Chinese OFDI in Africa: Economic Opportunities vs. Political Risks

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Thesis Submitted to the University of Nottingham for the Degree of

Doctor of Philosophy

April, 2024

Abstract

Foreign Direct Investment (FDI) is an important driver of economic growth and world integration. With the rapid development of China, the once "World Factory" and ideal recipient of inward FDI is now outsourcing its own outward FDI (OFDI) to the rest of the world, especially Africa. Chinese OFDI in Africa did not start until the 1980s, and it kept below 0.5 billion USD in terms of OFDI stock till 2000. However, it increased rapidly after 2000 and reached 47.9 billion USD by 2019, which is almost 100 times that of 2000. What are the perceptions of and motivations for Chinese enterprises investing in Africa? Major existing FDI theories including Monopolistic Advantage Theory, Internationalization Theory, Ownership-Location-Internalization Paradigm (OLI Paradigm), etc., are used in understanding developed countries FDI experience in investing in emerging economies. Their explanatory power however is yet to be tested for Chinese OFDI in underdeveloped or developing economies in Africa. The aim here is to reveal the economic and political determinants of Chinese OFDI on the continent from different perspectives. The study extensively collects both aggregate country-level panel data covering 36 Africa countries in time period of 2006-2019 and firm-level cross-sectional data covering 2554 FDI projects in 45 African countries by 2022[1]. Employing panel data approaches and spatial econometric methods, this study analyzes the economic opportunities and political risks of Chinese OFDI from aggregate country-level, third-country, and firm-level perspectives.

[1] According to China's Ministry of Commerce, the number of Chinese OFDI projects in Africa was 2554 in 2022 and these projects distributed in 45 African countries. The sample of aggregate country-level data limits to 36 African countries because of data gap in some country-level explanatory variables.

The following empirical results are obtained in this study. (1) Total natural resource rent and GDP growth rate are positively significant supporting the hypothesis that Chinese OFDI in Africa is natural resource and market seeking, while GDP per person employed is negatively significant indicating that Chinese OFDI is seeking for higher returns on capitals instead of labor productivity. (2) Score of Conflict and Government Accountability are positively significant; the risk of Conflict and the risk of Government Accountability are significant constraints on Chinese OFDI. (3) One-year lagged OFDI is negatively significant, indicating that one-year lagged Chinese OFDI in Africa constrains current year; there is a dispersion effect in the temporal dimension. (4) There is a negative third-country effect in Chinese OFDI in Africa that spills over via geographical proximity, while there is a positive third-country effect that transmits via international trade blocs. (5) By comparing firm-level FDI projects from enterprises with different ownership structures, of different sizes and in different sectors, it is found that POEs, non-listed enterprises, and enterprises from secondary sectors are more market seeking; SOEs and listed enterprises are more likely to be constrained by government effectiveness.

The empirical results of this study shed light on the investment decision making of Chinese enterprises and policy making of both Chinese government and Africa host country government. (1) Chinese enterprises, especially private enterprises, which are more sensitive to market motivation and are less capable of dealing with political risks should pay more attention to political risks in host African countries. (2) Related

government departments such as the MOFCOM and NDRC or mass organizations such as the Chamber of Commerce and the China Council for the Promotion of International Trade (CCPIT) should develop a risk evaluation indicator system to help enterprises to evaluate the attractiveness and risks of host African countries. (3) African governments should improve their countries' business environment, including better government accountability and better infrastructure to attract capital-intensive FDI projects from China. (4) Host country governments in Africa should reinforce the regional cooperation, especially geographical regional cooperation among neighboring countries to improve a benign cooperation in attracting FDI.

Acknowledgement

I would like to take this opportunity to express my sincere gratitude to my supervisors Professor David Kiwuwa and Professor Chang Liu for their expertise and patience in supervising me in accomplishing this thesis. Their insightful suggestions help me consistently improve this thesis. Also, I would like to thank Professor May Tan-Mullins, Professor Hang Zhou, Professor Saileshsingh Gunessee, Professor Eric Opoku, and Professor Jiarui Zhang for their feedbacks and suggestions offered when reviewing some chapters of this thesis.

Special thanks go to my parents and my wife who are taking most of the household affairs so as to keep me more concentrated on my study in these 6 years. Without their selfless assistance and everlasting love, I cannot devote myself in pursuing higher academic and professional achievement.

Though going through hundreds of modifications and revisions, it is possible that inadequacies and errors may still remain in this thesis. And the responsibility is entirely my own.

Contents

Chapter One: Introduction

In the process of globalization, multinational enterprises have developed various internationalization strategies. Among these strategies, foreign direct investment (FDI) is an important mode that has long been a heated research topic because of its high engagement in host countries. This study aims to focus on Chinese outward foreign direct investment (OFDI) in Africa and to analyze the determinants of Chinese OFDI in Africa, especially the economic opportunities that attract Chinese OFDI and the political risks that constrain Chinese OFDI.

Chinese investment in Africa is an interesting research topic. China has received much foreign investment and has long been considered the "world's factory". Now, this "world factory" is outputting its own investment in Africa. What are the perception and motivation behind Chinese investment in Africa? What are the determinants of Chinese OFDI in Africa? Has China invested in Africa in pursuit of natural resources? Do political risks in Africa constrain Chinese investment? The enthusiasm for finding answers to these questions motivates this research.

This chapter is an introductory chapter that starts from the research background in Section 1.1. Section 1.2 presents the research questions of this study. Section 1.3 highlights the significance of this research, including both its theoretical and empirical significance. Section 1.4 introduces the structure of this thesis for a better understanding of the relationships among all these chapters.

1.1 Background of the Research

FDI is a very important component of globalization, and it separates the innovation and production phases; in most cases, FDI maintains the innovation and research process in the home country while outsourcing production to host countries. It is important for both the home country and host country to fully use the factors of production. For the home country, OFDI can transfer some domestic production facilities overseas, taking advantage of overseas production factors or occupying the overseas market with the aim of obtaining greater profits. For the host country, inward foreign direct investment (IFDI) offers a large amount of capital to fuel the economy and increase employment.

China has long been the largest recipient of FDI in the past 40 years since the reform and opening up[2], and developing rapidly due to its low labor cost. However, with the recent development of high technology, China has moved up in the global value chain. In addition, China has largely increased its OFDI in recent years, increasing from 17.63 billion in 2006 to 178.82 billion in 2021[3]. Meanwhile, it once was difficult to associate Africa with recipient of FDI, but now it attracts a large amount of Chinese OFDI, increasing from 0.52 billion in 2006 to 4.98 billion in 2021. In contrast to traditional FDI studies that analyze FDI transferred from developed countries to emerging countries, this study investigates whether Chinese OFDI in Africa has different motivations and risk perceptions. To reveal the economic motivations and risk perceptions of Chinese OFDI in Africa, this study analyzes the determinants of Chinese OFDI from different perspectives via different approaches.

2 China's opening up and reform policy was implemented in 1978.
3 Chinese OFDI here refers to OFDI from mainland China.

1.2 Research Questions

As discussed above, this study aims to investigate the determinants of Chinese OFDI in Africa. Thus, the main research question is listed as question (1) shows.

(1) What are determinants of Chinese OFDI in Africa and what are their effects?

Since the determinants of FDI have been comprehensively studied, many different types of determinants have been uncovered. Under the framework of the OLI Paradigm and Internalization Theory, this study takes economic and political determinants in the host country as two types of major determinants. Therefore, research question (2) is as follows.

(2) What are the economic motivations and political constraints that significantly determines Chinese OFDI in Africa? Is Chinese OFDI motivated by natural resources? Is Chinese OFDI constrained by the political risks in Africa?

Another reason to focus on economic and political determinants is that there are two heated debates over economic motivations and political risks in academia. First, it has been debated whether Chinese OFDI is motivated by natural resources in Africa. Pehnelt and Abel (2007), Cheung et al. (2012), Alves (2013) and Ross (2015) suggested that Chinese OFDI was motivated by natural resources in Africa. Nevertheless, Okafor et al. (2015) and Shan et al. (2018) found that resources in Africa are not significantly related to Chinese OFDI. Second, there is a heated debate over whether Chinese OFDI is constrained by political risks. Ross (2015) and Fan (2017) suggested that political risks constrain Chinese OFDI in Africa. Goswami and Haider (2014) argued that the effect of political risks on Chinese OFDI is not significant. Buckley et al. (2007),

Biggeri and Sanfilippo (2012), and Lu et al. (2017) even found a positive relationship between political risks and Chinese OFDI.

However, economic motivations and risk perception can be influenced by third-country effects, considering that African countries are not isolated; instead, they are interdependent on each other via geographical and economic channels. Thus, the third research question is as follows.

(3) What is the role of Third-Country Effect in determining Chinese OFDI in Africa? Will the geographical proximity and economic proximity influence the FDI decisions?

Additionally, economic motivations and risk perceptions vary among different types of Chinese enterprises. Enterprises with different ownership structures, of different sizes, and in different industry sectors have different perceptions of economic motivations and political constraints. The fourth research question is as follows.

(4) What is the role of enterprise characteristics such as enterprise ownership, enterprise size, and the industry sector in determining Chinese OFDI in Africa? Are the motivations and risk perceptions different between SOEs and POEs, between listed enterprises and non-listed enterprises, and among different industry sectors?

1.3 Significance of the Research

1.3.1 Theoretical Significance

(1) Considering the existed FDI studies are developed on FDI from developed countries to emerging countries, this research enriches FDI studies by analyzing

Chinese OFDI in Africa, i.e., FDI from one emerging country to the other emerging countries. The topic "Chinese OFDI in Africa" is itself an interesting and easily forgotten research topic. In the past years, China with large population and low labor cost, has often been treated as an ideal recipient of FDI, and China has even been called the "world's factory". However, with the rapid development of China, it has gradually become a very important source of FDI. In addition, because of the colonialism and slavery history, Africa is easily forgotten when studying host countries of FDI. Therefore, the topic of "Chinese OFDI in Africa" is itself important and easily overlooked by academia. Additionally, considering that existing FDI studies have been developed based on analyzing FDI from developed countries to emerging countries, the focus on Chinese OFDI in Africa in this study will hopefully complement FDI theories due to the special research objects of this study, i.e., China as the home country and Africa as the host countries.

(2) This research contributes to two long-existing debates in FDI studies, i.e., whether Chinese OFDI in Africa is resource seeking and whether Chinese OFDI is constrained by political risks in Africa. As previously mentioned, there is no consensus on whether Chinese OFDI in Africa is motivated by natural resources (Pehnelt & Abel, 2007; Alves, 2013; Okafor et al., 2015; Shan et al., 2018) or whether Chinese OFDI is constrained by political risks (Ross, 2015; Buckley et al., 2007; Biggeri and Sanfilippo, 2012). Thus, this study employs different approaches, including static models, dynamic models, spatial models, etc., and it uses different types of data, including both aggregate country-level data and firm-level data, with the aim of explaining why different results

regarding the determinants of Chinese OFDI in Africa were obtained by previous studies.

(3) This research tries to reveals the full picture of the determinants of Chinese OFDI in Africa in both static and dynamic spatiotemporal dimensions as well as from a third-country perspective. Chinese OFDI in Africa is a comprehensive research topic that relates to different determinants and can be influenced by autocorrelation in the temporal and country dimensions, as well as by enterprise characteristics. In contrast to existing FDI studies, this study employs multiple research perspectives, including static determinants, dynamic determinants, third-country effects, and the risk and motivation perceptions of different enterprises to reveal the full picture of Chinese OFDI in Africa.

1.3.2 Empirical Significance

This research innovates in terms of the research methods of FDI studies, especially in the following ways. (1) By employing both a static panel data model and a dynamic panel data model, this study effectively tests the agglomeration or discrete effect of Chinese OFDI in Africa in the temporal dimension. To increase the reliability of the estimation results, the static panel data model is estimated with POLS, RE, and FE estimation, while the dynamic panel data model is estimated with system and level GMM estimation. (2) By conducting spatial econometric analysis with both geographical proximity weight matrix and economic proximity weight matrix, this research analyzes the third-country effects of Chinese OFDI in Africa in both the geographical and economic channels. Using exploratory spatial data analysis (ESDA), the local and global Moran's I, the spatial autoregressive model (SAM), the spatial error

model (SEM), and the spatial Durbin model (SDM), this study analyzes the third-country effects, including complementary and substitution effects, of Chinese OFDI in Africa. (3) Employing firm-level data, including both transaction-level data from the MOFCOM and first-hand survey data, this study compares the motivations and risk perceptions of Chinese enterprises with different ownership structures, of different sizes, and in different industry sectors.

By revealing the determinants of Chinese OFDI in Africa, especially economic opportunities and political risks, this study offers feasible suggestions on investment cooperation between China and Africa. *For China, it is important to know how to balance economic opportunities and political risks.* The most ideal situation for a firm is to find a perfect African host country with the most economic opportunities and the least political risks. However, in practice, firms can ignore risks when they are facing enormous economic opportunities. Therefore, it is necessary for policy-makers in China to release official guidance for firms interested in investing in Africa to help them better avoid and manage risks. *For Africa, it is insightful for policy-makers to know the real motivation for and constraints on Chinese OFDI in Africa so that they can enhance the business environment accordingly and attract FDI from China.* Additionally, this study has implications for policy-makers in Africa in terms of dealing with relationships with third countries in geographic or economic proximity to attract Chinese OFDI, i.e., competition or cooperation.

1.4 Structure of the Thesis

This research starts by defining the motivations and research questions in Chapter

One. Chapter Two, Chapter Three, and Chapter Four are theoretical chapters that clarifies the theoretical foundation of studies on Chinese OFDI in Africa. Chapter Five, Chapter Six, and Chapter Seven are empirical chapters that analyzes determinants of Chinese OFDI in Africa from different perspectives. Chapter 8 is a conclusion chapter that summarizes research results and offers policy implications. The figure below (Figure 1-1) shows the structure of this thesis as well as the process and logic of this study.

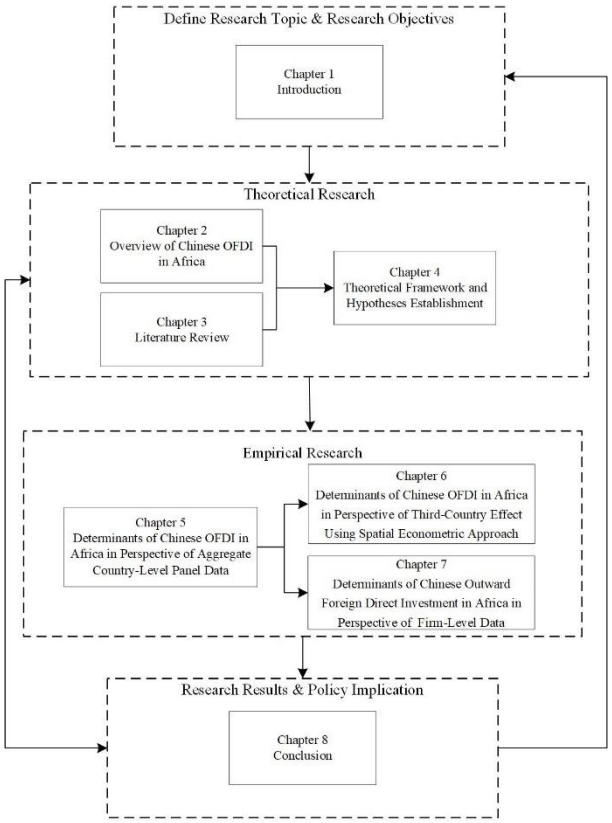


Figure 1-1 Structure of the thesis and relations among the chapters

Chapter 1 is an introductory chapter that illustrates the research background, research significance and research questions. This chapter introduces the general situation of Chinese OFDI in Africa and provides a brief explanation of why Chinese OFDI in Africa is a meaningful research area as well as the questions and objectives of

this research.

