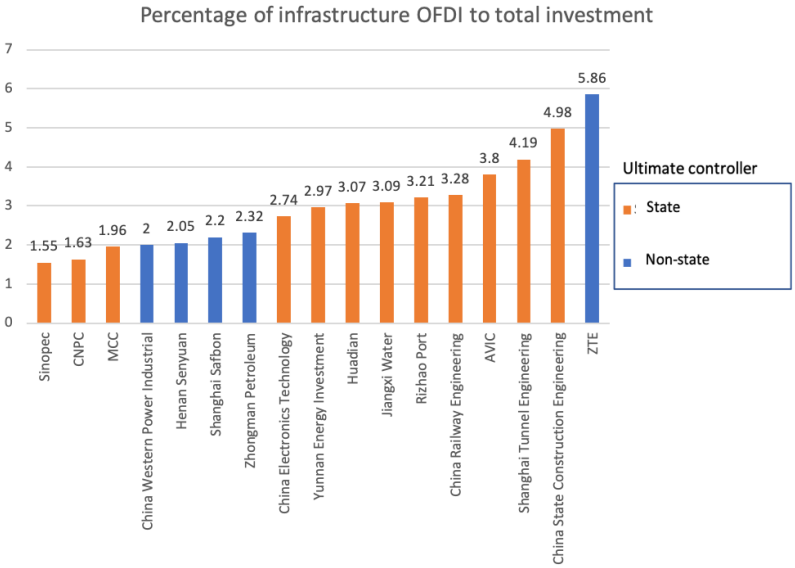


Chart 2.4

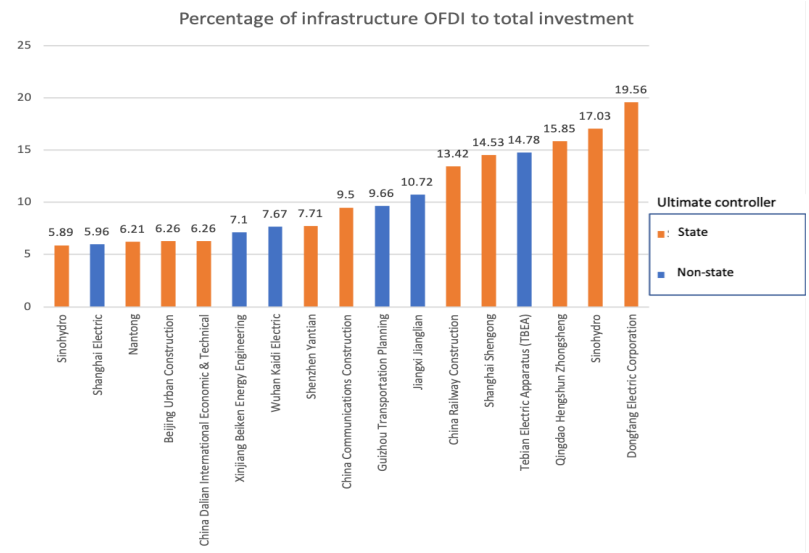


Chart 2.5

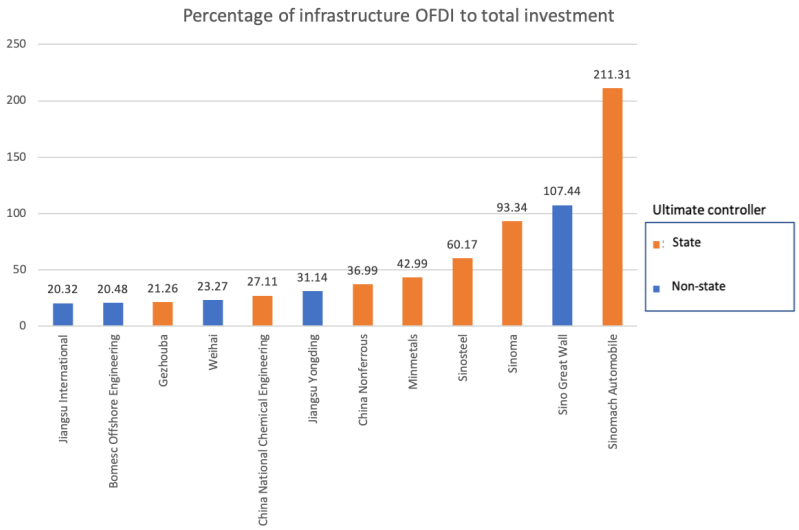
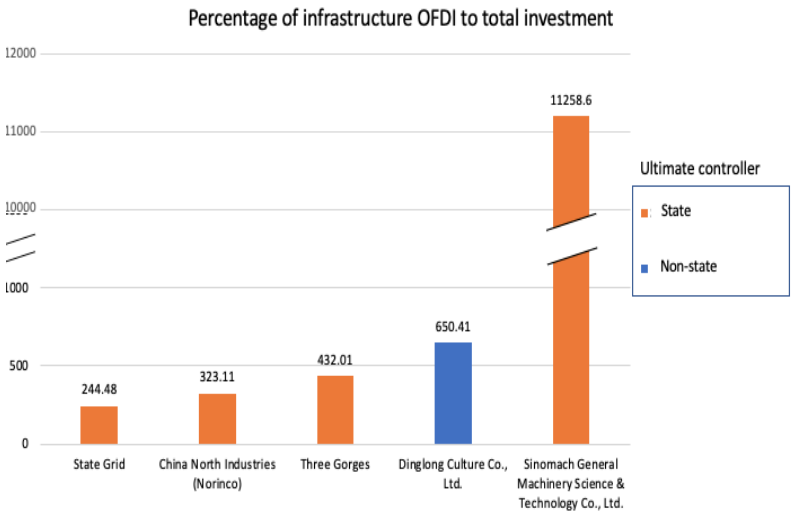


Chart 2.6



Chapter 3 Do Chinese firms enhance profitability from foreign infrastructure investment in Africa, Europe and BRI?

3.1 Introduction

Chinese infrastructure investment has increased manifolds in the past few decades, especially after the 2007 financial crisis. In 2016 Chinese banks held six of the seven top lending spots by lending in infrastructure and building projects the amount of $35.4bn (Financial Times, 2019). China's infrastructure OFDI of this scale and magnitude has undoubtedly attracted academic attention. Questions are arising regarding the impact of this on the investor. Is this trend driven by profitability or China's wider political strategy?

FDI literature has proven that firms perform OFDI to maximize profits (Buckley and Casson, 1976; Dunning, 1980). However, Emerging Market Enterprises (EMEs) differ from multinational corporation (MNCs) in several aspects such as weak institutional environment (Child & Rodrigues, 2005) and more government intervention (Gammeltoft, et al., 2010). The most distinct feature for Chinese firms performing infrastructure OFDI is government intervention (Scissors, 2019). High government intervention may pressurise Chinese firms to perform infrastructure OFDI that is not profitable for the firm. This is because these SOE's are burdened to meet government needs from a social welfare standpoint, environmental protection efforts and philanthropic commitments (Lin, et al., 2020). They are used to fulfil the states wider objectives such as; providing a solution to excess production capacity (Yang, et al., 2020), enhance china's soft power (Voon & Xu , 2020), gain support for 'one China policy' (Pannell, 2013), ensure energy security (Zhao, et al., 2020) and gain access to new technology and markets (Curran, et al., 2017). Carrying out infrastructure OFDI to achieve these objectives can encourage Chinese firms to engage in high risk projects which are not profitable.

Specially, investment in infrastructure is associated with higher risks. As natural monopolies, infrastructure investments tend to be capital intensive and therefore subject to high fixed costs. These investments also produce non-tradable services where assets cannot be easily redeployed for other uses and are usually immobile. For such investments high government regulations is inescapable. The risk is exaggerated when foreign investors become involved. For example, because of the non-tradable services and immobile nature of infrastructure investment, foreign investors cannot divert local production in case they become dissatisfied with host country government. Moreover, infrastructure OFDI in developing countries doubles these risks owing to lack of rules and regulations and political and institutional instability in developing countries (Ramamurti & Doh, 2004). With rising risky overseas infrastructure investments by Chinese firms, the dissatisfaction among the residents of China is also increasing. They question the prudence of Chinese government's decision to engage and encourage infrastructure OFDI to developing countries. Whether this investment is successful or are Chinese citizens paying the price of an unplanned and chaotic infrastructure OFDI drive? It is important to analyse this in detail.

This Chapter contributes to the literature in the following manner. (1) It analyses the impact of Chinese infrastructure investment on Chinese firms. This is unique as Chinese infrastructure OFDI and its impact on firm profitability has rarely been empirically studied in the past. Although, there has been some research regarding individual industry sectors, none of the studies are exclusively on Chinese infrastructure OFDI at *firm level*. (2) the analysis separates the investment into three different regions and explore how investment in different regions can impact Chinese firm's profitability. This cross-region comparison is something that hasn't been done before. Using Heckman two step method to reduce sample selection bias and system GMM to eliminate endogeneity problem, I document that the impact of Chinese firms' infrastructure OFDI on firm profitability is overall positive. This impact does not differ across

the three regions Africa, Europe and BRI. However, the results suggest that infrastructure OFDI by low state-owned firms increases firm's profitability, whereas it has an insignificant impact on highly state-owned firms. This effect is the consequence of minor government interference in low state-owned firms which allows these firms to invest in profitable regions (Sun, et al., 2002).

The structure of the paper is as follows: I review the literature in Section 3.2. Section 3.3 concerns empirical design, section 3.4 contains description and measurement of variables. Section 3.5 discusses the main empirical results. Section 3.6 concludes the paper.

3.2 Literature review

3.2.1. OFDI and firm productivity

In the literature OFDI has been widely accepted as a mechanism by which firms can exploit ownership advantages and increase profitability by accessing new resources, realizing resource relocation and stimulating competition. Buckley and Casson, (1976) suggest that firms perform OFDI to maximize profits by bringing activities that are linked to markets under common ownership and control, in order to bypass the imperfections of the intermediate product markets. They highlight two main channels that are created; (1) Knowledge flows i.e. the internalisation of the flow of knowledge stemming from R&D, (2) components and raw materials flow that includes the internalisation of processes that involves products flowing through successive stages of production and the distribution channel. In other words, a firm performing OFDI can increase its profitability by either enhancing source firm's knowledge or by enhancing production linkages. Following a similar path, Dunning (1980) suggest that a firm carries out OFDI if it believes it can enhance its performance or profitability by gaining access to some form of income generating asset. These assets may be technology, superior managerial access or natural resources, which the firm knows its competitor cannot obtain

easily. This is called the ownership (O) specific advantage. Given a firm possesses the O specific advantage, the next step for the firm will be to engage in OFDI if it believes owning or controlling the value adding activities will be more beneficial. This is called internationalization (I) specific advantage. The firms then combine its O specific advantage with some host country specific characteristic i.e. natural resources or strategic-assets, in an attempt to increase their profits. This is referred to the location (L) specific advantage. Two motivating factors behind firm's willingness to internalize their ownership exist. Firstly; to exploit market imperfections such as high transaction costs, economies of scale, costs of enforcing security or property rights, ensuring quality to protect sellers' reputation. Secondly; the incentive of government intervention in the allocation of resources for example, government incentives to internalize, e.g. tax differentials and exchange rate policies. Overall, theory predicts that firms would have higher productivity if they engage in OFDI either by reducing costs through streamlining processes or dissipating knowledge.

Emerging market enterprises (EMEs) differ from multi-national corporations (MNCs) in several aspects including; weak institutional environment (Child & Rodrigues, 2005), more government intervention (Gammeltoft, et al., 2010) and fewer O-specific advantages (Wells, 1983). They possess some advantages compared to MNC such as; low costs in home country, however, they also have disadvantages for example low R&D and technology. These advantages and disadvantages influence EME's investment location decisions. Cuervo-Cazurra & Genc (2008) find that EME's are more willing and successful in investing in less developed countries (LDC) than the developed country MNE counterparts. This is because EMEs generally have less ownership specific advantages than MNEs, for example, low R&D and small size. Managers in LDCs find it easier to work in poor governance conditions because of superior experience of dealing with weak institutional environment. Li, et al (2017) suggest that OFDI significantly contributes to productivity growth for private EMEs. This is because

OFDI helps EMEs create and transfer knowledge, relocate resources and realize economies of scale. Moreover, OFDI helps EME access developed institutions and enhance competition. Using firm level evidence from Taiwanese manufacturing firms, Liu & Nunnenkamp (2011) show that generally, foreign operations promote an increase in domestic production and employment, conditional on the size of investment. Overall, despite the obvious disadvantage of low R&D, EMEs can perform well in LDCs due to superior experience of working in similar culture, imperfect capital markets and poor governance areas.

Particularly, literature related to Chinese firms suggest that they engage in OFDI to gain from capital market imperfections, ownership specific advantages and institutional factors (Buckley, et al., 2007). This may result in survival of inefficient Chinese firms. Chinese firms also benefit from ownership specific advantages such as flexibility, economies of scale on use of capital, familiarity from operating within an emerging market and networking skills. Moreover, home institutional environment, created by the Chinese government and its agents, influences the amount and location of OFDI. The extent of government intervention may determine the success of Chinese firms rather than its performance when competing for projects in the global market. This can either have a positive impact on firm profitability (if firm wins contract owing to low costs) or a negative impact (if government intervention lead to burdensome admin costs or fulfilment of political motive by investing in risky projects). Although Chinese firms may not have the O-specific advantages of a typical MNC, but owing to their unique background, they have different types of advantages that can encourage them to pursue OFDI and also positively effect firm performance. Empirical evidence related to Chinese OFDI impact on firm performance supports this view. For instance, Huang & Zhang (2017) use data of 2549 Chinese manufacturing firms and find that Chinese firms' performing first-time OFDI, enhance their parent firm's productivity. They argue that firms that perform OFDI acquire a series of important resources abroad through technological and non-technological channels. The

overseas subsidiary can either directly gain technology and know-how through establishing R&D centres in host countries, or it can indirectly get the technology via spill overs from host countries. This can then enhance parent firms' productivity. However, the extent to which each firm can efficiently utilize technical and non-technical resources depends on its absorptive capacity. Zhao, et al. (2010) examined changes to China's productivity as a result of its OFDI to eight developed countries from the period 1991 to 2007. They report that OFDI has beneficial impact on the total factor productivity. This is because engaging in OFDI enhanced firm efficiency. This is due to OFDI-related R&D spill overs, that leads to substantial efficiency improvements in Chinese firms, has a great impact on productivity growth. Overall, theory suggests Chinese OFDI performing firms differ from mature market MNEs. Their local and host country environment and their ownership advantages make them unique and therefore, the effect of OFDI on the profitability of EMEs will be different to that of MNEs.

3.2.2 China's SOEs and political objectives

An important issue related to Chinese OFDI's impact on firm performance is the prevalence of State-Owned Enterprises (SOEs) in China. Even after the reforms, Chinese SOEs cannot completely be separated from the government. State-owned firms often enjoy privileges showered upon them by the Chinese government. On the other hand, these firms are pressurized into fulfilling the government objectives even if it means sacrificing firm profitability. Political control over firms can be detrimental to firm performance if politicians exert pressure on managers to pursue political and social objectives that are harmful for firms' economic objectives such as, correcting market failures or providing excessive employment (Boycko, et al., 1996). The implicit assumption is that managers and shareholders have an incentive to maximize profit, in the absence of political control. Using survey data to construct indexes of decision-making power of the local party committee Chang & Wong (2004) finds that party control over managers is negatively associated with firm performance. Conversely, political

control over firms can also generate a positive effect on firm performance because they help secure scarce resources and mitigate agency problems in firms with poor corporate governance (Qian, 1996). State owned firms find it easier and cheaper to secure loans. For example, Ge, et al. (2020) argue that differentiation in government support between firms leads to different levels of credit risks and corporate bond issuing cost. The higher the government support, the lower the cost of financing. State-ownership can also mitigate agency problems because politicians have incentives to prevent managers from engaging in behaviour that reduces the amount of resources over which politicians have discretion. Comparing the performance of private firms to SOEs, Chen, et al (2009) conclude that in an emerging market economy, where institutions and law enforcement is weak, market-oriented state-ownership can be superior to private ownerships.

Even when engaging in OFDI, state-owned firms may be affected by affiliation with home country government. State-owned firms by definition are assets of home-country government, which makes them a part of their home-country institutions. Such an affiliation raises the firms' probability of bearing external institutional pressures and alters the nature of firms' response to this pressure. For example, an SOE may have to serve the political goals of the state and align its interests with the home institution rather than challenge them. Cui & Jiang (2012) argue that state ownership makes the SOE dependent on home country government resources which increases home country government's interference and also reflects poorly on the firm's image in the host country institutional environment. Resource dependency and political image compel firms to conform to institutional pressures rather than resist these pressures. Cui & Jiang (2012) also find that the effects of institutional pressures were stronger for SOEs than for non-SOEs. This means that when a SOE is performing OFDI, it's interest may align with home country government rather than seeking only profitability. FDI literature also proposes that political conditions in the host country may have an impact on investment flows. Firms are

attracted to environment that protect their property rights or offer stability. However, depending on the national origin of the firm, managers consider risk factors in host countries in different ways (Tuman & Shirali, 2015). For example, Chinese OFDI is often motivated by economic, institutional and political characteristics of host countries. These include factors such as host country market size, natural resource endowment, asset-seeking, real exchange rate and culture (Buckley, et al., 2007). Due to the prevalence of political control and state-ownership in Chinese firms (especially in the firms that perform infrastructure OFDI), it is likely that these firms may not hesitate to engage in infrastructure OFDI in riskier regions to pursue national interests. For example, Buckley, et al (2007) finds no difference between the quantity of Chinese OFDI to developed and developing countries. In developing countries, Chinese firms rely on strong ties between the Chinese state and the host government to protect their interest. Some studies find Chinese firms are attracted to countries that are politically risky (Ramasamy, et al., 2012; Kolstad & Wigg, 2012). Therefore, it is likely that China's bilateral relations with the host country play an important role in the perceived risk of OFDI by Chinese firms. Conversely, politically connected firms performing OFDI may enjoy strong government protection in securing strategic resources and market access in their home market. They may also benefit from tariff evasion and easier access to export and import licences (Guo, et al., 2020).

Overall, there is inconclusive evidence of the impact of political connection on OFDI performing firms. Firm's productivity may increase because of tax rebates and low costs of capital or it may decrease because of bearing the burden of government policies and political interference.

3.2.3 Chinese firms' infrastructure OFDI

Recently, infrastructure OFDI have begun to play an important part of the Chinese firms quest for growth and profitability. Empirical evidence suggests this strategy is positively impacting

Chinese corporations. Goldstein (2009) compares the investment motivations of the national oil companies (NOCs) of China, India, Malaysia and Britain. They document that due to limited domestic opportunities to increase upstream production and thin or negative margins on downstream production, Chinese NOCs expand overseas to increase production revenues. They find that oil companies in China often make profit enhancing decisions even if it contradicts government desire to devote additional investment to improve yields in mature, less profitable fields at home to increase declining domestic production. China's NOCs engage in OFDI to increase profits from overseas investments and continuously expand for survival (Wu, 2008). Additionally, China's commercial and policy banks have been making major contributions in the renewable energy sector. China's domestic solar and wind industries are among the most competitive in the world. The benefits of investing in renewable energy can be gauged from the fact that China's commercial sector investment in solar and wind energy is exceeding policy banks (Munoz, et al., 2018). This implies that OFDI in the renewable energy sector is economically beneficial and not merely directed by the Chinese government. Munoz, et al (2018) document that investing in overseas renewables could yield dividends for Chinese financial institutions and provide market expansion opportunities for Chinese firms in those sectors. Overall, the literature review for China's infrastructure OFDI suggests that the Chinese firms that engaging in infrastructure OFDI are doing so to survive severe competition and enhance profits. Government incentives are important but seem to play a secondary role when it comes to investment decisions.

In the next section, I review the literature of China's infrastructure investment in three separate regions; Africa, Europe and BRI. Two strands of literature are relevant to China's infrastructure investment in these three regions. One is regarding China's infrastructure OFDI in these regions and Chinese firm profitability. The other is regarding political objectives of Chinese firm's investing in these regions. Reviewing both strands of literature will provide us with the

complete picture why China chooses to invest in infrastructure OFDI in Africa, Europe and BRI and whether that investment is proving beneficial for the Chinese economy.

3.2.4 Africa

China's investment in Africa is attracted by rich natural resources, low-cost logistics, labour and a fast-growing consumer market. Chinese enterprises have dominated the financing and construction of critical infrastructure in Africa since 2017 (Chiyemura, 2021). When conducting infrastructure OFDI, Chinese companies choose familiar geographical locations and engage in projects belonging to industries that they have abundant experience. This enhances these firm's O-specific advantages and can be reflected positively in their performance. Bosshard, et al (2009) analyse Chinese construction of dams in Sudan. They claim that China's dam building capacity has increased, is flexible and Chinese firms can often build dams quicker, and at lower costs than other companies. China's quest for oil also encourages infrastructure OFDI in Africa. Two of China's main SOEs are actively involved in resource exploration and oil production in Africa (Drogendijk & Blomkvist, 2013).

The premise that Chinese infrastructure OFDI in Africa is carried out solely to gain resources without considering revenue implications is negated by (Tan-Mullins, et al. 2017). They use fieldwork data from hydropower projects in Ghana and Nigeria and evaluate the behaviour of Chinese stakeholders engaged in large hydropower projects. They find that profit is the main driver of China's OFDI in hydropower. A decrease in suitable sites for hydropower projects in China is encouraging these companies to engage in OFDI. They link the OFDI to Chinese firms eploring ways to improve their profit margins and increase revenues by investing in the global market and cutting costs. Moreover, Jiang (2009) review China's energy and resource extraction operations in Africa. They claim that with the help of experience and technology, China's NOCs turn African countries that are considered valueless by Western companies, into profitable operations. This is because OFDI by China's NOCs into Africa comes with the

advantage of low-cost local workforce, which enables Chinese energy companies to perform extractive operations at a lower cost than a comparative domestic exploration. Chinese NOCs often outbid their competitors in major contracts awarded by governments of African countries because they seek short term returns and also strategic positioning for the future. Chinese companies avail these unique advantages over western operators and generate profitable returns for most of their operations. Overall, China's plan for investment in Africa is mainly to search for natural resources. However, there is evidence that profit is also an important driver of Chinese infrastructure investment into Africa (Tan-Mullins, et al., 2017). Chinese firms are using their experience and technology to turn African firms into profitable operations (Jiang, 2009).

China's 'going global' policy and its infrastructure OFDI to Africa also has another important agenda i.e. to raise support for Chinese policies in international affairs (Pannell, 2013). This stems from Beijing's concern regarding its image in the international community. One of China's most important national interest is gaining international support for 'one China policy', which has been criticised extensively. Moreover, western media often accuse Beijing of stealing technology and of new imperialism in BRI countries. To counter these accusations, China has begun propagating diplomatic ideas such as "responsible power" and "good neighbour policy" (Liang, 2012). The use of soft power is considered as the best way to demonstrate its good intentions and responsibility. The concept of soft power suggests that countries can often achieve their objects by persuasion rather than force (Nye, 1990). Soft power involves China's assistance in form of concessional loans with low interests granted by Chinese policy banks to Chinese companies for infrastructure projects in Africa (Jakobson, 2009). Chinese companies (especially state-owned) may be pressured by the home country government to invest in the region. This in turn can impact firm profitability.

Similarly, Chinese investment in Africa is centred around seeking natural resources, energy security and new markets for Chinese products (Rodriguez & Bustillo, 2011; Kolstad & Wigg, 2012; Pannell, 2013). These OFDI entail high fixed cost and often involve Chinese SOEs. When an SOE is involved in such projects, it is more likely that it will receive beneficial treatment from home country government, such as easy access to loans or contracts for other projects. Home country government can also favour the SOE by negotiating with the host country government to pursue these projects on favourable terms, such as receiving benefits, rebates, tax evasions etc (Diwan, et al., 2015). Zhao, et al (2020) finds that China's energy OFDI can help enhance its energy security by increasing the volume of energy imports and diversifying source countries. They argue that overseas oil investment can bring new oil suppliers' by gaining more control over oil resources and also by learning the technology which can reduce uncertainty around oil imports. Overall, literature indicates that Chinese firms may have political objectives or resource/market seeking motivations to engage in infrastructure OFDI in Africa. This can alter the impact of China's overseas infrastructure investment on Chinese firms' profitability.

3.2.5. Europe

Literature related to China's infrastructure OFDI in Europe mainly discusses the motivation of investment. Curran, et al. (2017) suggests that China invests in European infrastructure mainly to access the European market and technological assets. For example, China's investment in European oil and gas sector is conducted to learn from European firms' environmentally friendlier energy production and to enhance industrial capabilities of Chinese state-owned energy companies (Liedtke, 2017). This allows Chinese firms to develop R&D in the green energy sector and then transfer the knowledge to their subsidiaries. Such practices also streamline the firms supply chain and provide them with competitive advantage over neighbouring countries firms. This may enhance firms' profitability.

Similarly, Pareja-Alcaraz (2017) document that Chinese corporations have growing pressure to obtain assets that can give firms competitive edge or allow deeper market penetration. This is consistent with the view that Chinese firms that engage in infrastructure OFDI in Europe are doing so in the hope of maintaining their competitive edge. However, the Chinese energy companies that engage in OFDI in Europe are driven by different, sometimes contradictory interests. For example, SOEs have domestic considerations and are not constrained by short-term returns whereas private companies are more sensitive to conditions in the host country and are attracted to large developed economies that can offer strategic assets in the short and medium run. Bitsch, et al (2010) document that European infrastructure investments are found to have consistently higher returns than their non-European counterparts, this is because Europe has the largest privatization of the infrastructure sector.

Another strand of literature related to China's infrastructure OFDI in Europe highlight the problems faced by Chinese firms due to their political closeness. For example, Rabe & Gippner (2017) analyse Chinese construction of a nuclear power plant in the UK. A shift in the UK government halted plans for production because the new government was concerned about China's motive of investment. The decision to halt the project was due to concerns about ownership and security. This is because the European countries consider investment from China as a threat that stems from the fear that Europe will lose its technological advantage to China. From China's side, Chinese firms' political involvement and connections can be beneficial for the firms investing in Europe. For example, China's investment Greece's Piraeus port was a politically motivated decision. China invested in Piraeus port to gain access to European market (Karlis & Polemis 2018). Putten, (2016) analyse whether Chinese state-owned COSCO and other Chinese firms have benefitted from investment in Greece Piraeus port. Due to Chinese firm managing the port, handling costs per container have lower with high container throughput. This is because other partner ships of COSCO also call at Piraeus. The

high container throughput has risen the productivity from 10-12 containers per hour to 44 container per hour since the Chinese company became involved. Many other large companies are deciding to use Piraeus as a distribution hub for ships coming to Europe from Asia via Suez Canal because it is closer than other ports in the EU. This not only saves costs for Chinese companies but also increases China's revenues for handling the port (Soyres, et al., 2019).

Overall, China's infrastructure OFDI in Europe dominates in the energy sector and is mainly motivated by strategic asset seeking. Chinese firms are pushed into the European market owing to intense domestic competition, profit seeking motivation and government incentive.

3.2.6. BRI

The belt and road initiative proposed by China in 2013 seeks to deepen connectivity and cooperation by improving infrastructure. Relevant literature highlights motivation of investment and potential cost saving benefits that can incur due to the BRI. BRI investments are expected to significantly reduce trade costs between China and participating countries (Soyres, et al., 2019). Andrews-Speed, et al (2016) analyse China's energy and mineral resources engagement in Southeast Asia. They highlight that the goal of investor company and government in energy and mining sectors do not align. The aim of the company is to seek profits whereas government seek to enhance security of supply. They claim that Chinese companies investing in European infrastructure intend to become international corporations to secure long-term profitability. Chinese oil producing companies also engage in OFDI to try and avoid losses owing to regulated domestic prices in China as a result of increase in international oil prices. Moreover, Hubbard (2016) suggests that the motivation for China to conduct infrastructure OFDI in BRI is to gain higher returns. Additionally, the growing demand for construction materials would lead to China's economic growth. This implies that China's investment in BRI is not only aimed at seeking profitability but also energy security and a stable economic growth for the country. L

Literature for BRI also points towards cost savings benefits that can occur due to infrastructure investment in the region. Schinas & Westarp (2017) assess the impact of the new silk road compared with the existing maritime routes. As an example of the existing route, the "Ocean Alliance: Asia-North Europe service" is used and the costs are calculated. Comparison between the BRI route and the current service reveals several findings; the new version will have fewer ports and hence port costs will be lower, the distance also reduces in the new setting and hence this will result in lower number of vessels, lower bunker costs and time charter costs. The author concludes that these lower costs will result in lower fixed cost which will allow a greater margin for Chinese shipping corporations. Breaking even in the new scenario would be easy for Chinese firms. Baniya, et al. (2020) investigate the trade impact of reducing transportation times. Their results confirm a negative relationship between trading times and exports. Next, they look into the impact of BRI on trading times and find that the new land and maritime connections among BRI economies may reduce trade times by 2.8 percent on average, assuming there is a preference for maritime transport. Total trade within BRI countries increases by 4.1%, assuming that trade in all products can switch transportation modes relatively easily to take advantage of improved transport links. Even the lower bound estimate is 2.5%, assuming that products cannot switch transportation modes. They also find that if improvement in BRI infrastructure is complimented with reduction in border delays, the improvement along economic corridors will increase trade by more than 10 percent for some regions in the BRI (Baniya, et al., 2020). Similarly, Soyres, et al. (2020) also find that the impact of transport infrastructure network related to BRI reduces trade cost. Overall, these studies reveal that investing in infrastructure for the BRI region can be beneficial for Chinese companies as it may lead to cost reductions and consequently increase profitability.