Chapter 2 reviews the development of Chinese outward FDI, African inward FDI, and Chinese outward FDI in Africa. From both statistical and institutional perspective, this chapter analyzes the development and characteristics of Chinese OFDI in Africa, which motivates and enlightens me to seek reasons from the later theoretical and empirical studies.

Chapter 3 reviews related studies in terms of the research context of Chinese OFDI in Africa. This chapter first clarifies the concept of FDI, and then reviews its nexus with economic development and social development. Additionally, this chapter reviews the potential determinants of Chinese OFDI in Africa proposed in the existing studies. Finally, this chapter reviewed the most related empirical studies from the perspective of methodologies, with which both implications and limitation are concluded.

Chapter 4 describes the theoretical framework, specifies the variables used in this study, and establishes the hypotheses in this study. The theoretical framework is reemphasized here to explain the interrelationships among the research questions, and it serves as a bridge connecting the theoretical and empirical parts of this thesis. And both dependent and independent variables are specified so that hypotheses can established.

Chapter 5 analyzes the economic and political determinants of Chinese OFDI in Africa with aggregate country-level panel data covering the 2006-2019 period. A panel data model with estimations including POLS estimation, random-effect GLS estimation and fixed-effect within estimation is employed to estimate the effects of the economic

and political determinants of Chinese OFDI in Africa. Additionally, a dynamic panel data model with system and level GMM estimation is used to analyze the agglomeration or discrete effects of Chinese OFDI in Africa.

Chapter 6 takes the third-country effect into consideration because African countries are not isolated; instead, they are geographically or economically interdependent. Chinese OFDI in one African country may be influenced by the characteristics of other African countries through geographical and economic proximity. Thus, spatial econometric methods are employed in this chapter. Spatial autocorrelation is first examined with Moran's I and Geary's C index. Then, a SAR model and a SEM are established to analyze whether spatial correlation is transmitted through a spatially lagged dependent variable ($\rho W y_{it}$) or an unidentified transmission mechanism ($\lambda W \mu_{it}$). Additionally, by combining the advantages of both the SAR model and the SEM, an SDM is established to analyze the spatial effects of both spatially lagged dependent and exogenous explanatory variables.

Chapter 7 uses both transaction-level data from the MOFCOM and first-hand survey data to analyze economic motivations and risk perceptions at the firm level. Considering that the motivations and risk perceptions of enterprises with different ownership structures, of different sizes and in different industry sectors can be differentiated, this study employs firm-level data and divides the data into an SOE group and a POE group; a listed group and a non-listed group; and a primary sector group, a secondary sector group, and a tertiary sector group. Regressions are conducted for different groups so that the motivations and risk perceptions of different enterprises

can be compared. Additionally, qualitative research methods, including three-step coding and textual analysis, are conducted based on respondents' answers to the open-ended questions of the survey and interviews so that comparisons can be further conducted between SOEs and POEs.

Chapter 8 is a conclusion chapter summarizing both the quantitative and qualitative findings of this research. Additionally, feasible suggestions are made for policy-makers in both home countries and host countries based on the findings of this study. The limitations of this study are also explained, and suggestions for further studies are offered in this chapter.

Chapter Two: Overview of Chinese OFDI in Africa

In order to show the overview of Chinese OFDI in Africa and support for further studies, this chapter reviews the development of Chinese OFDI in Africa, especially from the statistical and institutional perspective. Section 2.1 outlines statistical overview of Chinese outward FDI and the institutional environment of Chinese enterprises, focusing on the difference between state owned enterprises (SOEs) and privately owned enterprises (POEs). Section 2.2 offers a brief overview of African inward FDI from both statistical and institutional perspective. Section 2.3 describes the development of Chinese OFDI in Africa, also from statistical and institutional perspective. Section 2.4 is a conclusion section. By reviewing the overview development of Chinese OFDI in this chapter, it motivates and enlightens me to seek reasons from the later theoretical and empirical chapters.

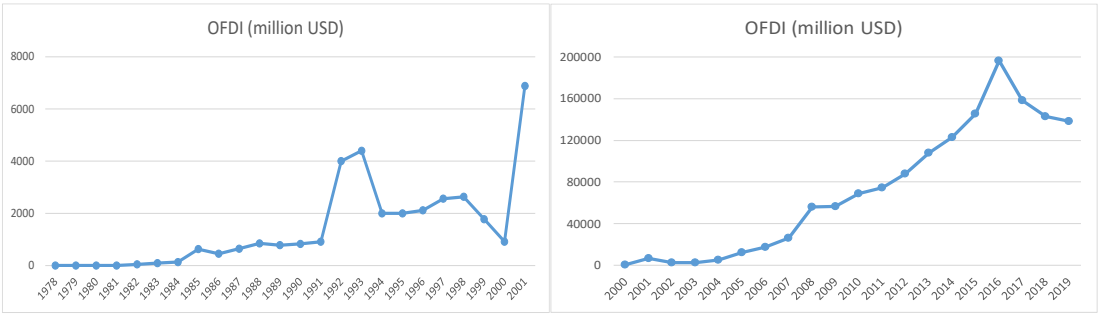
2.1 China as Home Country

2.1.1 Statistical Overview of Chinese Outward FDI

As the home country, China's OFDI was nearly zero when it opened up to the outside world in 1978, and Chinese OFDI steadily increased after Chairman Deng Xiaoping[4] emphasized economic development. In addition, in 1992, Deng Xiaoping delivered a speech called the South Tour Speech ("nan fang tan hua" in Chinese). In this speech, he confirmed the great success of the reform and opening up and encouraged Chinese enterprises to "go out" ("zou chu qu" in Chinese), which led to the first wave of a sharp increase in Chinese OFDI in 1992.

4 Deng Xiaoping was the second chairman of China, succeeding Chairman Mao Zedong.

In 2001, China joined the WTO, which indicates that both Chinese products and Chinese capital were globally recognized. This recognition enabled Chinese OFDI to have a second wave of a sharp increase. After 2002, there was a consistent increase in Chinese OFDI. By 2016, China had the second highest annual OFDI flow all over the world. A decrease in the 2017-2019 period caused China to drop in the global rankings to number 3, following the United States and Japan. The development trend of Chinese OFDI flow from 1978 to 2019[5] is shown in Figure 2-1.



(1)1978-2001 (2) 2000-2019

Figure 2-1 Chinese OFDI outflow in 1978-2001 and 2000-2019

Note: Data source from UNCTAD; figure was computed by the author.

Additionally, in terms of Chinese OFDI destinations, the most popular destinations were "tax havens", which included the Cayman Islands and the British Virgin Islands. In addition to these countries, Chinese OFDI largely went to developed countries, such as the United States and Australia, and neighboring countries around China, such as Singapore and Russia. The top 10 countries with the largest Chinese OFDI stock by the end of 2019 are shown below (see Figure 2-2).

[5] The data in this study are counted through the end of 2019, the year before the COVID-19 pandemic, which caused a great shock to FDI activities.

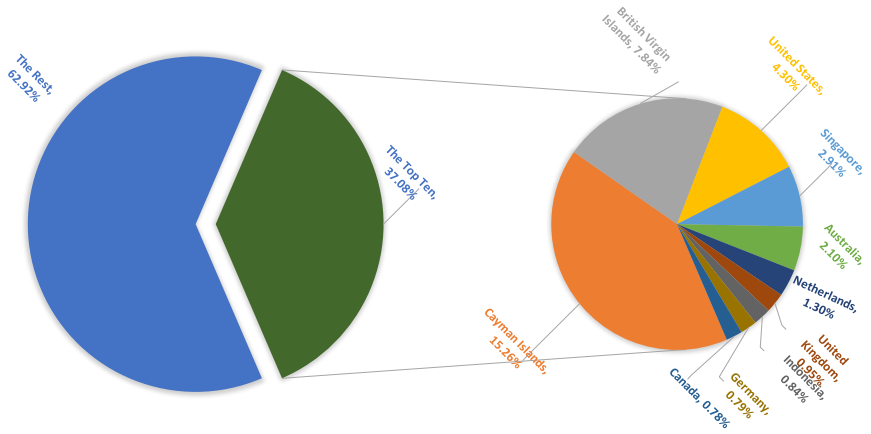


Figure 2-2 Top 10 Chinese OFDI stock destinations and its ratio to total Chinese OFDI stock by 2019

Note: Data source from Statistic Bulletin of China's Outward Foreign Direct Investment; figure was computed by the author.

According to the figure above, the top 10 Chinese OFDI stock destinations accounted for approximately 1/3 of the total Chinese OFDI stock; this value was not large, indicating that the distribution of Chinese OFDI was geographically dispersed. Among the top 10 countries, the largest share went to the Cayman Islands and the British Virgin Islands for the purpose of tax reduction. The United States, the largest economy in the world, followed, ranking third. Additionally, Singapore, an emerging neighboring country, was the 4th largest Chinese OFDI destination, followed by Australia, the Netherlands, the United Kingdom, Indonesia, Germany, and Canada.

2.1.2 Institutional Environment of China

Institutions are the constraints and incentive system of a society (North, 1990). From the institutional perspective, Chinese FDI can be concluded as five stages, i.e., cautious internationalization in 1979-1985, government encouragement stage in 1986-1991, expansion and regulation stage in 1992-1998, "go global" policy period in 1999-2001, and post WTO period since 2001 (Buckley et al., 2008).

Stage one: cautious internationalization stage. FDI became permissible in 1979 in China after the “Open Door Policy”. At that time only a few sate-owned enterprises are allowed to invest abroad. And foreign investment towards China was restricted to only a few appointed industries after complicated procedures.

Stage two: encouragement stage. Gradually, government liberalized restrictive policy especially after chairman Deng Xiaoping’s journey to the south (Drogendijk & Blomkvist, 2013). Four special economic zones (SEZ) along the coast began to offer preferential policies to attract FDI.

Stage three: expansion and regulation stage. The success in SEZs encouraged a lot of other coastal cities and even inner cities to join in. However, there was still domestic concern about loss of control over state assets. Therefore, State Planning Commission and SAFE were required to examine projects valued at more than 1 million US dollars before referral to MOFTEC for final approval (Buckley et al., 2008).

Stage four: post WTO stage. China joined WTO in 2001 and very soon the “going global” policy was initiated. After that, both private and state-owned were very much encouraged to invest abroad and Africa became an attractive investment destination (Voss, 2011).

After opening up in 1978, China has shifted from a planned economy to a market economy, aiming to accelerate the development of the national economy. One major effort in this transition was to separate the government and industry (Pearson, 2005). Subsequently, private enterprises were encouraged, and two major types of enterprise ownership were formed: state-owned enterprises (SOEs) and privately owned

enterprises (POEs). To understand Chinese OFDI, it is necessary to understand the different institutional environments of Chinese SOEs and POEs. The institutional environments of SOEs and POEs can differ in the following ways.

(1) Industry sectors. SOEs actively play a role in core industries such as defense, energy, minerals, and telecommunications to fulfill the objectives of the government. It would be very difficult for POEs to enter these industries, and most of them operate in more competitive industry sectors, such as textiles, garments, and retail. Additionally, a substantial Chinese FDI in Africa was made by SOEs, which are believed to be more policy oriented (Lu, et al., 2017).

(2) Government and financial support. Financial support is very important for internationalization because it usually requires a large budget. In China, most financial institutions are owned by the government. This enables SOEs to be more likely to obtain financial support, while POEs, especially small and medium-sized POEs, are less likely to obtain financial support. For example, Alves (2013) found that SOEs are more likely to be awarded fiscal incentives and financial inducements in the context of the "Going Global" strategy (Alves, 2013).

(3) OFDI approval process. Although the market was liberalized after the strengthening stage, several government departments are still responsible for monitoring the economy and investment. Therefore, both SOEs and POEs need to receive approval before making overseas investments. The two major departments for evaluating OFDI activities are the National Development and Reform Commission (NDRC) and the Ministry of Commerce (MOFCOM). SOEs also need approval from

the State Asset Supervision Administration Commission (SASAC) before submission to the NDRC and MOFCOM. Although it seems that SOEs need to go through a more complicated approval process, the approval procedures for central SOEs are exempted under most conditions (Sauvant & Chen, 2014).

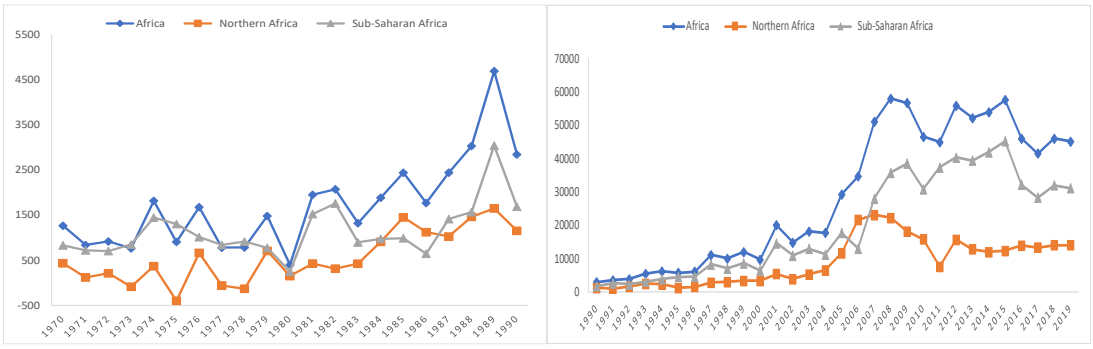
Therefore, it can be concluded that the institutional environment is more favorable for SOEs in the above three aspects. Differences in institutional environments lead to different motivations and different risk perceptions for OFDI decisions. POEs are believed to be more market seeking, while SOEs are believed to be more resource seeking (Huang & China, 2014); additionally, POEs are believed to be more risk averse, while SOEs are believed to be more risk tolerant (Ren & Jack, 2014). These differences lead to Chinese POEs and SOEs having different economic motivations and risk perceptions when making FDI investment decisions. Estrin et al. (2016) conducted a comparative study between Chinese SOEs and POEs and found that only when government policies are liberalized enough will the internationalization strategies of SOEs and POEs converge.

2.2 Africa as Host Country

2.2.1 Statistical Overview of African Inward FDI

It seems that it is difficult to associate Africa with being the host countries of FDI. Nevertheless, Africa has a long history of being a recipient of FDI. Early in 1970 (i.e., to which the earliest FDI statistics can be traced back), investment in Africa reached 1200 million USD, but the inward foreign direct investment (IFDI) flow into Africa fluctuated substantially with the wars and independence that frequently occurred in

Africa (see Figure 2-3). In 1990, the independence of Namibia marked the independence of all of Africa and the end of colonialism by Western countries. Therefore, the FDI flow in Africa experienced a steady increase after 1990. Influenced by the economic crisis in 2008, there was a decrease in African inward FDI during the 2008-2010 period. By dividing Africa into Northern Africa and Sub-Saharan Africa, it was found that as an OFDI destination, Sub-Saharan Africa was more popular than Northern Africa in both the 1970-1990 and 1990-2019 period. The difference between Sub-Saharan Africa and Northern Africa was larger in recent years between 2008 and 2019.



(1) 1970-1990 (2) 1990-2019

Note: Data source from UNCTAD; figure was computed by the author.

Figure 2-3 IFDI flow into Africa in 1970-1990 and 1990-2017

From the perspective of individual countries, it was found that the most popular host countries were large economies, such as South Africa and Nigeria, or resource-abundant countries, such as Algeria and Angola. The 10 African countries with the largest IFDI stocks in 2019 are shown in the following figure (Figure 2-4).