Another strand of BRI literature analyse China's infrastructure OFDI from political point of view. These studies suggest that one of the motives of announcing the BRI in 2013 was to

export China's overcapacity in some sectors such as steel and construction. For example, Bluhm, et al (2020) argue that Chinese government considers steel a strategic commodity and maintains excess production capacity. This policy results in the government dumping the excess capacity of steel, cement etc. to developing countries in the form of aid or infrastructure projects. Moreover, by using the BRI investment Chinese government is not only transferring excess capacity to developing countries, but is also transforming its traditional industry to high tech manufacturing firms. Using data for 140 countries and 57 industries, Yang, et al (2020) find that China's industrial transformation will benefit from infrastructure investment in the BRI. As a result of BRI investment, labour and capital will move from traditional industries (such as food processing, clothing and textiles) to high tech manufacturing industries (such as metal products, transportation equipment, machinery and equipment) This is because Chinese investment in the BRI is mainly in the infrastructure/construction sector and often, Chinese companies import their own labour to construction sites to complete these projects. This ensures that Chinese labour gain the necessary experience and skills to conduct such projects in future. Industries at home also upgrade to meet the demand for heavy and high-tech construction equipment in the BRI. Therefore, BRI can prove beneficial to China by shifting focus from traditional industries to high tech manufacturing industries. Demiryol (2019) argue that China's main limitation is its dependence of economic performance on global value chains. In order to reduce vulnerabilities stemming from over dependence on supply chains, Chinese government have adopted the BRI to establish direct access to supplies. Moreover, some scholars also suggest that BRI is a diplomacy step taken by the Chinese government and is used as a tool for enhancing China's soft power in the world. Often by granting concessional loans to the developing world for improving infrastructure network, Chinese government aim to promote China's global image (Voon & Xu , 2020). Free Trade agreements announced by China in 2013 is another example. Since the announcement, majority of BRI partners are in the

process of negotiating with China. Many countries are renegotiating for revised and more comprehensive deals (Demiryol, 2019). This improves Beijing's political image amongst the BRI participating countries. In such a scenario, the state-owned firm investing in these projects may be pressured to initiate a project even if the firm deems it risky, or unprofitable. Griffiths (2017) pinpoints the motivation of China to invest in infrastructure along the BRI is to create new markets. He suggests that, a decrease in the European and US economic demand (after the financial crisis of 2007) and the subsequent decline in China's internal growth has led to the Chinese leadership focus on enhancing its growth by creating new markets and BRI. Chinese firms that are politically connected may be pressured into conducting infrastructure investment in BRI. This can benefit the firm as these firms have Chinese government's backing when dealing with host country governments. This can help Chinese firms gain tax rebates, special concessions or contracts for other projects. Additionally, the Chinese firm can also benefit from low-cost capital from home country government. In sum, the BRI literature suggests that Chinese infrastructure OFDI in BRI can prove to be beneficial for the Chinese firm, as it reduces costs (Schinas & Westarp, 2017). Moreover, China is also investing in the BRI to address the country's political objectives such as dealing with excess capacity and enhancing China's soft image.

Overall, literature relevant to this chapter belongs to two groups. The first suggests that Chinese firms perform infrastructure OFDI to maximize profitability. The other strand of literature suggests that Chinese firms perform OFDI to fulfil political objects. These objectives range from China's energy security to enhancing soft power to exporting domestic excess capacity. In Africa, Chinese firms perform infrastructure investment to ensure energy security. However, one of the main political objectives is to gain support for its 'one China policy'. In Europe, Chinese firms seek to enhance profitability by investing in European infrastructure. The political objective is to access latest technology. The economic motive of Chinese firms

investing in BRI is to reduce trade costs across the BRI countries. However, the political motive is to increase China's soft power and dump domestic excess capacity on developing countries. Majority of the above reviewed studies analyse the impact of Chinese infrastructure investment on a macro level (Schinas & Westarp, 2017; Soyres, et al., 2020). Some study implications on Chinese firms but limit the analysis to one sector e.g. Bosshard, et al (2009) examine China's overseas investment of hydropower dams, Putten, (2016) analyse China's investment in Greece's Piraeus port. Others limit analysis to one region e.g. Africa (Tan-Mullins, et al., 2017) or BRI (Baniya, et al., 2020; Schinas & Westarp, 2017). In this chapter, I analyse the effects of infrastructure OFDI on Chinese firm profitability. This analysis differs from the discussed literature because (1) it is a firm level analysis and (2) it examines China infrastructure investment across different regions; Africa, Europe and BRI.

3.3. Empirical Design

Traditionally, OLS regression is often used to measure the impact of OFDI on firm profitability. However, using OLS regression ignores an important issue of self-selection. The issue that larger and more productive firms are more likely to undertake foreign investment. (Castellani and Barba Navaretti, 2004;Temouri, et al., 2009). This scenario creates concern of potential selection bias and in such a case, OLS will yield biased and inconsistent estimates. Bias can be present in case firms engaging in infrastructure OFDI have better productivity (or sales) than firms that did not, only because firms performing infrastructure OFDI are inherently larger and more interested in innovation or technological upgrades. Therefore, to correct sample selection bias, I apply a popular method introduced by Heckman (1976, 1979) in this analysis,

Heckman's (1979) model adopts two stages; the first stage of the procedure evaluates the probability that firms engages in overseas infrastructure OFDI, using a probit specification. It

is essentially a selection model where firms decide whether or not to engage in infrastructure OFDI. This estimation is then used to calculate the inverse Mill's ratio (IMR). The second stage is the quantity model in which the variable IMR is inserted and check its significance level. A significant coefficient of IMR suggests that there is indeed a sample selection bias problem in the model. However, Heckman technique has limitations when applying it to the panel data settings. Wooldridge (1995) introduces a more appropriate method for testing and correcting sample bias in panel data models. Here, I also apply Wooldridge's (1995) extension of Heckman's method used frequently in the literature e.g. (Dustmann, et al., 2007). The model starts by estimating the selection equation by standard panel data probit from which it obtains the inverse mills ratio (*IMR*) for MNE firms.

$$Prob(ofdi_{it} > 0)\begin{cases}1+\alpha_1 STATE + \alpha_2 ROA + \alpha_3 AGE + \alpha_4 SIZE + \alpha_5(yr2013 - yr2019) \\ 0\ otherwise\end{cases} \quad (1)$$

$ofdi_{it}$ is a dual variable where $ofdi$ =1 represent firms that performed infrastructure OFDI. The variable *STATE* is the ratio of state shares to total share capital and represents state-ownership in Chinese firms. *ROA* is the return on total assets. *AGE* is the natural logarithm of the number of years the firm has been in operation, whilst *SIZE* is the natural log of total assets. yr2013-yr2019 is a time dummy variable to incorporate the impact of BRI. A firm's state ownership is important because China's SOE's are actively involved in infrastructure OFDI (Wu, 2008). In other words, the ownership status of the firm can determine whether a firm gets involved in infrastructure OFDI or not. Moreover, the variables *ROA, AGE* and *SIZE* of the firm are also included. This is because that a firm's profitability, experience and size are all important in deciding whether the firm will engage in infrastructure OFDI. I also include time dummy variables from year 2013 to 2019. These are included to incorporate the impact of BRI. After the announcement of China's BRI project in the year 2013, Chinese infrastructure OFDI accelerated and this may have an impact on firm's decision to engage in infrastructure OFDI.

In the second step, I estimate the generalized linear equation and include the inverse Mills ratio (IMR_{it}) obtained from the first step, to correct for possible selection bias.

$$ROA_{it} = \beta_0 + \beta_1 ROA_{it-1} + \beta_2 OFDI_{it-1} + \beta_3 DEBT_{it-1} + \beta_4 WC_{it-1} + \beta_5 CASHFLOW_{t-1} + \beta_6 SALESGR_{it-1} + \beta_7 AGE_{it-1} + \beta_8 SIZE_{it-1} + \beta_9 STATE_{it-1} + \beta_{10}\mathrm{IMR}_{it-1} + \beta_{11} T + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{it} \quad (2)$$

In equation (2), the dependent variable is *ROA (*return on assets*)*. *OFDI* is the ratio of Chinese outward foreign direct investment to total assets. *DEBT* is the ratio firms' total borrowings scaled by total assets. *WC* represents non-cash working capital to total assets. *CASHFLOW* of the company is the flow of cash, scaled to total assets. *SALESGR* represents the sales growth rate of the firm. *AGE* is the natural log of years of establishment of firm. *SIZE* is the natural log of total assets while *STATE* is the ratio of state shares to total share capital. The variable *IMR* is the inverse mills ratio obtained from equation 1.

The second stage of the model further investigates the influence of the amount of China's infrastructure OFDI on firms' profitability (ROA). Profitability is a measure of performance as it is imperative for sustained growth of a firm and this growth can be considered in terms of return on assets (Fitzsimmons, et al., 2005). Corporate finance literature commonly use return on assets as a measure of profitability (Maury, 2006). It is relevant to the analysis as infrastructure projects have characteristics such as large size, long production period and high risk owing to greater fixed costs and *ROA* measures the efficiency with which assets are managed to create profits. Other indicators such as sales growth or return on equity cannot capture the overall perspective of corporate profitability (Yoo & Kim, 2015). All other variables and ratios are calculated based on the formulas used by GTA Research Service Centre, CSMAR China. Details of variables and calculations are described in the appendix 2. The subscripts identifies individual firms and represents the current year.

In the above equations I control for the effect of borrowing on investment including; leverage, (DEBT) which is the ratio of total debt to total assets. The immediate effect of an increase in

leverage of a firm is to increase its cost of capital, which comprises of two elements; the interest payment and cost of bankruptcy. By including this ratio as a control variable; I aim to control the effect of leverage on profitability of a firm. Moreover, this ratio is important as infrastructure industry is a capital-intensive industry that is expected to have substantial leverage. By including this ratio, I can control the effect of borrowing of investment on profitability (Lin & Bo , 2011).

$SALESGR$ stands for the annual sales growth rate. Historically, sales growth has had a significantly positive effect on firm profitability because firms with high rate of sales growth are likely to be more profitable than firms with a lower rate of sales growth. The variable *CASHFLOW* is calculated as net profit plus depreciation scaled to total assets. I also control for the substitution effect of working capital investment by including changes in the non-cash working capital scaled by total assets of the firm (*WC*). The variable (*SIZE*) stands for the firm size measured by the natural logarithm of the firm's total assets. It is expected that larger firms will have more resources to invest and will be able to generate superior returns. Especially because overseas investment is often undertaken by large firms since they are more likely to bear risks associated with foreign operations. Caves (1982) argue that a firm's incentive to invest in the domestic market decreases as it grows in size because increasing domestic market share will be less profitable as compared to expanding abroad. Finally, the variable (*AGE)* is the natural logarithm of firm age in years. This variable is included to control the effect of firm's experience. All these variables are described in appendix 2.

Another issue that is prevalent in studying the impact of OFDI on *ROA* is the endogeneity issue. Endogeneity occurs when the relationship between dependent (*ROA*) and independent variables (*OFDI*) may not be independent of each other. Therefore, to control endogeneity effect, I have used the system-GMM estimator developed by Arellano & Bover (1995) and Blundell & Bond (1998) which yields consistent and efficient estimates. The estimators solve

the endogeneity problem by using a series of internal instrumental variables based on lagged values of dependent and independent variables.

$$ROA_{it} = \beta_1 ROA_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 DEBT_{i,t-1} + \beta_4 WC_{i,t-1} + \beta_5 CASHFLOW_{i,t-1} + \beta_6 SALESGR_{i,t-1} + \beta_7 AGE_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 STATE_{i,t-1} + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{i,t} \quad (3)$$

Explanation of all variables are same as equation 2 and description is also available in Appendix 2.

3.4. Data and descriptive statistics

Our main panel dataset covers 14 years from 2005-2019 during which China experienced a noticeable growth in infrastructure OFDI. For this chapter, two main data sources are used. The first is China Global Investment Tracker (CGIT) by American Institute & the Heritage Foundation, from which data for China's infrastructure OFDI is obtained. The data identifies individual transactions of China's global construction contracts. An advantage of this data set is that each construction transaction can be tracked to the host country of investment which is useful to compare China's infrastructure investment to three regions; Africa, Europe and BRI. The CGIT data is then merged with firm data obtained from CSMAR (China's Listed Firm Financial Statement and Financial Ratio database). CSMAR provides quarterly firm financial data where as CGIT data is monthly data. In order to merge these datasets, I had to convert the CGIT data into quarterly data.

The main dataset contains 200 non-financial Chinese listed firms which includes 8848 observations in the final dataset. These are listed firms chosen from CGIT dataset that performed OFDI. This is used for the first stage of Heckman two step method to calculate the probability of investment. Out of the 200 Chinese listed firms, 74 firms are identified from *CGIT* database as firms that conducted overseas construction contracts involving construction of port terminals, dams, public housing etc (Scissors, 2020). During the sample period, 1324

overseas construction projects were carried out by Chinese listed firms. After deleting missing values and outliers, the data comprises of 3329 observations for only infrastructure OFDI panel data. This dataset is used for the second stage of Heckman two step method and also for the robustness analysis i.e. GMM estimation. I have split the regions according to the World Bank Group country classifications and the BRI projects are identified in the original data.

Table 3.1 represents summary statistics for the whole sample of firms that conducted infrastructure OFDI and then split into three regions separately for the period 2005-2019. I find that firms that that have performed infrastructure OFDI in Europe has the greatest (*ROA)* as can be observed from the mean value of 0.53 compared to 0.20 for BRI and 0.03 for Africa. Moreover, the mean of variable sales growth *(SALESGR)* for Chinese firms investing in Europe is greater than firms investing in BRI or Africa. This suggests that Chinese firms investing in Europe are taking advantage of the large European market. The mean of variable *AGE* suggests that younger firms invest in Europe whereas the oldest invest in the BRI. This is consistent with the literature on firm behaviour which suggests that that older firms choose high-equity entry modes that require firms to commit more resources (Hannan & Freeman, 1984). Another perspective suggests that younger firms have more learning advantages compared to older firms (Barron, et al., 1994). Chinese firms investing in Europe are doing so to seek strategic assets and therefore, it is imperative that these firms can easily integrate new technology and strategic assets. This is why young firms may be investing in European infrastructure. Table 3.2 shows the correlation matrix for the variables. The correlation coefficients for all variables are overall modest.

Insert Table 3.1 & 3.2

3.5. Empirical Results

3.5.1. The whole sample

Using a sample of only the firms that have performed infrastructure OFDI can lead to sample selection bias. The firms that perform infrastructure OFDI may be different than firms that do not perform infrastructure OFDI. This is because Chinese firms that perform infrastructure OFDI are likely to be large in size to be able to initiate huge infrastructure projects. They are also likely to be politically connected and pressured into fulfilling government's agenda of infrastructure investment in BRI. Due to their political connection, the firms may be able to acquire more benefits from the government than a firm performing regular OFDI. For example, Yu, et al. (2019) finds that there is a high correlation between overcapacity and the number of OFDI deals in the BRI, which supports the speculation that BRI is launched to ease China's domestic over-capacity. This means that the firms that perform infrastructure OFDI in the BRI are likely to be large Chinese construction organizations, working at overcapacity and may be politically connected to secure infrastructure OFDI projects to relieve their overcapacity. To address the sample selection issue, I apply a commonly used method introduced by Heckman (1976, 1979). Table 3.3 presents the first stage results of the Heckman two step model. The first stage is a probit model which estimates the selection equation.

The result of the whole sample in column (1) of table 3.3 shows that other things being equal, the greater the size of the firm, the greater the tendency of the firm to invest in infrastructure OFDI. Size is an important determinant of OFDI decision. This is because infrastructure OFDI experience sunk costs at an initial stage and large firms are considered to have better access to credit than small firms (Horst, 1972). Therefore, larger firms are more likely to carry out infrastructure OFDI. The results also show that the older the firm, the less likely it's tendency to invest in infrastructure OFDI. In other words, younger firms are investing in infrastructure

OFDI. The estimated coefficient for the variable *STATE* is insignificant. This means that there is no evidence that firms with high state ownership are more likely to invest in infrastructure OFDI. Column (2, 3 & 4) of Table 3.3 shows the first stage estimates of the probit model for Africa, Europe & BRI respectively. Similar to the whole sample, I observe that large sized firms are more likely to perform infrastructure OFDI.

Insert Table 3.3

Table 3.4 shows the second stage estimations of the Heckman two step model, for the whole sample. In the second stage, I include the variable inverse mills ratio (IMR) obtained from the probit equation. The second stage estimation for the whole sample has a negative and significant coefficient of the variable IMR for (column 1, 2 & 4). However, it is insignificant for column 3. This implies that overall, Chinese firms, especially in Africa and BRI do self-select into Infrastructure OFDI and non-infrastructure OFDI groups according to their underlying comparative advantage. This means that without correcting this selection bias, OLS coefficients will tend to be overestimated.

Insert Table 3.4

Column (1) of Table 3.4 shows the Heckman second step estimation results for the whole sample. I find that the estimated coefficient for the main independent variable is positive and significant. It indicates Chinese infrastructure OFDI is positive and significant representing that 1 standard deviation increase in infrastructure OFDI leads to 0.022[2] units increase in return on assets. In simple words, these results suggest that Chinese firms that perform infrastructure

[2]Unit increase in return on assets due to 1 standard deviation increase in OFDI is calculated by (0.004x (0.33/0.06) = 0.022, where the unstandardized estimated coefficient for OFDI is 0.004, 0.33 is the standard deviation of OFDI and 0.06 is the standard deviation of ROA.

OFDI increase profitability due to their investment. These results contradict the widespread view that Chinese firms perform infrastructure OFDI even if it is detrimental to firm profitability. Often Chinese firms are pushed into performing infrastructure OFDI because of limited domestic opportunities and excess production capacity (Goldstein (2009). However, this does not mean that Chinese firms are not driven by profits. Our findings are consistent with Wu (2008) who suggest that Chinese NOCs OFDI is driven by higher profits from overseas investments as compared to domestic investment. The mixture of push factors; such as domestic competition and over capacity, coupled with pull factors; such as seeking higher profitability, makes these investments advantageous for Chinese firms. Moreover, Chinese firms' political closeness can also prove to be an advantage, especially when investing overseas. Chinese firms that are politically controlled find it easier and cheaper to secure loans (Ge, et al., 2020). This makes these firms more competitive in the foreign market. These firms are also often opaquer than their foreign counterparts (Li, et al., 2018). This allows them to be flexible to changes and not be governed by strict rules and regulations, which makes Chinese infrastructure investment attractive.

The estimated coefficient for *CASHFLOW* is positive and significant in all estimations in Table 3.4, suggesting that firms that generate greater cash flow tend to be more profitable. Greater cashflow provides a firm with more investment flexibility. Results for other variables show that sales growth (*SALESGR)* is positively associated with firm profitability. However, the small estimated coefficient either represents a negligible impact or is indicative of scaling issue. The estimated coefficient of the variable representing state ownership (*STATE*) is positive and significant with *ROA.* This means that state owned firms that are investing in infrastructure OFDI are more profitable than non-state-owned firms. In China, state plays a key role in influencing firm behaviour including OFDI (Becker-Ritterspach, et al., 2019). SOE's

performance may be affected positively, when government intervention leads to easy and low-cost access to capital.

3.5.2. Africa, Europe and BRI

Column (2), (3) and (4) of Table 3.4 shows the estimated coefficients of the second stage of Heckman two step analysis for Africa, Europe and BRI regions respectively. I find that the estimated coefficient for OFDI all three column is positive and significant. This indicates that infrastructure OFDI in all three regions has a positive impact on Chinese firms' profitability. In column (2) Experience of investment in Africa has enabled Chinese firms to become more productive and efficient. For example, China's dam building capacity, flexibility and efficiency has increased as compared to competitors (Bosshard, et al. 2009). Our results are consistent with the hypothesis that Chinese firms are not pressured into performing infrastructure OFDI in Africa at the cost of firm profitability. Rather, the results imply that even if Chinese firms perform infrastructure OFDI in Africa for political purposes, the investment is chosen to ensure firm profitability as well. Other variables in column (2) are; debt, which has a positive and significant relationship with firm profitability. This is consistent with Molnar & Lu, (2019) who suggest Chinese firms' political connections allow profit making SOEs borrow more and aggressively. Sales growth and Cashflow, both have a positive and significant relationship to return on assets which is expected.

Column (3) shows the results of China's infrastructure investment in the European region. I find that infrastructure OFDI has a positive and significant relationship with return on assets for this region. This is in line with Bitsch, et al (2010) who document that European infrastructure investments are found to have consistently higher returns than their non-European counterparts. Chinese firms invest in Europe's infrastructure to gain access to the European market or to gain access to strategic assets (Curran, et al., 2017). In both cases, firms benefit from investing in Europe. Especially, Chinese firms have taken advantage of investing

in Europe's energy sector by enhancing their energy-industrial capabilities (Liedtke, 2017). Chinese firms learn to streamline production processes and transfer knowledge gains to other subsidiaries, making their operations profitable.

Finally, Column (4) presents China's infrastructure OFDI in BRI. The estimated coefficient for the main independent variable is again positive and significant. Literature related to BRI discusses transport cost savings as a result of the initiative (Baniya, et al., 2020; Schinas & Westarp, 2017). They imply that Chinese firms can reduce costs by decreasing transportation distance and time. Another strand of literature related to the BRI suggests that Chinese infrastructure OFDI into the BRI is to dump excess capacity of steel, cement and other construction inputs. BRI enlarges the market size and is profitable for the firm (Chang et al, 2021). Yang, et al (2020) finds that China's infrastructure OFDI in the BRI leads to China's labour and capital moving from traditional industries to high tech manufacturing industries. This type of innovation may lead to higher Chinese firms' profitability.

Overall, I find that China's infrastructure OFDI in all three regions, is improving firm profitability. Comparison of the results reveal that Chinese companies have different motives for each region. They alter their expectations and strategy according to the host country's geographical and cultural location, technological capital, existing resources and infrastructure. China's infrastructure OFDI in Africa is motivated by ensuring energy security. Chinese firms invest in Africa's natural resource industry such as oil and minerals and streamline their production methods by practicing and learning. These firms often bring their own employees, equipment and materials which helps reduce its excess capacity. Infrastructure investment in Europe is characterised by gaining technology and ensuring knowledge flows from the European firms. The improvement in technology and R&D may result in Chinese firms gaining competitive advantage and increase profitability. Finally, Chinese firms investing in BRI infrastructure gain profitability by dumping their excess capacity on the developing countries.

They do this by filling the infrastructure gap in these countries and also provide a market to their over produced goods and excess labour. Moreover, Chinese infrastructure investment in the BRI is also encouraging Chinese firms to make a shift from traditional industries to a high-tech manufacturing industry. These steps ensure that Chinese firms that perform infrastructure OFDI are R&D intensive, have streamlined production processes and are cost efficient to compete with foreign companies. This, coupled with Chinese government support for firms performing infrastructure OFDI, such as tax benefits, low cost capital etc. ensure firm profitability.

3.5.3. High and low State-ownership

Chinese governments intervention in State Owned Enterprises (SOE) has been a popular subject amongst researchers. SOE's performance may be positively affected, when government intervention leads to easy access of loans or it can also be negatively impacted by enduring greater levels of interference to act in line with state objectives. For example, Ramasamy, et al. (2012) reports that Chinese SOEs invest in countries with higher risks as compared to private firms. This finding is consistent with the premise that state firms can be pressurised into making decisions that does not benefit the firm, but are in the interest of the state. Over the years, Chinese government have implemented several reforms to gradually reduce the influence of state in SOE's and have been successful in improving state-owned firms' performance and profitability. However, even after the reforms, state plays a significant role in SOEs operations. For example, Du, et al (2014) finds that even for Chinese private listed firms, entry into high-barrier industry is easier for firms with politically connected independent directors. This suggests that the SOEs that were privatized or their had their shares diluted, still remain under the influence of state even after reducing state ownership. However, it can also be argued that these privately listed, state connected firms do not face the similar pressure as a highly state-owned enterprise, to act in line with state objectives. Therefore, Chinese listed

firms with low state-ownership's profitability may be differently impacted by infrastructure OFDI than highly state-owned firms' profitability.

Insert Table 3.5

Majority of the firms performing infrastructure OFDI, especially in developing countries in the BRI are state-owned (Scissors, 2021). Therefore, majority of the firms in this sample are also state owned. To split the sample into highly state-owned and low state-owned firms, I divided the data by taking the median of the state ownership ratio (CSMAR) of the all the Chinese listed firms in the sample. The firm with values below or equal to the median value are considered low state-owned firms and firms with state ratio above the median value are considered high state-ownership firms. The results are displayed in Table 3.5.

Column (1) shows the results for high state-ownership firms. I find that the estimated coefficient for the impact of infrastructure OFDI on profitability is insignificant. This suggests that high State-ownership firms do not always engage in profitable infrastructure projects. This echoes the premise that firms that are highly influenced by government intervention, invest in infrastructure projects that are carried out for purposes other than profit seeking. For example, China's NOCs entry in Africa to seek natural resources or the fact that state-owned firms are frequently asked to absorb the costs for connecting remote areas with roads, bridges or electricity, or not laying off a redundant workforce (Yi-Chong, 2014). Moving on to the control variables, sales growth (*SALES*) is positive and significant to firm profitability as expected. Variable *(CASHFLOW)* denoting Cash flow is positive to the profitability of the company highlights that the firms in the subsample have sufficient liquidity to run operations smoothly.

Column (2) shows the results for low state-owned firm. The estimated coefficient for low state-owned firms is positive and significant. This result is consistent with the hypothesis that low state-owned firms have more flexibility to choose infrastructure projects (Sun, et al., 2002),

and therefore can choose profitable projects. Moreover, as discussed above, these firms may be able to take advantage of the benefits of political connections without the additional pressure of carrying out national agenda. The SOE reforms in 2012 were based on classification. SOEs were classified into commercial and public service SOEs. Commercial SOEs were further divided into competitive and strategic sectors (related to key industries). Chinese government allows commercial SOEs to compete freely with private sector (Lin, et al., 2020). The operations of this type of SOEs are closer to private firms and therefore focus more on profitability than highly state-owned SOEs. The variable *(SALES) & (CASHFLOW)* are positive and significant which indicates that sales growth and Cashflow has a positive relationship with profitability for these firms. The positive and significant estimated coefficient of the variable *(AGE)* means that firm profitability increases with experience for the subsample firms.

To summarize, I find that the degree of state-ownership of firm can affect the impact of infrastructure OFDI on firm profitability. Infrastructure OFDI conducted by firms that have high state-ownership tend to have an insignificant impact on their profitability. This is consistent with the premise that high state-owned firms have to bear the burden of carrying out state objectives even it is not in interest of the firm. However, infrastructure OFDI conducted by firms that have low state-ownership tend to have a positive and significant impact on firm profitability. This is because these firms have less state interference and often enjoy the liberty of competing in foreign markets freely. This allows them to choose low-risk and high rewarding projects.

3.5.4 Robustness Analysis

Finally, to analyse whether the above findings are robust I also employ system Generalized Method of Moments (GMM) estimation method (Roodman, 2006). GMM helps to minimize endogeneity problem commonly present in FDI studies and also accounts for the issue of

autocorrelation which may arise due to the inclusion of lagged dependent variable. For all the models, the performance of the Arellano-Bond test statistics shows that ar1 is significant and that ar2 is not significant at the 5 percent level, implying that no serial and auto-correlation exist in error terms. Moreover, the Sargan test is carried out for testing over-identifying restrictions in the statistical model. In table 3.6, the p-values for Sargan test implies we cannot reject the null hypothesis that the overidentifying restrictions are valid. In other words, our instruments are valid and model is not mis-specified.

Insert Table 3.6

Column (1) of table 3.6 shows the result for the whole sample. I find that the results for the main independent variable is in line with the Heckman two step estimation i.e. China's infrastructure OFDI has a positive impact on firm profitability. This is applicable to the whole sample and the result split into different regions. Results for other variables show; (1) The variable *DEBT* is positive and significant for the whole sample which suggests that overall firm is using their debt in an optimal manner. (2) The working capital ratio (*WC)* is positive and significant for column (1) & (2) indicating that overall, Chinese firms' short-term liquidity, assets and health has a positive effect on its profitability which is generally the norm. However, this ratio is negative for firms conducting infrastructure OFDI in Europe and BRI. This suggests unproductive use of current assets. (3) In line with Heckman two step estimation, the variables *CASHFLOW & SALESGR* are positive and significant.

3.6. Conclusion

This chapter analyse the importance of China's infrastructure OFDI for Chinese firms. Chinese firms' political connections raise doubts about their motivation of investment. This chapter aims to address the question whether Chinese firms invest in overseas infrastructure to increase profitability or do they have some other political motive? The answer to this issue is important

for Chinese investor and the host country government. It provides the Chinese investors with a clear view of whether the overseas infrastructure investment is sustainable in the long run and if it is feasible to make similar investments in the future. It also provides the host country governments a better understanding of the purpose of Chinese infrastructure investment. If China's infrastructure investment does not generate profits, this implies that Chinese investment may be politically motivated and the host country government should be cautious of the reasons of Chinese infrastructure investment. This research will help host country government develop policies to ensure China's infrastructure investment brings mutual benefits and does not challenge national security.

In this chapter, I empirically examine the impact of Chinese overseas infrastructure investment on Chinese firms based on 74 Chinese listed companies during the period of 2005-2019. Using the Heckman two step estimation procedure, I find that (1) the impact of Chinese firms' infrastructure investment on firm profitability is overall positive for the whole sample. This impact is consistent across different regions, namely, Africa, Europe and BRI region. (2) I also discover that infrastructure investment by firms with high state-ownership has an insignificant impact on firm profitability, whereas infrastructure investment by firms with low state ownership has a positive impact on the firms' profitability. These results indicate that Chinese firms are performing well in filling infrastructure gaps in different geographical locations. However, host country government should be cautious if the source of investment is high state-owned firms. The results confirm that high state-owned firms engage in infrastructure OFDI for motivations other than profitability.

Table 3.1: Summary Statistics

	All			Africa			Europe			BRI			t-statistics		
Variable	N	μ	σ	N	μ	σ	N	μ	σ	N	μ	σ	*μ(Africa)-μ(Europe)*	*μ(Europe)-μ(BRI)*	*μ(Africa)-μ(BRI)*
ROA	3746	0.03	0.06	2282	0.03	0.04	1087	0.53	13.81	3308	0.20	7.92	-1.73	0.97	-1.02
OFDI	4674	0.03	0.33	2583	0.02	0.16	1206	0.02	0.25	3924	0.02	0.20	0.00	0.00	0.00
DEBT	3597	0.23	0.19	2198	0.20	0.13	1028	0.25	0.27	3181	0.23	0.19	-7.10	2.62	-6.43
WC	3748	-0.08	0.40	2282	-0.05	0.18	1082	-0.16	0.70	3300	-0.09	0.43	7.03	-3.91	4.20
CASHFLOW	3748	0.16	7.44	2282	0.01	0.04	1080	0.01	0.08	3298	0.01	0.05	0.00	0.00	0.00
SALESGR	3746	295.40	2976.13	2263	89.29	420.08	1078	243.12	1645.74	3275	89.50	434.33	-4.17	4.85	-0.01
AGE	3752	3.08	0.26	2282	3.05	0.28	1083	3.00	0.30	3304	3.09	0.26	4.73	-9.50	-5.48
SIZE	3748	23.71	2.10	2282	23.87	2.28	1082	24.16	2.30	3300	23.85	2.12	-3.44	4.09	0.36
STATE	3611	0.02	0.04	2201	0.02	0.03	1050	0.02	0.03	3189	0.02	0.04	0.00	0.00	0.00

Notes: Explanation of variables: N is the number of observations, μ is mean and σ is the standard deviation. ROA is the return on total assets, OFDI is the ratio of Chinese outward foreign direct investment to total assets, DEBT is the ratio of long-term debt plus short-term borrowings to total assets of the firm, WC is the non-cash working capital, CASHFLOW is the ratio of net profit plus depreciation to total assets, SALESGR is the sales growth rate, AGE is the natural log of the age of company in years, SIZE is the natural log of total assets and STATE is the ratio of state shares to total share capital.

Table 3.2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ROA	1.000								
(2) OFDI	-0.060***	1.000							
(3) DEBT	-0.173***	0.012	1.000						
(4) WC	0.135***	-0.057***	-0.688***	1.000					
(5) CASHFLOW	0.911***	-0.003	-0.027*	0.060***	1.000				
(6) SALESGR	-0.005	-0.006	-0.004	-0.016	-0.002	1.000			
(7) AGE	-0.044***	-0.011	0.133***	-0.101***	0.015	-0.013	1.000		
(8) SIZE	0.002	-0.155***	-0.097***	0.128***	-0.081***	0.068***	-0.320***	1.000	
(9) STATE	0.107***	-0.008	-0.056***	0.007	-0.009	-0.037**	0.032*	-0.174***	1.000

*Notes: Explanation of variables: ROA is the return on total assets, OFDI is the ratio of Chinese outward foreign direct investment to total assets, DEBT is the ratio of long-term debt plus short-term borrowings to total assets of the firm, WC is the non-cash working capital, CASHFLOW is the ratio of net profit plus depreciation to total assets, SALESGR is the sales growth rate, AGE is the natural log of the age of company in years, SIZE is the natural log of total assets and STATE is the ratio of state shares to total share capital. t statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Table 3.3: Heckman Two Step method: First stage estimates

	(1)	(2)	(3)	(4)
	ALL	Africa	Europe	BRI
STATE	-0.828	-1.116	0.003	0.007
	(0.50)	(0.59)	(0.99)	(0.90)
ROA	0.224	0.002	0.003	0.003
	(0.06)	(0.92)	(0.90)	(0.82)
AGE	-0.566*	-0.665*	-1.132***	-0.378
	(0.08)	(0.07)	(0.00)	(0.25)
SIZE	0.188***	0.195***	0.319***	0.287***
	(0.00)	(0.00)	(0.00)	(0.00)
_cons	-10.63***	-9.291***	-9.724***	-11.644***
	(0.00)	(0.00)	(0.00)	(0.00)
/lnsig2u	2.035***	1.369***	0.607***	1.253***
	(0.00)	(0.00)	(0.00)	(0.00)
Observations	148137	148138	148139	148139

Dependent variable is a dummy variable which takes the value 1 when a firm performs infrastructure OFDI and zero otherwise. Time dummies from year 2013-2019 is used to control the impact of BRI.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 3.4: Heckman Two Step method: Second stage estimates

	(1)	(2)	(3)	(4)
	All	Africa	Europe	BRI
L.ROA	0.068**	0.142***	0.000**	0.000
	(0.01)	(0.00)	(0.01)	(0.56)
OFDI	0.004***	0.006**	0.003***	0.008***
	(0.00)	(0.03)	(0.00)	(0.00)
DEBT	0.017**	0.021**	0.044***	0.018*
	(0.04)	(0.01)	(0.00)	(0.07)
WC	-0.006	-0.017**	0.008	-0.004
	(0.22)	(0.01)	(0.11)	(0.39)
CASHFLOW	0.951***	0.859***	1.006***	1.003***
	(0.00)	(0.00)	(0.00)	(0.00)
SALESGR	0.000***	0.000***	0.000*	0.000***
	(0.00)	(0.00)	(0.07)	(0.00)
AGE	0.009**	0.007	0.005	0.001
	(0.04)	(0.24)	(0.55)	(0.10)
SIZE	-0.001	-0.001	-0.003	-0.001
	(0.17)	(0.28)	(0.21)	(0.46)
STATE	0.053*	0.061**	-0.068	0.049
	(0.08)	(0.04)	(0.23)	(0.14)
IMR	-0.007***	-0.006***	-0.005	-0.005***
	(0.00)	(0.00)	(0.50)	(0.01)
T	0.000***	0.000**	0.000*	0.000***
	(0.00)	(0.02)	(0.06)	(0.00)
_cons	0.093***	0.082***	0.139	0.07**
	(0.00)	(0.01)	(0.72)	(0.02)
Observations	3435	2092	979	3015
R-squared	0.846	0.756	0.947	0.854

Dependent variable is return on asset (ROA). Time dummies from year 2013-2019 is used to control the impact of BRI p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 3.5: Heckman Two Step: Second stage estimates - sample split by ownership

	(1)	(2)
	HIGH STATE-OWNED	LOW-STATE-OWNED
L.ROA	0.108***	0.056***
	(0.00)	(0.01)
OFDI	0.001	0.005***
	(0.33)	(0.00)
DEBT	0.016*	0.015
	(0.05)	(0.16)
WC	-0.017***	-0.005
	(0.00)	(0.29)
CASHFLOW	0.858***	0.972***
	(0.00)	(0.00)
SALESGR	0.000*	0.000***
	(0.05)	(0.00)
AGE	0.006	0.009*
	(0.16)	(0.09)
SIZE	-0.001	-0.001
	(0.21)	(0.51)
IMR	-0.005	-0.005**
	(0.03)	(0.02)
T	0.000***	0.000**
	(0.00)	(0.03)
_cons	0.116*	0.077**
	(0.07)	(0.01)
Observations	1544	1891
R-squared	0.74	0.88

Dependent variable is return on asset (ROA). Time dummies from year 2013-2019 is used to control the impact of BRI p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 3.6: GMM estimation results

	(1)	(2)	(3)	(4)
	ALL	Africa	Europe	BRI
L.ROA	-1.284***	0.983	-240.81***	-97.715**
	(0.00)	(0.10)	(0.00)	(0.03)
L.OFDI	0.032**	0.217**	36.054*	28.528*
	(0.05)	(0.04)	(0.05)	(0.08)
L.DEBT	0.222**	0.095	-32.839	69.69
	(0.02)	(0.34)	(0.25)	(0.11)
L.WC	0.159***	0.515**	-34.421***	-8.247
	(0.00)	(0.04)	(0.00)	(0.50)
L.CASHFLOW	1.932***	-0.653	285.178***	196.052***
	(0.00)	(0.40)	(0.00)	(0.01)
L.SALESGR	0.000***	0.000*	0.001	0.008***
	(0.00)	(0.08)	(0.36)	(0.01)
L.AGE	0.148***	0.130	-33.805	37.926*
	(0.00)	(0.35)	(0.23)	(0.06)
L.SIZE	0.004	0.006	3.806	2.806
	(0.26)	(0.64)	(0.11)	(0.30)
L.STATE	0.583	-1.516	959.28***	2401.161**
	(0.46)	(0.21)	(0.01)	(0.03)
_cons	-0.544***	-0.530	8.324	-215.154*
	(0.00)	(0.47)	(0.94)	(0.05)
Observations	3329	2062	962	2946
ar1	-2.019	-2.615	-2.305	-2.132
	(0.04)	(0.01)	(0.02)	(0.03)
ar2	1.896	-.016	1.768	.078
	(0.06)	(0.99)	(0.08)	(0.94)
sargan	54.092	15.400	9.226	37.647
	(0.22)	(0.22)	(1.00)	(0.31)

*Notes: First difference are taken with lagged levels used as instruments. These instruments include lagged-one up to lagged-three of explanatory variables. Time and industry effects are controlled in all estimations by adding time and industry dummies. These dummies are also used as additional instruments. The instruments used in the levels equations in the system GMM estimations are the first differences of the explanatory variables, lagged-one and lagged-two of explanatory variables. For explanation of variables: see appendix 2. T-statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Chapter 4 Impact of Chinese infrastructure OFDI on firm's domestic investment: A comparative analysis on Africa, Europe and BRI

4.1. Introduction

As discussed in the previous chapter, Chinese global infrastructure investment has soared during the past few decades. In 2016, Chinese banks held six of the seven top lending spots by lending $35.4bn in infrastructure and building projects (Financial Times, 2019). However, critics question Chinese firms' decision of investing overseas due to which a large amount of finance flows out of China every year. They question the rationality of these firms' displacing domestic finance to fund risky infrastructure projects overseas. What impact will this have on Chinese firms' domestic investment and how it affects firms' financial constraints?

The debate whether a firm's engagement in OFDI increases or decreases its domestic investment remains inconclusive. Effect of OFDI on the home country's domestic investment can occur through two channels; product markets and financial markets. The product market is affected by firm's shifting production abroad. OFDI can complement domestic production by combining home production and foreign production to reduce costs and increase the returns to domestic production. If home country inputs are used to produce outputs in the host country by foreign affiliates, domestic output may increase. This is due to the potential decrease in costs the firm incurs by shifting its operations to different countries, making each stage of the production process more profitable (Desai, et al., 2005). The financial market is affected by shifting funds out of the home country, subsequently raising domestic interest rates and making borrowing difficult for domestic firms. Al-Sadig (2013) finds that OFDI makes domestic investment difficult by increasing domestic financial constraint. Lipsey & Stevens (1992) also

discovered that a firm's capital constraints can make an OFDI crowd out domestic investment. This highlights the importance of whether Chinese firms that engage in infrastructure OFDI can lead to crowding in/out domestic investment and if they are likely to be more or less financially constrained.

This research contributes to the literature in the following aspects: (1) I focus on the impact of Chinese *infrastructure* OFDI on firm's home country investment. Discussions around impact of infrastructure OFDI on home country firms has increased manifolds during the past decade but has rarely been a subject of empirical research. (2) Most of the literature concerning OFDI's impact on home country domestic investment is conducted on the country and industry-level. Although, Lipsey & Stevens (1992) conduct firm level analysis but the sample is only 7 firms, 16 to 20 years observation. This research consists of a vast panel data of 14 years observations of 205 Chinese listed firms. (3) This study considers the importance of host country locations and compare results across different regions. These differences can arise due to the unique motivations, production processes and government influence in the Chinese firms performing OFDI. (4) Finally, I also shed light on the two channels through which home country domestic investment is affected. I analyse the impact on the production channel by observing the marginal impact of sales growth by infrastructure investment on firm's domestic investment. Moreover, I analyse the financial channel by observing the variations of financial constraints a Chinese firm faces whilst engaging in infrastructure OFDI in different regions. I believe that the firms investing in infrastructure OFDI in different location face different impact through these channels.

I document a positive impact of Chinese firms' infrastructure investment on its domestic investment. This positive impact is consistent across Africa, Europe and BRI countries. This suggests that Chinese firm's infrastructure OFDI does not displace Chinese firms home country fixed investment. Meaning that overall, China's infrastructure OFDI develop certain economic

linkages in the host county that increase Chinese firm's domestic investment. For example, Chinese firms may import production inputs such as heavy machinery, for construction of infrastructure abroad. Moreover, I also test whether this impact is reduced or increase through the finance and product channel. The results suggest that the positive impact of Chinese infrastructure OFDI is reduced via the finance channel. This result holds true across all the sample region. This means that when Chinese firms perform infrastructure OFDI, they use up some of capital available to firms for a similar investment at home. Finally, I do not find any evidence that the positive impact of China's infrastructure OFDI on firm's fixed investment is impacted via the production channel. This result is consistent with the view that Chinese firm's generate overcapacity in production outputs. Bluhm, et al (2020) argue that Chinese government considers steel and other construction materials such as cement, glass etc a strategic commodity and maintains excess production capacity. Due to excess production capacity in construction materials the positive impact of infrastructure OFDI on firm's domestic investment is not affected via the production channel.

The structure of this chapter is the following: section 4.2 reviews the literature. Section 4.3 concerns empirical design, section 4.4 includes data description and measurement of variables. Section 4.5 discusses main empirical results and section 4.6 concludes the paper.

4.2. Literature review

4.2.1. Literature related to OFDI and Domestic Investment

literature regarding the impact of OFDI on home country domestic investment is inconclusive. One view argues that OFDI crowds out domestic investment while the other suggests that it enhances domestic investment. For example, Lipsey & Stevens (1992) discuss the interactions between foreign and domestic activities of a firm. They identify two channels through which OFDI can impact home country domestic investment. The first is through home country

financial markets, whereby firms would transfer part of their capital abroad, which means that part of their domestic savings is shifted out of the country. Secondly, it impacts through the product markets by shifting production abroad. This channel affects home country domestic investment in different ways depending on the motive of investment. If firms shift their production abroad to serve host country and neighbouring markets, it can divert home country's domestic investment and home country's exports. However, if the FDI outflows complement the home country's exports through backward and forward production linkages, it can benefit the product market.

4.2.2 Financial channel

Literature related to firm's investment behaviour started with the work of Modigliani-Miller who argue that the value of the firm is irrelevant of its capital structure in perfectly efficient markets. They suggest that the firm invests either to maximize profits or market value (Modigliani & Miller, 1958). However, in reality, markets are imperfect, and transaction costs, tax advantages, agency problems, cost of financial distress and asymmetric information exists. A firm's investment decision is affected by the costs of external financing it faces which is higher than the firms internal finance. OFDI can affect the finance channel by shifting funds out of the home country, subsequently raising domestic interest rates and making borrowing difficult for domestic firms. Stiglitz & Weiss (1981) argue that the expected rate of return to the bank depends on the probability of repayment and firms that are willing to pay very high interest rates are, on average, perceived riskier than firms paying low interest rate, as their possibility of repaying the loan is low. Therefore, banks ration credit by setting an optimal interest rate which influence the borrowers to take actions that are in banks' interest, as well as attract low-risk borrowers and hence maximize the banks' returns. This suggest that internal and external finance are not perfect substitutes and investment depend on firm's financial factors, such as availability of internal finance, easy access to capital markets or debt finance.

The existence of such capital constraints implies that firms will allocate capital in markets where their interests are greatest and where they can operate most profitably.

When MNCs capital costs are not constant, domestic and foreign investment may be substitutes. If the cost of borrowed funds increases as the firm becomes more leveraged, then the MNC's alternative projects (foreign and domestic) will compete for access to relatively cheap internally generated funds. If the firm decides to invest these scarce resources abroad, it may reduce the likelihood of a similar investment at home and vice versa (Blomstrom & Kokko, 1994). Similarly, assessing the foreign and domestic operations of multinational firms, Lipsey & Stevens (1992) test whether interactions between domestic and foreign decisions exists. They find evidence of these interactions through the finance side, where investments in different locations compete for scarce funds. In other words, due to the increasing cost of external finance, a decision to invest and produce more abroad is a decision to invest and produce less at home. In such a situation, if a firm invests its scarce resources abroad, a simultaneous domestic investment in the home country of a similar kind would be unlikely. Feldstein (1995) analyse the effect of OFDI on domestic investment by U.S. non-financial corporate parents from the decade 1970s to 1980s. Using this cross-country data, they also find that OFDI reduces home country domestic investment on a dollar-for-dollar basis. In other words, every dollar invested abroad means one dollar less invested at home. This is because OFDI induces U.S firms to use much more foreign debt and equity finance in their majority-owned foreign affiliates than they would use for domestic investments.

Another theoretical argument is based on a neoclassical approach to multinationals. It suggests that firm's decision to invest in different locations abroad is made by comparing the marginal rate of return of outward capital investment project and the cost of capital. This means that given various costs, such as transportation costs, trade restrictions and the cost of capital, firms first analyse the expected profitability of a project and then decide on the location of

investment. Using data of firms from the Netherlands, Belderbos (1992) finds that domestic investment is not governed by expected profitability in the home country alone, but also by profitability and export demand differentials between the home market and foreign locations. This means that large MNEs will have the ability to allocate global investments according to relative profitability and export demand and this will facilitate a more rapid transition of the home country domestic economy to an industry structure that is in accordance with its comparative advantage.

Empirical evidence from the above studies suggests that due to increasing cost of capital and other costs, multinational firms fight for scarce financial resources and therefore, an investment abroad reduces the chances of a similar investment at home. Additionally, firms also gauge the expected profitability of a foreign investment and then decide where to invest. Firms choose to allocate their finances in locations with lower costs, higher profitability and export demand as compared to the home country. This practice displaces firm's finances from engaging in home country domestic investment to performing OFDI.

4.2.3 Production channel

OFDI can also complement domestic production by combining home production and foreign production to reduce costs and increase the returns to domestic production. If home country inputs are used to produce outputs in the host country by foreign affiliates, domestic output may increase. This is due to the potential decrease in costs the firm incurs by shifting its operations to different countries, making each stage of the production process more profitable (Desai, et al., 2005). However, the true impact of shifting production abroad in unclear and depends on numerous factors such as the motives of investment. Dunning & Lundun (2008) identify three main motivations of investment; efficiency seeking, market seeking and strategic asset seeking. If a firm is performing OFDI to seek efficiency in production, it will potentially perform a vertical FDI, where a firm shifts part of its production chain to the host country to

benefit from relatively cheap inputs. In such a scenario, there is no initial impact to the domestic production. There will be a possibility that OFDI may stimulate domestic investment through the firms exporting capital.

When the firm performs OFDI to seek foreign markets, the impact mainly depends on whether the OFDI displaces domestic exports. For example, performing OFDI in a service-oriented industry may have a positive or insignificant impact on the rate of domestic investment because it is unlikely that it will displace exports. However, in a manufacturing-oriented industry, if the domestic firm moves its production facilities abroad then OFDI may displace exports. Although, it may be possible that the shifting of production facilities for a finished product increase exports of intermediate products from the parent or other domestic firms. Therefore, the net impact is unclear. Finally, when a firm is seeking assets unavailable at home by performing OFDI, the impact on domestic investment may be positive. This is because access to new technology and knowledge can help firms increase productivity (Al-Sadig, 2013).

Moreover, investment conducted from a less advanced to a more advanced economy has an even greater impact on the firm's production channel. Knoerich (2017) describes that tangible capability returns are generated when machinery and capital goods, normally acquired in more advanced economies are shipped back to the home economy. This leads to an increase in productivity through enhanced production processes inherited from the firm's overseas operations. Also, multinationals use OFDI to acquire natural resource companies and obtain exploration rights or purchase land. These investments are later used as production inputs when raw material is shipped back to the home country.

Literature discussed above suggests that the impact of OFDI on domestic investment via the production channel is mostly positive or insignificant. However, empirical evidence shows mixed results. Using time series data of American multinationals for 1980s to the 1990s, Desai,

et al (2005) finds that higher levels of capital expenditure by multinational's own foreign affiliates are associated with greater levels of domestic investment, suggesting that foreign and domestic investment are complements rather than substitutes. In another country-level analysis, Herzer & Schrooten's (2008) attempt to find the long-run and short-run effects of OFDI on domestic investment in the US and Germany. They discover that in the US, OFDI has positive long-run impact on domestic investment. This is because American multinational firms combine home production with foreign production to reduce costs and raise the return to domestic production, thereby stimulating domestic output and domestic investment. However, in Germany, they find that this complementary relationship exists only in the short run. In the long-run, OFDI replaces the German domestic investment. In a macroeconomic analysis, Sumaro (2008) investigates the relationship between OFDI and domestic investment for Finland over the period 1965-2006 and finds that OFDI decreases domestic investment. Azolibe, (2020) investigates country level panel data for Middle eastern and North African countries (MENA). Using panel dynamic ordinary least squares and panel fully modified ordinary least square, they find a positive and significant influence on the growth of domestic manufacturing firms of OFDI made by the region. One reason is because oil producing firms in the MENA region often set refineries abroad and then exports crude oil as a raw material for the refineries to refine and distribute to both home and abroad. This overseas expansion helps increase crude oil production and manufacturing sector output in home country. Hsu, et al. (2015) adopts a distinctive approach by emphasising the importance of host countries conditions. They argue that the relationship between OFDI and domestic investment varies with the location of investment. Dividing industrial level data into OFDI to China and OFDI to other foreign countries, they find that OFDI to China has a positive and significant impact on domestic investment, whereas investment to other foreign locations is insignificant. They attribute these results to the combination of unique MNE advantages with various host

countries conditions. OFDI in industrial segments in China may potentially forge industrial linkages with firms in Taiwan. Whereas the geographic and cultural distance between other foreign countries e.g. USA and Taiwan and transportation costs may reduce the likelihood of forging industrial linkages between American and Taiwanese firms. They find that foreign and domestic investment can be complements in one country, whereas they are substitute in other countries. This study emphasises the importance of host country location when considering the impact of OFDI on domestic investment of a firm.

Overall, theoretical literature points towards a positive impact of OFDI on domestic investment through the production channel. However, empirical evidence provides mixed results. Some find a positive impact (Desai, et al., 2005; Herzer & Schrooten, 2008), whereas, Sauramo (2008) finds a negative impact.

4.2.4 China OFDI and domestic investment

Literature on China's OFDI differs from the above literature because most of China's OFDI comes from state-owned firms. This can raise the issue of Chinese OFDI proving to be a threat to national security of host country. Due to this security threat, many countries apply additional restrictions and taxes on China's FDI especially after COVID-19. This raises the cost of capital for Chinese OFDI and in such a scenario, an investment abroad may replace a similar investment home. However, capital market imperfections in the Chinese economy ensures capital is available to Chinese firms at below market rates (Buckley, et al., 2007). This access to abundant and relatively low-cost capital enables Chinese SOEs to implement governments agenda and conduct OFDI. For example, Chinese policy banks provide large amounts of financing to Chinese energy companies to enter global energy market (Kong & Gallagher, 2017). Therefore, it is difficult to assess how China's OFDI will impact home country domestic investment.

Empirical literature regarding Chinese OFDI and its impact on domestic investment has mixed results. Using industry level data for 9 years from 2004-2013 of Chinese manufacturing firms, You & Solomon (2015) performed GMM analysis to estimate the effects of OFDI on domestic investment. They find that OFDI has a positive influence on domestic investment and attribute these findings to China's ample domestic savings, huge foreign exchange reserves and the resource and market seeking determinants of OFDI. Using Macrolevel data, Ameer, et al. (2017) identify the effects of OFDI on domestic investment. Their findings suggest a unidirectional relationship between OFDI and Domestic investment in the long run. In other words, an increase in OFDI causes an increase in domestic investment and not vice versa. Ali, et al (2019) suggests that Chinese overseas investment does not substitute its domestic investment because of China's domestic savings. These savings are greater than its domestic financial needs. China also has a huge amount of foreign reserves owing to accumulated trade surplus of many years. This implies that Chinese MNEs are not likely to rely on domestic savings, and thus will not affect domestic investment. Using Chinese time series data for the period 1982-2016, Ali, et al (2019) find a positive relationship between Chinese OFDI and domestic investment. Godim, et al. (2018) analyse the impact of Chinese OFDI on home country domestic investment. They find a crowding-in effect for China which means that OFDI enhances domestic investment. This is because when MNEs are asset seeking, there is no negative impact on the economy in the firms' country of origin because the firm is looking for resources unavailable in its market (Hejazi & Pauly, 2003). When the motivation for OFDI is resource-seeking, MNEs are interested in acquiring resources unavailable in their home country, in such a case OFDI would have a positive impact on domestic investment. OFDI provides a way to access new knowledge and technology for economic development.

Overall, the results for the impact of China's OFDI on home country domestic investment suggest a crowding in effect (You & Solomon, 2015; Ali, et al., 2019). In other words, China's OFDI crowds in home country domestic investment.

4.2.5 China's infrastructure OFDI and domestic investment

The above discussion begs the question whether general OFDI theory apply to China's infrastructure OFDI. To the best of my knowledge this is the first study analysing the impact of China's infrastructure OFDI on firms' domestic investment. Also, this research is the first in analysing the impact of China's infrastructure OFDI on the finance and production channels. To understand general OFDI theory's implication in *infrastructure* OFDI, I review Chang, et al., (2021), who explores whether existing theories can explain China's OFDI in Belt and Road countries. This comparison is justified as the majority of China's OFDI to BRI is infrastructure OFDI. Chang, et al., (2021) finds that China's OFDI to BRI regions follows the pattern of "North to South" investment. This means that with regards to infrastructure OFDI, China is acting the role of a "developed country" to invest in less-developed countries to seek markets, natural resources and cheap labour. Chinese firms seek large markets for infrastructure investment in host countries to release the stress of excess capacity, increase domestic investment and maintain production linkages. Moreover, also in line with general theory, Chinese firms are seeking natural resources and cheap labour when investing in the infrastructure BRI. The authors conclude that existing theory is able to explain a large part of Chinese OFDI in BRI countries. In short, the literature on OFDI is largely relevant for literature on infrastructure OFDI as well.

4.2.6 Comparison of China's infrastructure OFDI in Africa, Europe & BRI

Researchers emphasise the importance of host country location when determining the impact of OFDI on domestic investment. Therefore, I review the literature regarding China's infrastructure OFDI in three different regions, Africa, Europe and BRI to gauge the differences

to the production and financial channels when determining the effect of China's infrastructure OFDI on domestic investment.

There is consensus in the literature regarding the motivation of China's investment in Africa. China's infrastructure OFDI to Africa is mainly to seek natural resources and this comprises mostly of infrastructure OFDI (Cheung, et al., 2011). Therefore, production linkages involved in OFDI to Africa could be upstream (backward) linkages that relate to the procurement of goods and services required by the industry to operate. Investment in natural resource seeking infrastructure sector may develop these linkages as often, the equipment involved is complex and after sale maintenance services is commonplace in the industry. Downstream (forward) linkages involves industries that refine the product before reaching to the final consumer. For example, in mining industry, diamonds mined require cutting and polishing before reaching the final consumer (Morris, et al., 2012) . These linkages are likely to enhance firms' domestic investment through the production channel. However, Schiere & Rugamba (2011) argue that China cannot benefit from economies of scale in Africa as the African market is divided into small segments and border-stop related transport costs are common. Another way that China's OFDI in Africa can impact firm's domestic investment is through China's unique financing for African infrastructure projects. Known as the "Angola model", it is a supposed method of financing preferred by the Chinese government whereby funds, usually for infrastructural development in African countries, are secured using natural resources as collateral (Corkin, 2011). This type of finance bodes particularly well with countries that cannot provide adequate financial guarantees (Foster, et al., 2009). Such financing may crowd out Chinese firms' domestic investment and therefore, it may be the case that Chinese firms OFDI to Africa have an insignificant impact on firm's domestic investment. Overall, literature suggests China's infrastructure OFDI to Africa has a positive impact on firms' domestic investment.

A general consensus exists among researchers regarding China's motivation of investment to Europe. It is mainly to seek strategic assets (Blomkvist & Drogendijk, 2016). Cozza, et al (2015) find that after acquiring strategic asset-rich businesses in developed countries, innovation performance of Chinese firms rises significantly. Zhou, et al. (2019) also suggest that reverse technology spill overs through OFDI in developed countries is positively linked with Chinese firm's domestic innovation performance. This incorporates improving and streamlining the production channel. By improving production processes and reducing costs these firms become more competitive in the domestic market and hence increase domestic investment. The two studies mentioned above indicate that it is possible for Chinese infrastructure OFDI to Europe, to have a positive impact on firms' domestic investment. However, OFDI can also decrease domestic investment if it displaces firms' exports. Schuler-Zhou, et al. (2019) suggest that EU is China's most important trading partner, but also the market where Chinese companies face many dumping charges. Therefore, replacing exports with investment in the EU is a better option for some Chinese companies. In case a firm's exports are replaced with OFDI, this would likely have an insignificant impact on domestic investment.

Literature on BRI suggests that Chinese OFDI in the BRI region is used as a solution to production over capacity (Drogendijk & Blomkvist, 2013). Domestic push factors such as China's GDP & export growth, foreign exchange reserves and production overcapacity are found to affect China's OFDI especially after the BRI (Yu, et al., 2019). The study suggests that due to excess capacity and reserves, it is unlikely that OFDI will displace Chinese firms' domestic investment in BRI.

Overall, literature specific to Chinese infrastructure OFDI and firm's domestic investment have mixed results. Chinese firms can benefit from China's domestic savings and huge foreign reserves. Moreover, location of investment can also alter the impact of Chinese OFDI on firm's

home country domestic investment. In the next section, I develop a model to empirically test the impact of China's infrastructure OFDI on domestic investment and whether this impact changes within three different groups (Africa, Europe and BRI) of host countries.

4.3. Empirical Design

In standard literature, majority of the models that have been used to evaluate OFDI and domestic investment relationship include either country level macro-economic indicators, or industrial level indicators (Herzer & Schrooten, 2008; Al-Sadig, 2013). However, I use firm level indicators with a simple dynamic panel data model to investigate the impact of Chinese firm's infrastructure OFDI on its fixed investment.

$$I_{it} = \beta_0 + \beta_1 OFDI_{it} + \lambda X_{it} + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{it} \quad (1)$$

Subscripts i identifies individual firms and t represents the current year. I_{it} denotes fixed investment of a firm i and time t and is the main dependent variable for model (1). It is a proxy for the firm's home country domestic investment and is measured as change in fixed assets from the previous year plus depreciation. The main independent variable for model (1) is the ratio of outward infrastructure investment by the Chinese listed firm to the firm's total assets ($OFDI$). The observation of this variable takes the value zero at the time when no investment is made. X_{it} depicts a set of explanatory variables capturing firm level characteristics. $\mathfrak{f}_i$ and $\mathfrak{f}_t$ are firm effects and time effects, respectively and $\varepsilon_{i,t}$ is the error term.

Two important econometric issues need to be addressed in relation to the estimations. First is the endogeneity issue, which indicates that the relationship between fixed investment (*I*) and Chinese infrastructure OFDI (*OFDI*) may not be independent of each other. I use the system-GMM estimator developed by Arellano & Bover (1995)and Blundell & Bond (1998) which yields consistent and efficient estimates. The estimators solve the endogeneity problem by

using a series of internal instrumental variables based on lagged values of dependent and independent variables.

The endogeneity problem relates to the fact that firms may choose to invest in locations where they know they will have productivity advantage, while the potential sample selection problem arises from the possibility that from a sample of firms, the more productive ones are those that will engage in infrastructure OFDI (Temouri, et al., 2009). This scenario creates a concern of potential selection bias and in the case of a selection bias, OLS will yield biased and inconsistent estimates. Therefore, in this analysis, I also apply a popular method introduced by Heckman (1976, 1979), to correct sample selection bias.