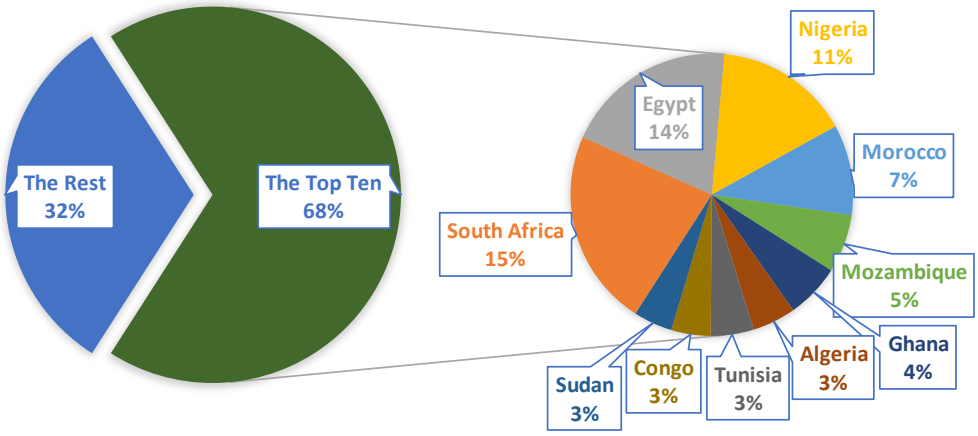


Figure 2-4 Top 10 Africa countries with largest IFDI stock by the year of 2019

Note: Data source from UNCTAD; figure was computed by the author.

It was found that African countries with large IFDI stocks were clustered among several African countries since the top 10 African countries accounted for 68% of the total IFDI stock in all of Africa. Among the top 10 countries, South Africa, as the largest economy with a relatively stable government, attracted the most IFDI. Egypt, which had the second largest population and third largest GDP, attracted the second largest FDI. Nigeria, which had the largest population and abundant oil resources, was the third popular IFDI destination, followed by Morocco, Mozambique, Ghana, Algeria, Tunisia, Congo, and Sudan.

2.2.2 Institutional Environment of Africa

Africa is the second largest continent, with 54 independent countries and regions. The history of Africa includes a history of colonialism, slavery, wars, disease, and disasters. With the independence of Namibia in 1990, Africa quickly recovers its economy in 21st century. In fact, Africa is the fastest-growing market in the world, with an annual population growth rate of 2.3% and an annual GDP growth rate of 5%.

However, the largely lagged technology small market size makes a lot of Africa

countries quite struggling in their economy development. Thus the integration of Africa is attached large attention among academic and policy makers. And trade bloc is one important form.

There are 6 major trade blocs within Africa, i.e., 6 trade blocs in Africa (the East African Community (EAC), the Southern African Development Community (SADC), the common market of Eastern Southern Africa (COMESA), the Union of the Arab Maghreb (UMA), the Economic Community of Western African States (ECOWAS), and the Economic Community of Central African States (ECCAS). And some Africa countries belongs to more than one trade blocs and make them more likely to be invested in for larger market potential (Gekonge, 2014). The 6 major trade blocs in Africa and their members are listed as follow (See Table 2-1).

Table 2-1 African Trading Blocs and Their Members

Trading Blocs	Members
EAC	Kenya, Uganda, Tanzania, Burundi, Rwanda, South Sudan
SADC	South Africa, Angola, Botswana, Zimbabwe, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Mauritius, Democratic Republic of Congo, Seychelles, Madagascar, Comorin
COMESA	Burundi, Comorin, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe
UMA	Algeria, Libya, Mauritania, Morocco, Tunis
ECOWAS	Benin, Burkina Faso, Mali, Niger, Senegal, Togo, Guinea-Bissau
ECCAS	Angola, Burundi, Cameroon, Central Africa, Chad, Congo, Democratic Republic of Congo, Gabon, Equatorial-Guinea, Sao Tome and Principe

2.3 Development of Chinese OFDI in Africa

China did not have outward FDI until the Open-Door Policy was implemented in 1978, and by 2019, China had an annual OFDI flow reaching 136.91 billion USD, 2.70

billion USD of which was allocated to Africa. The ratio of Chinese OFDI in Africa to total Chinese OFDI is low while South Africa, Aleria, etc. are among the top Chinese OFDI destinations from individual Africa country perspective. The following subsections reviews development of Chinese OFDI in Africa from statistical and institutional perspective respectively.

2.3.1 Statistical Overview of Chinese OFDI in Africa

Chinese OFDI in Africa did not start until the 1980s, and by 2003, the Chinese OFDI stock in all of Africa was only 74.81 million USD. However, it increased very rapidly after 2003. In 2004, 2005, 2006, 2007 and 2008, African countries, including Sudan, Algeria, Zambia, Nigeria, and South Africa, were among the top 10 annual Chinese OFDI outflow destinations. In 2008, South Africa even ranked No. 1 as the most popular destination of Chinese OFDI. See the figure below (Figure 2-5).

	2004		2005		2006		2007		2008	
No. 1	Cayman Islands	1286	Cayman Islands	5160	Cayman Islands	7833	Cayman Islands	2602	South Africa	4808
No. 2	British Virgin Islands	386	British Virgin Islands	1230	British Virgin Islands	538	British Virgin Islands	1876	British Virgin Islands	2104
No. 3	Sudan	147	South Korea	589	Russia	452	Canada	1033	Australia	1892
No. 4	Australia	125	United States	232	United States	198	Pakistan	911	Singapore	1551
No. 5	United States	120	Russia	200	Singapore	132	United Kingdom	567	Cayman Islands	1524
No. 6	Russia	77	Australia	193	Saudi Arabia	117	Australia	532	Kazakhstan	496
No. 7	Indonesia	62	Germany	124	Algeria	99	Russia	478	United States	462
No. 8	Singapore	48	Kazakhstan	95	Australia	88	South Africa	454	Russia	395
No. 9	Nigeria	46	Sudan	92	Zambia	87	Singapore	398	Pakistan	265
No. 10	Bahamas	44	Algeria	85	Mongolia	82	Nigeria	390	Mongolia	239

Africa Latin America North America Asia Europe Austrilia

Figure 2-5 Top 10 Chinese OFDI outflow destinations in 2004-2008 with Africa countries marked red

Note: Data source from Statistic Bulletin of China's Outward Foreign Direct Investment; figure was computed by the author.

In the 2004–2008 period, Chinese OFDI largely flowed to Africa, which seems to coincide with China's rapid development, with a GDP growth rate above 10% (except for GDP growth in 2008, which was slightly less than 10% because of the economic crisis). The ratio of the China-Africa OFDI flow to the total Chinese OFDI flow also

supports this point. In the figure below (Figure 2-6), the 2004-2008 period witnessed both a higher ratio of Chinese OFDI in Africa and a higher GDP growth rate in China, which makes some scholars to believe that China was using the natural resources in Africa to fuel its own development and that the relationship between China and Africa was unbalanced (Pehnelt & Abel, 2007; Alves, 2013; Sven, 2014; Ross, 2015).

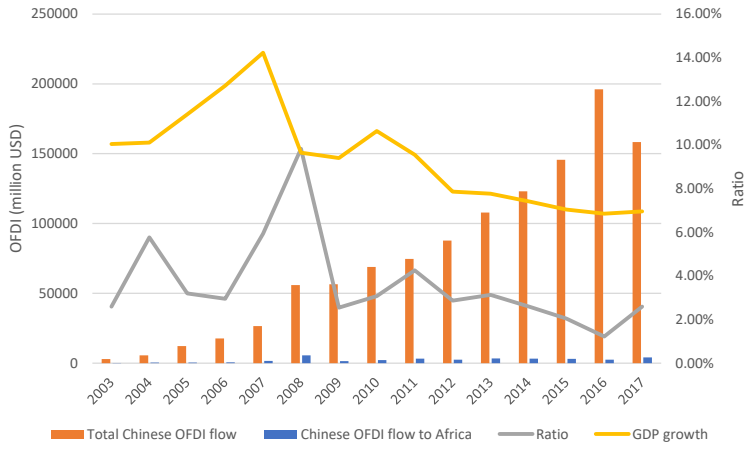


Figure 2-6 Ratio of China-Africa OFDI to total Chinese OFDI and GDP growth rate in China

Note: Data source from Statistic Bulletin of China's Outward Foreign Direct Investment; figure was computed by the author.

2.3.2 Institutional Environment of Chinese OFDI in Africa

China's engagement in Africa can be divided into three overlapping stages, i.e., the early stage of the Bandung Conference (1955-1990), the transition stage after Deng Xiaoping's tour to the south (1990-2000) and the strengthening stage under the Forum on China-Africa Cooperation (2000-onward).

a. Early stage in 1955-1990

In 1955, the Bandung Conference was held in Indonesia, and its theme was anti-colonialism. Many African countries attended the conference, and China was invited to share its experience with anti-colonialism, which led to a close relationship between

China and Africa. Subsequently, China offered aid and interest-free loans first to Guinea and then to other African countries. However, at that time, the Chinese government took the political struggle as central work and did not liberalize its economy until 1978. After 1978, both trade and investment between China and Africa began to occur, though very little.

FDI became permissible in 1979 in China after the "Open Door Policy". However, at that time, only a few state-owned enterprises (SOEs) were allowed to invest abroad, while privately owned enterprises (POEs) were still prohibited from investing abroad. Additionally, FDI was restricted to only a few appointed industries after complicated approval procedures.

b. Transition Stage in 1990-2000

The main feature of the transition stage was the increasing FDI between China and Africa. In 1990, China signed its first bilateral investment treaty (BIT), with Ghana serving as a trial. Chairman Deng Xiaoping's journey to the south in 1992 further liberalized the restrictive investment policy. In Deng's South China Speech, he largely confirmed the economic development of China and encouraged enterprises to explore new methods of economic cooperation. Subsequently, an increasing number of BITs between China and Africa were signed.

Additionally, four special economic zones (SEZs) were established along the coast, namely, Shenzhen, Zhuhai, Xiamen, and Shantou. The four SEZs enjoy preferential policies in the field of FDI, which encourage both inward FDI and outward FDI.

However, there was still domestic concern about the loss of control over state

assets. Therefore, SOEs are more supportive than POEs of outward investment. Additionally, the State Planning Commission and State Administration for Foreign Exchange (SAFE) were required to examine FDI projects valued at more than 1 million US dollars before referral to the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) for final approval (Buckley et al., 2008).

c. Strengthen Stage in 2000-onwards

Established in 2000, the Forum on China-Africa Cooperation (FOCAC) indicates that the China-Africa relationship has entered a new stage. The establishment of the FOCAC aimed to strengthen economic and trade cooperation between China and Africa. In 2001, China joined the WTO, and very soon, the "Going Global" policy was initiated, which further pushed Chinese investment and Chinese products to the whole world, especially Africa. In addition, both POEs and SOEs were strongly encouraged to invest abroad.

With the promotion of the FOCAC, cooperation between China and Africa has increased through the promotion of trade and grants for concessional loans. For example, China issued 60 billion USD in concessional loans to Africa in the 7th FOCAC in 2018. Under the framework of the FOCAC, the annual bilateral trade between China and Africa reached 200 billion US dollars in 2018. By 2019, China had signed BITs with 15 African countries. The strengthening period also featured strengthening ties with Africa by competing for greater influence in Africa than in other emerging countries, such as India (Zhang, 2016a; Gekonge, 2014).

2.4 Conclusion

This chapter reviewed the development of Chinese OFDI in Africa from both statistical and institutional perspective. As the home country, China did not start its OFDI till 1978; and it experienced its first sharp increase in 1992 when Chairman Deng Xiaoping deliver the “South Tour Speech” and encourage enterprises to “go out”. It had the second sharp increase in 2001 when China joined the WTO. Additionally, it is necessary to consider the different institutional environment of SOEs and POEs.

As the host countries, African inward FDI is quite fluctuated partly due to the wars and independence that frequently occurred. Additionally, joining into the trade blocs also earns the host Africa countries additional advantage to attract FDI (Gekonge, 2014).

For Chinese OFDI in Africa, the high ratio of Chinese OFDI into Africa as percentage to total Chinese OFDI in 2006-2008 coincides with the fast-speed growth rate of Chinese economy, which makes some scholars to wonder whether China is using natural resources to fuel its own development. From perspective of institutional environment, China’s engagement in Africa is divided into three overlapping stages, i.e., the early stage of the Bandung Conference (1955-1990), the transition stage after Deng Xiaoping’s tour to the south (1990-2000) and the strengthening stage under the Forum on China-Africa Cooperation (2000-onward). And the review of Chinese OFDI in Africa in this chapter largely supports further analysis of determinants of Chinese OFDI in Africa.

Chapter Three: Literature Review

The literature on foreign direct investment (FDI) is vast. Focusing on the determinants of Chinese OFDI in Africa, this chapter is structured as follows. Section 3.1 illustrates the definition and classification of FDI and distinguishes FDI from similar concepts. Section 3.2 explains the role of FDI in economic development and its effect on social development. Section 3.3 starts from a theoretical foundation and illustrates the potential economic and political determinants of Chinese OFDI in Africa. Section 3.4 reviews empirical studies on the determinants of Chinese OFDI in Africa from the perspectives of the research sample, the variables used, and the methods employed, which enlightens the methodology of this study. Finally, Section 3.5 concludes the contents of this chapter and discusses the contributions of this study.

3.1 Concept of Foreign Direct Investment (FDI)

Foreign direct investment (FDI) can be defined in many different ways. The OECD defines FDI as "obtaining a lasting interest by a resident entity in one economy in an entity resident in an economy other than that of the investor" (OECD, 1999). UNCTAD defines FDI as "an investment involving long-term relationship and reflecting a lasting interest and control by an enterprise resident in a foreign country" (UNCTAD, 2005). To be concise, FDI is an investment made by a firm or an individual from one country in a business in another country. For joint ventures, ownership of 10% or more of voting power in an enterprise by a foreign investor is also considered to indicate this relationship (Blundell-Wignall & Roulet, 2017). Subsection 2.1.1 classifies FDI from different perspectives, and Subsection 2.1.2 distinguishes FDI from

related confusing concepts.

3.1.1 Classification of FDI

FDI can be further classified in different ways. *First, FDI can be divided into vertical FDI and horizontal FDI according to the relationship between overseas production facilities and final production.* If overseas production facilities are used to supply only resources and preliminary products, then the FDI is vertical. If overseas production facilities are responsible for producing some types of final products and sever some markets with their final products, then the FDI is horizontal.

Second, FDI can be divided into natural resource-seeking FDI, market-seeking FDI, efficiency-seeking FDI, and strategic asset-seeking FDI based on FDI motivations. As a development of Eclectic Theory, Dunning (1993) identified 4 basic motivations for FDI, i.e., the natural resource-seeking motivation, market-seeking motivation, efficiency-seeking motivation, and strategic asset-seeking motivation, that provide an impetus for foreign production. Here, it is worth mentioning that the 4 types of FDI classified based on motivations overlap with vertical or horizontal FDI. For example, resource-seeking FDI can be categorized as vertical FDI, while market-seeking FDI is mainly horizontal FDI (Biggeri & Sanfilippo, 2009).

Third, FDI can be divided into outward foreign direct investment (OFDI or ODI) and inward foreign direct investment (IFDI) based on the direction of investment. For example, if FDI is made by country A and flows into country B, it is OFDI for country A and IFDI for country B.

3.1.2 Distinguishing FDI from Related Terms

FDI is easily confused with other international activities. *First, FDI differs from exporting, licensing, and franchising.* As one mode of internationalization, FDI differs from low-commitment modes such as exporting and medium-commitment modes such as licensing and franchising because of its full commitment (Pan & Tse, 2000; Owusu & Habiyakare, 2011). Although exporting or international trade is conceptually different from FDI, it is believed to be highly correlated with FDI. For example, Eden and Miller (2004) suggested that exports have a negative impact on FDI, as exporting is an alternative way to internationalize and share the cake from the world market.