In first estimation, I apply Heckman two step model. Heckman's (1979) model adopts two stages, in which the first stage is the selection model, and the second stage is the quantity model. Heckman technique has limitations when applying it to the panel data settings therefore, I apply Wooldridge's (1995) extension of Heckman's method used frequently in the literature (Dustmann, et al., 2007). Whilst in the original Heckman model, the model begins by estimating the selection equation by standard probit, this model starts by estimating the selection equation by standard *panel data* probit from which it obtains the inverse mills ratio (*IMR*).

$$Prob(ofdi_{it} > 0)\begin{cases} 1+\alpha_1 I + \alpha_2 STATE + \alpha_3 DEBT + \alpha_4 CASHFLOW + \alpha_5 AGE + \alpha_6 SIZE \\ 0\ otherwise \end{cases}$$

$ofdi_{it}$ is a dual variable where $ofdi$ =1 represents firms that performed infrastructure OFDI. Whereas *ofdi = 0* represent firms that performed OFDI but not infrastructure OFDI. Usually Heckman two step model deduce the selection bias between all listed firms and firms that performed OFDI. However, in this case I interpret the selection bias between listed firms that

have conducted OFDI and firms that have conducted infrastructure OFDI. This difference is chosen within selection bias because firms that perform infrastructure OFDI are different from firms that perform general OFDI. Specifically, firms performing infrastructure OFDI are more likely to be experienced, bear more government involvement, highly leveraged, positive cashflow and large in size as compared to the firms performing general OFDI. To address these differences, I include STATE, DEBT, CASHFLOW, AGE and SIZE as explanatory variables in the above equation. I selected these variable because a firm's ownership structure, debt status, cashflow and its age and size impact it's decision to originate infrastructure OFDI or general OFDI. In the second step, I estimate the generalized linear equation and include the inverse Mills ratio (IMR_{it}) obtained from the first step, to correct for possible selection bias.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SALESGR_{i,t-1} + \beta_6 CASHFLOW_{i,t-1} + \beta_7 WC_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10}\mathrm{IMR}_{i,t-1} + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{it} \quad (2)$$

In equation (2), the second stage of this model further investigates the influence of the value of China's infrastructure OFDI on domestic investment of firms (I). the dependent variable is the firm's fixed expenditure (I). The subscripts i identifies individual firms and t represents the current year. In the above equations, I control the effects of profitability by including return on assets (ROA) that represents the firm's profitability. The effects of borrowing are controlled by including leverage ($DEBT$) which is the ratio of total debt to total assets (Lin & Bo, 2012). The debt ratio is included in the regression model because a large body of literature in finance confirms that a firm's capital structure influences investment decision (Harris & Raviv, 1991). $SALESGR$ stands for the annual sales growth rate and is used to provide the accelerator effect in the model (2). The variable $CASHFLOW$ is net profit plus depreciation scaled to total assets. It is generally used in the literature as the indicator for a firms' financial constraint. A positive and statistically significant coefficient suggests the presence of financial constraint on investment. I also control for the substitution effect

between the working capital investment and the fixed investment following Fazzari & Petersen (1993) by including changes in the non-cash working capital scaled by total assets of the firm (WC). Considering inventory component of working capital enters directly into the production function, it is one of the key elements of the firm, ($SIZE$) stands for the firm size measured by the natural logarithm of the firm's total assets and (AGE) is the natural logarithm of firm age in years. The lagged-one period investment is also included to consider the dynamic nature of investment. This chapter also allows for within-firm correlation in the error term by employing firm clustered standard errors. The source of the variables is described in appendix 3.

To test the effect of Infrastructure OFDI on firm's investment behaviour via the finance channel, I include an interaction term between the Chinese infrastructure OFDI and the firms' cashflow.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SALESGR_{i,t-1} + \beta_6 CASHFLOW_{i,t-1} + \beta_7 WC_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10}(OFDI \times CASHFLOW) + \beta_{11}\mathrm{IMR}_{i,t-1} + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{i,t} \quad (3)$$

The key focus for this test is on the cashflow variable and the interaction term between Chinese infrastructure OFDI and the firms Cashflow. Sensitivity of investment to cashflow is widely accepted as a signal of the presence of financial constraint (Fazzari, et al, 1988). In the case that financial constraint is present, I expect to see the estimated coefficient of the cash flow variable to be positively and statistically significant. The estimated coefficient of the interaction term of China's infrastructure OFDI with cashflow will determine the change in the impact of China's infrastructure OFDI and firm's domestic investment. A positive and significant coefficient suggests that the intervening effect of the interaction term increases the direct impact of infrastructure OFDI on firm's fixed investment. A negative and significant coefficient suggests that the intervening effect of the interaction term reduces the direct impact of infrastructure OFDI on firms fixed investment. For example, a positive and

significant coefficient of infrastructure OFDI with a negative and significant coefficient of the interaction term will mean that the intervening effect of the interaction term reduces the direct positive impact of infrastructure OFDI on firm's domestic investment. This means that that infra OFDI increase domestic investment but this positive impact is reduced via the finance channel.

Another important test is to check the impact of infrastructure OFDI on domestic investment via the production channel. A firm's decision to perform infrastructure OFDI can impact its production linkages. Altering these production linkages can then lead to change in domestic investment. For example, if a firm performs OFDI and moves its domestic production facilities abroad, then OFDI may displace exports. Reduction in firm's export can negatively impact domestic investment. Therefore, it is vital for businesses to identify whether these linkages/channels increase or decrease infrastructure OFDI's impact on domestic investment.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SALESGR_{i,t-1} + \beta_6 CASHFLOW_{i,t-1} + \beta_7 WC_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10}(OFDI \times SALESGR) + \beta_{11}\mathrm{IMR}_{it-1} + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{i,t} \quad (4)$$

In equation (4), I add the interaction term of China's infrastructure OFDI with sales growth to identify the impact on the production channel. A positive and significant impact of sales growth on domestic investment is a proxy of the accelerator effect in the economy (Bo, et al., 2006). The estimated coefficient for the interaction term of OFDI with sales growth *(SALESGR x OFDI)* will represent reduction or increase in the impact infrastructure OFDI has on firm's fixed investment. A negative and significant coefficient suggests that the intervening effect of the interaction term reduces the impact infrastructure OFDI has on firms fixed investment. Whereas a positive coefficient of the interaction term suggests that the intervening effect of the interaction term increases the impact infrastructure OFDI has on firms fixed investment.

Next, I use the system-GMM estimator developed by Arellano & Bover (1995)and Blundell & Bond (1998). Equation (5) determines the relationship of firm's infrastructure OFDI with its fixed investment. I also include the lagged fixed investment ratio in the equation to allow for a correlation between the previous and current investment decision (Harrison, et al., 2004). The main variable of interest is China's infrastructure OFDI (*OFDI*) whose sign and significance determines the impact on firm's domestic investment. The remaining variables are independent variables which are the same are equation (2) described above.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SALESGR_{i,t-1} + \beta_6 CASHFLOW_{i,t-1} + \beta_7 WC_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{i,t} \quad (5)$$

Equation (6) is similar to equation (5) except for an additional interaction term between the Chinese infrastructure OFDI and the firms' cashflow which determines the intervening effect on the relationship between infrastructure OFDI and firm's fixed investment.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SALESGR_{i,t-1} + \beta_6 CASHFLOW_{i,t-1} + \beta_7 WC_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10}(OFDI \times CASHFLOW) + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{i,t} \quad (6)$$

Equation (7) is also similar to equation (5 & 6) above, except that in equation (7) I include the interaction term of China's infrastructure OFDI with sales growth to identify the impact of the production channel on the relationship between China's infrastructure OFDI and firm's fixed investment.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 DEBT_{i,t-1} + \beta_5 SALESGR_{i,t-1} + \beta_6 CASHFLOW_{i,t-1} + \beta_7 WC_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10}(OFDI \times SALESGR) + \mathfrak{f}_i + \mathfrak{f}_t + \varepsilon_{i,t} \quad (7)$$

Equation (5, 6 & 7) are used to estimate the impact of infrastructure OFDI on firm's fixed investment for the whole sample and the three regions; Africa, Europe and BRI separately.

4.4. Data and descriptive statistics

Similar to chapter 3, I use two data sources in this chapter. The main data is China's overseas infrastructure investment data. This is obtained from *China Global investment tracker* (CGIT) (American Enterprise Institute & The Heritage Foundation, 2005). The second source of data is firm level data which includes firm balance sheet and income statement data. This is obtained from *China Stock Market and Accounting Research Database* (CSMAR).

The CGIT data identifies individual transactions of China's global construction contracts. This dataset provides the option of tracking each construction transaction to the host country of investment which is useful in this analysis as it allows the option to compare China's infrastructure investment in three regions; Africa, Europe and BRI. The CGIT data is then merged with firm dataset obtained from CSMAR database. CSMAR database provides quarterly firm financial data where as CGIT data is provided as a monthly dataset. To combine these datasets, the CGIT data had to be converted into quarterly data.

The main dataset contains 200 non-financial Chinese listed firms which includes 8848 observations in the final dataset. These are listed firms chosen from CGIT dataset that performed OFDI. This is used for the first stage of Heckman two step method to calculate the probability of investment. Out of the total 4286 Chinese listed firms, 74 firms were identified from *CGIT* database (Scissors, 2020) as firms that conducted overseas construction contracts involving construction of port terminals, dams, public housing etc. During the sample period, 1324 overseas construction projects were carried out by Chinese listed firms. After deleting missing values and outliers, the data comprises of 3329 observations for only infrastructure OFDI panel data. This dataset is used for the second stage of Heckman two step method and also for the robustness analysis i.e. GMM estimation. The regional split consists of 784 Chinese overseas infrastructure transactions in BRI, 547 transactions in Africa and 275 transactions in

Europe. I split the regions according to the World Bank Group country classifications, whereas, the BRI projects are identified in the original CGIT data.

Insert Table 4.1

Table 4.1 presents summary statistics for the whole sample and the three regions. The average total debt to total assets ratio (*DEBT*) is 0.231 for the whole sample, implying Chinese listed firms' high dependency on loans. The mean sales growth rate (*SALESGR*) is 0.82 for the whole sample, which indicates strong growth opportunities in China during the sample period. Firms investing in BRI also have the highest average value of *CASHFLOW*. Finally, the variable *SIZE* indicates that the largest firms are investing in Africa and the variable *AGE* indicates that the oldest firms are investing in BRI. Table 4.2 shows the correlation matrix for the variables. The correlation coefficients for all variables are overall modest.

Insert Table 4.2

4.5 Empirical Results

4.5.1. The Whole sample

Table 4.3 presents the first stage results of the Heckman two step model. The first stage is a probit model which estimates the selection equation. The result of the whole sample in column (1) of table 4.3 shows that other things being equal, the greater the size of the firm, the greater the tendency of the firm to invest in infrastructure OFDI. However, the estimated coefficient for the variable *STATE* is insignificant. This means that among the sample of Chinese listed firms that have performed OFDI, there is no evidence that high state firms are more likely to invest in infrastructure OFDI than low state firms.Column (2, 3 & 4) of Table 4.3 shows the first stage estimates of the probit model for Africa, Europe & BRI respectively. Similar to the

whole sample, the results state that large sized firms are more likely to perform infrastructure OFDI.

Insert Table 4.3

Table 4.4 shows the second stage estimations of the Heckman two step model, for the whole sample. In the second stage, I include the variable inverse mills ratio (IMR) obtained from the probit equation. The second stage estimation for the whole sample has a positive and significant coefficient of the variable IMR for all three estimations (column 1, 2 & 3). This implies that firms do self-select into infrastructure OFDI and non-infrastructure OFDI groups according to their underlying comparative advantage. Without correcting this selection bias, OLS coefficients will tend to be overestimated.

Insert Table 4.4

Table 4.4 shows the impact of Chinese infrastructure OFDI on Chinese listed firm's domestic investment. Column (1) of Table 4.4 shows the Heckman second step estimation results for the whole sample without interaction term. Column (2) shows the estimates for the whole sample with cashflow and OFDI interaction term. Column (3) shows the estimates for the whole sample with sales growth and OFDI interaction term. The results suggest that the estimated coefficient for China's infrastructure OFDI is positive and significant for all three columns. This means that the impact of China's infrastructure OFDI (*OFDI*) on its fixed investment (*I*) is positive. In other words, the listed firms in the sample, find that engaging in infrastructure OFDI increases their domestic investment. This result is in line with general OFDI and domestic investment literature which suggests that OFDI has a positive impact on domestic investment (Al-Sadig, 2013; Desai, et al., 2005). The estimated coefficient for *CASHFLOW* is positive and significant in all estimations in Table 4.4, suggesting that an average Chinese listed firm in the sample faces a certain degree of financial constraints on investment.

Moreover, the variable *ROA*, representing firm profitability, also has a significant and positive impact on firms fixed investment for all estimates.

The impact of firms OFDI on its domestic investment can be enhanced or reduced via the production or financial channel. To empirically test both these channels, I add interaction terms, and to the estimations. The results of the interaction terms are introduced in column (2) & (3). Column (2) reports the result of the estimates including the interaction term cash flow with infrastructure OFDI. I find the estimated coefficient for the interaction term between cash flow and China's infrastructure OFDI to be negatively significant. This suggests that the intervening effect of the interaction term reduces the direct positive impact of infrastructure OFDI on firm's fixed investment. This reduction in direct positive impact of infrastructure OFDI on firms fixed investment is through the finance channel. In other words, the negative estimated coefficient of the interaction term suggests that infrastructure OFDI does displace funds that otherwise could be used for firm's domestic fixed investment.

In Column (3) of table 4.4, I include the interaction term between sales growth and China's infrastructure OFDI (*SALESGR x OFDI).* This interaction term illustrates the intervening effect of the interaction term on the direct positive impact of China's infrastructure OFDI on the firm's fixed investment through the production channel. I find the estimated coefficient for the interaction term between sales growth and China's infrastructure OFDI (*SALESGR x OFDI)* to be insignificant. This result suggests that the intervening effect of the interaction term on the direct positive impact of infrastructure OFDI on firms fixed investment is insignificant. The finding is in contrast with previous studies which points towards a positive impact of OFDI on domestic investment through the production channel (Desai, et al., 2005; Herzer & Schrooten, 2008). This result may be due to Chinese firm's overcapacity in production outputs. Bluhm, et al (2020) argue that Chinese government considers steel and other construction materials such as cement, glass etc a strategic commodity and maintains excess production capacity. Due to

excess production capacity in construction materials the positive impact of infrastructure OFDI on firm's domestic investment is not affected via the production channel. China's infrastructure OFDI was driven by excess capacity in the industry especially after the 2008 financial crisis.

Overall, for the whole sample, I find that infrastructure OFDI positively impact's domestic investment. When observing the channels through which infrastructure OFDI increases Chinese listed firms' fixed investment, I find that intervening effect of the interaction term (*CASHFLOW x OFDI)* reduces the direct impact of infrastructure OFDI on firm's fixed investment, whereas the intervening effect of the interaction term (*SALESGR x OFDI)* does not change the direct impact of infrastructure OFDI on firm's fixed investment. In other words, the direct positive impact of infrastructure OFDI on firm's fixed investment is affected by the finance channel but not by production channel.

4.5.2. Comparison of Africa, Europe and BRI

This chapter also estimates and compares the impact of infrastructure OFDI in three different regions, namely Africa, Europe and BRI. Table 4.5 shows the second stage of Heckman two step estimation for Africa. The estimated coefficient for China's infrastructure OFDI is positive and significant for all estimations. This means that China's infrastructure OFDI in Africa has a positive impact on Chinese firms' capital investment. The estimated coefficient for the variable *CASHFLOW* is insignificant suggesting that it is not an important variable in the capital spending behaviour of firms investing in Africa and that there is no evidence of presence of a financial constraint. The interaction term of Cash flow with China's infrastructure OFDI in column (2) have a negative and significant estimated coefficient. Similar to the whole sample estimate, this suggests that the intervening effect of the interaction term (*CASHFLOW x OFDI)* reduces the direct impact of infrastructure OFDI on firm's fixed investment. This means that firm's infrastructure OFDI increases its fixed investment, however the effect is reduced through the finance channel. This is consistent with the premise that Chinese firms negotiate

infrastructure OFDI contracts with African countries with high loan repayment risk. They agree payment via natural resources in exchange for infrastructure investment known as 'Angola model' (Foster, et al., 2009). This type of agreement requires high initial costs which involves firms finances to be displaced to host country. However, since the payment is made in natural resources and often used directly as an input in the manufacturing sector, it is difficult for firms to replace the displaced funds as fixed investment. Therefore, the interaction term between firms cashflow and infrastructure OFDI reduces the direct positive impact of infrastructure OFDI on firms fixed investment. The interaction term of the variable *SALESGR* with China's infrastructure OFDI in column (3) of table 4.5 has an insignificant estimated coefficient. This means that there is no the intervening effect of the interaction term sales growth and China's infrastructure OFDI on the positive impact of infrastructure OFDI and firms' domestic investment.

Insert Table 4.5

Table 4.6 displays of the results of Heckman two step estimation of the impact of China's infrastructure OFDI in Europe on firms fixed investment. The estimated coefficient for China's infrastructure OFDI is positive and significant for column (3). The estimated coefficient of non- cash working Capital ratio (WC) is positive and significant across all estimates. The positive and significant estimated coefficient of the variable CASHFLOW suggests the presence of a degree of financial constraint in Chinese firms. Moreover, the variable ROA, representing firm profitability, also has a significant and positive impact on fixed investment for all estimates. The variable SIZE has positive and significant impact suggesting that large firms are prone to greater fixed investment.

Insert Table 4.6

Next, I observe the interaction term in column (2), table 4.6. The estimated coefficient for cashflow and infrastructure OFDI interaction is negative and significant. This is in line with the whole sample results which suggests that the intervening effect of the interaction term reduces the direct positive impact of China's infrastructure OFDI on firms' fixed investment. Similar to the result for the whole sample, the estimated coefficient for sales growth and infrastructure OFDI interaction term is insignificant. In other words, I do not find evidence that China's infrastructure OFDI to Europe impacts Chinese firms' fixed investment through the production channel.

Table 4.7 displays the estimates for the BRI sample. Similar to previous estimates for the whole sample, I find that the estimated coefficient for infrastructure OFDI is positive and significant in all three columns. This suggests that infrastructure OFDI in the BRI region leads to an increase in the firm's home country fixed investment. The estimated coefficient of the variable *CASHFLOW* is also positive and significant suggesting the presence of financial constraint in the firm. The estimated coefficient of the variable *ROA* is also positive and significant representing the positive relationship of capital investment with firm profitability. The variable *SIZE* and *AGE* has positive and significant impact suggesting large and well-established firms are more likely to meet greater fixed investment.

Insert Table 4.7

Review of the interaction terms in column (2) and (3) of table 4.7 suggests that the intervening effect of the interaction term cashflow with infrastructure OFDI reduces the positive impact of infrastructure OFDI on firms fixed investment. However, the intervening effect of the interaction term of sales growth with infrastructure OFDI is insignificant to the positive impact of infrastructure OFDI on firm's home country fixed investment. The insignificant effect in the firms performing infrastructure OFDI in the BRI countries can be attributed to Chinese firm's

excess production capacity. Excess production capacity occurs that the production capacity formed in advance exceeds the needs of equilibrium quantity, and then leads to the situation in which there is idle surplus of production factors (Liu, et al., 2017). This excess capacity of production in Chinese firms is being used for investment especially in the BRI regions (Yang, et al., 2020). These results are in line with the results for the whole sample and European region.

Overall, I find that Chinese infrastructure OFDI have a positive impact on Chinese listed firms' home country fixed investment. This result is consistent across Chinese firms' infrastructure OFDI in the three regions Africa, Europe and BRI. Furthermore, I also find that the positive impact of Chinese firms' infrastructure OFDI on firm's home country fixed investment is reduced via the finance channel. This means that the China's infrastructure OFDI reduces the finances available to firms for fixed investment and therefore, reduces the positive impact firm's infrastructure OFDI has on its fixed investment.

4.5.3. Robustness analysis and endogeneity issue

To minimize endogeneity problem, I have used system Generalized Method of Moments (GMM) estimation method (Roodman, 2006). GMM also accounts for the issue of autocorrelation which can arise due to inclusion of lagged dependent variable. For all the models, the performance of the Arellano-Bond test statistics shows that ar1 is significant and that ar2 is not significant at the 5 percent level, implying that there no serial and auto-correlation in the error terms exists. I employ valid instruments and the models are appropriately formulated.

Insert Table 4.8

Table 4.8 shows the impact of Chinese infrastructure OFDI on Chinese listed firm's domestic investment. Column (1) of Table 4.8 shows the GMM estimates for the whole sample without interaction term. Column (2) shows the GMM estimates for the whole sample with cashflow

and OFDI interaction term. Column (3) shows the GMM estimates for the whole sample with sales growth and OFDI interaction term. Similar to Heckman estimations for the whole sample in table 4.4, I find that the estimated coefficient for China's infrastructure OFDI is positive and significant for all three columns. The estimated coefficient for *CASHFLOW,* is positive and significant in all estimations in table 4.8, suggesting that an average Chinese listed firm in the sample faces a certain degree of financial constraints on investment. Moreover, the variable *ROA*, representing firm profitability, also has a significant and positive impact on firm's fixed investment for all estimates. Unlike the earlier estimations, I also observe the estimated coefficient for sales growth (*SALESGR*) is significant with positive sign in all estimations confirming the accelerator effect of investment. The results of the interaction terms of Cash flow with Chinese infrastructure OFDI and sales growth with Chinese infrastructure OFDI is introduced in column (2) & (3). In line with the earlier estimation, the estimated coefficient for the interaction term between cash flow and China's infrastructure OFDI (*CASHFLOW x OFDI)* is negatively significant and the estimated coefficient for the interaction term between sales growth and China's infrastructure OFDI (*SALESGR x OFDI)* to be insignificant. This suggests the results for Heckman two step estimation are robust.

Table 4.9, 4.10 & 4.11 shows the GMM estimates for three different regions, namely Africa, Europe and BRI. I find that (1) all results are in line with the earlier estimates for Heckman two step method i.e. the relationship of infrastructure OFDI with firm's home country domestic investment is positive and significant for all three regions. (2) For all regions, the estimated coefficients of the control variables; *CASHFLOW and SALESGR* are positive and statistically significant. As discussed earlier, the positive and significant estimated coefficient of the variable *CASHFLOW* suggests that the average Chinese listed firms in this sample faces financial constraint on investment. Moreover, the estimated coefficient for sales growth (*SALESGR*) is positive and significant, similar to the whole sample, confirming the accelerator

effect of investment. (3) For Africa, the interaction terms Cash flow with China's infrastructure OFDI in column (2) and sales growth with China's infrastructure OFDI in column (3) of table 4.9, have insignificant estimated coefficient. The estimated coefficient of the (*CASHFLOW x OFDI)* interaction term is insignificant. This suggests that intervening effect on the of the interaction term on the positive relationship of infrastructure investment is insignificant

Insert Table 4.9

(4) For Europe, the estimated coefficient for cashflow and infrastructure OFDI interaction term is negative and significant. This is in line with the Heckman two step estimation results for Europe. This suggests that the intervening effect of the interaction term reduces the positive impact China's infrastructure OFDI has on its domestic investment.

Insert Table 4.10

(5) Table 4.11 displays the GMM estimates for the BRI sample. Similar to previous estimates Heckman two step estimation, the interaction term between cashflow and infrastructure OFDI in column (2) is negative and significant whereas the interaction term between sales growth and infrastructure OFDI in column (3) is insignificant. This result suggests that China's infrastructure OFDI impacts Chinese firm's home country investment positively. However, the intervening effect of the *(OFDI x CASHFLOW)* interaction term reduces the direct positive impact of infrastructure OFDI on firm's home country fixed investments. In other words, the results confirm our earlier results for the whole sample and Europe, i.e. the positive impact of China's infrastructure OFDI on firm's home country fixed investment is reduced via financial channel.

Insert Table 4.11

Overall, the robustness analysis supports the results presented using Heckman two step model.

4.6. Conclusion

This chapter addresses the issues faced by Chinese government regarding their investment decision. China's infrastructure OFDI has increased during the past few decades. With the increase in infrastructure OFDI, Chinese government is faced with rising concerns regarding scarce domestic resources being used to make overseas investment. Moreover, the risky nature of infrastructure investment, especially in developing countries, adds to these concerns. However, infrastructure OFDI can also increase firm's home country fixed investment if the firm combine home production with foreign production to reduce costs and raise the return to domestic production, thereby stimulating domestic output and domestic investment. Therefore, it is important to analyse whether China's infrastructure OFDI drive is increasing or decreasing Chinese firm's home country fixed investment.

In this chapter, I empirically examine the impact of Chinese overseas investment on firm's domestic investment and investment-cash flow sensitivity based on 205 companies during the period of 2005-2019, involving 1323 infrastructure OFDI transactions. Using the Heckman two step model and system GMM estimation procedure, I find that the impact of Chinese firms' infrastructure investment on its domestic investment is overall positive. The positive impact is consistent across Africa, Europe and BRI regions. Moreover, I also test whether this positive impact is reduced or increased through the financial and production channels. The result for the interaction terms suggests that that this positive impact is reduced via the financial channel. This means that when Chinese firms perform infrastructure OFDI, they use up the scarce capital available to firms to make home country fixed investment. This result is true across all the sample regions; Africa, Europe and BRI. However, I do not find any evidence that the positive impact of China's infrastructure OFDI on firm's fixed investment is impacted via the

production channel. These results pass the robustness test as the results using GMM estimation as well as Heckman two step method are similar.

The findings of this chapter ensure Chinese firms and policy makers that infrastructure OFDI does not displace home country fixed investment. After the 2008 financial crisis, much of China's GDP growth was derived by local infrastructure investment. This policy was adopted by the Chinese government to ensure demand is maintained in the key industries e.g. steel, cement, construction etc. However, critics argued that this type of GDP growth model was not sustainable because local demand for infrastructure will eventually diminish. To address this issue, in 2013, Chinese government launched the BRI initiative to maintain China's GDP growth at previous levels and as a solution to excess capacity in China's key industries. The results of this chapter, i.e. China's infrastructure OFDI has a positive relationship with firm's home country fixed investment proves that China's strategy is working. Chinese firms are not only consuming existing excess capacity by engaging in infrastructure OFDI, but also implementing home country fixed investment. This suggests that due to overseas infrastructure OFDI, forwards and backward production linkages are created by Chinese firms which requires them to enhance their fixed investments. The results of this chapter confirm that regardless of the political motives of Chinese infrastructure OFDI, it is benefitting Chinas economic growth. Policy makers should encourage this strategy and encourage firms to invest in less risky regions. Chinese firms should also analyse the location of investment and ideally invest in locations where there is less risk to Chinese firms' assets and investment.

Table 4.1: Summary Statistics

	All			Africa			Europe			BRI			t-statistics		
Variable	N	μ	σ	N	μ	σ	N	μ	σ	N	μ	σ			
I	3408	-0.02	1.23	2012	0.00	0.05	969	-0.07	2.30	2975	-0.03	1.31	1.36	-0.67	1.03
OFDI	3546	0.04	0.37	2047	0.07	0.49	1006	0.13	0.69	3099	0.04	0.40	-2.76	5.09	2.40
DEBT	3397	0.23	0.19	1981	0.19	0.13	961	0.25	0.28	2996	0.23	0.20	-7.94	2.42	-7.86
WC	3545	-0.08	0.41	2046	-0.05	0.18	1006	-0.17	0.72	3098	-0.10	0.44	7.10	-3.69	4.88
CASHFLOW	3403	-0.08	3.02	1977	-0.01	0.08	959	-0.26	5.68	2985	-0.09	3.22	1.96	-1.16	1.10
SALESGR	3505	0.82	14.38	2026	0.77	11.84	993	0.66	4.02	3065	0.65	9.71	0.28	0.031	0.40
ROA	3545	0.19	7.65	2046	0.03	0.04	1006	0.57	14.35	3098	0.21	8.18	-1.70	0.99	-0.99
AGE	3537	2.57	0.52	2038	2.52	0.58	999	2.42	0.61	3090	2.57	0.53	4.39	-7.49	-3.18
SIZE	3545	23.61	2.10	2046	23.89	2.26	1006	24.11	2.31	3098	23.79	2.12	-2.51	4.07	1.61
STATE	3407	0.02	0.04	2014	0.02	0.03	969	0.02	0.03	2978	0.02	0.04	0.00	0.00	0.00

Notes: Explanation of variables: N is the number of observations, μ is mean and σ is the standard deviation. I is the firm's capital investment, ROA is the return on total assets, OFDI is the ratio of Chinese outward foreign direct investment to total assets, DEBT is the ratio of long-term debt plus short-term borrowings to total assets of the firm, WC is the non-cash working capital, CASHFLOW is the ratio of net profit plus depreciation to total assets, SALESGR is the sales growth rate, AGE is the natural log of the age of company in years, SIZE is the natural log of total assets and STATE is the ratio of state shares to total share capital.