Second, FDI differs from foreign aid. For one thing, FDI differs from foreign aid because the main role of foreign aid is to supplement the host country's sources of finance and boost infrastructure and social development, while FDI goes to different business fields (Alemu, 2017). For the other, foreign aid is usually launched by the government, while foreign direct investment is made by enterprises, although Chinese state-owned enterprises are more policy oriented. Additionally, the aim of foreign aid should be selfless, while FDI is a business activity that aims to increase profits. However, there is a hot debate about China's foreign aid activities and whether such activities are for aid purposes or for investment purposes. Afawubo and Mathey (2017) suggested that China uses foreign aid to secure its investment in Africa. Lu et al. (2017) conducted an empirical study and found that Chinese foreign aid was not used to mitigate political risks in the whole sample but that the mitigating effect of aid became significant in resource-abundant countries.

Third, FDI differs from foreign portfolio investment (FPI). FDI differs from FPI

because its investment form can involve nonfinancial investments, such as technology and human resources, while FPI involves only the investment of financial assets. Additionally, the profit of FDI is generated through successful operation in host countries, while the profit of FPI is obtained via investment in foreign financial assets without operational practice.

3.2 FDI, Economy, and Development

The importance of FDI has long been discussed. Theoretical studies suggest that FDI has a positive effect on the development of host countries since it supports capital accumulation, technological progress, and human capital development (Zhang, 2021). Under the assumption of constant returns to scale, post-Keynesian theories emphasize the positive effect of FDI on economic growth through capital accumulation (Rosenstein-Rodan, 1961). However, neoclassical growth theories emphasize the positive effect of technological progress (Solow, 1957). The new endogenous growth model considers the long-term interrelationship between technology development, human capital and economic growth (Romer, 1986). Therefore, the following subsections illustrate the link between FDI and economic development from the perspectives of investment capital (Subsection 3.2.1), technological development (Subsection 3.2.2), and human capital (Subsection 3.2.3).

3.2.1 Link Between FDI and Investment Capital

An increasing amount of international capital flowed to developing countries in the early 1990s, especially in the form of FDI (Sadik & Bolbol, 2001). For home countries (usually developed countries), a lower interest rate and competitive market

competition in these countries “push” them to find emerging markets, and increasingly better macroeconomic policies and fundamentals in developing countries “pull” them to build overseas facilities. For host countries (usually developing countries), FDI can offer them extra investment capital to quickly fuel the local economy. Alves (2013) suggested that Chinese OFDI in Africa actually involves infrastructure-for-resources deals, i.e., Africa obtains capital from China to build infrastructure, while China obtains resources from Africa. Additionally, FDI is believed to promote local investment when foreign capital is required to operate jointly with local firms (Luo, 2007).

3.2.2 Link Between FDI and Technology Development

FDI is believed to have technology spillover effects on local country technological development via several channels (Akhtaruzzaman et al., 2017). First, the demonstration effect of FDI plants and their innovative products allows local firms to imitate more efficient production methods and more advanced products. Second, the market penetration of MNEs increases competition in the host country market and induces a crowding-out effect to push local firms to adopt new and more efficient technology. Third, when multinationals integrate into local production chains, productivity spillovers can occur in upstream or downstream production sectors.

3.2.3 Link Between FDI and Human Capital

Human capital enhancement has been considered as another important aim of introducing FDI into domestic countries. For one thing, the MNEs will employ local employees and offer training & working experience. And the migration of labors from foreign affiliates to host country enterprise acts as a channel of knowledge transfer

(Jude, 2016). For the other, in order to attract skill intensive FDI, host country government will have government training programs to improve local labor's skill and capability. Also, Ali et al. (2016) believed that the role of technology spillover through FDI is largely dependent on human capital, i.e., better human capital in host countries can better absorb technology spillover.

In conclusion, Section 3.2 reviews the important role of FDI in economic and social development. However, not everyone supports FDI's positive effect on boosting the local economy. Navas (2019) suggested that technology spillovers occur only after 8-9 years of FDI flow into a less developed host country, and this effect is especially significant for Southeast Asian countries but not significant for South American countries. Additionally, some scholars argue that FDI can be exploitative by occupying the domestic market and "killing" homogeneous enterprises in market competition (Ram & Zhang, 2002).

3.3 Determinants of Chinese OFDI in Africa

The determinants of FDI have long been heated discussed in academia word. The most heated 2 debates are whether Chinese OFDI in Africa is natural resource seeking and whether Chinese OFDI in Africa is constrained by political risks. These two debates about economic motivation and political risks are actually two parts of Internalization Theory. Buckley and Casson (1976) developed Internalization Theory, according to which they argued that firm-specific advantages need to offset the costs of doing business abroad when making OFDI decisions. Thus, this study divides the determinants of Chinese OFDI in Africa into economic opportunities that motivate

Chinese enterprises to invest in Africa and political risks that constrain Chinese enterprises from investing in Africa.

This section starts from the theoretical foundation of FDI determinants in Subsection 3.3.1, which explains what determines FDI from a theoretical perspective. The economic and political determinants are discussed in Subsection 3.3.2 and Subsection 3.3.3 respectively, which are the two major types of determinants of Chinese OFDI in Africa. Subsection 3.3.4 illustrates other determinants, including infrastructure, trade, and inflation.

3.3.1 Theoretical Foundation of FDI Determinants

Many theories have attempted to explain FDI as well as its conditions, motivations, locations, and determinants. The major FDI theories include Monopolistic Advantage Theory, Internalization Theory, International Product Life Theory, Eclectic Theory, etc.

(1) Monopolistic Advantage Theory. Developed in 1960, Hymer's (1976) Monopolistic Advantage Theory was the first attempt to explain the FDI and initiated the research of FDI theories. Kindleberger (1969) further developed the Monopolistic Advantage Theory and suggested the precondition of FDI is that the MNE has monopolistic advantages over local companies. And the monopolistic advantages came from tangible assets such as internal & external scale of economy or intangible assets such as trademarks, patents etc. However, monopolistic advantage theory illustrates only one condition of FDI, i.e., monopolistic advantage, and does not explain the location of FDI.

(2) International Product Life Cycle Theory. Vernon's (1966) International

Product Cycle Theory tries to explain FDI through four production stages, i.e., the innovation stage, growth stage, maturity stage, and decline stage. According to the theory, U.S. companies created new and innovative products and exported surpluses to foreign markets. Nevertheless, some foreign markets, such as the European market, had high demand and good technological capability and began to imitate American products. American firms were forced to transfer their production facilities to local markets to maintain their profits. Production cycle theory explains some types of investment as well as the location of FDI, but many more FDIs are motivated by more complicated considerations.

(3) Internalization Theory. Internalization theory assumes that the market is incomplete. Buckley and Casson (1976) suggested that transaction costs will increase during the flow of intermediate products and knowledge property products and that enterprises will internalize production to overcome the increase in transaction costs. Buckley (1988) further developed the theory that a firm's ability to internalize the market or not is up to the point where the benefits of future internalization outweigh the cost of internalization. If the benefits of internalization can offset the cost of internalization, then the firm will choose to internalize its production, i.e., FDI will be chosen instead of looser forms of contract such as subcontracting, coproduction deals, or licensing.

(4) Eclectic Theory. Dunning (1977) proposed Eclectic Theory and argued that an MNE needs to have three types of advantages to invest abroad—an ownership advantage, a location advantage and an internalization advantage—i.e., the ownership-

location-internalization (OLI) paradigm. Eclectic Theory or the OLI Paradigm is an eclectic theory of Monopolistic Theory, Location Theory, and Internalization Theory. Dunning (1988) suggested that enterprises are motivated to conduct international production if they can acquire all three advantages, i.e., the ownership advantage, location advantage, and internalization advantage. The ownership advantage can be acquired mainly from firm-specific knowledge, human capital, property rights, etc. The location advantage can be acquired from the costs of production factors, political stability, regulatory frameworks, distance, etc. The internalization advantage can be acquired from different modes of internationalization to reduce transaction costs or to reduce risks. Since the ownership and internalization advantages are based on firm-specific factors while the location advantage is based on host country variables, Dunning (1993) further developed the theory and identified *four locational determinants of FDI, i.e., natural resource advantages, market advantages, efficiency advantages and strategic asset advantages*. However, neither Eclectic Theory nor the OLI Paradigm provides insight into the extent of these advantages when making FDI decisions.

Eclectic Theory or the OLI Paradigm is already a comprehensive theory for analyzing the locational determinants of FDI. However, eclectic theory is based on developed countries' FDI investing in emerging countries. With the development of emerging countries such as China and India, much FDI has flowed from emerging countries to other emerging countries. Therefore, it is unclear whether Eclectic Theory or the OLI Paradigm still has good explanatory power for emerging countries' FDI in

other emerging countries (Buckley et al., 2007; Park & Roh, 2019).

3.3.2 Economic Determinants

As mentioned earlier, Dunning (1978) proposed the OLI Paradigm and categorized resource-seeking, market-seeking, efficiency-seeking and strategic asset-seeking motivations as 4 locational determinants of FDI. Many related empirical studies have been conducted under the framework of Dunning's theory (Drogendijk and Blomkvist, 2013; Cheung et al., 2012; Okafor et al., 2015), to analyze the economic determinants of Chinese OFDI in Africa.

(1) Natural resources as economic opportunities. There are two opposite opinions about Chinese resource motivations in Africa. Traditionally, it was believed that China's OFDI in Africa is motivated by Africa's abundant natural resources, including oil, gas, and minerals (Pehnelt & Abel, 2007; Biggeri & Sanfilippo, 2009; Cheung et al., 2012; Alves, 2013; Ross, 2015). For example, Pehnelt and Abel (2007) suggested that China used tied aid as a means of securing local OFDI, which mainly involved energy industries, including oil and other resources. Cheung et al. (2012) found that although neither oil nor minerals were significant when using an approved OFDI dataset to conduct Tobit regression, the interaction "Going Global*Oil" was positively significant, indicating that China had a preference for oil-producing African countries after the launch of the "Going Global" policy; and the IMF-OECD dataset showed stronger evidence for China's quest for natural resources. It was also supported by the other scholars that China offers generous concessional loans and large investments in infrastructure projects in African countries in exchange for access to resources (Alves,

2013; Corkin, 2012). A case in point is Algeria, an African country with a high Chinese OFDI stock, is the fifth largest gas producer and exporter and is also a member of OPEC.

The other opposite saying is that Chinese OFDI in Africa is not resource-seeking (Okafor et al., 2015; Shan et al., 2018). Using dynamic panel data estimation, Okafor et al. (2015) found that natural resource rents were negatively related to Chinese OFDI in a full sample and a regional sample of Sub-Saharan African (SSA) countries. This finding was supported by Shan et al. (2018), who used fixed-effect regression and found that richer natural resources do not necessarily attract more Chinese OFDI, while both GDP and infrastructure are strongly and positively related to Chinese OFDI.

(2) Markets as economic opportunities. There is strong evidence that Chinese firms engaged in Africa are there for market-seeking purposes (Cleeve, 2012; Cheung et al., 2012; Tsao, Lu and Yeh, 2015). From the perspective of China, surplus domestic production combined with trade tariffs forces China to seek markets abroad. From the perspective of Africa, Africa is the fastest-growing market in the world, with an annual population growth rate of 2.3% and an annual GDP growth rate of 5%. Thus, market seeking can be an attractive economic opportunity for Chinese OFDI in Africa. There are two proxies for the market-seeking motivation, i.e., market growth and market size (Cleeve, 2012; Cheung et al., 2012). Market growth indicates market potential, while market size indicates the current market scale, and both of these proxies are proven to have a positive impact on attracting Chinese FDI to Africa (Cleeve, 2012). Additionally, the different perceptions of the market-seeking motivation between SOEs and POEs are worth examining. For example, Tsao et al. (2015) showed that, compared to SOEs,

which are concentrated in resource and infrastructure industries, Chinese private enterprises in Africa are more likely to invest in retail industries and are more market oriented.

(3) Efficiency as an economic opportunity. Efficiency can be acquired in accessing to cheaper or better factors of production that engage in certain intermediate and final products. There are four types of production factors, including labor, capital, land, and entrepreneurship. Considering that the land is fixed and entrepreneurship is unevaluable, production function in classical theories mainly focuses on labor and capital. Thus, capital efficiency and labor efficiency are focused when considering efficiency seeking motivation.

In the labor efficiency perspective, Wood et al. (2014) found that emerging-market MNCs are more likely to invest in low-wage economies such as Africa and are not concerned with the local skills gap. However, Ross (2015) used another proxy, GDP per person employed, to test the correlation between productivity and Chinese OFDI in Africa and found that Chinese OFDI was not efficiency seeking.

In the capital efficiency perspective, Asiedu (2022) believed that investment is more likely to flow into capital scarce countries to seek for higher returns on capital. Mijiyaw (2015) used the inverse value of real GDP per capita as proxy for capital efficiency seeking motivation and it was positively significant to FDI flow into Arica, which further supports that FDI in Africa is seeking for higher returns on capitals.

To combine the labor efficiency and capital efficiency, Okafor et al. (2015) used the rate of return, the educational enrollment rate, corruption, trade openness and

inflation as proxies for efficiency-seeking motives; they found that the rate of return, the educational enrollment rate, and trade openness were positively significant, while corruption and inflation were negatively significant. These findings strongly support the idea that Chinese enterprises are efficiency seeking when making OFDI decisions.

(4) Strategic assets as economic opportunities. Strategic assets refer to assets that are essential for enterprises in future development, including land, local distribution networks, brands, technology and preferred policies. These strategic assets can be acquired through mergers and acquisitions (Ross, 2015). Okafor et al. (2015) used the number of mergers and acquisitions as a proxy variable for the strategic asset-seeking motivation and found no significant correlation between strategic assets and Chinese OFDI in Africa in the whole sample; however, they found that recent OFDI inflows in some regions of SSA are more motivated by strategic assets. Similar results were obtained by Ross (2015), who used the ratio of high-technology exports to total manufactured exports as a proxy variable for strategic assets; he found no significant evidence that Chinese FDI in Africa is strategic asset seeking. Additionally, other types of strategic assets have been discussed in previous studies. For example, many countries, including China, allegedly buy farmland in Africa to produce food and feed their domestic citizens, similar to outsourcing (Anonymous, 2009).

3.3.3 Political Determinants

Political risks are uncertainties caused by political reasons. In the business field, political risks are the probabilities that profits or even investments will be lost due to political uncertainty in the host country. Political risks must be considered as an

important determinant in FDI studies for the following reasons. (1) As discussed in internalization theory, political risks are the costs that overseas MNEs have to overcome to obtain the abovementioned economic opportunities. (2) Political risks are considered a proxy for efficiency in doing business abroad. For example, Mourao (2018) used a vector of indexes of government effectiveness, corruption perception, political stability, and regulatory quality as proxies for the efficiency-seeking motivation. (3) Political risks are assessed before enterprises make investment decisions and are assessed when investment projects are approved by related government departments.

Traditionally, political risks in Africa can be classified as government instability, terrorism attacks, major criminal cases, coups, internal and external wars, corruption, or other political policy-caused risks (Zhang, 2016b; Wang, 2012). There are various reasons for experiencing political risks. The instability of African economies, the protection of local governments against Chinese enterprises, and the inadequate localization management of Chinese enterprises are all important reasons for political risks (Luo & Huang, 2009). The unpredictability of political risks often worsens the situation (Zhang, 2015). Additionally, political risks vary across different Africa countries. It is believed that MNEs in countries with well-established sociopolitical and economic systems tend to encounter nonviolent political risks such as unfavorable legal rulings and stringent entry requirements, while MNEs in host countries with an underdeveloped sociopolitical and economic environment tend to have more severe political risks such as the overthrowing of political regimes, wars, and expropriations (Bremmer, 2014; Casson and Lopes, 2013).