Table 4.2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) I	1.000									
(2) OFDI	0.001	1.000								
	(0.921)									
(3) DEBT	0.106*	-0.001	1.000							
	(0.000)	(0.926)								
(4) WC	-0.003	0.001	-0.946*	1.000						
	(0.753)	(0.945)	(0.000)							
(5) CASHFLOW	-0.062*	0.001	-0.862*	0.672*	1.000					
	(0.000)	(0.919)	(0.000)	(0.000)						
(6) SALESGR	0.000	-0.001	-0.001	0.001	0.000	1.000				
	(0.973)	(0.887)	(0.937)	(0.917)	(0.972)					
(7) ROA	-0.107*	0.000	-0.491*	0.372*	0.908*	0.000	1.000			
	(0.000)	(0.973)	(0.000)	(0.000)	(0.000)	(0.978)				
(8) AGE	-0.008	-0.010	0.015	-0.015	-0.011	0.005	-0.004	1.000		
	(0.454)	(0.308)	(0.152)	(0.128)	(0.280)	(0.600)	(0.696)			
(9) SIZE	0.050*	-0.086*	-0.123*	0.131*	0.101*	-0.001	0.043*	0.025*	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.924)	(0.000)	(0.012)		
(10) STATE	0.164*	-0.001	0.757*	-0.625*	-0.597*	-0.001	-0.490*	0.011	-0.108*	1.000
	(0.000)	(0.897)	(0.000)	(0.000)	(0.000)	(0.947)	(0.000)	(0.278)	(0.000)	

*Notes: Explanation of variables: I is the firm's capital investment, ROA is the return on total assets, OFDI is the ratio of Chinese outward foreign direct investment to total assets, DEBT is the ratio of long-term debt plus short-term borrowings to total assets of the firm, WC is the non-cash working capital, CASHFLOW is the ratio of net profit plus depreciation to total assets, SALESGR is the sales growth rate, AGE is the natural log of the age of company in years, SIZE is the natural log of total assets and STATE is the ratio of state shares to total share capital. t statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Table 4.3: Heckman Two Step Estimation-First Stage

	(1)	(2)	(3)	(4)
	Whole Sample	Africa	Europe	BRI
I	0.004	0.319	-0.006	0.002
	(0.98)	(0.81)	(0.86)	(0.99)
STATE	-0.198	-0.377	-0.24	-0.062
	(0.33)	(0.18)	(0.59)	(0.77)
DEBT	-0.505	-0.344	-0.143	-0.707*
	(0.18)	(0.49)	(0.85)	(0.09)
CASHFLOW	-0.003	0.001	0.001	-0.003
	(0.96)	(0.96)	(0.99)	(0.92)
AGE	0.171	0.197	0.067	0.16
	(0.21)	(0.22)	(0.78)	(0.24)
SIZE	0.265***	0.168***	0.252***	0.263***
	(0.00)	(0.00)	(0.00)	(0.00)
_cons	-9.618***	-7.934***	-10.05***	-9.522***
	(0.00)	(0.00)	(0.00)	(0.00)
/lnsig2u	0.997***	0.943***	0.363	0.707***
	(5.375)	(4.738)	(0.935)	(3.602)
Observations	8558	8558	8558	8558

Notes: First stage is a probit estimation. Dependent variable is a dummy variable (infra_decision) which takes the value 1 if firm decides to perform infrastructure OFDI. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.4: Heckman Two Step Estimation-Whole Sample Second Stage

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-6.934***	-6.941***	-6.935***
	(0.00)	(0.00)	(0.00)
L.OFDI	0.082***	0.053***	0.105***
	(0.00)	(0.00)	(0.00)
L.DEBT	-0.606**	-0.588**	-0.605**
	(0.04)	(0.05)	(0.04)
L.WC	0.156***	0.158***	0.156***
	(0.00)	(0.00)	(0.00)
L.CASHFLOW	2.999***	3.002***	2.999***
	(0.00)	(0.00)	(0.00)
L.SALESGR	0.000	0.000	0.000
	(0.16)	(0.16)	(0.16)
L.ROA	0.354***	0.354***	0.354***
	(0.00)	(0.00)	(0.00)
L.AGE	0.314***	0.309***	0.314***
	(0.00)	(0.00)	(0.00)
L.SIZE	0.439***	0.435***	0.438***
	(0.00)	(0.00)	(0.00)
IMR	1.760***	1.746***	1.755***
	(0.00)	(0.00)	(0.00)
T	0.003*	0.003*	0.003*
	(0.09)	(0.09)	(0.09)
L.(OFDI x CASHFLOW)		-0.695***	
		(0.00)	
L.(OFDI x SALESGR)			-0.029
			(0.17)
_cons	-17.518***	-17.36***	-17.47***
	(0.00)	(0.00)	(0.00)
Observations	3021	3021	3021
R-squared	0.795	0.796	0.795

Notes: Dependent variable is the firm's capital investment (I). One year Lagged values are used for the independent variables. Time effects are controlled in all estimations by adding time dummies. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.5: Heckman Two Step Estimation-Africa Second Stage

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	0.015	0.015	0.015
	(0.46)	(0.47)	(0.47)
L.OFDI	0.008*	0.007*	0.013*
	(0.07)	(0.09)	(0.06)
L.DEBT	0.051*	0.051*	0.05*
	(0.07)	(0.07)	(0.07)
L.WC	-0.013	-0.013	-0.013
	(0.24)	(0.24)	(0.27)
L.CASHFLOW	-0.008	-0.005	-0.007
	(0.72)	(0.82)	(0.73)
L.SALESGR	0.000	0.000	0.000
	(0.37)	(0.38)	(0.40)
L.ROA	-0.058***	-0.059***	-0.057***
	(0.01)	(0.01)	(0.01)
L.AGE	-0.024**	-0.024**	-0.023**
	(0.04)	(0.04)	(0.04)
L.SIZE	-0.020**	-0.020**	-0.020**
	(0.02)	(0.02)	(0.02)
IMR	-0.140**	-0.141**	-0.140**
	(0.01)	(0.01)	(0.01)
T	-0.001**	-0.001**	-0.001**
	(0.01)	(0.01)	(0.01)
L.(OFDI x CASHFLOW)		-0.040*	
		(0.06)	
L.(OFDI x SALESGR)			-0.006
			(0.13)
_cons	1.185**	1.189**	1.182**
	(0.01)	(0.01)	(0.01)
Observations	1629	1629	1629
R-squared	0.057	0.057	0.057

Notes: Dependent variable is the firm's capital investment (I). One year Lagged values are used for the independent variables. Time effects are controlled in all estimations by adding time dummies. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.6: Heckman Two Step Estimation-Europe Second Stage

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-8.384***	-8.388***	-8.387***
	(0.00)	(0.00)	(0.00)
L.OFDI	0.046	-0.152	0.608*
	(0.46)	(0.32)	(0.09)
L.DEBT	-0.162	-0.131	-0.141
	(0.57)	(0.64)	(0.62)
L.WC	0.139*	0.143*	0.139*
	(0.08)	(0.07)	(0.08)
L.CASHFLOW	3.625***	3.628***	3.627***
	(0.00)	(0.00)	(0.00)
L.SALESGR	0.000	0.000	0.000
	(.312)	(.333)	(.347)
L.ROA	0.434***	0.435***	0.435***
	(0.00)	(0.00)	(0.00)
L.AGE	0.056	0.043	0.047
	(0.33)	(0.42)	(0.37)
L.SIZE	0.319***	0.288***	0.291***
	(0.00)	(0.00)	(0.00)
IMR	1.397***	1.277***	1.279***
	(0.00)	(0.00)	(0.00)
T	0.006**	0.006**	0.006**
	(0.02)	(0.02)	(0.03)
L.(OFDI x CASHFLOW)		-2.489*	
		(0.09)	
L.(OFDI x SALESGR)			-0.41
			(0.16)
_cons	-14.739***	-13.47***	-13.534***
	(0.00)	(0.00)	(0.00)
Observations	866	866	866
R-squared	0.954	0.954	0.954

Notes: Dependent variable is the firm's capital investment (I). One year Lagged values are used for the independent variables. Time effects are controlled in all estimations by adding time dummies. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.7: Heckman Two Step Estimation-BRI Second Stage

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-7.036***	-7.042***	-7.036***
	(0.00)	(0.00)	(0.00)
L.OFDI	0.144***	0.103***	0.138***
	(0.00)	(0.00)	(0.00)
L.DEBT	-0.844	-0.832	-0.844
	(0.12)	(0.12)	(0.12)
L.WC	0.132***	0.133***	0.132***
	(0.01)	(0.01)	(0.01)
L.CASHFLOW	3.045***	3.047***	3.045***
	(0.00)	(0.00)	(0.00)
L.SALESGR	0.000	0.000	0.000
	(0.14)	(0.14)	(0.14)
L.ROA	0.36***	0.36***	0.36***
	(0.00)	(0.00)	(0.00)
L.AGE	0.258**	0.255**	0.258**
	(0.02)	(0.03)	(0.02)
L.SIZE	0.395**	0.394**	0.395**
	(0.04)	(0.04)	(0.04)
IMR	1.582**	1.578**	1.582**
	(0.04)	(0.04)	(0.04)
T	0.001	0.001	0.001
	(0.40)	(0.40)	(0.40)
L.(OFDI x CASHFLOW)		-0.947***	
		(0.00)	
L.(OFDI x SALESGR)			0.016
			(0.30)
_cons	-15.358**	-15.308**	-15.364**
	(0.04)	(0.04)	(0.04)
Observations	2715	2715	2715
R-squared	0.812	0.812	0.812

Notes: Dependent variable is the firm's capital investment (I). One year Lagged values are used for the independent variables. Time effects are controlled in all estimations by adding time dummies. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.8: Whole sample GMM estimates

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-7.765***	-7.36***	-7.927***
	(0.00)	(0.00)	(0.00)
L.OFDI	0.377**	0.148**	0.283***
	(0.02)	(0.05)	(0.003)
L.DEBT	2.228	-2.776	-0.474
	(0.13)	(0.22)	(0.66)
L.WC	1.316**	-2.089	-0.451
	(0.03)	(0.13)	(0.37)
L.CASHFLOW	3.37***	3.145***	3.408***
	(0.00)	(0.00)	(0.00)
L.SALESGR	0.049***	0.029**	0.032**
	(0.00)	(0.01)	(0.00)
L.ROA	0.335***	0.361***	0.417***
	(0.00)	(0.00)	(0.00)
AGE	0.128	1.174*	0.675
	(0.71)	(0.08)	(0.26)
L.SIZE	0.014	0.939***	0.631
	(0.78)	(0.01)	(0.10)
L.(OFDI x CASHFLOW)		-1.325**	
		(0.04)	
L.(OFDI x SALESGR)			0.156
			(0.367)
_cons	-1.328	-26.375***	-17.657
	(0.53)	(0.01)	(0.10)
N	2987	2946	2969
ar1	-1.967	-2.677	-2.11
	(0.05)	(0.01)	(0.04)
ar2	-1.577	-1.859	-1.35
	(0.12)	(0.06)	(0.18)
sargan	48.581	40.346	53.654
	(0.89)	(1.00)	(0.55)

Notes: Instruments include lagged-one up to lagged-four of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. For explanation of variables: see appendix 3. p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.9: Africa GMM estimates

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-0.062	-0.047	-.222*
	(0.50)	(0.44)	(0.08)
L.OFDI	0.008***	0.004***	0.005***
	(0.01)	(0.00)	(0.00)
L.DEBT	0.001	0.028	-0.007
	(0.95)	(0.22)	(0.79)
L.WC	-0.015	0.015	-0.016
	(0.48)	(0.55)	(0.51)
L.CASHFLOW	-0.011	0.006	0.005
	(0.86)	(0.88)	(0.87)
L.SALESGR	0.000	0.000	0.000
	(0.84)	(0.74)	(0.69)
L.ROA	-0.053	-0.058	-0.12
	(0.48)	(0.20)	(0.13)
AGE	.006*	0.004	-0.002
	(0.05)	(0.78)	(0.85)
L.SIZE	.002***	0.002	-0.001
	(0.00)	(0.75)	(0.56)
L.(OFDI x CASHFLOW)		0.005	
		(0.83)	
L.(OFDI x SALESGR)			-0.002
			(0.23)
_cons	-.065***	-0.074	0.031
	(0.00)	(0.75)	(0.61)
N	1680	1691	1761
ar1	-2.578	-2.348	-2.064
	(0.01)	(0.02)	(0.04)
ar2	-0.8	-0.352	-1.598
	(0.42)	(0.73)	(0.11)
sargan	47.274	54.945	105.141
	(0.86)	(0.06)	(0.37)

Notes: Instruments include lagged-one up to lagged-four of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.10: Europe GMM estimates

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-8.477***	-8.478***	-7.767***
	(0.00)	(0.00)	(0.00)
L.OFDI	0.399***	0.353***	0.739***
	(0.00)	(0.00)	(0.01)
L.DEBT	3.518	3.471	4.596
	(0.11)	(0.11)	(0.25)
L.WC	1.968***	1.965***	1.975***
	(0.00)	(0.00)	(0.00)
L.CASHFLOW	3.674***	3.674***	3.356***
	(0.00)	(0.00)	(0.00)
L.SALESGR	0.05***	0.051***	0.055***
	(0.01)	(0.00)	(0.00)
L.ROA	0.434***	0.434***	0.403***
	(0.00)	(0.00)	(0.00)
AGE	-0.179	-0.165	-0.157
	(0.65)	(0.67)	(0.77)
L.SIZE	0.216***	0.215***	-0.045
	(0.01)	(0.01)	(0.63)
L.(OFDI x CASHFLOW)		-1.029***	
		(0.01)	
L.(OFDI x SALESGR)			-0.858
			(0.17)
_cons	-5.732**	-5.719**	0.568
	(0.04)	(0.04)	(0.85)
N	851	851	849
ar1	-2.012	-2.000	-1.973
	(0.04)	(0.05)	(0.05)
ar2	0.168	0.111	-0.593
	(0.87)	(0.91)	(0.55)
sargan	39.083	35.611	35.885
	(0.47)	(0.63)	(0.66)

Notes: Instruments include lagged-one up to lagged-four of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4.11: BRI GMM estimates

	(1) Without interaction term	(2) Cashflow interaction term	(3) Sales growth interaction term
L.I	-8.005***	-7.622***	-7.23***
	(0.00)	(0.00)	(0.00)
L.OFDI	0.581**	0.128**	0.093***
	(0.03)	(0.04)	(0.00)
L.DEBT	2.082	-0.256	0.147
	(0.29)	(0.84)	(0.29)
L.WC	1.440*	-0.731	0.217***
	(0.08)	(0.15)	(0.00)
L.CASHFLOW	3.474***	3.269***	3.165***
	(0.00)	(0.00)	(0.00)
L.SALESGR	0.003*	0.062	0.001**
	(0.08)	(0.29)	(0.04)
L.ROA	0.39***	0.378***	0.362***
	(0.00)	(0.00)	(0.00)
AGE	0.359	1.004	0.086
	(0.11)	(0.10)	(0.27)
L.SIZE	0.142*	0.729**	0.011
	(0.09)	(0.01)	(0.52)
L.(OFDI x CASHFLOW)		-1.253***	
		(0.01)	
L.(OFDI x SALESGR)			-0.034
			(0.16)
_cons	-5.200*	-21.183**	-0.735
	(0.08)	(0.02)	(0.33)
N	2611	2562	2718
ar1	-2.565	-2.87	-2.724
	(0.01)	(0.00)	(0.01)
ar2	-1.097	-1.86	-0.616
	(0.27)	(0.06)	(0.54)
sargan	49.512	62.308	124.603
	(0.07)	(0.89)	(0.07)

Notes: Instruments include lagged-one up to lagged-four of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. For explanation of variables: see appendix 3.

p-values are in parentheses

**** p<.01, ** p<.05, * p<.1*

Chapter 5 Do host countries benefit from Chinese infrastructure investment? A comparative analysis on Africa, Europe and BRI

5.1. Introduction

China has gained experience in how to use infrastructure investment to promote domestic economic growth in the process of its economic transition. Since the start of the 21st century China has been investing extensively in overseas infrastructure to expand its economic influence. The scale and the scope of China's overseas infrastructure investment have attracted global attention. Concerns arise whether Chinese overseas infrastructure investment is driven by economic interest or by its geopolitical strategy. Especially, China has been accused of new imperialism by creating debt dependence on China.

China's overseas infrastructure investment has contributed to the global development by narrowing the gap between demand for and supply of infrastructure. According to the OECD (2018), on average, global infrastructure investments are falling short by USD0.35-0.37 trillion per year. There is increasing evidence that Chinese infrastructure investment has generated positive economic results to host countries. For example, focusing on transportation projects, the World Bank (2019)documents that the Belt and Road Initiative (BRI) projects can expand trade, increase foreign investment, and reduce poverty by lowering trade costs, although there exist some risk factors that are common to all large infrastructure projects.

The criticisms on China's overseas infrastructure investment reported by the media are often related to four issues: weak environmental concerns, lack of social responsibilities, low transparency (regarding both public procurement and terms and conditions of loans), and debt overhang e.g. (World Bank, 2019). Correspondingly, published researches on Chinese overseas infrastructure investment are mainly the debates on these controversial issues, particularly debt

overhang (Hurley, et al., 2018; Horn, et al., 2019). In the existing literature, the concerns over these issues are debated only on the surface by reporting what has happened, there is no systematic empirical evaluation of their economic impacts. In addition, these discussions often treat China's overseas infrastructure investment as a grand geopolitical strategy, whereas there is little evidence on whether host countries have benefited from China's infrastructure investment. The lack of evidence has generated many fluctuations regarding host countries' approach to Chinese infrastructure investment. For example, some countries that initially welcomed Chinese infrastructure investment are becoming reluctant to invest further owing to security concerns or unfavourable terms of contracts. General mistrust of Chinese infrastructure investment is rising. Moreover, in this respect, international policymakers have been guided by media stories rather than evidence. If there is no empirical evidence, then there will be no scientific ground based on which policies on international development can be made. Therefore, it is important to empirically examine whether these infrastructure investments are beneficial for host country's economies or they are just a way for China to gain economic and political superiority in the region.

This Chapter contributes to the literature in the following aspects. Firstly, I empirically examine the impact of Chinese overseas infrastructure investment on the economic performance of recipient countries. This research is unique as Chinese overseas infrastructure investment has rarely been studied empirically in the past. Although some studies on individual industry sectors exist, however, none of the previous studies are exclusively on China's overseas infrastructure investment. Evidence on economic impacts of these investments on recipient countries is scarce. Secondly, I compare the impact of Chinese overseas infrastructure investment across three regions where China has been heavily involved in infrastructure: Africa, Europe and BRI. The comparative study approach is justified by (a) the degree to which host countries can benefit from Chinese infrastructure investment depends on host country

characteristics, whereas the effect of host country characteristics can be strongly revealed by comparing the empirics across different regions rather than within the region. (b) the motivations of Chinese infrastructure investment in different regions are different. A comparative study across different regions not only help us identify regional specific factors but also allows us to generate a summarized global pattern of China's overseas infrastructure investment. Previous studies on China's overseas investment have been mainly on China's investment activities in a specific geographical location in isolation. Thirdly, I explicitly consider how the motivation of investment alters the impact of China's infrastructure investment on recipient countries.

This chapter documents that the impact of China's infrastructure investment on host country GDP growth is overall positive for the whole sample. However, this result varied across different subsamples. I find that it is positive for Africa and BRI, whereas it is insignificant for European host countries. This positive impact also exists in low-income and countries having close aid ties with China, whereas it is insignificant for high-income countries and countries having low aid ties with China. I also find that motivations of China's investment alter the direct impact of China's infrastructure investment on host countries. More specifically, resources-seeking motivation reduces the direct positive impact of Chinese infrastructure investment on African, low-income, and high-aid connection host countries. Market-seeking motivation reduces the positive impact of Chinese infrastructure investment on host countries in the BRI region. And finally, the technology/strategic assets-seeking motivation has a negative impact for European host countries, high-income countries, and countries with weak aid ties with China.

The structure of the chapter is as follows: I review the related literatures in Section 5.2. Section 5.3 concerns empirical design, which includes data description, empirical models and

measurement of variables. Section 5.4 discusses main empirical results. Section 5.5 concerns robustness tests. Section 5.6 concludes the paper.

5.2. Literature review

5.2.1. Infrastructure investment and economic growth in general

It is debatable how infrastructure investment affects economic growth. One view concern that infrastructure investment supports the private sector and increases its capacity to be more productive (Aschauer, 1989; Munnell & Cook, 1990b). Another view argues that public capital can be a substitute for private capital and hence decrease overall economic productivity (Barro, 1990; Summers & Heston, 1984).

Aschauer (1989) argues that public capital can be seen as an element of the production function. He examines the U.S. data from 1949 to 1985 on non-military government spending and core infrastructure including streets and highways, airports, mass transit, electrical facilities etc. Aschauer documents a positive relationship between infrastructure investment and productivity. In line with Aschauer's production function argument, Munnell & Cook (1990b) document a positive relationship between infrastructure investment and productivity using a panel data of 48 U.S. states in 1970-1986. Munnell's (1992) also finds that public capital has a significant positive impact on output. However, Aschauer (1989)'s production function approach was mainly criticised for reverse causality (Munnell, 1992).

Some researchers document a negative effect of public capital on economic growth. For example, Barro (1990) extends previous endogenous-growth models (Summers & Heston, 1984) to include taxes. He argues that the relationship between growth rate and public spending depends on how government finance public services. If taxes are increased to finance public services, the impact on economic growth may be insignificant or even decline. Based on 98 countries for during 1960-1985, Barro (1990) finds that an increase in resources devoted to

public capital is associated with a decline in the average annual growth rate of real per capita GDP. Overall, there is no conclusive evidence to support the notion that public capital always increases economic productivity.

5.2.2. Infrastructure OFDI and host country economy

Does the above-mentioned relation between infrastructure investment and economic growth apply to the situation in which the infrastructure project is invested by foreign investors rather than by the host country government? Bogart & Chaudhary (2013) examine the impact of colonial era British railway outward foreign investment (OFDI) on host country economic performance. They evaluate total factor productivity (TFP) growth for Indian railways and assess its impact on the national income growth rate from 1874 to 1912. They document that the growth in the railway sector contributed to a 3.1 percent increase in Indian national income during the period. They attribute the positive impact of railway OFDI on Indian national income to social savings. Due to the increase in railways productivity more savings were achieved by a large decline in freight rates. In another study, Huillery (2009) examines whether colonial FDI has a long-term impact on host country economic growth. Focusing on long-term impact of colonial public investments in French West Africa on a district level, Huillery finds that districts that received more public investments during1910-1928 have significantly better performances today. This implies that increased public investment in those districts leads to a stable political environment, which encourages investment. To summarize, this literature provides evidence of a positive impact of infrastructure OFDI on host country productivity. These infrastructure OFDI filled a huge infrastructure gap in underdeveloped countries in the colonial era, which led to a productivity increase in these host countries.

Some other studies on non-colonial era also document positive impacts of infrastructure OFDI on host country economic performance. For example, Elheddad (2019) study the impact of oil FDI on six oil-exporting and producing countries during 2003-2013. The author finds that

greenfield FDI inflows to the oil sector yields a significant and positive effect on the public domestic investment. This is because public investments in these countries depend mainly on the oil sector to finance their activities. In another study, using a survey data of 228 firms with 64 mining companies, Ghebrihiwet (2019) concludes that R&D cooperation in the mining sector helps local firms gain access to new technology. These studies indicate a positive impact of infrastructure FDI on the host country economy. To summarize, there is evidence of favourable spill-over effects of infrastructure FDI on the host country economy.

5.2.3. Chinese overseas infrastructure investment

To what extent can a host country benefit from Chinese infrastructure OFDI depends on characteristics of the host country. In addition, host country characteristics determine the investment motivation in this country. Therefore, I conduct the literature review of Chinese infrastructure OFDI respectively for three regions where China has been dominant in infrastructure investment.

5.2.3.1. Chinese infrastructure investment in Africa

Researchers identify two types of motivations of FDI flow to Africa: market-seeking (where goods are produced in host country and sold locally) and non-market-seeking (Asiedu, 2002; Dreher, et al., 2017). Because demand is weak in low income countries, it is unlikely that Africa is attractive for FDI that is motivated by market-seeking. On the other hand, other studies find that market-seeking is an important investment motivation for FDI in Africa. For example, Cheung et al. (2014) compare the main drivers of China's contracted engineering projects in Africa (including building highways, water conservancy, dams and power plants) with the Chinese general OFDI. They examine data from 52 African countries for the period of 1991-2010 and find that host country GDP is important for investment of these projects, supporting the market-seeking motive. Surprisingly, they did not obtain any evidence in support of the resources-seeking motive. However, other scholars find that the resource-seeking motivation

is indeed important for Chinese OFDI in Africa. For example, Jiang, (2009) explores China's role in Africa as an energy and resource extractor based on extensive field research in Africa and China. The author reviews China's national oil company's (NOC's) investment in Africa and establishes that the slowdown of domestic production and failed entry in the U.S. energy market have driven Chinese energy companies to opt for alternative risky investments in Africa. A key motive of investment in Africa is Chinese energy security (Jiang, 2009). In addition, Brautigam & Gallagher (2014) use the open-source data collection approach to identify infrastructure loans in African and Latin American countries that were repaid by commodities during 2003-2011. They derive information on debt repayment from websites, media reports, bank announcements, and government documents, etc. They report that about 56% of infrastructure loans in African countries are repaid by commodities (often natural resources) during 2003-2011. Many of these commodity-based debt repayments were related to infrastructure projects undertaken by China. This suggests a strong resources-seeking motivation of Chinese infrastructure investment in Africa.

5.2.3.2. Chinese infrastructure investment in Europe

China's large-scale exploration of the EU infrastructure market started immediately after the 2007/08 global financial crisis. Based on information collected from 40 interviews between 2015-2017, Kirchherr & Matthews (2018) investigate drivers of Chinese infrastructure investment in Europe through Chinese technology transfer in the hydropower industry in Europe and Latin America. They find that the main drivers of Chinese hydropower investment into Europe is business consideration and increasing cooperation in the region to create a trading platform for China. This is consistent with market-seeking motive. However, they find that the motivation for securing the access to natural resources is not valid for Europe. Liedtke (2017) explores the data of 30 Chinese energy investments in Europe between 2008-2015. Their investigation suggests that Chinese energy OFDI in Europe is to serve political and

commercial goals. In addition, Curran, et al. (2017) find that both market-seeking and technology-seeking are important motivations for Chinese investment in Europe's renewable energy sector. Their qualitative investigation, drawing on published documents, existing research, media interviews and case study analyses, reveal that access to technologies and knowledge is a key motivation for Chinese OFDI in this sector. Similarly, Pareja-Alcaraz (2017) analyse Chinese investment in the energy sector of Southern European countries. The author finds that these investments are driven by the ambition to seek new markets and strategic assets. The author argues that the growth of Chinese investment in this sector during European financial crisis (2009-2012) suggests an opportunistic approach of acquiring assets at low prices, which is in line with the strategic assets-seeking motive.

To summarize, Chinese investment in Europe are mainly in the energy sector that contains advanced technology. Chinese firms are not interested in acquiring natural resources, rather they are interested in either the European market or access to technology and strategic assets.

5.2.3.3. Chinese infrastructure investment in BRI

Most discussions on China's investment in the BRI regions are policy orientated. Empirical literature is very thin. Among others, a recent Work Bank report is the most representative one. The World Bank report (2019) empirically estimates the impacts of transportation projects among the BRI corridors. An overall conclusion of the report is that transport projects invested by China in the BRI regions can expand trade, increase foreign investment, and reduce poverty-by lowering trade costs. But for some countries, the costs of new infrastructures could outweigh the gains. Policy implications concern that host countries need to take some reform measures, regarding transparency and openness of initiative, enhance economic fundamentals, and improving host country governance, to maximize positive effects of BRI transport projects.

There are a few other studies that are relevant to the motivation of China's infrastructure investment in BRI. For example, according to Lamb & Dao (2017) China has dominated electrical power generation in Myanmar and Vietnam, which is mainly undertaken by Chinese SOEs. Wu & Chong (2018) explain the growing Chinese involvement in the overseas high-speed railway investment in Thailand and Indonesia. They claim that the main motivation for Chinese investment in these two regions is geopolitical influence. Moreover, Yu (2014) claims that engaging in overseas high-speed railway construction especially in the ASEAN region will facilitate Chinese company's export of technology, high-end railways equipment and components, which supports the market-seeking motive for Chinese investment.

In summary, motivations of China's infrastructure investment in different regions are different. The main motivation of China's infrastructure investment in Africa is mainly resources-seeking. In the EU, China invested mainly in technology and the energy sector, which is motivated by both market-seeking and technology/strategic assets-seeking. The objectives of BRI are to firstly make 'physical' connections among countries in the six economic corridors through building up infrastructures, and then to expand business investment and trade. Hence, both market-seeking and resources-seeking motivations are important.

5.3. Empirical Design

5.3.1. Empirical model specifications and measurement of variables

Drawing from theories of public capital and economic growth in the above literature review, we formulate the main testable hypothesis in this paper as: China's infrastructure OFDI has a positive impact on host country economic growth. As discussed in the literature above, China's infrastructure OFDI may generate a positive impact on host country economic growth by increasing foreign investment in the host country, spreading foreign technology, expanding trade and reducing poverty.

To test the hypothesis, I use a simple dynamic panel data model to investigate the impact of China's infrastructure OFDI on economic growth of host countries.

$$Y_{it} = \beta_0 + \beta_1 Y_{i\,t-1} + \beta_2 OFDI_{i\,t-1} + \lambda X_{i\,t-1} + \varepsilon_{it} \quad (1)$$

Y_{it} is the annual growth rate of GDP per capita for country i in time t. β_0 is a constant. $Y_{i\,t-1}$ is the lagged-one annual growth rate of GDP per capita for country i. *OFDI* is the ratio of China's infrastructure investment to GDP per capita for country i. X contains other factors affecting GDP growth and are also known as control variables. They include the stock of natural resources (*NR*), trademark applications (*PATENT*), net export to China (*TRADECHINA*), country risk (*RISK*), net debt ratio (*DEBT*), human capital (*SCHOOL*), and private business investment (*INVESTMENT*). ε_{it} is the error term. Equation (1) can be written as:

$$GDPGR_{it} = \beta_0 + \beta_1 GDPGR_{i\,t-1} + \beta_2 OFDI_{i\,t-1} + \beta_3 NR_{i\,t-1} + \beta_4 PATENT_{i\,t-1} + \beta_5 TRADECHINA_{i\,t-1} + \beta_6 RISK_{i\,t-1} + \beta_7 DEBT_{i\,t-1} + \beta_8 SCHOOL_{i\,t-1} + \beta_9 INVESTMENT_{i\,t-1} + \delta_1 Year + \delta_2 Country + \varepsilon_{it} \quad (2)$$

$GDPGR_{it}$ denotes the annual growth rate of GDP per capita for country i in time t and is the main dependent variable. The main independent variable is the ratio of Chinese infrastructure investment in the host country to the country's GDP per capita ($OFDI_{i,t-1}$) . The observation of this variable takes the value of zero at the time when no investment is made. $NR_{i,t-1}$ is the ratio of the stock of natural resources to GDP. Stock of natural resources is constructed by calculating the average value of four resource rents: including oil, coal, mineral and forest rents. The resource rents are the difference between the value of production of the resource at world prices and their total cost of production. The data on natural resources was obtained from World Bank Development Indicators (The World Bank, 2019) for the year 2005-2017. I follow Blomkvist & Drogendijk (2016) to introduce a variable $PATENT_{i,t-1}$, which is the proportion

of the total count of patent applications in host country to GDP per capita of the host country. This variable is a proxy for the level of technology assets owned by the host country. The information on patents is collected from World Intellectual Property Organization (WIPO, 2019) during 2005-2017.

Among control variables, $TRADECHINA_{i,t-1}$ stands for the ratio of net exports to China from the host country scaled by the host country's GDP. Net export to China is the difference between total exports to China and total imports from China. Imports represent the value of all goods and other market services received from the China, whilst exports represent the value of all goods and other market services exported to China. The data is extracted from World Bank Development Indicators (The World Bank, 2019) in US$ for period of 2005-2017. $RISK_{i,t-1}$ refers to host country risk. This variable is measured by taking the average of scores of various country risk indicators which are published on the World Bank website. I follow Kaufmann et. al (2011) to include the following elements: control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, and rule of law. Higher values of this variable $RISK_{i,t-1}$represent low country risks and the values range from -2.5 to 2.5. $DEBT_{i,t-1}$ is the ratio of total net debt of the host country to GDP. The information on debt is obtained from the International Monetary Fund (2019) website. $SCHOOL_{i,t-1}$ refers to the proportion of total number of school enrolment to the total school-going age population in the same year. I follow Borensztein et al. (1998) in measuring this variable. However, the problem of missing data led to low observations for this variable, therefore, I interpolated the missing observations of this variable by taking three years' prior average of secondary school enrolment. Finally, $INVESTMENT_{i,t-1}$ is the ratio of gross fixed capital formation to the host country's GDP. I obtain the information on gross fixed capital formation for the host country from World bank development Indicators (The World Bank, 2019). I also control for time and

country effects. I use the lagged one period (t-1) observations for all explanatory variables. $\varepsilon_{i,t}$ is the error term.