Additionally, the impact of political risks has long been controversial in the academic community. Traditionally, political risks in Africa are assumed to have a negative effect on Chinese OFDI (Ross, 2015; Fan, 2017). However, the opposite argument has been raised: Chinese OFDI is positively related to political risks (Buckley et al., 2007; Biggeri & Sanfilippo, 2012; Lu, Huang and Muchiri, 2017). The reasons for this phenomenon are as follows. (1) Enterprises determined to invest in risky countries are better prepared. (2) Risky countries usually have less competitive markets; thus, China can have a first-mover advantage in these countries (Lu, Huang & Muchiri, 2017). (3) The institutional environment of China is quite similar to that of Africa; thus, Chinese enterprises are better able to adapt to risky African countries (Buckley et al., 2007).

In previous studies, political risks are evaluated by 2 main data sources, namely, the Worldwide Governance Indicators (WGI) developed by the World Bank and the International Country Risk Guide (ICRG) developed by the Political Risk Service (PRS) group. On the one hand, the WGI constructs aggregate indicators of six broad dimensions of governance, namely, voice and accountability, political stability and the absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. On the other hand, the ICRG dataset include 12 indicators, namely, government stability, socioeconomic conditions, the investment profile, internal conflict, external conflict, corruption, the military in politics, religious tension, law and order, ethnic tension, democratic accountability, and bureaucracy quality. The scores of the 12 indicators are offered based on the proneness of experiencing these

risks in particular countries. Comparing the 2 datasets, the advantage of the WGI is that it covers a large sample of countries, while the advantage of the ICRG is that it is more comprehensive in evaluating different kinds of political risks.

To measure political risks, this study used 12 indicators from the ICRG in Chapter 5 and Chapter 6 and used 6 governance indicators from the WGI in Chapter 7. This is because Chapter 7 uses cross-sectional data in which the sample size is quite limited and because the large data gap in the ICRG will further shrink the sample size. Since the 12 indicators from the ICRG are somewhat correlated, they are categorized into 4 categories, i.e., *conflicts*, *governance quality*, *government stability*, and *government accountability,* via factor analysis (see Subsection 4.2.3 in Chapter 4 for factor analysis of political risks). The following section illustrates the possible correlation between Chinese OFDI in Africa and political risks in Africa.

(1) Conflicts as political risk. This vector includes different types of conflicts, i.e., internal conflict, external conflict, the military in politics, religion in politics, and ethnic tension. In the past decades, Africa has experienced continuous internal and external wars, and some countries, such as Libya and South Sudan, have been in war in recent years. Suliman and Mollick (2009) found that, unlike other determinants, internal and external wars are always consistent and significantly negative determinants of FDI flows to Sub-Saharan Africa. Using the instrumental variable method, Biggeri and Sanfilippo (2009) supported this finding based on a panel dataset of 43 African countries and found that conflicts have a negative effect on the investment decisions of Chinese enterprises. However, Li and Vashchilko (2010) argued that for middle-income

countries, military conflict does not significantly affect investment; however, for low-income and high-income countries, military conflict significantly reduces investment.

(2) Governance quality as a political risk. Socioeconomic conditions and bureaucratic quality belong to this vector. Considering socioeconomic conditions and investment profiles, Cheung et al. (2012) found that socioeconomic conditions are positively related to Chinese OFDI in Africa. Cleeve (2012) suggested that countries with good socioeconomic conditions and bureaucratic quality tend to attract larger proportions of FDI. However, Akhtaruzzaman et al. (2017) found that bureaucratic quality does not significantly affect Chinese OFDI in Africa. Another issue in governance quality is the informal economy (or shadow economy), which may also constrain investors (Schneider and Klinglmair, 2004).

(3) Government stability as a political risk. "Government stability" is a vector that includes government stability and the investment profile. Many African countries are considered to be notorious in terms of government stability. Carmignani (2009) found that government instability increases income inequality, while greater inequality increases the probability of government termination. Additionally, government stability is believed to have a positive long-term effect on attracting FDI according to both dynamic least squares and seemingly unrelated regressions (Jabri & Brahim, 2015). However, in Cleeve's (2012) research, political instability does not have any effect on FDI inflow into SSA countries.

The investment profile was combined with government stability into the same vector because investment profile-related risks, including expropriation and payment

delay, are largely caused by government instability (Shan et al., 2018; Felix et al., 2017). A case in point is the Zamfara Dam in Nigeria, which ultimately failed after three years of assessment and consultation because signed contracts were routinely reviewed when power changed hands (Felix et al., 2017). Additionally, Akhtaruzzaman et al. (2017) found that expropriation risk is the most important of the available measures of different dimensions of institutional quality for affecting FDI inflows.

(4) Government accountability as a political risk. "Government Accountability" is a vector used to reflect whether the government is accountable to its citizens. Democratic accountability[6] is used to assess whether the government is performing its duties well and taking responsibility for its people. Shan et al. (2018) conducted panel data regression involving 22 countries and found that among 5 institutional factors, only accountability had a significant and positive effect on attracting Chinese OFDI. However, Akhtaruzzaman et al. (2017) argued that the influence of democratic accountability was quite limited. Included in the vector of government failure, Goswami and Haider (2014) found that the risk of socioeconomic stability, bureaucracy quality, corruption, etc., did not constrain but, rather, encouraged Chinese FDI inflow in Africa.

3.3.4 Other Determinants

Chinese OFDI in Africa is a complicated research topic that cannot be fully explained by economic opportunities and political risks. Many related studies have

[6]Please note Democratic Accountability here does not refer to the political system that obtain authorization from different groups of people through democratic means and are responsible for governing affairs within their respective jurisdictions. Instead, it refers to how reactive is a government to the good of its people.

discussed other determinants, mainly including infrastructure, trade, aid, the exchange rate, and related policies.

(1) Infrastructure is an important determinant of Chinese OFDI in Africa. The importance of infrastructure is twofold. On the one hand, China is carrying out infrastructure construction projects in many African countries, and it is even accused of using infrastructure to exchange for resources (Tsao et al., 2015; Alves, 2013). China is carrying out many infrastructure projects in Africa, but whether Chinese aid projects in Africa are for humanitarian reasons or for purposes of resource exploitation has been questioned. Alves (2013) suggested that China is loaded with cash and a booming construction industry and desperately needs resources to fuel its development, while Africa is endowed with rich natural resources and lacks the capital and infrastructure to transform its resource advantage into wealth. Therefore, the deal of "infrastructure for resources" seems to make sense. This was supported by Tsao et al. (2015), who found that resource-oriented investments launched by China's central SOEs are usually accompanied by large infrastructure construction investments in the host country.

On the other hand, the poor infrastructure in Africa could be a possible deterrent for Chinese OFDI in Africa (Barua et al., 2017; Goswami & Haider, 2014). Well-developed infrastructure will attract FDI, while incomplete infrastructure will be a deterrent. Moyo (2013) confirmed that the poor quality power infrastructure in Africa leads to electricity cuts and thus causes output loss. Not only electricity but also transportation infrastructure constrains FDI. It is believed that both China and Western countries built many ports, airports, and railways in Africa to increase the efficiency of

transport (Gwilliam, 2011). Using the number of telephones per 100 people and the number of cellphones per 100 people as proxy variables for infrastructure, it was found that there is a positive relationship between infrastructure and FDI inflow (Goswami & Haider, 2014), which was also evidence of the importance of infrastructure in FDI activities.

(2) Trade is another important determinant of Chinese OFDI in Africa. The effect of trade is ambiguous and mainly lies in three aspects, i.e., trade intensity with China, trade cost from China to host country and trade openness of the host country.

First, intensity of trade with China has impact on investment decision. Cheung et al. (2012) found that African countries with stronger trade ties with China are more likely to receive Chinese OFDI. This finding was supported by Song (2011), who found that a group of Chinese private investors in Africa were encouraged by Sino-Africa trade and the Sino-Africa summit. However, this finding contradicts Eden and Miller's (2004) view that exports are an alternative way of making OFDI.

Second, trade cost from China to host countries. Trade costs have been considered a push factor for the market-seeking motivation. For example, Chen et al. (2018) found that although trade costs alone were not significant, the interaction term of GDP and trade costs was positive and significant, which indicates that Chinese OFDI would invest in larger economies only if the trade costs were sufficiently high. Buckley et al. (2007) divided trade into Chinese exports to the host country and Chinese imports from the host country, and they found that Chinese OFDI was positively associated with Chinese exports but that Chinese imports had a negative effect, indicating that some

Chinese investors relocate some production to host countries to avoid trade barriers and save on costs.

Third, the trade openness of the host country also influences FDI decisions. Trade openness indicates the effectiveness and emphasis of international business, and a higher degree of trade openness attracts more FDI. For example, Biggeri and Sanfilippo (2009) found that the trade-to-GDP ratio has a significant and positive effect on Chinese OFDI in Africa. This finding was supported by Goswami and Haider (2014), who found that trade openness also had a significant positive effect on FDI inflows.

(3) The exchange rate and inflation affect Chinese OFDI in Africa. The exchange rate and inflation are discussed together since a higher inflation rate directly leads to a lower value of currency and a decrease in the exchange rate in the international market. Traditionally, it was believed that appreciation of host country currency was associated with higher FDI flows, while depreciation or inflation was associated with lower FDI flows (Schmidt & Broll, 2009). However, Ross (2015) used the inflation rate as a proxy variable for economic stability and found that the relationship between the inflation rate and Chinese OFDI was not statistically significant. The results of Buckley et al.'s (2007) research are more divergent; they found that the exchange rate was not significant with respect to Chinese OFDI, while inflation was found to be positively significant in the other sample.

(4) Aid is also an important factor for Chinese OFDI in Africa. The role of aid is another important aspect when studying the China-Africa relationship. It is believed that aid can secure FDI projects and moderate the effect of political risks (Biggeri and

Sanfilippo, 2009; Lu et al., 2017). Biggeri and Sanfilippo (2009) suggested that economic cooperation, including aid programs and technical assistance projects, between China and Africa had a significant positive effect on Chinese OFDI in Africa. Instead of examining the direct relationship between Chinese OFDI and aid, Lu et al. (2017) used panel data covering 50 African countries to investigate the role of aid in mitigating political risks for Chinese OFDI in Africa, and they found that Chinese aid had a positive moderating effect on the relationship between political risks and Chinese OFDI in resource-abundant countries. However, for the whole sample of African countries, the moderating effect was found to be negative.

(5) Government policies also play an important role in Chinese investment in Africa. The effects of policies are mixed and include encouraging policies of home countries, restrictive policies of home countries, preferential policies of the host country, and prohibitive policies of host countries. Claassen et al. (2011) suggested that the increase in investment in Africa was mostly attributed to the Forum on China-Africa Cooperation (FOCAC). China implemented an Africa aid policy under the framework of the FOCAC, and enterprises, especially SOEs, were obliged to invest in Africa (Gu, 2009; Zhang & Liu, 2012). Additionally, the "Going Global" policy encourages many enterprises, both private and state owned, to invest abroad (Lin, 2013). The push from the Chinese central government was also explained by many scholars as wining African allies as a distinguishing feature from 'Western' aid and as a wish to foster political relations and agent drivers (Sven, 2014). Yin and Vaschetto (2011) suggested that China used a strategy of soft power composed of low-key diplomacy, soft-power plays, and

complementarity in business conduct to establish itself as Africa's ally rather than a new imperial power.

Additionally, the policies on the host country side largely affect Chinese OFDI in Africa. For example, Osabutey and Okoro (2015) found that a large amount of FDI flowed to the Nigerian telecommunications sector after the liberalization policy was implemented in the telecommunications industry, which made telecommunication sector the second most profitable industry in terms of FDI after the extractive oil industry. Similarly, Boly et al. (2020) empirically assessed the attraction effect of reduction policies on corporate income tax which increased FDI inflows in Africa.

3.4 Review of Empirical Studies

3.4.1 Hot and Frontier Topics in Field of Chinese OFDI in Africa

"Foreign Direct Investment/ FDI/ OFDI/ Outward direct Investment/ ODI", "Chinese/ China", and "Africa/ African" were used as 3 keywords searched in the Web of Science (WOS) database, and 183 papers were found. These papers were further manually filtered by excluding conference papers, book reviews, etc., and 155 effective research papers written in the English language were returned. Based on the 155 effective papers, keyword co-occurrence analysis was conducted via CiteSpace (6.1.R6) software to analyze the hot and frontier topics in the field of Chinese OFDI in Africa because keywords can accurately summarize a research topic. See Figure 3-1 and Table 3-1 below for the keyword co-occurrence analysis.

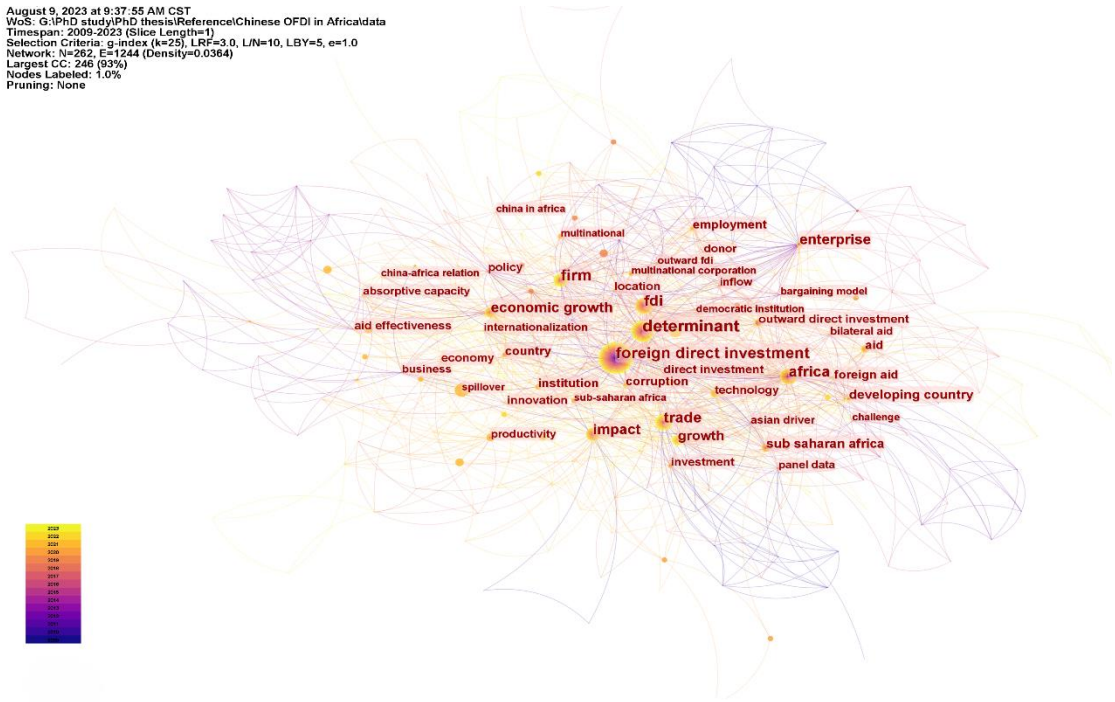


Figure 3-1 Co-occurring Analysis of Keywords on Researches in the Field of Chinese OFDI in Africa

Table 3-1 Centrality and Frequency of Keywords on Researches in the Field of Chinese OFDI in Africa

Rank	Keywords			
	Frequency		Centrality	
1	Foreign direct investment	87	Determinant	0.28
2	FDI	40	Foreign direct investment	0.22
3	Determinant	28	Africa	0.21
4	Economic growth	26	FDI	0.19
5	Trade	18	Firm	0.19
6	Firm	18	Impact	0.15
7	Impact	17	Economic growth	0.14
8	Growth	16	Trade	0.13
9	Aid	10	Enterprise	0.13
10	Developing country	10	Aid	0.07

From the above co-occurring analysis of keywords, following conclusions can be reached. (1) Studies on Chinese OFDI in Africa can be traced back to 2009. Studies in earlier years (marked in purple in Figure 3-1) focused mainly on the general concepts of "foreign direct investment", the "determinant" and the "impact" of Chinese OFDI in Africa. Nevertheless, studies in recent years (marked in yellow in Figure 3-1) have been

mainly divided into research content and research methods. For example, recent research content includes “aid”, “institution”, etc., while recent research methods include “panel data”, “spillover”, etc. (2) Except for “foreign direct investment” and “FDI”, “determinant” is the most frequent keyword in related studies, followed by “economic growth”, “trade”, “firm”, “impact”, “growth” “aid” and “developing country”. These results indicate that the determinant of Chinese OFDI in Africa is a heated research topic. (3) Additionally, “determinant” is the keyword with the highest centrality and serves as an important bridge in the whole network of research, linking many other keywords.