To what extent host countries can benefit from China's infrastructure investment depends on host country characteristics, whereas host country features often determine motivations of China's investment in the country. This suggests that assessing the economic impacts of China's infrastructure investment on recipient countries should also consider the intervening effect of the investment motivation (Driffield & Love, 2007). Therefore, I introduce interaction terms between Chinese infrastructure investment and the three main motivations of China's infrastructure investment. They are resources-seeking (*NR*), market-seeking (*GDPGR*), and technology/strategic assets-seeking (*PATENT*). Therefore, I have:

$$GDPGR_{it} = \beta_0 + \beta_1 GDPGR_{i,t-1} + \beta_2 OFDI_{i,t-1} + \beta_3 NR_{i,t-1} + \beta_4 PATENT_{i,t-1} + \beta_5 TRADECHINA_{i,t-1} + \beta_6 RISK_{i,t-1} + \beta_7 DEBT_{i,t-1} + \beta_8 SCHOOL_{i,t-1} + \beta_9 INVESTMENT_{i,t-1} + \beta_{10}(GDPGR_{i,t-1} \times OFDI_{i,t-1}) + \beta_{11}(NR_{i,t-1} \times OFDI_{i,t-1}) + \beta_{12}(PATENT_{i,t-1} \times OFDI_{i,t-1}) + \delta_1 Year + \delta_2 Country + \varepsilon_{i,t} \quad (3)$$

5.4. Data and descriptive statistics

The data on Chinese infrastructure investment is obtained from *China Global investment tracker* (AIE & The Heritage Foundation, 2005). The data consists of Chinese outward infrastructure OFDI. I identified 1060 infrastructure investment projects undertaken by China out of a total 2705 transactions for the period from 2005 to 2017. The data is divided into three regions, namely Africa, Europe and BRI. These regions are defined according to the World Bank Group country classifications. Following *the Fung Business Intelligence Centre* (Chin & He, 2016) that states 65 countries along the BRI, I use these countries for the analysis on the BRI region. The data sources for all variables are described in appendix 4. A panel dataset is constructed and our sample countries consist of 101 host countries belonging to Africa, Europe and BRI, respectively. This includes 40 countries in the sample for Africa, 14 Countries in

Europe and 47 countries in the BRI. There is no overlapping regarding host countries in the regional subsamples. More specifically, the sample consists of 36 countries from Sub-Saharan Africa, 15 Middle East and North Africa, 29 Europe and 21 from Asia. The countries are classified into regions according to the World Bank (2019). In the robustness test (Section 5.5) I split the sample by the level of income and by the aid-connection with China, respectively. A list of the country classification according to region, income level, and aid connection with China is provided in Appendix 5.

Insert Table 5.1

Table 5.1 presents summary statistics for the whole sample and the three regions separately for the period 2005-2017. I observe that the mean value of *GDPGR* in BRI is 3% which is the highest amongst the three regions. This suggests that host countries in the BRI region have substantial market potential (Blomkvist & Drogendijk, 2016). The mean value of *GDPGR* in Africa is 2.2 %. The mean of China's infrastructure *OFDI* for separate regions indicate that Chinese infrastructure *OFDI* is highest in Africa. Additionally, looking at the variable *TRADECHINA*, I observe that Africa has the highest ratio of net export to China. This suggests that China is a very important trade partner for African countries in which China has heavily invested in infrastructure. The variable *PATENT & INVESTMENT* has a lower mean value for Europe than in others regions. This is because some host countries that are geographically located in the EU are excluded from the European sample as they belong to the BRI classification. For example, Russian federation has a considerable number of patents, but it is included in the BRI sample. Other variables indicate that Africa has the highest average for stock of natural resources (*NR*). Table 5.2 shows the correlation matrix for the variables. Except for the variables *RISK* and *SCHOOL*, the correlation coefficients for other variables are overall modest.

Insert Table 5.2

5.5 Empirical Results

5.5.1. The whole sample

I estimate the empirical models by the system GMM method (Roodman, 2006) to reduce endogeneity and autocorrelation problems. For all the models the performance of the Arellano-Bond test statistics shows that AR1 is significant and that AR2 is not significant at the 5% level, implying that there is no serial and auto-correlation in error terms. In addition, Hansen statistics confirms that the instruments used are acceptable.

Column (1) of Table 5.3 displays the results for the whole sample. I observe that the estimated coefficient for China's infrastructure OFDI is positively significant, which suggests that Chinese infrastructure investment is in general beneficial to host countries. The estimated coefficient for the lagged-one GDP growth is positively significant, which confirms the persistence of economic performance. The estimated coefficient for net trade with China (*TRADCHINA*) is also positively significant, which suggests that engaging in trade with China is beneficial for the host country. The estimated coefficient for private investment (*INVESTMENT*) is also positive and significant in explaining GDP growth rate.

Insert Table 5.3

Column (1) of Table 5.4 shows the GMM results with interaction terms between China's infrastructure OFDI and investment motivations. The results show that Chinese infrastructure OFDI again has a positive and significant impact on host country GDP growth. The estimated results for the stock of natural resources (*NR*) and technological assets (*PATENT*) are positive and significant. Regarding the intervening effect of the investment motivation, I observe that the estimated coefficient for the interaction term between infrastructure OFDI and resources-

seeking motivation (*NR x OFDI*) is negatively significant. This result suggests that when the motivation of investment is resources-seeking, the direct impact of Chinese OFDI on the host country is reduced. This is in line with the resource curse premise (Sachs & Warner, 2001). The resource curse proposes a negative impact of OFDI on economic growth in countries that have higher natural resources. Hayat (2018) studies the impact of natural resource FDI on economic growth and suggests that the positive impact of FDI inflow declines if the host country is expanding the size of their natural resource sector. Boschini et al. (2007) suggest that resource curse is only applicable to countries that have low-quality institutions. I believe that the resource curse effect is significant in the sample because it contains a large number of low-income, resource rich countries. The estimated coefficient for technology/strategic assets-seeking interaction terms (*PATENT x OFDI*) is also negative and significant, which suggest that when all sample host countries are combined, the intervening effect of technology/strategic assets -seeking motivation reduces the direct impact of China's infrastructure OFDI on economic growth.

In sum, for the whole sample, I find that the impact of Chinese infrastructure OFDI is positive and significant to the host country economy. However, this impact is reduced when the Chinese motivation for infrastructure OFDI is resources-seeking and technology/strategic assets-seeking.

Insert Table 5.4

5.5.2. Africa, Europe and BRI

I now compare the GMM results shown in Table 5.3 across Africa (column (2)), Europe (column (3)) and BRI (column (4)). I observe that the estimated coefficient for China's infrastructure OFDI is positively significant for both Africa countries and countries in the BRI region, but it is insignificant for host countries in Europe. The result on Africa is in line with

Nguepjouo (2017) and it is contrary to concerns of Chinese infrastructure OFDI exploiting African workers and economy. The insignificant impact of Chinese infrastructure OFDI on European host countries is also consistent with the literature. China's motivation of infrastructure OFDI in Europe is mainly technology/strategic assets-seeking (Curran, et al., 2017; Kirchherr & Matthews, 2018). Driffield & Love, (2007) argue that the spill-over effect of OFDI may be insignificant or even negative, if the host country is more research and development intensive than the source country. This is because is such a scenario, the source country may steal technology from the host country without offering any benefits. Europe is more advanced in R&D facilities, and technology is the main driver of economic growth in Europe. Therefore, it is unlikely that Chinese infrastructure investment could enhance economic performance of European host countries.

Similar to African countries, the estimated impact of Chinese infrastructure OFDI on host countries along the BRI region is also positive and significant. This result is in line with the World Bank report (2019) and Westarp & Schinas, (2017) who find that Chinese infrastructure investment along BRI routes can result in decreased transit time and can economically benefit the region by enhancing trade. In sum, this set of results show that China's infrastructure investment is beneficial for recipient countries in Africa and along the BRI region, but it is not significant in European recipient countries.

Regarding other variables, I emphasize the difference across the three regions. I observe that (1) The estimated impact of nature resources stock (*NR*) is negative for African countries, whereas it is insignificant for the European and BRI host countries. This result suggests that the sample host countries that have high stock of natural resources often have weaker economic performance. This is in line with the resource curse premise (Sachs & Warner, 2001). (2) The estimated impact of technology (*PATENT*) is positively significant for European countries, but it is not significant for African and BRI countries. This may be explained by the notion that

Europe is much more advanced in R&D facilities, and up-to-date technology is the main driver of economic growth in Europe. (3) The estimated impact of trade with China (*TRADECHINA*) is positively significant for African recipient countries, whereas it is insignificant for EU and BRI host countries. This result indicates that trade with China is very important for African economies. (4) human capital indicator (*SCHOOL)* positively explains GDP growth for EU countries, which is in line with the notion that EU economies are driven by technology and knowledge incentive services sectors which contain high level of human capital. This result is also consistent with the result (2) regarding the impact of technology (*PATENT*) on GDP growth for EU host countries.

Moving on to the GMM results on the intervening effect of investment motivations, which are shown in Table 5.4 across Africa (column (2)), Europe (column (3)) and BRI (column (4)). Regarding other variables, I observe that (1) the estimated impact of the nature resources stock (*NR*) is negative for African countries, whereas it is insignificant for the European and BRI host countries, which is consistent with the result in Table 5.3 on this. (2) the estimated impact of net export to China (*TRADECHINA*) is insignificant for both African and BRI host countries, but it is negatively significant for host countries in Europe. This is evident of Europe's trade deficit with China which affects its GDP growth rate negatively (eurostat, 2019). (3) The estimated impact of human capital indicator (*SCHOOL*) positively explains GDP growth for EU countries, but it is insignificant for both African and BRI host countries, which is also consistent with the result in Table 5.3

As far as the impact of China's OFDI is concerned, I find that (1) the estimated coefficient for China's infrastructure OFDI is positively significant for all three regions. This result suggests that the direct impact of China's infrastructure investment is by and large beneficial for recipient countries. (2) the interaction term between infrastructure investment and market-seeking motivation (*GDPGR x OFDI*) is negative and significant for the BRI

region. This implies that when the motivation for Chinese infrastructure investment is market-seeking for this region, the direct positive impact of Chinese OFDI on host country is reduced. This finding is in line with Yu (2014) who asserts that investment in high-speed railway construction in BRI region is to facilitate Chinese firms' exports in the region. (3) The interactive term between infrastructure investment and natural resources (*NR x OFDI*) is negatively significant for Africa. This means that when the Chinese motivation of infrastructure investment is to seek natural resources in African countries, the direct positive impact of Chinese OFDI on host country is reduced. (4) the interactive term between infrastructure investment and technology/strategic assets-seeking motivation (*PATENT x OFDI*) is negatively significant for European countries. This suggests that if the Chinese motivation to invest in Europe is to seek technology/strategic assets, the impact of infrastructure OFDI on host country GDP growth rate will be reduced. This result confirms the negative spill-over effect of technology (Driffield & Love, 2007).

To summarize the results so far, Firstly, for Africa where the sample consists of low income, low technological and high-risk countries, Chinese infrastructure OFDI has a positive effect on the economic performance of the host country. However, the results indicate that China's infrastructure investment in Africa is mainly driven by resources-seeking. This investment motivation reduces the direct positive effect of Chinese infrastructure investment on African countries. Secondly, for Europe, a region characterised with high income, high technology and low risk, Chinese infrastructure OFDI has no significant impact on GDP growth of host countries. Moreover, as the interaction term between technology and OFDI shown in column (3) of Table 5.4 is negatively significant in explaining GDP growth for the EU host countries. This result can be explained by the motivation of China's infrastructure investment in the EU. Because China's infrastructure investment in the EU has been mainly in the energy sector and is mainly driven to seek technology and strategic assets, China infrastructure investment in the

EU may generate a negative spill-over effect. According to Driffield & Love (2007) if the source country has a lower R&D intensity than the host country, then a negative spill-over effect may exist. These spill-over effects can be generated from a possible market stealing effect of relative technology laggards. Market-stealing effect is caused by more productive MNEs taking market share from less efficient domestic producers, forcing them up the average cost curve and lowering their productivity (Harrison & Aitken, 1999). Thirdly, like Africa, Chinese infrastructure OFDI has a positive effect on the economic performance of host countries along the BRI region. However, this positive direct impact will be reduced by the market-seeking investment motivation of Chinese investment in this region. This is consistent with Miniesy & Elish (2017)who finds that a considerable market size (GDP) provide opportunities for foreign investors for the efficient utilisation of resources and to accrue economies of scales. Typically, countries in Europe enforce barriers for Chinese FDI and in Africa, the market size is relatively small. This is why market-seeking interaction term for Europe and Africa is insignificant. García-Herrero & Jianwei (2016) assess the impact of Chinese infrastructure investment in BRI on trade benefit by reducing transport costs across the region. They find that in such a scenario, the European countries gain from trade with China whereas the Asian countries are the biggest losers. Hence the market-seeking motive for BRI countries has a negative relationship with host country growth.

5.6. Robustness tests

5.6.1. Splitting sample by the level of income

The results in Section 4 show that Chinese infrastructure OFDI impacts the economic performance of host countries differently across Africa, Europe, and BRI regions. A key difference in the host country features between Europe versus Africa and BRI countries is in the level of economic development and technology advance. Developed European countries

have already completed industrialization process and have developed high-tech content services sectors as the driver of their economic growth post industrialization. This contrasts with sample host countries in Africa and the BRI region which consists of low income, low technological and weak governance. Given the level of development differs, China invested in these regions with different motivations. Both the literature and the empirical results in Tables 5.3 & 5.4 show that resources-seeking and 1 market-seeing are important for Africa and BRI countries, whereas seeking for technology and strategic assets are more important for developed European economies. On this ground, I split the whole sample into high-income vs. low-income countries. I split the sample by using the list of high income and low-income countries classified by the world bank (The World Bank, 2019). Based on this sample split I can check the robustness of the results obtained in Table 5.3 and Table 5.4, and can provide further confirmation to support the argument that the impact of China's infrastructure investment on recipient countries depends on characteristics of host countries.

Table 5.5 shows the GMM estimation results for high versus low income countries, respectively. I focus on discussing the results that are different between the two subsamples. Table 5.5 shows that (1) the impact of Chinese infrastructure OFDI is insignificant (when considering investment motivation) for high-income countries, whereas it is positive for low-income countries in both columns (3) and (4). This result is in line with the results obtained in both Table 5.3 and Table 5.4 for Europe versus Africa. It confirms that China's infrastructure investment is more likely to be beneficial for less developed low-income host countries. This is because these countries lack financing for infrastructure investment and the demand for infrastructure is very high for supporting their economic activities. Chinese infrastructure investment fills the infrastructure gap in low-income economies. In contrast, in high-income economies, infrastructure investment is already saturated and hence further investment is not proving to be beneficial for the economic growth rate (Devarajan, et al., 1996). (2) the

estimated impact of technological capability (*PATENT*) is positively associated with GDP growth for high-income countries, but it is insignificant for low-income countries. This confirms that technology is the main driver of economic growth in high income countries. (3) The estimated impact of net exports (*TRADECHINA*) is positively significant for low-income countries, whereas it is insignificant for high-income countries. This result suggests that China is an important trade partner especially for low-income countries and trade with China is more important for low income countries as compared to high income countries. (4) the estimated impact of debt is positively significant in explaining GDP growth for low income countries (column (3)), but it is not important for growth of high-income countries. This suggests that the reliance of real economic activities on borrowing in less developed low-income countries is very high. (5) the estimated coefficient for country risk indicator (*RISK*) is positively significant only for high-income countries but not for low income countries. This suggests that social stability and country governance are better in high-income countries, which promotes economic growth.

Regarding the intervening effect of the investment motivation, I observe that (1) for high-income recipient countries, technology/strategic-seeking motivation weakens the direct impact of Chinese infrastructure investment in these countries (column (2)). This result again confirms the negative spill over effect of technology-seeking OFDI (Driffield & Love, 2007). (2) For low-income countries, resources-seeking motivation reduces the direct positive impact of Chinese infrastructure investment. This result is consistent with the result for the African sample. This can be explained by that low-income countries in general have weak institutions which leads to higher corruption and hence a negative impact of natural resources (Boschini, et al., 2007). It again confirms that the resources curse problem is severer for less developed countries.

5.6.2. Splitting sample by aid connection with China

Unlike China's official aid projects, China's overseas infrastructure financing is less concessional and more commercial, hence financial flows involved in China's infrastructure OFDI should be allocated to advance China's economic interests (Dreher, et al., 2017). China's official aid projects in host countries are relevant to examining China's infrastructure investment decision in the host country. This is because the aid connection between China and the host country can be used as a proxy for the closeness between China and the host country. Cheung et. al. (2014) use whether the host country has an official diplomatic tie with Taiwan as a measure of closeness between China and the host country when they examine China's contracted engineering projects in Africa. In addition, if the China's official aid projects are related to host country infrastructure projects, then it will alter the direct impact of Chinese infrastructure investment on the economic performance of the host country. Akramov (2012) finds that aid to certain sectors including infrastructure contribute to economic growth. Moreover, some scholars suggest that China's foreign aid motives to smooth the way for Chinese companies to gain access to resources Brautigam (2011), which implies that China's official aid projects are likely to be connected to China's other economic activities in recipient countries. Moreover, China's official aid projects are often directed to less developed and low-income countries. On this ground, I split the sample by the aid connection between China and the host country in which China's infrastructure investment takes place. I split the sample by taking the median of Chinese official aid financing to the host country during 2005-2017. More specifically, if a host country has received China's official aid which is larger than the median of the sample, then it is classified as a high aid connection country, otherwise, the country belongs to low aid connection group. The information on China's official aid in the host country is collected from the *AidData* (Dreher, et al., 2017).

Insert Table 5.6

The GMM results are displayed in Table 5.6. Regarding the control variables, it is interesting to observe the followings: (1) the estimated impact for technology (*PATENT*) is positively significant for low aid connection host countries (columns (3) and (4)), but it is not significant for highly connected countries. This may be explained by that low aid connection subsample group contains more developed high-income countries. (2) the estimated impact of net trade with China (*TRADECHINA*) is positively associated with GDP growth for high aid connection host countries (column (1)), but it is not significant for low aid connection countries. The result is consistent with the result in earlier tables where I have seen that China is an important trade partner especially for low-income countries, and China's official aid financing have gone mostly to low-income countries. (3) the estimated impact of debt (*DEBT*) is positive and significant high aid connection countries, whereas it is insignificant for low aid connection countries. Similar to the result on low income sub-sample in Table 5.5, this suggests that the reliance of real economic activities on borrowing in less developed countries (who received more China's official aid) is very high.

Regarding the key independent variable, Chinese infrastructure OFDI has a positive impact on GDP growth for high aid connection countries in both columns (1) and (2) in Table 5.6, but this impact becomes insignificant for low aid connection countries (columns (3) and (4)). This result suggests that countries that receive more official aid from China also benefit from Chinese infrastructure investment. This confirms the conjecture that Chinese official aids are complementary to China's infrastructure investment in the host country, and vice versa. In a case study, Brautigam (2011) compares Chinese foreign aid with OECD countries foreign aid and finds that Chinese foreign aid consists of a mix of grants, interest free loans and concessional loans. The focus of Chinese foreign aids is on infrastructure projects as compared to social projects. Essentially, unlike the OECD, Chinese foreign aids are provided not on the basis of fixed rules and difficult to meet criteria, rather it is flexible and catered to the countries

need. In addition, Charles et al. (2013) highlight that after the 2008 financial crisis, the focus of Chinese official aids has shifted towards infrastructure investment, which suggests that the Chinese government prefer to initiate foreign aid projects that complement Chinese infrastructure OFDI.

Regarding the intervening effect of the investment motivation, I find that for high-aid recipient countries resources-seeking motivation weakens the direct impact of Chinese infrastructure investment in these countries. This is similar to the result for low-income and African countries. For low aid recipient countries, technology/strategic assets-seeking motivation reduces the direct impact of Chinese infrastructure investment in these countries. This result again confirms the Driffield & Love (2007) hypothesis of the negative spill over effect of China's technology/assets-seeking OFDI and is similar to the estimated results of high-income and European countries sub-sample.

5.7. Conclusion

In this chapter, I empirically examine the impact of Chinese overseas infrastructure investment on recipient countries based on 101 host countries during the period of 2005-2017 which involves 1060 overseas infrastructure investment projects. Using the system GMM estimation procedure, I find that (1) the impact of China's infrastructure investment on host country GDP growth is overall positive for the whole sample. But this impact differs across Africa, Europe and the BRI region. I find that Chinese infrastructure investment has a positive effect on Africa and BRI, whereas this impact is insignificant for European host countries. Further analysis shows that Chinese infrastructure investment in low-income countries is positive. This impact is also positive for host countries having close aid ties with China. In contrast, the impact of Chinese infrastructure OFDI is insignificant for both high-income countries and countries having low aid ties with China. (2) Motivations of China's investment alter the direct impact

of China's infrastructure OFDI on host countries. the results show that the intervening effect of investment motivation varies with host country characteristics. More specifically, I find that resources-seeking motivation is important for African countries, low income host countries, and countries that maintain high-aid connections with China. Resources-seeking motivation reduces the direct positive impact of Chinese infrastructure OFDI on these countries. I also find that if China's infrastructure investment is market-seeking, then the intervening effect of investment motivation is negative for host countries in the BRI region. The intervening effect of the technology/strategic assets-seeking motivation is negative for European countries, high-income host countries and countries with weak aid ties with China.

The findings suggest that Chinese infrastructure OFDI has a positive effect on low-income and low-tech countries. An implication of this paper is for the low-income host country government is to establish policies to facilitate Chinese infrastructure investment. However, it is equally important to identify the motivation of Chinese infrastructure investment in order to maximize the scale of benefit.

Table 5.1: Summary Statistics

	Whole sample			Africa			Europe			BRI			t-statistics		
VARIABLES	*N*	μ	σ	*N*	μ	σ	*N*	μ	σ	*N*	μ	σ			
GDPGR	1,276	2.330	5.115	507	2.228	4.907	182	0.415	2.445	599	3.006	5.664	4.773	-6.000	-2.419
OFDI	1,286	0.232	0.925	517	0.396	1.322	182	0.009	0.045	597	0.141	0.398	3.948	-4.444	4.493
NR	1,201	2.564	3.233	479	3.398	2.913	168	0.177	0.441	565	2.561	3.565	14.268	-8.646	4.102
PATENT	1,286	0.278	0.664	517	0.085	0.242	182	0.222	0.388	599	0.474	0.888	-5.531	-3.725	-9.656
TRADECHINA	1,228	0.035	0.200	490	0.069	0.306	182	0.009	0.019	568	0.015	0.062	2.643	-1.309	4.099
DEBT	1,306	-1.565	6.409	516	-2.664	6.068	182	-1.715	5.186	620	-0.753	6.905	-1.881	-1.741	-4.905
RISK	1,319	-0.204	0.929	526	-0.650	0.578	182	1.285	0.496	623	-0.269	0.809	-40.332	24.597	-9.028
SCHOOL	1,095	75.471	31.744	417	47.934	23.159	179	113.592	17.918	494	85.001	19.150	-33.827	17.403	-26.442
INVESTMENT	1,224	23.038	7.117	484	23.321	8.959	182	20.693	3.484	570	23.441	5.959	3.849	-5.908	-0.260

Notes: N is the number of observations, μ is mean and σ is the standard deviation. The variable GDPGR is stated as a percentage. Explanation of variables: see appendix 4

Table 5.2: Correlation Matrix

	GDPGR	OFDI	NR	PATENT	TRADECHINA	DEBT	RISK	SCHOOL	INVESTMENT
GDPGR	1.000								
OFDI	0.042	1.000							
	(0.13)								
NR	-0.021	0.049	1.000						
	(0.47)	(0.09)							
PATENT	0.051	0.014	-0.099**	1.000					
	(0.07)	(0.63)	(0.00)						
TRADECHINA	0.039	-0.013	-0.066*	-0.048	1.000				
	(0.18)	(0.65)	(0.03)	(0.09)					
DEBT	0.121***	-0.049	0.417***	-0.017	-0.097***	1.000			
	(0.00)	(0.08)	(0.00)	(0.55)	(0.00)				
RISK	-0.120***	-0.189***	-0.362***	-0.042	-0.078**	0.129***	1.000		
	(0.00)	(0.00)	(0.00)	(0.13)	(0.01)	(0.00)			
SCHOOL	-0.112***	-0.215***	-0.306***	0.141***	-0.126***	0.104***	0.724***	1.000	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
INVESTMENT	0.141****	0.043	0.056	0.007	-0.044	0.030	0.016	-0.020	1.000
	(0.00)	(0.13)	(0.06)	(0.80)	(0.14)	(0.30)	(0.58)	(0.52)	

Explanation of variables: see appendix 4

*t statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Table 5.3 Impact of Chinese infrastructure investment on host countries

	All	Africa	Europe	BRI
L.GDPGR	0.362***	1.547***	0.477***	0.347***
	(5.26)	(4.44)	(3.87)	(3.98)
L.OFDI	1.857*	2.466*	6.516	1.469*
	(2.05)	(2.20)	(0.69)	(2.07)
L.NR	-0.070	-1.248*	-1.148	-0.249
	(0.51)	(1.97)	(0.38)	(0.83)
L.PATENT	0.055	- 0.438	2.537**	-0.085
	(0.11)	(1.30)	(2.77)	(0.13)
L.TRADECHINA	2.645*	16.772*	-0.493	2.289
	(2.14)	(2.06)	(0.02)	(0.34)
L.DEBT	0.033	0.397	0.356	-0.041
	(0.61)	(1.66)	(1.53)	(0.81)
L.RISK	-0.184	-3.854	-2.118	-1.788
	(0.11)	(1.53)	(1.33)	(1.30)
L.SCHOOL	0.030	0.071	0.075*	0.093
	(0.64)	(1.27)	(2.19)	(1.75)
L.INVESTMENT	0.067*	0.337*	-0.166	0.029
	(2.07)	(2.06)	(0.71)	(0.45)
_cons	-2.698	-11.549	-0.851	-5.282
	(0.65)	(0.84)	(0.14)	(0.31)
N	796	296	154	335
ar1	-3.213	-2.100	-3.076	-2.808
	(0.00)	(0.036)	(0.00)	(0.01)
ar2	-0.265	1.040	-1.873	-1.526
	(0.79)	(0.300)	(0.06)	(0.13)
sargan	42.280	23.660	32.900	37.980
	(0.07)	(0.166)	(0.11)	(0.38)

*Notes: First difference are taken with lagged levels used as instruments. These instruments include lagged-one up to lagged-ten of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. The instruments used in the level equations in the system GMM estimations are the first differences of the explanatory variables, lagged-one and lagged-two of explanatory variables. For explanation of variables: see appendix 4. T-statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Table 5.4 Impact of Chinese infrastructure investment on host countries: the intervening effect of investment motivation

	All	Africa	Europe	BRI
L.GDPGR	2.130***	1.547***	0.434***	1.1165***
	(6.96)	(4.44)	(4.04)	(3.80)
L.OFDI	9.952*	15.153*	23.139*	5.273*
	(2.09)	(2.55)	(1.79)	(2.08)
L.NR	0.789*	-1.911*	-2.196	-0.240
	(2.33)	(2.31)	(1.07)	(0.78)
L.PATENT	12.737*	-2.030	1.038	1.989
	(2.46)	(0.56)	(1.10)	(1.51)
L.TRADECHINA	6.464	-0.926	-20.347*	4.796
	(1.44)	(0.19)	(2.42)	(0.74)
L.DEBT	-0.212	0.109	0.056	-0.199
	(1.60)	(0.24)	(0.38)	(1.42)
L.RISK	2.573	-7.311	1.205	0.861
	(1.03)	(1.79)	(1.29)	(0.94)
L.SCHOOL	0.021	0.075	0.023*	-0.011
	(0.23)	(1.19)	(2.71)	(0.43)
L.INVESTMENT	-0.150	0.299*	-0.339	-0.026
	(1.63)	(2.45)	(1.82)	(0.43)
L.GDPGR x L.OFDI	-0.520	-1.173	5.020	-0.793*
	(0.93)	(1.71)	(1.26)	(2.29)
L.NR x L.OFDI	-1.325*	-2.253*	162.211	-0.199
	(1.99)	(2.08)	(0.47)	(0.28)
L.PATENT x L.OFDI	-16.240*	-21.803	-143.523*	-3.812
	(2.54)	(1.04)	(2.43)	(1.57)
_cons	-4.164	10.573	6.876	,1.888
	(0.38)	(0.32)	(1.37)	(0.51)
N	801	302	154	298
ar1	-2.794	-2.300	-2.740	-2.720
	(0.01)	(0.02)	(0.01)	(0.01)
ar2	0.226	1.010	-1.859	-1.52
	(0.82)	(0.31)	(0.06)	(0.13)
sargan	25.350	4.840	18.39	11.380
	(0.19)	(0.99)	(0.82)	(0.66)

*Notes: First difference are taken with lagged levels used as instruments. These instruments include lagged-one up to lagged-eleven of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. The instruments used in the level equations in the system GMM estimations are the first differences of the explanatory variables lagged-one and lagged-two of explanatory variables. For explanation of variables: see appendix 4. T-statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Table 5.5 Impact of Chinese infrastructure investment on host countries: high-income low-income countries

	Income			
	High	High with motivation	Low	Low with motivation
L.GDPGR	1.577***	0.483***	0.152	0.252
	(6.84)	(5.88)	(1.66)	(1.74)
L.OFDI	-11.563	32.410	1.725*	3.593*
	(1.91)	(1.89)	(1.99)	(2.00)
L.NR	0.609	-0.287	-0.333	-0.181
	(1.85)	(1.04)	(1.58)	(0.65)
L.PATENT	4.384*	1.016*	1.162	2.792
	(2.12)	(2.23)	(0.61)	(1.38)
L.TRADECHINA	16.177	-2.632	6.755*	13.821*
	(1.12)	(0.31)	(2.41)	(1.95)
L.DEBT	-0.147	0.072	0.377*	0.190
	(1.66)	(1.33)	(2.13)	(1.20)
L.RISK	4.265*	0.65	0.268	-0.850
	(2.47)	(1.54)	(0.29)	(0.72)
L.SCHOOL	-0.172	-0.012	-0.008	-0.021
	(1.88)	(1.18)	(0.34)	(0.68)
L.INVESTMENT	-0.225	-0.0352	0.044	0.162
	(1.40)	(0.72)	(0.68)	(1.32)
L.GDPGR x L.OFDI				
		-2.49		-0.208
		(1.37)		(0.76)
L.NR x L.OFDI				
		-3.347		-0.510*
		(0.91)		(1.98)
L.PATENT x L.OFDI		-9.586**		-3.184
		(2.34)		(1.83)
_cons	-11.837*	9.796**	-4.124	-11.910
	(2.57)	(2.87)	(0.51)	(0.63)
N	384	382	324	339
ar1	-2.704	-3.22	-2.697	-3.099
	(0.01)	(0.00)	(0.01)	(0.00)
ar2	-1.041	-1.750	-0.354	0.272
	(0.30)	(0.08)	(0.72)	(0.79)
sargan	7.500	19.020	16.730	22.420
	(0.96)	(0.39)	(0.78)	(0.92)

*Notes: First difference are taken with lagged levels used as instruments. These instruments include lagged-one up to lagged-twelve of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. The instruments used in the level equations in the system GMM estimations are the first differences of the explanatory variables lagged-one and lagged-two of explanatory variables. For explanation of variables: see appendix 4. T-statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.00*

Table 5.6 Impact of Chinese infrastructure investment on host countries: high-aid connection vs low-aid connection countries

	Aid Connection			
	High	High with motivation	Low	Low with motivation
L.GDPGR	0.182*	0.068	0.787**	0.542**
	(1.99)	(0.65)	(3.33)	(2.97)
L.OFDI	1.616*	5.400*	2.254	19.10
	(2.12)	(2.14)	(1.56)	(1.90)
L.NR	-0.153	-0.122	-0.520	-0.602
	(0.49)	(0.37)	(1.55)	(0.90)
L.PATENT	2.191	3.933	0.979*	1.108*
	(1.06)	(1.10)	(1.97)	(2.63)
L.TRADECHINA	6.077*	3.312	-21.11	-20.45
	(2.50)	(1.59)	(1.64)	(1.01)
L.DEBT	0.244*	0.323*	-0.089	0.042
	(2.51)	(2.57)	(1.11)	(0.35)
L.RISK	0.728	0.921	-0.977	-1.420
	(0.83)	(0.68)	(0.76)	(1.30)
L.SCHOOL	-0.02	-0.020	0.042	0.027
	(0.73)	(0.52)	(0.62)	(1.36)
L.INVESTMENT	0.029	0.008	-0.089	-0.004
	(0.67)	(0.12)	(1.32)	(0.06)
L.GDPGR x L.OFDI		0.219		-2.801
		(1.22)		(1.43)
L.NR x L.OFDI		-0.647*		-4.424
		(2.07)		(1.65)
L.PATENT x L.OFDI		-5.565		-8.885***
		(1.40)		(3.68)
_cons	0.213	-1.443	2.570	2.082
	(0.05)	(-0.40)	(0.47)	(0.41)
N	385	391	355	352
ar1	-3.332	-2.145	-2.290	-2.320
	(0.00)	(0.03)	(0.02)	(0.02)
ar2	-0.066	0.022	-1.290	-1.350
	(0.95)	(0.98)	(0.19)	(0.18)
sargan	12.160	10.900	30.400	31.610
	(0.88)	(0.93)	(0.17)	(0.49)

*Notes: First difference are taken with lagged levels used as instruments. These instruments include lagged-one up to lagged-nine of explanatory variables. Time effects are controlled in all estimations by adding time dummies. These time dummies are also used as additional instruments. The instruments used in the level equations in the system GMM estimations are the first differences of the explanatory variables lagged-one and lagged-two of explanatory variables. For explanation of variables: see appendix 4. T-statistics in parentheses: * p<0.05, ** p<0.01, *** p<0.001*

Chapter 6 Conclusion

6.1 Introduction

China's infrastructure OFDI has seen a remarkable growth over the past 15 years. As a percentage of the Country's GDP, China's average infrastructure spending in 2018 was 10 times higher than that of the United States (Statista, 2021). This scale of investment has global ramifications; such as cost reductions for stakeholders, host country debt dependency, negative environmental impact etc. However, discussing every aspect of China's infrastructure OFDI is beyond the scope of this research. This thesis discusses the implication of Chinese infrastructure OFDI on two main participants; Chinese firms and host countries.