3.4.2 Review of Methodologies

This study searches for the most cited research papers in the field of Chinese OFDI in Africa via the WOS and Scopus databases and reviews the 10 most cited research papers that use quantitative or combinations of quantitative and qualitative methods. The citations were counted in all the databases up to 09/08/23. The 10 most cited papers are listed in Table 3-2. The review of methodologies also focuses on papers from the perspective of the research period and sample, the variables used, and the methods employed.

Table 3-2 Summary of Methodology in Top 10 Most Cited Papers in Field of Chinese OFDI in Arica

Studies	Research Period	Obs. Sample (N*T)	Dependent Variables	Explanatory Variables	Estimation Methods	Citation
Cheung et al. (2012)	(1) 1991-2005 (2) 2003-2007	(1) 31*14 (2) 33*5	(1) Approved ODI flow data % to population; (2) IMF-OECD ODI flow data %	Market-seeking (proxied by GDP, Real GDP per capita, GDP growth rate); Economic Interaction (proxied by trade with China % total trade, amount of China’s contracted projects); Risk (proxied by	Panel Data Model with Tobit regression & Heckman	123

			to population	economic condition, political system risk, conflict, social tension risk, corruption risk, law and order risk); Natural resource (proxied by crude oil production, mineral output)	two-stage regression	
Sanfilippo (2010)	1998-2007	41*10	FDI stock	Market-seeking (proxied by GNI, share of Trade to GDP); Resource-seeking (proxied by oil production); Risk-aversion (proxied by conflict and civil liberties); FDI-Trade nexus (proxied by Chinese import, Chinese export); China-Africa Cooperation (proxied by large cooperation projects); Control variables (human capital proxied by adult literacy, infrastructure proxied by telephone mainlines)	Static Panel Data Model with two-way fixed LSDV estimation	80
Chen et al. (2018)	1998-2012	49*15	Firm-level Chinese ODI transaction data	Capital endowment; Human capital endowment	Linear Probability Model & Binomial regression model with FE estimation	69
Shan et al. (2018)	2008-2014	22*7	FDI stock	Natural resource (proxied by total natural resource rent), Market size (proxied by GDP), voice & accountability, political stability, absence of violence, regulatory quality, rule of law, Control variables (inflation, infrastructure, trade openness)	Panel Data Model with FE estimation	41
Mourao (2018)	2003-2010	48*8	FDI flow	Economic factors (a vector of population, forest area, index of exports diversification, agriculture added value in Gross Added Value, inflation rate, real per capita GDP); Determinant of efficiency (a vector of index of Government Effectiveness, Corruption Perception, Political Stability, Regulatory Quality)	Stochastic Frontier Model with ML estimation	38
Drogendijk & Blomkvist (2013)	2003-2009	47*1	Mean of FDI flow in 2003-2009	Marke-seeking (proxied by GDP); Natural resource seeking (proxied by ratio of ore and metal exports); Strategic assets seeking (proxied by patent registration); Control variables (inflation, exchange rate, political risks, Chinese minority, trade from China to host country)	Cross-section data with OLS estimation	35
Akhtaruzz	2004-2012	41*9	FDI flow	GDP per capita, GDP per capita,	Panel Data	30

aman et al. (2017)				Institutional quality, China Aid, Mineral Exports to China, Mineral exports to rest of the world, amount of Confucius Institute, GDP, Trade, Inflation, Geographical distance,	Model with OLS estimation & Poisson Pseudo-Maximum-Likelihood estimation	
Borojo & Jiang (2020)	2003-2014	44*12	FDI flow	Market size (proxied by GDP per capita, population); Diplomacy (proxied by China's voting alignment with African countries in the U.N. General Assembly, Recognition of one China or not); Doing Business Index (composed by eigenvector variables including cost to start business, enforce contract, register property); Border and transparency (composed by eigenvector variables including document to import, document to export, time to import, time to export, cost to import, cost to export); Political and governance index (composed by eigenvector variables including control of corruption, rule of raw, regulatory quality, government effectiveness, absence of political instability, voice and accountability); Debt GDP ratio; Natural resources motivation (proxied by Natural resources depletion rate); Distance; Real per capita GDP of China; Trade openness between China and Africa; Inflation, Credit to private sector, Level of democracy.	Gravity Model with pseudo-maximum likelihood estimation	23
Ross (2015)	2003-2012	8*10	FDI flow	Market-seeking (proxied by GDP growth annual, GDP per capita); Efficiency-seeking (proxied by GDP per person employed); Resource-seeking (proxied by total natural resource rent); Strategic-Assets seeking (proxied by high-technology export); Infrastructure (proxied by mobile cellular subscription; electronic power consumption); Economic stability (proxied by inflation); Government policy (proxied by trade openness); Regulatory environment (proxied by time to export)	Panel Data Model with OLS, FE & RE estimation	22

(1) Research Period & Research Sample

Most studies on the determinants of Chinese OFDI in Africa have used panel data, i.e., have focused on *N* countries with an observation time period of *T*. Thus, the research sample is composed of *N***T*. The research period and research sample in previous studies are quite different. Sanfilippo (2010) used Chinese OFDI in 41 African countries in the 1998-2007 period as the sample to uncover the interrelationships between Chinese FDI and economic cooperation. Using 6 risk indices from the ICRG dataset, Cheung et al. (2012) focused on 31 African countries due to a data gap in risk indices and analyzed the determinants of Chinese OFDI in the 1991-2005 and 2003-2007 periods. Ross (2015) further narrowed the sample down to 8 African countries and investigated the determinants of Chinese OFDI in these 8 African countries in the 2003-2012 period.

So, what are an ideal research period and research sample for studies on the determinants of Chinese OFDI in Africa? It is believed that research on Chinese OFDI in Africa should use data after 2003 because it was only after 2003 that China began to adopt OECD and IMF standards to record OFDI data (Cheung et al., 2012). Therefore, to have a consistent statistical standard and to statistically compare Chinese OFDI in Africa with other countries' OFDI in Africa, it is more important to use recent Chinese OFDI statistics, especially FDI data after 2006, because 2006 witnessed the beginning of a large inflow of Chinese OFDI into Africa and 2006 is the year Forum on China-Africa Cooperation (FOCAC) Beijing Summit is held as a summit for national leader. However, the outbreak of COVID-19 occurred at the end of 2019 and strongly influenced FDI activities from 2020 to 2023. Thus, the 2006-2019 research period is an

ideal research period, because Chinese OFDI in Africa is a complicated and dynamic process and short research period as well as limited research sample cannot fully reveal the motivation and perception of Chinese OFDI in Africa.

Regarding the research sample, the total number of independent African countries by 2019 was 54; thus, the largest sample was 54. However, because of the data gap in some African countries, especially the data gap in regard to political risks, none of the previous related studies have successfully covered all 54 African countries. Additionally, within the data available, a larger sample offers better estimation accuracy.

(2) Variables Used

The use of variables directly affects the robustness and accuracy of the analysis. Thus, both dependent variable and independent variables used in existing studies are reviewed. *The first issue is the dependent variables used in existing studies.* The dependent variables used in most of those previous studies can be divided into two types: the OFDI stock and OFDI flow. Sanfilippo (2010) used the OFDI stock as a dependent variable to indicate the cumulative amount of OFDI, and this usage was also supported by Shan et al. (2018). However, more studies choose OFDI flow as the dependent variable (Ross,2015; Akhtaruzzaman et al.,2017; Cleeve, 2012) since OFDI flow reflects the annual inflow of Chinese OFDI in Africa. This research suggested that OFDI flow can be used to better estimate the determinants of Chinese OFDI in Africa because it is more sensitive to changes in potential determinants. Following the studies of Cleeve (2012) and Mijiyawa (2015), this research uses OFDI flow as a percentage of GDP as the dependent variable to address the endogeneity of GDP.

The second issue is the independent variables used existing studies. The use of interdependent variables has been even more diverse in previous studies. There are two reasons for the diversity of explanatory variables. One reason is that the determinants of Chinese OFDI in Africa are diverse, as discussed in the previous section (see section 2.3). The other reason is the use of different proxies for the same determinant. For example, GDP (Buckley et al., 2007; Biggeri & Sanfilippo, 2009), GDP per capita (Cleeve (2012; Goswami & Haider, 2014), and population (Mijiyawa, 2015) have all been used as proxy variables for the market-seeking motivation. In addition, the natural resource-seeking motivation has been proxied by total natural resource rents (Okafor et al., 2015; Shan et al., 2017), the production of crude oil (Biggeri & Sanfilippo, 2009), and the ratio of ore and metal exports to merchandise exports (Buckley et al., 2007) in previous studies. The use of variables as well as their effects in previous studies will be further reviewed and summarized in Chapter 5, Section 5.2.

(3) Methods Employed

The methods used in studies on Chinese OFDI in Africa can be divided into two categories: static regression models and dynamic regression models. Buckley et al. (2007) used static OLS regression and random effects regression to investigate the determinants of Chinese OFDI. Taking advantage of instrumental variables, Biggeri and Sanfilippo (2009) used 2SLS regression to analyze the interaction between FDI, trade and cooperation. Ross (2015) comprehensively used three static regression models, OLS regression, random effects regression, and fixed effects regression, to analyze the determinants of Chinese OFDI in 8 African countries.

However, Chinese OFDI in Africa is not independent in the temporal dimension, and it is possible that it is affected by previously existed OFDI in Africa. Specifically, home country enterprises continuously invest in the same host country to achieve purposes of risk aversion and agglomeration effects (Barrell and Pain, 1999; Mijiyawa, 2015). Therefore, Chinese OFDI in Africa is a dynamic research topic. In recent years, several researchers have begun to use dynamic methods to analyze Chinese OFDI in Africa. For example, Okafor et al. (2015) used POLS, fixed effects and GMM regressions to investigate the motives for inward FDI in SSA countries.

Additionally, Chinese OFDI in Africa is not spatially independent and can potentially be affected by a third country, especially a country's neighboring countries. According to Tobler's (1970) First Law of Geography, "everything is related to everything else, but near things are more related to each other", which led scholars to analyze the third-country effect from a spatial perspective. On the one hand, the spatial effect of Chinese OFDI in Africa can be positive because one African country has good cooperation with its neighboring countries, which has a positive spillover effect on that country, i.e., a complementary effect. On the other hand, the spatial effect of Chinese OFDI in Africa can be negative because one African country competes with its neighboring countries in attracting Chinese OFDI, which has a negative spillover effect on this African country, i.e., a substitution effect. However, to the best knowledge of the author, few studies have employed spatial econometric methods to analyze the third-country effect of Chinese OFDI in Africa.

3.4.3 Implications & Limitations of Previous Studies

As previously mentioned, many empirical studies have been conducted on the determinants of Chinese OFDI in Africa, greatly contributing to the FDI literature. However, studies on the determinants of Chinese OFDI in Africa can theoretically and empirically go further in the following ways.

(1) Whether the existing classical FDI theories have a large explanatory power for Chinese OFDI in Africa is worthy of further analysis. Most previous studies on Chinese OFDI in Africa were conducted under the framework of Dunning's OLI Paradigm and, particularly focused on the locational determinants of Chinese OFDI in Africa, i.e., the natural resource-seeking motivation, market-seeking motivation, efficiency-seeking motivation, and strategic asset-seeking motivation. However, Duning's Eclectic Theory and the OLI Paradigm were established based on developed countries' FDI in developing countries. Are they suitable for explaining the motivations behind Chinese OFDI in Africa? Some scholars have suggested that a new theory is needed (Buckley, 2007; Park & Roh, 2019). Additionally, the different institutional environments of SOEs and POEs cause Dunning's theory to have different levels of explanatory power. This study suggests that some first-hand surveys of MNEs are needed to test the explanatory power of theory for Chinese OFDI in Africa.

(2) Chinese OFDI in Africa is a compound research field influenced by many different determinants, and the use of appropriate determinants and their proxies is highly important. First, the use of the FDI stock as a proxy for the amount of Chinese OFDI in Africa may cause problem of spurious regression. Most previous studies used either OFDI flow (Buckley et al., 2007; Cleeve, 2012; Mijiyawa, 2015) or the OFDI

stock (Biggeri & Sanfilippo, 2009; Shan et al., 2017) to measure the amount of Chinese OFDI in Africa. However, the OFDI stock is the cumulative amount of Chinese OFDI in Africa, and the Chinese OFDI stock is constantly increasing during the observation period in many African countries. That is, the change in the FDI stock is not sensitive enough in analyzing the real significant determinants. Second, the determinants of Chinese OFDI in Africa relate to both economic and political determinants, and some important determinants have been ignored or improperly used in previous studies. For example, Shanfillipo (2009), Cheung et al. (2012), and Shan et al. (2018) focused more on the market-seeking motivation and natural resource-seeking motivation, and all directly ignored the efficiency-seeking motivation and strategic asset-seeking motivation. Third, having too many determinant variables in a limited sample will reduce the estimation accuracy and cause multicollinearity. For example, most previous studies directly used score of International Country Risk Guide (ICRG) indicators as proxy variables for the political risks of Chinese OFDI in Africa (Cleeve, 2012; Cheung et al., 2012; Shan et al., 2018). The ICRG data themselves are reliable and comprehensive, but there are problems in direct usage of this dataset. For one thing, there are as many as 12 indicators in the ICRG dataset to evaluate political risks, which will affect the accuracy of the estimation if a small sample is used. For the other, the 12 indicators can be correlated. This study believes that factor analysis is better for preprocessing the ICRG data.

(3) The effect of the determinants on Chinese OFDI in Africa has still been ambiguous in previous studies. Whether Chinese OFDI in Africa is resource seeking

and whether Chinese OFDI in Africa is constrained by political risks are still under heated discussion. Biggeri and Sanfilippo (2009), Cheung et al., 2012, and Ross (2015) believed that Chinese OFDI in Africa is motivated by natural resources, while Okafor et al. (2015) and Shan et al. (2015) argued that Chinese OFDI is actually more likely to flow into African countries with fewer natural resources. Another topic under debate is the effect of political determinants. Ross (2015) and Fan (2017) suggested that political risks constrain Chinese OFDI in Africa. Goswami and Haider (2014) argued that the effect of political risks on Chinese OFDI is not significant. Buckley et al. (2007), Biggeri and Sanfilippo (2012), and Lu et al. (2017) even found a positive relationship between political risks and Chinese OFDI. Additionally, the effects of economic opportunities and political risks depend largely on the subjective perceptions of enterprises, which are further influenced by enterprise ownership, industry characteristics, etc.