In the first part, implications for Chinese firms and their stakeholders is examined. Infrastructure OFDI on such a large scale raises the question whether China's infrastructure OFDI drive is generating profits for firms. If these projects are not generating profits, then continued spending on these can cause economic distress for the country. Moreover, theory suggests that a firm's motivation of engaging in OFDI is to increase profitability (Dunning, 1980). If Chinese firms are not investing overseas to enhance profitability, then it is likely that they will have some other political motive. The second issue is whether China's infrastructure OFDI is displacing domestic fixed investment. When a firm engages in infrastructure OFDI, it invests its limited capital abroad. In such a case, it is unlikely that a similar kind of investment will be made at home. This may displace fixed investment in the firm's home country. If there are too many such investments, capital may flow out and similar fixed investments in China will decrease. In aggregate such a scenario may leave Chinese industry deprived of necessary investment and unable to compete with its western counterparts

The results of the first part of this research have implications for the Chinese firm's Chief Executive Officers (CEO's) and other stakeholders e.g. SOB's. It documents that Chinese infrastructure OFDI is generating firm's shareholder wealth. This should encourage CEO's to engage in more overseas infrastructure activities. However, CEO's should also practice caution when deciding which projects to invest in. Host country risks, such as corruption, terrorism, regime change etc. can abruptly alter the terms of their contract or terminate it altogether. Therefore, CEO's should consider to invest in projects that promise small frequent and safer returns rather than risky abnormal returns.

The second part of the research discusses the implication of China's infrastructure OFDI on host countries. On the one hand, China's infrastructure OFDI fills the infrastructure gap in developing countries and helps them accelerate GDP growth. On the other hand, China is also criticized of neo colonialism by cornering these countries into a debt trap. In this research, I analyse the impact China's infrastructure OFDI has on host country's economic growth. The data for this research is project level data which distinguishes this research from others and ensures accuracy. As a whole, this research provides a complete perspective of China's infrastructure OFDI.

The results for the second part document that Chinese infrastructure OFDI drive host country GDP growth. These results have implications for host country government and construction partners. Host country government can benefit from China's infrastructure investment by securing basic infrastructure which is crucial for GDP growth. It is easier for developing countries to seize investment from China as compared to other global financing institutes. This is because China's investment is not controlled by strict rules and regulations but is flexible and agile. Host country's friendly relationship with China also plays a major role in attracting Chinese investment. Host country government should ensure that Chinese infrastructure

investment is directed towards projects that truly contributes to long-term growth of the country.

The thesis follows the following structure. In the first part of the thesis I discuss the journey through which China's infrastructure OFDIs evolved to its current level and the influence it has on Chinese corporate sector and host country's economic growth. Three main aspects are explored; (1) I find whether Chinese firms' infrastructure OFDI has a positive influence on these firms' profitability. (2), I assess the extent to which China's infrastructure OFDI influence the investment behaviour of Chinese listed firms. I also review the two channels (production and finance) through which infrastructure OFDI impact the investment behaviour of Chinese listed firms. (3) I examine the impact of China's infrastructure OFDI on host country economic growth. I also observe how difference in China's motivation of investment in a particular region, alter this impact.

6.2 Summary of main findings

In Chapter 3, I discuss the implications of China's overseas infrastructure investment on Chinese economy by analysing firm profitability. Since China's overseas infrastructure investment is dominated by SOEs, decisions to invest may not always be based on seeking profit. This is because China's SOEs political connections can pressurize firms to fulfil governments objectives. Literature suggests that Chinese government may pressurize SOEs to invest overseas to enhance soft power in the region (Jakobson, 2009), or gain access to natural resources (Rodriguez & Bustillo, 2011) etc. Investing labour and resources in such projects can have detrimental impact on SOEs profitability. Therefore, it is important to analyse whether Chinese listed firms are generating profits from their overseas infrastructure investment or not. Additionally, China's global portfolio has raised questions regarding varying firm performance in different regions. As China's political objectives for investing differs across these regions,

a comparison can helps us understand whether investment in different regions can impact China's OFDI differently?

Using the data from American Enterprise Institute & The Heritage Foundation (2005), of 1437 infrastructure OFDI projects carried out by 74 Chinese listed firms during the year 2005 - 2019, I document that the Chinese listed firm's profitability increases as a result of infrastructure OFDI. This positive impact is also present across the three regions; Africa, Europe and BRI. This result is based on two main research methodologies. First, I employ Heckman two step method which mitigates the sample selection bias issue. Secondly, I use system GMM method to address the endogeneity issue. Using both these estimation methods, I find that Chinese infrastructure OFDI has a positive impact on firm's profitability. This implies that Chinese infrastructure OFDI is aimed at enhancing firm profitability and is not carried out only to achieve political objectives. Additionally, I also examine if being a highly state-owned or low state-owned firm impacts Chinese firms' profitability differently. The results suggest that low state-owned firms generate a positive impact on firm profitability whereas, high state-owned firms do not. This is consistent with the premise that low state-owned firms are similar to private firms i.e. they are competitive, profit oriented, risk averse and experience minimal government interference. These findings are significant as they suggest that overall, China's infrastructure OFDI is beneficial to Chinese listed firms. This means that in aggregate, China's economy may benefit from these infrastructure investments. However, Chinese government need to monitor and identify problems related to infrastructure OFDI in high state-owned firms.

In Chapter 4, I focus on China's the impact of infrastructure OFDI on firm's domestic fixed investment. In the previous chapter, the discussion focused on firm's profitability and the empirical findings suggested a positive role of infrastructure OFDI on firms' profitability. This provides us with a part of the whole picture. An important next step is to analyse whether the

firm re-invests this profit and other source of finances, to gain maximum profit. This discussion will reveal whether China's decision to engage in infrastructure OFDI crowds-in or crowds-out domestic investment. Empirical results provide evidence that Chinese listed firms that performed infrastructure OFDI also increased their fixed investment. In other words, infrastructure OFDI complements firms' domestic investment by creating forward and backward linkages (Desai, et al., 2005). The impact of infrastructure OFDI on firm's home country fixed investment is examined via two channels. The first is the production channel which is observed by including an interaction term of firm's sales growth with infrastructure OFDI. The second is the financial channel, observed by including the interaction term of cash flow with infrastructure OFDI. Using Heckman two step estimation, the results suggest that infrastructure OFDI has a positive impact on firm's home country fixed investment. However, the intervening impact of the interaction term, cash flow and infrastructure OFDI, reduces this direct positive impact. This is consistent with the premise that the positive impact of infrastructure OFDI on firm's domestic investment is reduced via the finance channel. These results are consistent over the three regions and the whole sample.

In Chapter 5, we document the effects of China's infrastructure OFDI on the host country's GDP growth. China has an enclosed operational system of conducting infrastructure OFDI, where Chinese state-owned banks and firms are involved in procurement, construction and financing the project. This enclosed system provides autonomy to Chinese government and raises concerns of neo-colonialism in host countries. Concerns are also arising regarding China cornering host countries into a debt trap. Moreover, China is also accused of luring developing countries to build unnecessary infrastructure in order to dump its overcapacity of production on these countries. This research addresses these concerns. Based on 101 host countries, I find a positive impact of China's infrastructure OFDI on the host country GDP growth. Splitting the sample into three regions; Africa, Europe and BRI reveal that the impact of China's infrastructure OFDI is positive on Africa and BRI, whereas it is insignificant in Europe.

Moreover, China's infrastructure investment in low income countries and countries with close aid ties with China is positive. This means that China's infrastructure OFDI has a positive impact on host country with large infrastructure gaps. European, high income or countries that do not have close aid ties with China does not significantly benefit from China's infrastructure OFDI. Chapter 5 also reviews the intervening effect of motivation of investment. The results are consistent with the view that China's motivation to grab natural resources reduces benefits to the host country. I find that when China's motivation to invest is to seek natural resources, the positive impact of China's infrastructure OFDI reduces on these countries. This includes Africa, low income and countries with close aid ties with China. Moreover, I also discover that China's motivation to seek technology reduces the positive impact of China's infrastructure OFDI for Europe, high income and countries that experience weak aid ties with China. These results provide evidence that the positive impact of China's infrastructure OFDI declines when China is conducting infrastructure OFDI in countries with superior technological prowess.

6.3 Policy Implications

Overall findings suggest that China's infrastructure OFDI drive has been successful. After the initiation of BRI, concerns regarding troubled Chinese infrastructure projects emerged which raised questions about performance of the investor firms. These concerns also gave rise to the problem whether China's infrastructure investment is politically motivated. The findings of this research alleviate these concerns as shown by the result in chapter 3, that suggest infrastructure OFDI has a positive impact on Chinese listed firm profitability. However, the results also state that China's high state-owned firms do not generate profitability from engaging in Chinese infrastructure OFDI. This implies that China's highly state-owned firms can be pressurized into conducting unprofitable infrastructure OFDI projects but are carried out to fulfil state objectives. CEO's of Chinese firms, especially high state-owned, need to be cognizant of this and try to engage in profitable projects. Our research also reassures the CEO's

and other stakeholders of Chinese firms that infrastructure OFDI is generating shareholder value. Firms should continue investing in infrastructure abroad.

In Chapter 4, this research alleviates concerns regarding investment decisions of Chinese listed firms. Chinese participants concern that infrastructure OFDI may be replacing domestic investment can be dismissed as results suggest that infrastructure OFDI has a positive impact on listed firm's home country fixed investment. However, CEO's of Chinese firms must continue overseas infrastructure investment as it is not displacing firm's home country fixed investment. However, this positive effect is not impacted via the production channel. This is consistent with the view that Chinese firms are using their excess production capacity to conduct infrastructure OFDI.

Finally, the result in Chapter 5 suggests that China's infrastructure OFDI is an important source of finance and helps mitigate its infrastructure gaps. An important issue which recipient country government needs to be careful about is China's motivation of infrastructure OFDI. If the motivation of infrastructure OFDI is resource or technology seeking, the positive impact of infrastructure investment declines. These finding emphasises the need for host country governments to carefully review each infrastructure project and ensure that mutual benefits are achieved by China's infrastructure OFDI. For example, infrastructure OFDI in Africa is often made to seek resources. Chapter 5's results suggest that the positive impact of China's infrastructure OFDI reduces if the motivation of investment is resource seeking. This is consistent with Morrissey (2012), who suggests that this is because China often forms few local economic linkages when investing in Africa. China brings their own machinery and labour to the extraction sites. This type of arrangement is detrimental to the host country as it rarely provides them the chance to transfer knowledge from Chinese firms or develop economic linkages. Therefore, host country government need to make sure that economic linkages are developed, host country labour is employed and knowledge flows between

Chinese firms and local firms are guaranteed. Moreover, the results in chapter 3 suggest that host country policy makers should be cautious of investments by highly state-owned firms. It is likely that these firms are acting on state objectives.

6.4 Limitations

A number of limitations exist in this thesis. First, China's infrastructure OFDI is compared in three regions i.e. Africa, Europe and BRI. These regions were chosen because China has became the main source of infrastructure for them or because China has accelerated its infrastructure OFDI to these regions. For future research, it would be interesting to include other regions (e.g. Americas, Australia) in the analysis. Moreover, in this research, I have included only the firms that have performed OFDI, for the first stage estimation of Heckman two step analysis. These firms were selected from CGIT data set. This included Chinese firms that performed any type of OFDI plus firms that performed infrastructure OFDI. In the second stage, I analyse the firms that have performed infrastructure OFDI. The intuition for this is that firms that perform infrastructure OFDI are mostly state-owned, larger in size and often have more debt than firms that perform other types of OFDI. However, this analysis could have also been conducted in a different way. For the first step of Heckman two step analysis, all of the listed firms could have been included.

Another limitation to this research is that only Chinese listed firms are included in this analysis. This is because of easy data availability for Chinese listed firms. Unlisted firms could also be included in the analysis in further research. With regards to estimations used in the analysis, we used system GMM to reduce the problem of endogeneity, it is impossible to completely eliminate it.

Appendix:

Appendix 1

Stock codes and names of companies in Quartiles for chart 2.1.

Quartile 1		Quartile 3	
Stock Code	**Company Name**	**Stock Code**	**Company Name**
601857	CNPC	601877	Zhejiang Chint
600028	Sinopec	600970	Sinoma
601668	China State Construction Engineering	600801	Huaxin Cement
601800	China Communications Construction	000939	Wuhan Kaidi Electric
601390	China Railway Engineering	000758	China Nonferrous
601186	China Railway Construction	600335	Sinomach Automobile
601669	Sinohydro	600017	Rizhao Port
601618	MCC	600487	Hengtong Group
600048	China Poly	002630	China Western Power Industrial
601985	China National Nuclear	000928	Sinosteel
600606	Shanghai Greenland	002091	Jiangsu International
600011	Huaneng Power	000088	Shenzhen Yantian
601600	Aluminum Corporation of China (Chinalco)	000035	China Tianying
601727	Shanghai Electric	000065	China North Industries (Norinco)
600027	Huadian	002358	Henan Senyuan
600068	Gezhouba	603619	Zhongman Petroleum
000063	ZTE	002460	Jiangxi Jianglian
Quartile 2		**Quartile 4**	
Stock Code	**Company Name**	**Stock Code**	**Company Name**
600170	Shanghai Construction	600461	Jiangxi Water
000898	Ansteel	603458	Guizhou Transportation Planning
000039	China International Marine Containers	600105	Jiangsu Yongding
601117	China National Chemical Engineering	002053	Yunnan Energy Investment
600875	Dongfang Electric Corporation	600116	Three Gorges
600089	Tebian Electric Apparatus (TBEA)	600389	Nantong
600266	Beijing Urban Construction	603727	Bomesc Offshore Engineering
000027	Shenzhen Energy	300262	Shanghai Safbon
600150	China State Shipbuilding	000018	Sino Great Wall
601699	Sinohydro	300208	Qingdao Hengshun Zhongsheng
600820	Shanghai Tunnel Engineering	002111	Weihai
600058	Minmetals	600131	State Grid
600039	Sichuan Road and Bridge	002502	Dinglong Culture Co., Ltd.
600500	Sinochem	600834	Shanghai Shengong
002415	China Electronics Technology	002828	Xinjiang Beiken Energy Engineering
600578	Beijing Power	600719	China Dalian International Economic & Tech.
000768	AVIC	600444	Sinomach General Machinery Sci & Tech Co.Ltd

Appendix 2

Description of variables and data sources

Variable	Proxy	Main or Control variable	Data source.
I	Ratio of Firm's fixed investment to total assets calculated by [(net fixed assets $_t$ – net fixed assets$_{t-1}$) + depreciation of fixed assets)] / Total assets.	Dependent/Main	China Securities Market & Accounting Research (CSMAR)
OFDI	Ratio of Chinese Outward Foreign Direct Investment to Total assets	Independent/Main	American Enterprise Institute & The Heritage Foundation
DEBT	Ratio of Long-term debt plus short-term borrowings to total assets of the firm	Control	China Securities Market & Accounting Research (CSMAR)
SALESGR	Sales growth rate	Control	China Securities Market & Accounting Research (CSMAR)
CASHFLOW	Cash flow of the company calculated by taking the ratio of net profit + depreciation and amortization to total asset	Control	China Securities Market & Accounting Research (CSMAR)
WC	Non-cash working capital calculated as (total current assets - cash and cash equivalents) - total current liabilities) / total assets	Control	China Securities Market & Accounting Research (CSMAR)
SIZE	Natural log of total assets	Control	China Securities Market & Accounting Research (CSMAR)
AGE	Natural log of age of company in years. The date of establishment of firm is noted and natural logarithm is then taken of the number of years the firm has been in operation	Control	China Securities Market & Accounting Research (CSMAR)
ROA	Return of Total Assets	Control	China Securities Market & Accounting Research (CSMAR)
STATE	Ratio of state shares to total share capital.		China Securities Market & Accounting Research (CSMAR)

Appendix 3

Description of variables and data sources

Variable	Proxy	Main or Control variable	Data source.
I	Ratio of Firm's fixed investment to total assets calculated by [(net fixed assets $_t$ – net fixed assets$_{t-1}$) + depreciation of fixed assets)] / Total assets.	Dependent/Main	China Securities Market & Accounting Research (CSMAR)
OFDI	Ratio of Chinese Outward Foreign Direct Investment to Total assets	Independent/Main	American Enterprise Institute & The Heritage Foundation
DEBT	Ratio of Long-term debt plus short-term borrowings to total assets of the firm	Control	China Securities Market & Accounting Research (CSMAR)
SALESGR	Sales growth rate	Control	China Securities Market & Accounting Research (CSMAR)
CASHFLOW	Cash flow of the company calculated by taking the ratio of net profit + depreciation and amortization to total asset	Control	China Securities Market & Accounting Research (CSMAR)
WC	Non-cash working capital calculated as (total current assets - cash and cash equivalents) - total current liabilities) / total assets	Control	China Securities Market & Accounting Research (CSMAR)
SIZE	Natural log of total assets	Control	China Securities Market & Accounting Research (CSMAR)
AGE	Natural log of age of company in years. The date of establishment of firm is noted and natural logarithm is then taken of the number of years the firm has been in operation	Control	China Securities Market & Accounting Research (CSMAR)
ROA	Return of Total Assets	Control	China Securities Market & Accounting Research (CSMAR)
STATE	Ratio of state shares to total share capital.		China Securities Market & Accounting Research (CSMAR)

Appendix 4

Description of variables and data sources

Variable	Proxy	Theoretical justification	Main or Control variable	Data source.
GDPGR	Growth rate of GDP per capita		Dependent/Main	World Bank Development Indicators.
OFDI	Ratio of Chinese Outward Foreign Direct Investment to GDP		Independent/Main	American Enterprise Institute and The Heritage Foundation data.
NR	Stock of natural resources is constructed by calculating the average value of four resource rents: including oil, coal, mineral and forest rents. The resource rents are the difference between the value of production of the resource at world prices and their total cost of production.		Main	World Bank Development Indicators
PATENT	The proportion of the total count of patent applications in host country to GDP per capita of the host country.		Main	World Intellectual Property Organization
TRADE	Exports to China less imports from china to the ratio of GDP	Trade intensity	Control	World Bank Development Indicators.
RISK	Host country risk. Average estimates of rankings of various country risk indicators Including; control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law. The values range from -2.5 to 2.5. A higher value indicates lower risk.	Macroeconomic conditions	Control	Worldwide Governance Indicators. The World Bank.
DEBT	Net Debt Ratio. The proportion of host country Net debt to GDP	Macroeconomic conditions	Control	International Monetary Fund
SCHOOL	Proportion of total number of school enrolment to the total school-going age population.	Macroeconomic conditions	Control	World Bank Development Indicators
INVESTMENT	The ratio of host country gross fixed capital formation to GDP	Macroeconomic conditions	Control	World Bank Development Indicators

Appendix 5

Classifications of host countries used in empirical analysis

Countries in Africa

AFRICA					
	Country	**Region**		**Country**	**Region**
1	Algeria	Middle East and North Africa	21	Mauritania	Sub-Saharan Africa
2	Angola	Sub-Saharan Africa	22	Mauritius	Sub-Saharan Africa
3	Benin	Sub-Saharan Africa	23	Morocco	Middle East and North Africa
4	Botswana	Sub-Saharan Africa	24	Mozambique	Sub-Saharan Africa
5	Cameroon	Sub-Saharan Africa	25	Namibia	Sub-Saharan Africa
6	Chad	Sub-Saharan Africa	26	Niger	Sub-Saharan Africa
7	Congo	Sub-Saharan Africa	27	Nigeria	Sub-Saharan Africa
8	Djibouti	Middle East and North Africa	28	Rwanda	Sub-Saharan Africa
9	Equatorial Guinea	Sub-Saharan Africa	29	Sao Tome	Sub-Saharan Africa
10	Eritrea	Sub-Saharan Africa	30	Senegal	Sub-Saharan Africa
11	Ethiopia	Sub-Saharan Africa	31	Sierra Leone	Sub-Saharan Africa
12	Gabon	Sub-Saharan Africa	32	South Africa	Sub-Saharan Africa
13	Ghana	Sub-Saharan Africa	33	South Sudan	Sub-Saharan Africa
14	Guinea	Sub-Saharan Africa	34	Sudan	Sub-Saharan Africa
15	Guinea-Bissau	Sub-Saharan Africa	35	Tanzania	Sub-Saharan Africa
16	Kenya	Sub-Saharan Africa	36	Togo	Sub-Saharan Africa
17	Liberia	Sub-Saharan Africa	37	Tunisia	Middle East and North Africa
18	Madagascar	Sub-Saharan Africa	38	Uganda	Sub-Saharan Africa
19	Malawi	Sub-Saharan Africa	39	Zambia	Sub-Saharan Africa
20	Mali	Sub-Saharan Africa	40	Zimbabwe	Sub-Saharan Africa

Countries in Europe

Europe		
	country	**region**
1	Belgium	Europe
2	Cyprus	Europe
3	Denmark	Europe
4	Finland	Europe
5	France	Europe
6	Germany	Europe
7	Greece	Europe
8	Italy	Europe
9	Netherlands	Europe
10	Norway	Europe
11	Portugal	Europe
12	Spain	Europe
13	Switzerland	Europe
14	United Kingdom	Europe

Countries in BRI

BRI					
	country	**region**		**country**	**region**
1	Afghanistan	South Asia	25	Oman	Middle East and North Africa
2	Bangladesh	South Asia	26	Pakistan	South Asia
3	Belarus	Europe	27	Philippines	East Asia and Pacific
4	Bosnia and Herzegovina	Europe	28	Poland	Europe
5	Brunei	Southeast Asia	29	Qatar	Middle East and North Africa
6	Bulgaria	Europe	30	Romania	Europe
7	Cambodia	Southeast Asia	31	Russian Federation	Europe
8	Croatia	Europe	32	Saudi Arabia	Middle East and North Africa
9	Czech Republic	Europe	33	Serbia	Europe and Central Asia
10	Egypt	Middle East and North Africa	34	Singapore	East Asia and Pacific
11	Georgia	Europe	35	Slovenia	Europe and Central Asia
12	Hungary	Europe	36	Sri Lanka	South Asia
13	Indonesia	East Asia and Pacific	37	Syrian Arab Republic	Middle East and North Africa
14	Iran	Middle East and North Africa	38	Tajikistan	Central Asia
15	Iraq	Middle East and North Africa	39	Thailand	East Asia and Pacific
16	Israel	Middle East and North Africa	40	Timor-Leste	East Asia and Pacific
17	Kazakhstan	Central Asia	41	Turkey	Europe and Central Asia
18	Kuwait	Middle East and North Africa	42	Turkmenistan	Central Asia
19	Kyrgyzstan	Central Asia	43	Ukraine	Europe and Central Asia
20	Latvia	Europe	44	United Arab Emirates	Middle East and North Africa
21	Malaysia	Southeast Asia	45	Uzbekistan	Central Asia
22	Montenegro	Central Asia	46	Vietnam	East Asia and Pacific
23	Myanmar	East Asia and Pacific	47	Yemen, Rep.	Middle East and North Africa
24	Nepal	South Asia			

References:

African Development Bank. (2018). *African Economic Outlook 2018.*

AIE & The Heritage Foundation. (2005). China Global investment Tracker.

Akramov, K. T. (2012). Foreign aid allocation, governance and economic growth. *Issue briefs from International Food Policy Research Institute (IFPRI), 72*.

Ali, U., Wang, J.-J., Morales, V. P., & Wang, M.-M. (2019). Foreign Direct Investment Flows and Domestic Investmment in China: A Multivariate Time Series Analysis. *Invesment Analyst Journal, 48*(1), 42-57.

Allen, F., Qian, J., & Qian, M. (2018). A review of China's Institution. *Centre for Economic Policy Research, Discussion Paper*.

Al-Sadig, A. J. (2013). Outward Foreign Direct Investment and Domestic Investment: the Case of Developing Countries. *IMF Working Paper, 13*(52).

Ameer, W., Xu, H., & Alotaish, M. S. (2017). Outward Foreign Direct Investment and domestic investment: evidence from China. *Economic Research, 30*, 777-788.

Andrews-Speed, P., Qiu, M., & Len, C. (2016). Chinese engagement in Southeast Asian energy and mineral resources: motivations and outlook. *Eurasian Geography and Economics, 57*(3), 316-342.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-compenents models. *Journal of Econometrics, 68*, 29-51.

Aschauer, D. A. (1989). Does Public Capital Crowd Out Private Capital. *Journal of Monetary Ecnomics, 24*, 171-188.

Azolibe, C. B. (2020). Does foreign direct investment influence manufacturing sector growth in Middle East and North African region? *International Trade, Politics and Development, 3*.

Bandiera, L., & Tsiropoulos, V. (2020). A Framework to Assess Debt Sustainability under the Belt and Road Initiative. *146*.

Baniya, S., Rocha, N., & Ruta, M. (2020). Trade effects of the New Silk Road: A gravity analysis. *Journal of Development Economics, 146*.

Barro, R. J. (1990). Government Spending in a Simple Model of Endogeneous Growth. *The Journal of Political Economy*.

Barron, D. N., West, E., & Hannan, M. T. (1994). A Time to Grow and a Time to Die: Growth and Mortality of Credit Unions in New York City, 1914-1990. *American Journal of Sociology, 100*(2).

Becker-Ritterspach, F., Allen, M., Lange, K., & Allen, M. M. (2019). Home-Country Measures to Support Outward Foreign Direct Investment: Variation and Consequences. *Transnational Corporations Journal , 26*(1).

Belderbos, R. (1992). Large Multinational Enterprises Based in a Small Economy: Effects on Domestic Investment. *Review of World Economics, 128*(3), 543-557.

Belt and Road Portal. (2021). *Belt and Road Portal*. Retrieved from www.yidaiyilu.gov.cn

Bitsch, F., Buchner, A., & Kaserer, c. (2010). Risk, retun and cash flow characteristics of infrastructure fund investments. *EIB Papers, 15*(1), 106-136.

Blomkvist, K., & Drogendijk, R. (2016). Chinese outward foreign direct investments in Europe. *European Journal of International Management, 10*(3), 343-358.

Blomstrom, M., & Kokko, A. (1994). Home Country Effects of Foriegn Direct Investment: Evidence from Sweden. *NBER Working Paper Series, Working paper no. 4639*.

Bluhm, R., Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. (2020). Connective Financing: Chinese Infrastructure Projects and the Diffusion of Economic Activity in Developing Countries. *Aiddata, Working Paper 103*.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*, 115-143.

Bo, H., Jacobs , J., & Sterken, E. (2006). A threshold uncertainty investment model for the Netherlands. *Applied Financial Economics , 16*(9), 665-673.