(4) The research method can be improved by considering the temporal influence since Chinese OFDI in different years is not independent. Most previous studies analyzed the determinants of Chinese OFDI with a static model using POLS estimation, RE estimation or FE estimation (Cleeve, 2012; Drogendijk & Blomkvist, 2013; Ross, 2015). The accuracy of static POLS, RE, and FE estimations is based on the hypothesis that Chinese OFDI in different years is independent and that no autocorrelation occurs in the temporal dimension. However, OFDI data are not time independent. It is believed that FDI is more likely to flow to countries that already have abundant FDI from a country or other countries with the aim of achieving the purposes of information sharing

and risk aversion (Biggeri & Sanfilippo, 2009). For example, Mijiyawa (2015) found that FDI tends to be invested in countries that already have abundant FDI as a result of agglomeration effects. Therefore, some scholars began to establish dynamic models and used GMM estimation to take time-lag effect into consideration (Okafor et al., 2015; Mijiyawa, 2015; Barua et al., 2017). However, the use of a dynamic panel data approach to analyze Chinese OFDI in Africa is still an emerging and new area of research that is worthy of further attention.

(5) Few previous studies have considered the third-country effect of Chinese OFDI in Africa. There are 54 African countries on the African continent, and these countries are not isolated. Instead, they are spatially or economically linked with each other. The characteristics of other African countries, especially a country's neighboring countries, will influence Chinese OFDI in this particular Africa country. That is, the third-country effect should be considered. Therefore, in addition to the static model and dynamic model, spatial models are necessary to analyze the third-country effect of Chinese OFDI in Africa as well as possible determinants from a spatial perspective. However, to the best knowledge of author, most previous studies considered only locational determinants or considered the push factor on the home country side and pull factors on the host country side (Fernández-Arias, 1996; Biggeri & Sanfilippo, 2009), while few studies of Chinese OFDI in Africa considered the third-country effect.

3.5 Conclusion

This chapter starts from the concept of FDI, explaining the definition of FDI and distinguishing FDI from related concepts such as international cooperation,

international trade, and foreign aid. This chapter stresses the importance of FDI, especially its nexus with economic development and social development. Subsequently, based on classic FDI theories, especially Internalization Theory and the OLI Paradigm, the determinants of FDI are reviewed. Finally, this chapter reviews empirical studies of Chinese OFDI in Africa from the perspective of frontier research topics and the methodologies used in this field. By reviewing previous studies, it is found that research on Chinese OFDI in Africa can theoretically and empirically go further.

Theoretically, it is doubted whether the established theories can well explain Chinese OFDI or not. As mentioned earlier, although Dunning's eclectic theory or the OLI paradigm is quite comprehensive, it is based on developed countries' OFDI in developing countries. It is questioned whether a new theory is needed to explain emerging countries' OFDI in other emerging countries (Buckley et al., 2007; Park & Roh, 2019), e.g., Chinese OFDI in African countries. This study contributes to verifying the explanatory power of Dunning's Eclectic Theory or the OLI Paradigm and whether a new theory of FDI is needed. Additionally, to study Chinese OFDI, it is meaningful to separate the roles of SOEs and POEs since the institutional environments of Chinese SOEs and POEs are quite different, which further leads to different risk perceptions and motivations.

Empirically, it is suggested that panel data from recent years and with large sample sizes be used to establish a model considering the spatiotemporal influence. Chinese OFDI in Africa is a complicated research topic, and it has many influencing factors, covering economic opportunities, political risks, and other variables such as

trade, infrastructure, and the inflation rate. Thus, to increase estimation efficiency, a larger panel data sample is necessary. Additionally, most previous empirical studies on the determinants of Chinese OFDI in Africa used a static model with OLS or fixed-effects estimation. However, the spatial agglomeration effect from the temporal perspective and the third-country effect from the spatial perspective need further attention when establishing the model. In other words, dynamic and spatial models are needed to further studies on Chinese OFDI in Africa.

In the following chapters, under the framework of Internalization Theory and the OLI Paradigm, this research explores the determinants of Chinese OFDI in Africa from different perspectives, which contributes and complements the existing studies. First, both static panel data model and dynamic panel data model are used to analyze the determinants of Chinese OFDI from aggregate country-level perspective. Second, spatial models are used to analyze the role of third-country effect in determining Chinese OFDI in Africa. Third, both second-hand FDI project data and first-hand survey and interview data are used to compare motivation and risk perception among different enterprises with different ownership structures, of different sizes and in different industry sectors.

Chapter Four: Theoretical Framework and Hypotheses Establishment

This chapter works as a bridge between previous chapters of theoretical analysis and later chapters of empirical analysis. It starts from theoretical framework of Internalization Theory and OLI Paradigm to clarify the possible determinants of Chinese OFDI in Africa in Section 4.1. Section 4.2 explains the related variables and their proxies used in this study, as well as the preprocessing of the raw data. Section 4.3 reemphasize the link between related determinants and Chinese OFDI in Africa, and thus the hypotheses are proposed. Section 4.4 is a conclusion section.

4.1 Theoretical Framework

As discussed in Section 3.3 in literature review chapter, major FDI theories include Monopolistic Advantage Theory, Internalization Theory, International Product Life Theory, Eclectic Theory, etc. This section is mainly about how this research is going to analyze the effect of both economic opportunities and political risks on Chinese OFDI in Africa under the theoretical framework of Internalization Theory and OLI Paradigm.

4.1.1 Internalization Theory

Initially proposed by Buckley & Casson (1976), Internalization Theory explains the foreign investment activities as the motivation to transfer internal advantage with lower cost. Thus, the two major components of Internalization Theory are advantage of internalization and cost of internalization. According to Buckley & Casson (1976), if the benefits of internalization can offset the cost of internalization, the firm will choose to internalize the production, i.e., FDI instead of licensing will be chosen.

Under the theoretical framework of Internalization Theory, if benefits of FDI in one Africa country outweigh the risks of FDI in that country, an increasing number of Chinese MNEs will choose to invest in this host Africa country. Thus, Chinese OFDI in this Africa country will increase. Otherwise, Chinese OFDI will decrease. That is, theoretically, the data on Chinese OFDI in African countries is largely determined by the combination of advantages and risks that caused by investing activities in Africa.

4.1.2 OLI Paradigm

Dunning (1977) expanded from internalization benefits to a combination of ownership advantage, location advantage and internalization advantage, i.e., OLI Paradigm. Since the ownership advantage is a comparative advantage developed from home country and internalization advantage developed from comparing between licensing and FDI, location advantage is the only one focusing on the host country advantage. Therefore, FDI decisions invest in one country or not are actually made based on comparison between the benefits of host countries and risks of host countries. Dunning (1993) further modified the OLI paradigm and proposed 4 types FDI motivations, i.e., market seeking motivation, resource seeking motivation, efficiency seeking motivation, and strategic assets seeking motivation. This further indicates the location advantage came from economic opportunities that can be acquired from host countries, including market, natural resource, efficiency, and strategic assets.

In this study, the four types of economic benefits identified by Dunning (1993) are employed as 4 motivations of FDI. Since these four types of benefits are comparative benefits in the economic perspective and the economic risks of host countries have

already taken into consideration, the risks of FDI will focus on political risks. Political risks, including conflicts, governance quality, government stability, and democratic accountability, are considered to be major potential costs of doing business in Africa. A theoretical model connecting OFDI to political risks and economic opportunities is established as follows (See Figure 4-1).

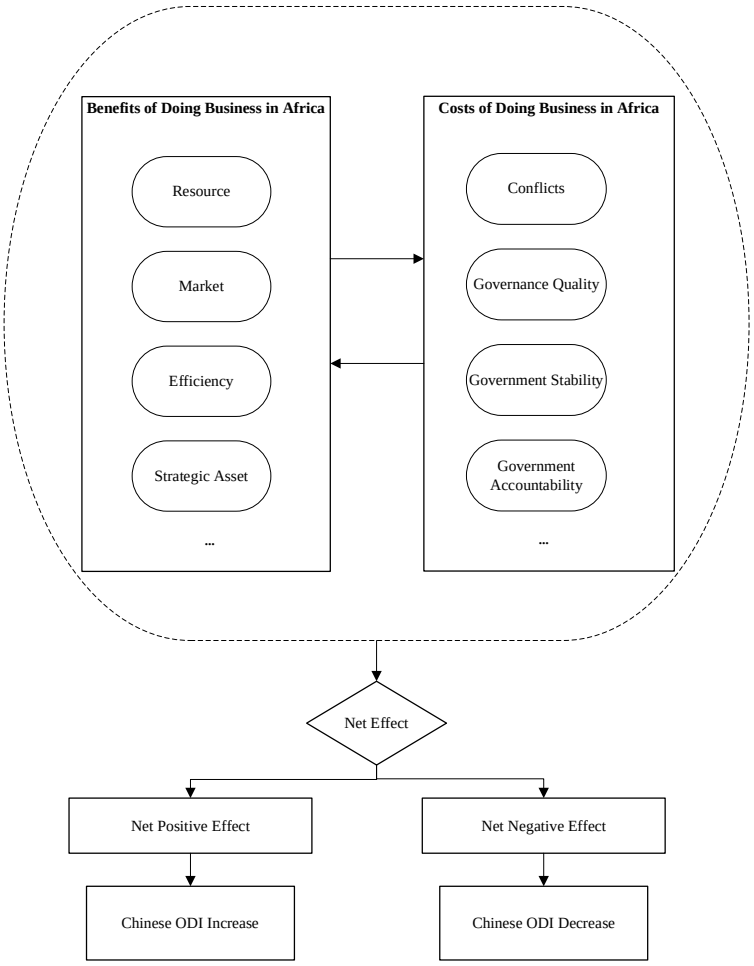


Figure 4-1 Framework of This Research Based on Internalization Theory and OLI Paradigm

Both quantitative research method and qualitative research method in this study are conducted under this theoretical framework. In the quantitative part, different types of panel data regression techniques are used to estimate the effect of different economic

opportunities and political risks. In the qualitative part, this study adopts a bottom-up approach via survey and interview to analyze whether SOEs and POEs, as well as enterprises of different sizes and in different industry sectors, share the same perception of these determinants.

4.2 Variables Specification and Preprocessing

Under the theoretical framework of Internalization Theory and OLI Paradigm, this section specifies the variables and their proxies used in this study. Dependent variable is firstly specified in Subsection 4.2.1, focusing on the choice between OFDI stock and OFDI flow. Subsection 4.2.2 specifies the economic variables employed in this study and the preprocess before the estimation. Subsection 4.2.3 specifies variables of political risks. Since 12 different but correlated indicators from ICRG are used, factor analysis is conducted to extract common components. Subsection 4.2.4 summarizes both dependent and independent variables used in this study.

4.2.1 OFDI Stock vs OFDI Flow

There are two kinds of variables that can be used to measure the amount of Chinese OFDI in Africa, i.e., OFDI flow and OFDI stock. OFDI flow reflects the annual amount of Chinese OFDI flowing into Africa countries while OFDI stock reflects the cumulative amount of Chinese OFDI in Africa. OFDI flow can capture instant changes in determinants of economic opportunities and political risks. And OFDI stock can indicate the overall preference of Chinese OFDI in Africa, but it can be insensitive to changes in the explanatory variables.

In previous studies, both OFDI stock and OFDI flow have been used as proxies

for the amount of Chinese OFDI in Africa. Shan et al. (2018), Goswami and Haider (2014), and Biggeri & Sanfillipo (2009), etc. chose to use OFDI stock as dependent variable while Buckley et al. (2007), Cleeve (2012), Ross (2015), etc. chose the OFDI flow as dependent variable. Based on the Chinese OFDI flow, Mijiyawa (2015) and Cleeve (2012) used Chinese OFDI flow percentage to host country GDP as dependent variable with the aim of reducing the endogeneity of GDP variable. Following Mijiyawa (2015) and Cleeve (2012), this research will mainly use OFDI flow % to GDP as dependent variable, because it can reflect the annual change of Chinese OFDI and reduce the possible bidirectional causality between OFDI flow and GDP of host countries.

4.2.2 Preprocessing of Economic Variables

Expecting the existence of heteroscedasticity, the economic variables with absolute values including OFDI flow % to host country GDP, natural resource rent % to GDP, GDP growth rate, GDP per person employed, high technology export % to manufactured export, cellular holding rate, trade openness, and inflation rate are transformed into natural logarithm. The use of logarithm will not change the effect of variable, but the economic implication of explanatory variable coefficients will be different. After using natural logarithm for both dependent variable and independent variable, the economic implication of coefficient β is that 1% increase in X averagely leads to $\beta\%$ increase in Y.

Also, the economic variables used in this model including natural resource rent % to GDP, GDP growth rate, GDP per person employed, high technology export % to

manufactured export, cellular holding rate, trade openness, and inflation rate are all lagged by one year when used in the static and dynamic estimation to reduced endogeneity. By doing so, it reduces the endogeneity. For example, FDI decision will be influenced by GDP in previous year while GDP in previous year will not be influenced by FDI in the next year, which reduces reverse-causality cased endogeneity.

4.2.3 Factor Analysis of Political Risks

The data on political risk variables used in this research are from ICRG dataset. Twelve indicators are used to measure 12 different but correlated types of political risks. See the correlation table in Table 4-1. Therefore, factor analysis is used to reduce the number of variables of political risks and recategorize into several components. By doing so, it is more clarified that which aspect of political risks plays a larger role in determining Chinese OFDI in Africa. Additionally, by using factor analysis, multicollinearity can be largely avoided.

Table 4-1. Correlation Between 12 Indices of Political Risks

	BQ	CO	DA	ET	EC	GS	IC	IP	LO	MP	RT	SC
BQ	1.000											
CO	0.182	1.000										
DA	0.107	0.358	1.000									
ET	0.353	0.408	0.068	1.000								
EC	0.236	0.418	0.327	0.519	1.000							
GS	-0.133	0.192	-0.059	0.229	0.311	1.000						
IC	0.124	0.497	0.229	0.491	0.703	0.408	1.000					
IP	0.324	0.273	0.138	0.357	0.408	0.376	0.398	1.000				
LO	0.239	0.362	0.022	0.598	0.168	0.221	0.316	0.221	1.000			
MP	0.319	0.511	0.454	0.584	0.566	0.083	0.526	0.399	0.443	1.000		
RT	0.078	0.407	0.264	0.418	0.389	0.171	0.624	0.293	0.310	0.392	1.000	
SC	0.530	0.421	0.071	0.534	0.401	0.191	0.315	0.469	0.488	0.403	0.296	1.000

Before factor analysis, the KMO test and the Bartlett test[7] are conducted to

[7] KMO and Bartlett test is a test to compare the value of correlation and partial correlation. The larger

examine the adequacy and goodness-of-fit of the data sample. The KMO value is 0.766, and the significance of Bartlett test is 0.00. These test results indicate that the dataset is good enough to conduct factor analysis.

Since the Table 4-1 shows that the 12 indicators are correlated, the data of 12 indicators are not orthogonal. Rotation of factor loading is conducted using Promax Rotation with Kaiser Normalization, as Varimax Rotation cannot be used for non-orthogonal factors. See Table 4-2 for details. The 12 indicators are extracted and recategorized into 4 components based on eigenvalues. Eigenvalues larger than 1 are considered as one individual component. See the scree plot for number of components in Figure 4-2. Results of factor analysis are listed as follows.

First, conflicts. Internal conflict, external conflict, military in politics, religious tension, and ethnic tension are extracted into one component, and it is referred to as "conflicts" because all these indicators are about internal or external wars and conflicts.

Second, governance quality. Bureaucratic quality and socioeconomic conditions are extracted into one component. Since both bureaucratic quality and socioeconomic conditions depends on the governance quality of the host government, it is referred to as "governance quality".