Bogart, D., & Chaudhary, L. (2013). Engines of Growth: The productivity advance of Indian Railways. *Journal of Economic History, 73*(2), 339-370.

Borensztein, E., Gregorio, J. D., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics, 45*, 115-135.

Boschini, A. D., Pettersson, J., & Roine, J. (2007). Resource Curse or Not: A Question of Appropriability. *Journal of Economics, 109*(3), 593-617.

Bosshard, P. (2007, May). China's Role in Financing African Infrastructure. *International Rivers Network*.

Bosshard, P., McDonald, K., & Brewer, N. (2009). Exporting dams: China's hydropower industry goes global. *Journal of Environmental Management, 90*, 294-302.

Boycko, M., Shleifer, A., & Vishny, R. W. (1996). A Theory of Privatisation. *The Economic Journal, 106*, 309-319.

Brautigam, D. (2009). *The Dragon's Gift: The real story of China in Africa.* Oxford: Oxford University Press.

Brautigam, D. (2011). Aid 'with Chinese characteristics': Chinese foreign aid and development finance meet the OECD-DAC aid regime. *Journal of International Development, 23*, 752-764.

Brautigam, D., & Gallagher, K. P. (2014). Bartering Globalization: China's Commodity-backed Finance in Africa and Latin America . *Global Policy, 5*(3).

Buckley, P. J., & Casson, M. (1976). *The future of the multinational enterprise.* Macmillan.

Buckley, P. J., Clegg, L. J., Cross , A. R., Liu, X., Voss, H., & Zheng, P. (2007). The determinants of Chinese outward foreign direct investment. *Journal of International Business Strudies, 38*, 499-518.

Casaburi, I. (2015). *Chinese Investment in Europe.* ESADE China Europe Club. ESADEgeo Center for global economy and geopolitics.

Caves, R. E. (1982). Multinational Enterprise and Economic Analysis. . *Cambridge University.*

Chang, E. C., & Wong, S. M. (2004). Political control and performance in China's listed firms. *Journal of Comparative Economics, 32*, 617-636.

Chang, L., Li, J., Cheong, K.-C., & Goh, L.-T. (2021). Can Existing Theories Explain China's Outward Foreign Direct Investment in Belt and Road Countries. *Sustainability*.

Charles, W. J., Wang, X., & Warner, E. (2013). *China's Foreign Aid and Government-Sponsored Investment Activities Scale, Content, Destinations, and Implications.* RAND Corporation.

Chen, G., Firth , M., & Xu, L. (2009). Does the type of ownership control matter? Evidence from China's listed companies. *Journal of Banking and Finance, 33*, 171-181.

Chen, M. X., & Lin, C. (2018). *Foreign Investment across the Belt and Road: Patterns, Determinants and Effects.* Washington DC: Policy Research Working Paper 8067, World Bank.

Cheung, Y.-W., Haan, J. d., Qian, X., & Yu, S. (2011). China's Outward Direct Investment in Africa. *Hong Kong Institute for Monetary Research*.

Child, J., & Rodrigues, S. B. (2005). The Internationalization of Chinese Firms: A case for Theoretical Extension? *Management and Organization Review, 1*(3), 381-410.

Chin, H., & He, W. (2016, May). *The Belt and Road Initiative: 65 Countries and Beyond.* Retrieved from Fung Business Intelligence Centre: https://www.fbicgroup.com/sites/default/files/B&R_Initiative_65_Countries_and_Beyond.pdf

Chiyemura, F. (2021). *Chinese firms- and African labor-are building Africa's infrastructure*. Retrieved from www.washingtonpost.com

Conrad, B., & Kostka , G. (2017). Chinese investments in Europe's energy sector: Risks and opportunities? *Energy Policy*(101), 644-648.

Corkin, L. (2011). Chinese Construction Companies in Angola: A Local Linkages Perspective. MMCP Discussion Paper No 2.

Corkin, L. (2011). Redefining Foreign Policy Impulses toward Africa: The Roles of the MFA, the MOFCOM and China Exim Bank,. *Journal of Current Chinese Affairs, 40*(4), 61-90.

Corkin, L. (2011). Uneasy allies: China's evolving relations with Angola. *Journal of Contemporry African Studies, 29*(2), 169-180.

Corre, P. L., & Sepulchre, A. (2016, May 15). Why China is investing heavily in Europe. *SCMP*. Retrieved from https://www.scmp.com/comment/insight-opinion/article/1944491/why-china-investing-heavily-europe

Cozza, C., Rabellotti, R., & Sanfilippo, M. (2015). The impact of outward FDI on the performance of Chinese firms. *China Economic Review, 36*, 42-57.

CSMAR. (n.d.). China Stock Market and Accounting Research Database.

Cuervo-Cazurra, A., & Genc, M. (2008). Transforming disadvantages into advantages: Developing-country MNEs in the least developed countries. *Journal of International Business Studies, 39*(6), 957-979.

Cui, L., & Jiang, F. (2012). State ownership effect on firms' FDI ownership decisions under institutional pressure: a study of Chinese outward-investing firms. *Journal of International Business Studies, 43*, 264–284.

Curran, L., Lv, P., & Spigarelli, F. (2017). Chinese investment in the EU renewable energy sector: Motives, synergies and policy implications. *Energy Policy, 101*(C), 670-682.

Demiryol, T. (2019). Political Economy of Connectivity: China's Belt and Road Initiative. *Research Association for Interdisciplinary Studies, 10*.

Desai, M. A., Foley, C. F., & Hines Jr, J. (2005). Foreign Direct Investment and the Domestic Capital Stock. *American Economic Review, 95*(3), 33-38.

Devarajan, S., Swaroop, V., & Zou, H.-f. (1996, Feburary). The composition of public expenditure and economic growth. *Journal of Monetory Economics.*(37), 313-344.

Dias, A. J., Ioannou, P. G., Associate Members, & ASCE. (1996). Company and Project Evaluation Model for Privately Promoted Infrastructure Projects. *Journal of Construction Engineering and Management, 71*.

Diwan, I., Philip, K., & Marc, S. (2015). *Pyramid Capitalism : Political Connections, Regulation, and Firm Productivity in Egypt.* World Bank Group. Washington DC: Policy Research Working Paper No 7354.

Dollar, D. (2016). China as a Global Investor. *Asia Working Group, Brookings*.

Dreher, A., & Langlotz, S. (2017). Aid and Growth: New Evidence Using an Excludable Instrument. *CESIFO Working Paper, 5515*.

Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. (2017). Aid, China, and Growth: Evidence from a New Global Development Finance Dataset. *AidData , 46*. Retrieved from https://china.aiddata.org/

Driffield, N., & Love, J. H. (2007). Linking FDI motivation and host economy productivity effects: conceptual ad empirical analysis. *Journal of International Business Studies , 38*, 460-473.

Drogendijk, R., & Blomkvist, K. (2013). Drivers and motives for Chinese outward foreign direct investments in Africa. *Journal of African Business, 14*(2), 75-84.

Du, X., Zeng, Q., & Du, Y. (2014). Do Politically Connected Independent Directors Help Chinese Listed Private Firms Enter High-Barrier Industries? *China Accounting and Finance Review, 16*(4).

Dunning, J. H. (1980). Toward an eclectic theory of International production: some empirical tests. *Journal of International Business Studies, 11*(1), 9-31.

Dunning, J. H., & Lundun, S. M. (2008). *Multinational Enterprises and the Global Economy* (2nd Edition ed.). Edward Elgar Publishing Limited.

Dustmann, C., Engracia, M., & Rochina-Barrachina. (2007). Selection correction in panel data models: An application to the estimation of females' wage equations. *Econometrics Journal , 10*, 263-293.

Dyer, G. (2007). China: Logistic is key to inland shift. Shanghai: Financial Times.

Elheddad, M. (2019). Foreign direct investment and domestic investment: Do oil sectors matter? Evidence from oil-exporting Gulf Cooperation Council economies. *Journal of Economics and Business, 103*, 1-12.

Eurostat. (2019). *China-EU International trade in good statistics*. Retrieved from ec.europa.eu: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=China-EU_-_international_trade_in_goods_statistics#EU_and_China_in_world_trade_in_goods

EY. (2020). How is China approaching SOE reform. *EY Greater China*.

Fazzari, S. M., & Petersen, B. C. (1993). Working Capital and Fixed Investment: New Evidence on Financing constraints. *RAND Journal of Economics, 24*(3), 328-342.

Fazzari, S. M., Hubbard, R. G., Petersen, B. C., Blinder, A. S., & Poterba, M. J. (1988). Financing Constraints and Corporate Investment . *Brookings Papers on Economic Activity , 1988*(1), 141-206.

Feldstein, M. (1995). The Effects of Outbound Foreign Direct Investment on the Domestic Capital Stock. In *The Effects of Taxation on Multinational Corporation* (pp. 43-66). University of Chicago Press.

Ferchen, M., Pieke, F. N., Putten , F.-P. v., Hong, T., & Blecourt, J. d. (2018). *Assessing China's Influence in Europe through Investments in Technology and Infrastructure. Four Cases.* Lieden, The Netherlands: LiedenAsiaCentre.

Financial Times. (2019). *China state banks pull back from risky overseas projects*. Retrieved from https://www.ft.com/content/273c324c-55ec-11e9-a3db-1fe89bedc16e

Fitzsimmons , J. R., Steffens , P., & Douglas, E. J. (2005). Growth and Profitability in Small and Medium Sized Australian Firms . *AGSE Entrepreneurship Exchange, Melbourne*.

Fortune. (2019). *Global 500*. Retrieved from https://fortune.com/global500/2019/search/

Foster, V., Butterfield, W., Chen, C., & Pushak, N. (2009). *Building Bridges: China's Growth Role as Infrastructure Financier for Sub-Saharan Africa.* (1 ed.). Washington D.C.: The World Bank.

Fu, X., Buckley, P. J., & Fu, X. M. (2020). The Growth Impact of Chinese Direct Investment on Host Developing Countries. *International Business Review, 29*.

Gammeltoft, P., Barnard, H., & Madhok, A. (2010). Emerging multinationals, emerging theory: Macro-and micro-level perspectives. *Jounal of International Management, 3*, 1-7.

García-Herrero, A., & Jianwei, X. (2016). *China's Belt and Road initiative: can Europe expect trade gains?* Bruegel Working Paper 2016/05.

Garunaut, R., Song, L., & Yao, Y. (2006). Impact and Significance of State-Owned Enterprise Restructuring in China. *The China Journal, 55*, 35.

Ge, Y., Liu, Y., Qiao, Z., & Shen, Z. (2020). State ownership and the cost of debt: Evidence from corporate bond issuances in China. *Research in International Business and Finance, 52*.

Ghebrihiwet, N. (2019). FDI technology spillovers in the mining industry: Lessons from South Africa mining sector. *Resources Policy, 62*, 463-471.

Godim, I., Ogasavara, M. H., & Masiero, G. (2018). Effects of Outward Foreign Direct Investment on Domestic Investment: The Cases of Brazil and China. *Journal of International Development, 30*, 1439-1454.

Goldstein, A. (2009). New Multinationals from Emerging Asia: The Case of National Oil Companies. *Asian Development Review, 26*(2), 26-56.

Griffiths, J. (2017, May). *Just what is this One Belt, One Road thing anyway?* Retrieved from CNN: http://edition.cnn.com/2017/05/11/asia/china-one-belt-one-road-explainer/index.html

Gu, J., & Carey, R. (2019). China's Development Finance and African Infrastructure Development. In *China-Africa and an Economic Transformation.* Oxford Scholarship Online.

Guo, G., Li, J., Wang, D., & Zhang, L. (2020). Political connection, contract intensity, and OFDI: Evidence from China. *Journal of Economic Surveys, 12448*(Special Issue), 1-24.

Haider, Z., & Jin, F. (2017). *Addressing the Global Infrastructure Deficit: Channels for U.S.-China Cooperation.* Center for Strategic and International Studies (CSIS).

Haiyue, L., & Manzoor, A. (2020). The impact of OFDI on the performance of Chinese firms along the 'Belt and Road'. *Applied Economic, 52*(11), 1219-1239.

Hannan, M. T., & Freeman, J. (1984). Structural Intertia and organizational change. *American Sociological Review, 49*(2), 149-164.

Harris, M., & Raviv, A. (1991). The Theory of Capital Structure . *The Journal of Finance, 46*(1), 297-355.

Harrison, A. E., Love, I., & McMillan, M. S. (2004). Global capital flows and financing constraints. *Journal of Development Economics, 75*, 269-301.

Harrison, A., & Aitken, B. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review, 89*(3), 605-618.

Hayat, A. (2018). FDI and economic growth: the role of natural resources. *Journal of Economic Studies, 45*(2), 283-295.

Heckman, J. (1976). The common Structure of Statistical Models of Truncation, Sample Selection and limited dependent variables and a simple estimator for such models. *Anals of Economic Social Measurement, 5*(4), 475-492.

Heckman, J. (1979). Sample Selection bias as a specification error. *Econometrica, 47*(1), 53-161.

Hejazi, W., & Pauly, P. (2003). Motivations for FDI and Domestic Capital Formation. *Journal of International Business Studies, 34*(3), 282-289.

Herzer, D., & Schrooten, M. (2008). Outward FDI and domestic investment in two industrialized countries. *Economic Letters, 99*, 139-143.

Hong, E., & Sun, L. (2006). Dynamics of Internationalization and Outward Investment: Chinese Corporations' Strategies. *The China Quarterly, 187*, 610-634.

Horn, S., Reinhart, C. M., & Trebesch, C. (2019). China's Overseas Lending. *NBER, 26050*.

Horst, T. (1972). Firm and industry determinants of the decision to invest abroad: An empirical study. *The Review of Economics and Statistics, 54*(3), 258-266.

Hsu, W. C., Wang, C., & Clegg, J. (2015). The Effects of Outward Foreign Direct Investment on Fixed-Capital Formation at Home: The Roles of Host Location and Industry Characteristics. *Global Economic Review, 44*(3), 353-368.

Huang , Y., & Zhang, Y. (2017). How does outward foreign direct investment enhance firm productivity? A heterogeneous empirical analysis from Chinese manufacturing. *China Economic Review, 44*, 1-15.

Huang, Y. (2016). Understanding China's Belt and Road Initiative: Motivation, framework and assessment. *China Economic Review, 40*, 314-321.

Huang, Y. (2017, July 24). Why China invests more in Europe than in the US. *Financial Times*.

Hubbard, M. C. (2016). The Asian Infrastructure Investment Bank: Multilateralism on the Silk Road. *China Economic Journal, 9*(2), 116-139.

Huillery, E. (2009). History Matters: The Long-Term Impact of Colonial Public Investments in French West Africa. *American Economic Journal: Applied Economics, 1*(2), 176-215.

Humphrey, C. (2015). Challenges and oppotunities for Multilateral Development Banks in 21st Century Infrastructure Finance. . *The Intergovernmental Group of Twenty Four on Monetary Affairs and Development (G-24) Working paper series*.

Hurley, J., Morris, S., & Portelance, G. (2018). *Examining the Debt Implications of the Belt and Road Initiative from a Policy Perspective.* Washington DC.

IMF. (2019). *International Monetary Fund*. Retrieved from IMF Data Mapper.

Jakobson, L. (2009). China's diplomacy toward Africa: drivers and constraints. *International Relations of the Asia-Pacific, 9*, 403-433.

Jenkins, R. (2018). *How China is Reshaping the Global Economy: Development Impacts in Africa and Latin America.* Oxford.

Jiang, W. (2009). Fuelling the Dragon: China's Rise and Its Energy and Resources Extraction in Africa. *The China Quarterly*(199), 585-609.

Jinchen, T. (2016, July). *One Belt and One Road': Connecting China and the world*. Retrieved from McKinsey & Company: http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/one-belt-and-one-road-connecting-china-and-the-world

Karlis, T., & Polemis, D. (2018). Chinese outward FDI in the terminal concession of the port of Piraeus. *Case Studies on Transport POLICY, 6*, 17-24.

Kaufmann, D., kraay, A., & Mastruzzi, M. (2010). The worldwide governance indicators: Methodology and Analytical Issues. *World Bank Policy Research , 5430*.

Kirchherr, J., & Mathhews, N. (2018). Technology transfer in the hydropower industry: An analysis of Chinese dam developers' undertakings in Europe and Latin America. *Energy Policy, 112*, 546-558.

Knoerich, J. (2017). How does outward foreign direct investment contribute to economic development in less advanced home countries? *Oxford Development Studies, 45*(4), 443-459.

Kolstad , I., & Wigg, A. (2012). What determines Chinese outward FDI? *Journal of World Business, 47*(1), 26-34.

Kong, B., & Gallagher, K. P. (2017). Globalizing Chinese Energy Finance: The Role of Policy Banks. *Journal of Contemporary China, 26*(108), 834-851.

Lamb, V., & Dao, N. (2017). Perceptions and practices of investment: China's hydropower investments in Vietnam and Myanmar. *Canadian Journal of Development Studies, 38*(3), 395-413.

Leverett, F., & Bingbing, W. (2017). The New Silk Road and China's Evolving Grand Strategy. *The China Journal, 77*.

Li, J., Li, P., & Boalian, W. (2018). The liability of opaqueness: State ownership and the likelihood of deal completion in international acquisitions by Chinese firms. *Strategic Management Journal*.

Li, L., Liu, X., Yuan, D., & Yu, M. (2017). Does outward FDI generate higher productivity for emerging economy MNEs? - Micro-level evidence from Chinese manufacturing firms. *International Business Review, 26*, 839-854.

Li, W. (1997). The impact of economic reform on the performance of Chinese state enterprises 1980-1989. *Journal of political Economy, 105*(5), 1080-1106.

Li, X., & Zeng , K. (2019, May 14). *Beijing is counting on its massive Belt and Road Initiative. But are Chinese firms on board?* Retrieved from Washingtonpost.com: https://www.washingtonpost.com/politics/2019/05/14/beijing-is-counting-its-massive-bridge-road-initiative-are-chinese-firms-board/

Liang, W. (2012). China's Soft Power in Africa: Is Economic Power Sufficient? *Asian Perspective, 36*(4), 667-692.

Liedtke, S. (2017). Chinese energy investments in Europe: An analysis of policy drivers and approaches. *Energy Policy, 101*, 659-669.

Lin, K. J., Lu, X., Zhang, J., & Zheng, Y. (2020). State-owned enterprises in China: A review of 40 years of research and practice. *China Journal of Accounting Research, 13*(1), 31-55.

Lin, M. H.-C., & Bo, H. (2012). State-ownership and financial constraints on investment of Chinese-listed firms: new evidence. *The European Journal of Finance, 18*(6), 497-513.

Lipsey, R. E., & Stevens, G. V. (1992). Interactions between Domestic and Foreign Invesment. *Journal of International Money and Finance, 11*(1), 40-62.

Liu, H. Y., Tang, Y. K., Chen , L. X., & Poznanska, J. (2017). The Determinants of Chinese Outward FDI in Countries Along "One Belt One Road". *Emerging Markets Finance and Trade, 53*(6), 1374-1387.

Liu, W., & Dunford, M. (2016). Inclusive globalization: unpacking China's Belt and Road Initiative. *Area Development and Policy, 1*(3), 323-340.

Liu, W., Zhang, Y., & Xiong, W. (2020). Financing the Belt and Road Initiative. *Eurasian Geography and Economics, 61*(2), 137-145.

Liu, W.-H., & Nunnenkamp, P. (2011). Domestic repercussions of different types of FDI; Firm level evidence for Taiwanese matufacturing. *World Development, 39*(5), 808-823.

Maury, B. (2006). Family ownership and firm performance: Empirical evidence from Western European corporations. *Journal of Corporate Finance, 12*(2), 321-241.

Miniesy, R. S., & Elish, E. (2017). Is Chinese outward FDI in MENA little? *EconPapers, 10*(1), 19-43.

Modigliani, F., & Miller, M. (1958). The Cost of Capital Corportation Finance and the Theory of Investment. *American Economic Review, 48*(3), 261-297.

Molnar, M., & Lu, J. (2019). State-Owned Firms Behind China’s Corporate Debt. *OECD, ECONOMICS DEPARTMENT*(WORKING PAPERS No. 1536).

Morris, S., Parks, B., & Gardner, A. (2020). Chinese and World Bank Lending Terms: A Systematic Comparison Across 157 Countries and 15 Years. *Center for Global Development, CGD Policy Paper 170*.

Morrissey, O. (2012). FDI in Sub-Saharan Africa: Few Linkages, Fewer Spillovers. *The European Journal of Development Research, 24*, 26-31.

Munnell, A. H. (1992). Infrastructure Investment and Economic Growth. *The Journal of EconomicPerspective, 6*(4), 189-198.

Munnell, H. A., & Cook, L. M. (1990b). How Does Public Infrastructure Affect Regional Economic Performance. *New England Economic Review*(Sep), 11-33.

Munoz, M., Gallagher, K. P., & Li , Z. (2018). Renewable Energy: The Trillion Dollar Opportunity for Chinese Overseas Investment. *China & World Economy, 26*(6), 27-49.

Nantulya, P. (2019). *Implications for Africa from China's One Belt One Road Strategy.* Africa Center for Strategic Studies.

Navaretti, G. B., & Castellani, D. (2004). Investments Abroad and Performance at Home: Evidence from Italian Multinationals. *SSRN*.

Ng, A., & Wei, L. (2017). *Strategic Collaboration - How inclusive management helps Chinese enterprises win overseas.* EY.

Nguepjouo, D. (2017). The spatialisation of China's presence in Cameroon: the case of the mining sector. *The Extractive Industries and Society, 4*, 513-524.

Nye, J. S. (1990). Soft power. *Foreign Policy, 80*, 153-171.

OECD. (2018). Highlights. *OECD Business and Finance Outlook*.

Pannell, C. W. (2013). China's Economic and Political Penetration in Africa. *Eurasian Geography and Economics, 49*(6), 706-730.

Pareja-Alcaraz, P. (2017). Chinese investments in Southern Europe's energy sectors : Similarities and divergences in China's strategies in Greece,Italy,Portugal and Spain. *Energy Policy, 101*, 700-710.

Plessis, R. D. (2016). China's African Infrastructure Projects: A tool in reshaping global norms. *South African Institute of International Affairs, https://www.jstor.org/stable/resrep25976*.

Putten, F. v. (2016). Infrastructure and geopolitics: China's emerging presence in the eastern mediterranean. *Journal of Balkan and Near Eastern Studies* (Special Issue: The Geo-politics of Conflict in the Eastern Mediterranean), 337-351.

Qian, Y. (1996). Enterprise reform in China: Agency problems and political control. *Economics of transitition, 2*(427-447).

Rabe, W., & Gippner, O. (2017). Perceptions of China's outward foreign direct investment in European critical infrastructure and strategic industries. *International Politics, 54*, 468-486.

Ramamurti, R., & Doh, J. P. (2004). Rethinking foreign infrastructure investment in developing countries. *Journal of World Business, 39*, 151-167.

Ramasamy, B., Yueng, M., & Laforet, S. (2012). China's outward foreign direct investment: Location choice and firm ownership. *Journal of World Business, 47*, 17-25.

Rodriguez, C., & Bustillo, R. (2011). A Critical Revision of the Empirical Literature on Chinese Outward Investment: A New Proposal. *Panoeconomicus*(Special Issue), 715-733.

Roodman, D. (2006). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), 86-136.

Sachs, J. D., & Warner, A. (2001). The curse of natural resources. *European Economic Review, 45*(4-6), 827-838.

Sauramo, P. (2008). Does outward foreign direct investment reduce domestic investment? Macro-evidence from Finland. *Labour Institute for Economic Research (Discussion Paper)*.

Schiere, R., & Rugamba, A. (2011). Chinese Infrastructure Investments and African Integration . *African Development Bank Group* .

Schinas, O., & Westarp, A. G. (2017). Assessing the impact of the maritime silk road. *Journal of Ocean Engineering and Science, 2*, 186-195.

Scissors, D. (2019). China's Global Business Footprint Shrinks. *American Enterprise Institute*.

Scissors, D. (2020). *China Global Investment Tracker*. Retrieved from https://www.aei.org/china-global-investment-tracker/

Scissors, D. (2020). China's Global Investment Vanishes Under COVID-19. *American Enterprise Institute*.

Scissors, D. (2021). China's Overseas Investment Starts the Long Climb back. *American Enterprise Institute*.

Soyres, d., Francois, Mulabdic, A., & Ruta, M. (2020). Common Transport Infrastructure: A Quantitative Model and Estimates from the Belt and Road Initiative. I. *International Finance Discussion Papers , 1273*.

Soyres, F. d., Mulabdic, A., Murray, S., Rocha, N., & Ruta, M. (2019). How much will the Belt and Road Initiative reduce trade cost. *International Economics, 159*, 151-164.

Stacy, K. (2017). *Financial Times*. Retrieved from https://www.ft.com/content/e150ef0c-de37-11e7-a8a4-0a1e63a52f9c

Statista. (2021). *Infrastructure spending as share of GDP in 48 OECD countries 2018.* Retrieved from https://www.statista.com/statistics/566787/average-yearly-expenditure-on-economic-infrastructure-as-percent-of-gdp-worldwide-by-country/

Stiglitz, J. E., & Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. *The American Economic Review, 71*(3), 393-410.

Summers, R., & Heston, A. (1984). Improved international comparisons of real product and its composition. *Review of Income and Wealth, 30*(2), 125-219.

Sun, Q., Tong, W. H., & Tong, J. (2002). How Does Government Ownership Affect Firm Performance? Evidence from China's Privatization Experience. *Journal of Business Finance and Accounting, 29*(2), 1-27.

Tan-Mullins, M., Urban, F., & Mang , G. (2017). Evaluating the Behaviour of Chinese Stakeholders Engaged in Large Hydropower Projects in Asia and Africa. *The China Quarterly*, 1-25.

Temouri, Y., Driffield, N. L., & Higon, D. A. (2009). German Outward FDI and Firm Performance. *Applied Economics Quarterly, 55*(4), 1-20.

Tuman, J. P., & Shirali, M. (2015). The Political Economy of Chinese Foreign Direct Investment in Developing Areas. *Foreign Policy Analysis*, 1-14.

Voon, J. P., & Xu , X. (2020). Impact of the Belt and Road Initiative on China's soft power: preliminary evidence. *Asia-Pacific Journal of Accounting & Economics, 27*(1), 120-131.

Wagenvoort, R., Nicola, C. d., & Kappeler, A. (2010). Infrastructure finance in Europe: Composition, evolution and crisis impact. *EIB Papers, 15*(1), 16-40.

Westarp, A. v., & Schinas, O. (2017). Assessing the impact of the maritime silk road. *Journal of Ocean Engineering and Science, 2*, 186-195.

Wildau, G., & Ma, N. (2017, May 11). *In charts: China's Belt and Road Initiative.* Retrieved from https://www.ft.com/content/18db2e80-3571-11e7-bce4-9023f8c0fd2e

WIPO. (2019, March). *World Intellectual Property Organization*. Retrieved from https://www.wipo.int/portal/en/index.html

Woetzel, J., Garemo, N., Mischke, J., Hjerpe, M., & Palter, R. (2016). *Bridging global infrastructure gaps. .* McKinsey Global Institute .

Wong, D. (2020, august 7). *How Can Foreign Technology Investors Benefit from China's New Infrastructure Plan?* Retrieved from China Briefing: https://www.china-briefing.com/news/how-foreign-technology-investors-benefit-from-chinas-new-infrastructure-plan/

Wooldridge, J. (1995). Selection corrections for panel data models under conditional mean independence assumptions. *Journal of Econometrics, 68*(1), 115-132.

World Bank. (2019). *Belt and Road Economics: Opportunities and Risks of Transpot Corridors.* The World Bank Group.

World Bank. (2019). *World Development Report 2019: The Changing Nature of Work.* Washington DC: World Bank.

Wu, A., Hong, K., & Chung, K. (2020). *The impact of COVID-19 on Belt and Road Initiative infrastructure and construction projects.* Norton Rose Fullbright - Issue 14.

Wu, G., Wang, J., & Prowse, D. (2017, 04 07). *Chinese Banks' Profitability Is Likely to Decline Further*. Retrieved from fitchratings.com: https://www.fitchratings.com/research/banks/chinese-banks-profitability-is-likely-to-decline-further-07-04-2017

Wu, K. (2008). China's overseas oil and gas investment: motivation, strategies and global impact. *Oil and Gas Energy Law, 6*(1).

Wu, S.-S., & Chong , A. (2018). Developmental Railpolitics: The Political Economy of China's High-Speed Rail Projects in Thailand and Indonesia. *Contemporary Southeast Asia: A Journal of International and Strategic Affairs, 40*(3), 503-526.

Yang, G., Huang, X., Huang, J., & Chen, H. (2020). Assessment of the effects of infrastructure investment under the belt and road initiative. *China Economic Review, 60*, 2020.

Yao, S., Zhang, F., Wang, P., & Luo, D. (2017). Location Determinants of China's Outward Foreign Direct Investment. *China and World Economy, 25*(6), 1-27.

Yi-Chong, X. (2014). Chinese State-owned Enterprises in Africa: ambassadors or freebooters? *Journal of Contemporary China, 23*(89), 822-840.

Yongding, Y. (2009). *China's Stimulus shows the problem of success*. Retrieved from https://www.ft.com/content/94314bde-91a3-11de-879d-00144feabdc0

Yoo, S., & Kim, J. (2015). The Dynamic Relationship between Growth and Profitability under Long-Term Recession: The Case of Korean Construction Companies. *Sustainability., 7*, 15982–15998.

You, K., & Solomon, O. H. (2015). China's outward foreign direct investment and domestic investment: An industrial level analysis. *China Economic Review, 34*, 249-260.

Yu, H. (2014). China's Eagerness to Export Its High-speed Rail Expertise to ASEAN Members. *The Copenhagen Journal of Asian Studies, 32*(2), 13-36.

Yu, H. (2017). Motivation behind China's 'One Belt, One Road' Initiatives and Establishment of the Asian Infrastructure Investment Bank. *Journal of Contemporary China, 26*(105), 353-368,.

Yu, S., Qian, X., & Liu, T. (2019). Belt and road initiative and Chinese firms' outward foreign direct investment. *Emerging Markets Review, 41*.

Zhao, W., Liu, L., & Zhao, T. (2010). The contribution of outward direct investment to productivity changes within China, 1991-2007. *Journal of International management, 16*, 121-130.

Zhao, Y., Shi, X., & Song , F. (2020). Has Chinese outward foreign direct investment in energy enhanced China's energy security? *Energy Policy, 146*.

Zhou, C., Hong, J., Wu, Y., & Marinova, D. (2019). Outward foreign direct investment and domestic innovation performance: evidence from China. *Technology Analysis & Strategic Management, 31*(1), 81-95.