Third, government stability. Government stability and investment profile are extracted into one component since investment profile related risks like expropriation, payment delay, etc. are very likely caused by instability of the government or change of power (Shan et al., 2018; Felix et al., 2017). Therefore, it is reasonable that

difference between correlation and partial correlation, the value of KMO is closer to 1.

government stability and investment profile are combined together, and it is referred to as “government stability”

Fourth, democratic accountability. Democratic accountability belons to the fourth component, and the indicator name, i.e., “democratic accountability”, is retained for the component name.

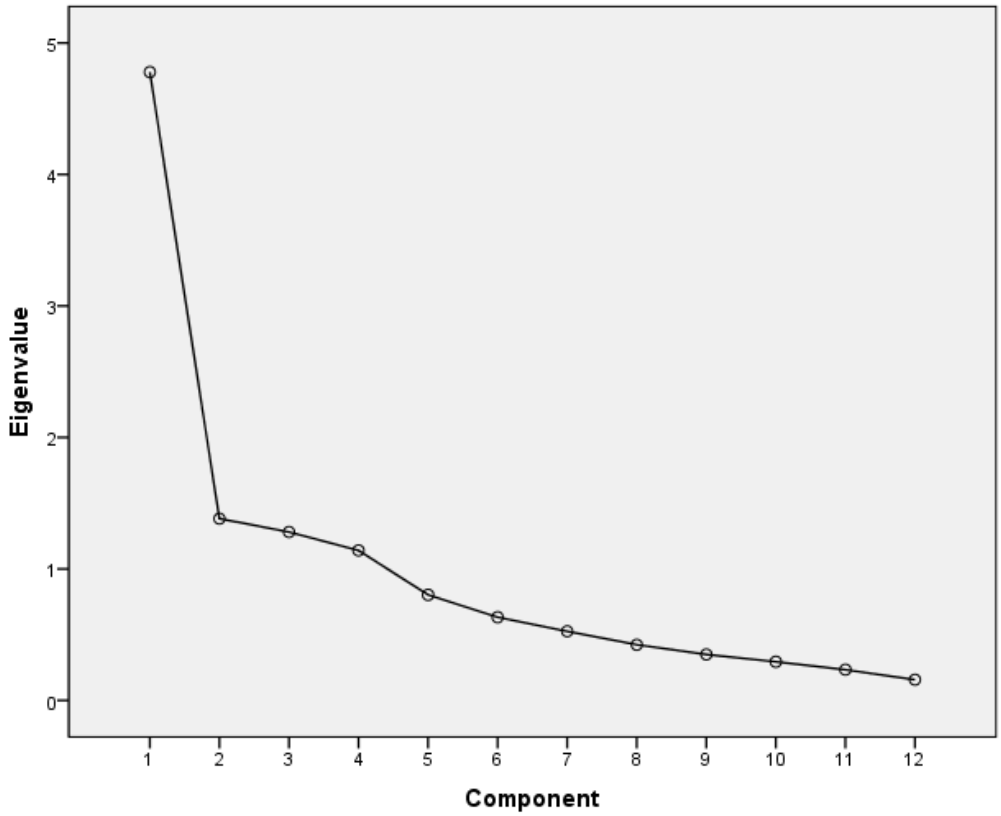


Figure 4-2 Scree Plot of Factor Analysis Based on Eigenvalue

Table 4-2 Components After Rotation

	1 (Conflicts)	2 (Governance Quality)	3 (Government Stability)	4 (Democratic Accountability)
RT	**.873**			
IC	**.791**			
ET	**.670**	.432		
MP	**.505**			.415
EC	**.504**			.342
LO	.495	.495		-.371
BQ		**.910**		
SC		**.749**	.335	

GS		**.939**		
IP	.324	**.730**		
DA			**.918**	
CO			.399	

Note: The extraction is based on principal component analysis; rotation is conducted via Promax with Kaiser normalization; small coefficients < 0.3 is not showed; rotation converged in 18 iterations.

4.2.4 Variables Summarization

Related data of variables used in this research are collected from credible sources including *Statistical Bulletin of China's OFDI*, World Development Indicator (WDI), and International Country Risk Guide (ICRG) etc., covering the period from 2006 to 2019. The variables and their sources are as follows (see Table 4-3).

Table 4-3. Quantitative Data and Data Source

Types	Variables	Proxy	Abbr.	Data Source
Dependent Variable	Chinese OFDI in Africa	Flow of Chinese OFDI % to Host Africa Country GDP	*ODIF*	Statistical Bulletin of China's OFDI
Economic Opportunities (Explanatory Variable)	Natural Resource	Total Natural Resource Rent % to GDP	*RES*	WDI
	Market	GDP Annual Growth Rate	*GDPGR*	
	Efficiency	GDP per Person Employed	*GDPPE*	
	Strategic asset	High-Technology export % to Total export	*HTECH*	
Political Risks (Explanatory Variable)	Conflicts	Score of Conflicts after Factor Analysis	*CONF*	ICRG
	Governance Quality	Score of Governance Quality after Factor Analysis	*GOV*	
	Government Stability	Score of Government Stability after Factor Analysis	*STAB*	
	Democratic Accountability	Score of Democratic Accountability after Factor Analysis	*ACCT*	
Control Variable	Inflation	Inflation Rate	*INF*	WDI
	Infrastructure	Mobile Cellular Subscriptions per 100 People	*CELL*	
	Trade openness	Total Export to GDP	*TRADE*	

4.3 Hypotheses Establishment

After specification of both dependent and independent variables, Subsection 4.3.2 aimed to specify the variables employed and the assumed link between economic opportunities and Chinese OFDI in Africa, while Subsection 4.3.3 specifies the link between political risks and Chinese OFDI in Africa. Thus, hypothesis of this research can be established for further estimation and testing using the quantitative model and

qualitative field studies.

4.3.2 Link between OFDI and Economic Opportunities

a. Natural Resource Seeking

Natural resources are highly regarded as an important determinant in Chinese OFDI in Africa (Pehnelt & Abel, 2007; Cheung et al., 2012; Alves, 2013; Ross, 2015). Africa is a continent abundant with natural resources, including oil, gas, minerals, diamonds etc. Because of the extensive growth economic model, China highly depended on natural resources to fuel its development in past years. Therefore, some previous study believed the effect of natural resource on Chinese OFDI is positive (Biggeri & Sanfilippo, 2009; Ross, 2015).

Following Ross (2015) and Shan et al. (2018), this research uses host country total natural resource rent as a percentage of GDP (abbreviated as *RES*) as proxy variable for natural resource seeking motivation to investigate whether Chinese OFDI in Africa is resource seeking. It is assumed that Chinese OFDI will be attracted to Africa countries with abundant natural resource. Thus, the hypothesis is proposed as follow.

H_{1a}: Chinese OFDI in Africa is positively associated with RES.

b. Market Seeking

A larger market size has larger demand, which is beneficial for enterprises aiming at large-scale producing and seeking for economies of scale. Strong evidence has shown that there is positive relationship between Chinese OFDI and market size of the host country (Buckley et al., 2007; Lu et al., 2017; Shan et al., 2018).

In addition to using Gross Domestic Product (*GDP*) to reflect the size of the host

market, GDP per capita (*GDPPC*) reflects the purchasing power at the individual level and GDP growth rate (*GDPGR*) reflects the increasing potential of the market. And three variables have been used as proxies for market seeking motivation (Okafor et al., 2015; Ross, 2015; Cheung et al., 2012). Since this study used Chinese OFDI flow % to host country GDP as a proxy for dependent variable and used GDP per person employed as proxy for efficiency seeking motivation, *GDP* and *GDPPC* are not appropriate proxies for market seeking motivation (considering multicollinearity problem). Thus, this study used *GDPGR* as a proxy for market seeking motivation, and it is assumed Chinese OFDI will be attracted to African countries with higher GDP growth rates. Thus, the hypothesis is proposed:

H_{1b}: Chinese OFDI in Africa is positively associated with GDPGR.

c. Efficiency Seeking

Efficiency can be acquired by accessing cheaper or better production factors in host countries. There are mainly two types of production factors, including labor and capital. Thus, labor efficiency and capital efficiency will be considered when analyzing the efficiency seeking motivation in FDI activities. For example, Cleeve (2012) used secondary school enrolment rate as proxy for labor efficiency seeking motivation, and found it is positively significant to FDI flow into Sub-Saharan Africa. Ross (2015) used another proxy of labor efficiency seeking motivation, i.e., GDP per person employed (GDPPE) for the reason that GDPPE can reflect the productivity of labors, where GDPPE was found not significant to Chinese OFDI in Africa. Capital efficiency is another type of efficiency seeking motivation. Mijiyaw (2015) used the inverse of real

GDP per capita as proxy for motivation of seeking for higher return on capitals, and found it was positively significant to inward FDI in Africa.

Following the study of Ross (2015), this study also uses GDPPE as the proxy for efficiency seeking motivation. Different from traditional studies, this study believes capital efficiency and labor efficiency is like two sides of a coin. In the other words, every country would be either having better labor endowment than capital endowment or having better capital endowment than labor endowment. Thus, this study expects a significant correlation between GDPPE and Chinese OFDI in Africa. If the GDPPE is negatively significant to Chinese OFDI, this indicates that Chinese OFDI is more likely to be attracted by labor productivity of host African countries. If the GDPPE is negatively significant to Chinese OFDI, it indicates that Chinrese OFDI is more likely to be attracted by higher capital returns in host African countries. Therefore, the third hypothesis is:

H_{1c}: Chinese OFDI in Africa is significantly associated with GDPPE.

d. Strategic Assets Seeking

Some scholars believed that few strategic assets can be acquired in Africa; thus, these scholars directly ignored this factor in their research (Shan et al., 2018). Although strategic assets in Africa may not be a very strong motivation for Chinese OFDI, it is included in this research to test for its existence.

Most of previous research used the number of mergers and acquisition (Okafor et al., 2015) or patents registration (Drogendijk & Blomkvist, 2013) to indicate the strategic assets in Africa. However, both variables have a severe data gap. Following

Ross (2015), this research used high technology export % to total export (abbreviated as *HTECH*) as a proxy for a better data availability. And it is assumed Chinese OFDI will be attracted to Africa countries with more high technologies. Therefore, it is hypothesized that:

H_{1d}: Chinese OFDI in Africa is positively associated with HTECH.

4.3.3 Link between OFDI and Political Risks

Following experience of Shan et al. (2018) and Goswami & Haider (2014), this research also uses ICRG dataset composed by 12 indices to indicate the degree of political risks in African countries. This study firstly used the total score of 12 indices, i.e., the sum of scores of 12 indices, is used as a proxy for political risks. In order to better understand the different effect of different types of political risks, factor analysis is employed and 12 indices are extracted into 4 components, i.e., conflicts, governance quality, government stability, and democratic accountability. See Subsection 4.2.3 for details.

a. Total Score of Political Risks

Following Mijiyawa (2015), the total score of political risks is firstly used to estimate the effect of political risk of host Africa countries on Chinese OFDI. And it is assumed that political risks will constrain Chinese OFDI in Africa. Therefore, it is hypothesized as:

H_{2a}: Political risks will negatively affect Chinese OFDI in Africa.

Here, it is necessary to mention that ICRG dataset evaluates the degree of political risks in host country by marking scores. Higher scores indicate lower risks. If the total

score of political risks is found positively relate to Chinese OFDI, H_{2a} is supported.

b. Conflicts

This vector comprises different kinds of conflicts including internal conflict, external conflict, military in politics, religious tension, and ethnic tension. It was believed that wars and conflicts had negative effect on Chinese OFDI (Cleeve, 2012; Biggeri and Sanfilippo, 2009). Therefore, the following hypothesis is proposed:

H_{2b}: The Risk of conflicts negatively affects Chinese OFDI in Africa.

Similarly, if the scores of conflicts are proven to be positively related to Chinese OFDI, it means the risk of conflicts negatively affects Chinese OFDI, and H_{2b} is supported.

c. Governance Quality

Socioeconomic condition and bureaucratic quality belon to the vector of governance quality. Governance quality of host county is believed having significant effect on FDI, and good socioeconomic condition and bureaucratic quality attracted larger proportion of FDI (Cleeve, 2012; Goswami & Haider, 2014). Therefore, it can be hypothesized:

H_{2c}: The risk of governance quality negatively affects Chinese OFDI in Africa.

If the score of governance quality is found positively related to Chinese OFDI in Africa, the risk of socioeconomic order is proven to negatively affect Chinese OFDI in Africa, and H_{2c} is supported.

d. Government Stability

Government stability comprises two main variables, i.e., government stability and

investment profile. It has been proven that risks related to investment profile, including expropriation, delay of payment, bad contract enforcement, etc. are largely caused by instability of host government (Shan et al., 2018; Felix et al., 2017). Both the instability of government and poor investment profile are believed constrain Chinese OFDI (Akhtaruzzaman et al., 2017; Mourao, 2018). Therefore, the following hypothesis is proposed:

H_{2d}: Risk of government stability negatively affect Chinese OFDI in Africa.

If the score of government stability is found positively related to Chinese OFDI, risk of government stability would be negatively related to Chinese OFDI and H_{2d} would be supported.

e. Democratic Accountability

This vector mainly comprises democratic accountability. The effect of accountability of host government has been controversial. And this study supports Shan et al. (2018) and Cleeve (2012), and believes good accountability of government will attract more OFDI inflow. Therefore, the hypothesis is proposed:

H_{2e}: The Risk of democratic accountability negatively affect Chinese OFDI in Africa.

If the score of democratic accountability is found positively related to Chinese OFDI in Africa, risk of accountability of government can be proven to negatively affect Chinese OFDI in Africa, and H_{2e} can be supported.

4.4 Conclusion

This chapter works as a bridge between theoretical analysis and empirical analysis.

It starts from the theoretical framework which is based on Internalization Theory and OLI Paradigm. Then this chapter specifies both dependent variable and independent variables, as well as preprocess the data of variables. After clarifying the link between dependent variables and independent variables, hypotheses are established. In later chapters, these hypotheses will be tested from static, dynamic, third-country, and firm-level perspectives.

Chapter Five: Determinants of Chinese OFDI in Africa: In Perspective of Aggregate Country-Level Panel Data

5.1 Introduction

Panel data approach (PDA) is widely employed in social studies because of its well-known advantages over cross-sectional or long time series regressions. First, PDA can take both individual effect and time effect into consideration, which increased the accuracy of estimation. Second, compared to typical cross-country regression, the sample can be expanded via multiplying the number of countries by the years of observation ($n=i\times t$). Third, PDA can reduce multicollinearity to a large extent.

Employing PDA, this chapter analyzes the empirical results about the effect of economic opportunities and political risks on Chinese OFDI in Africa. In Section 5.2, related literature using PDA approaches are reviewed, focusing on data sample, the variables chosen, the model used, as well as the major results generated. In Section 5.3, the data of this study is described via statistical summary with the aim of knowing the overall situation of the data. Section 5.4 describes the results of diagnostic tests including unit root test, VIF test and Pearson test, to ensure the data are stationary and that no severe multicollinearity or cross-sectional dependence existed between the explanatory variables. Section 5.5 specifies both the static model and dynamic model used in this chapter. Section 5.6 presents the empirical results of potential determinants in the static model with POLS estimation, while Section 5.7 presents the empirical results of dynamic model using system GMM estimation. Section 5.8 conducts re-estimations controlling the effect of bilateral investment treaties (BIT) for robustness

check. And Section 5.9 is the discussion and conclusion section.

5.2 Previous Studies

In contrast to the vast number of previous studies in literature review chapter, this section reviews and summarizes the most related studies on Chinese OFDI in Africa using the PDA approach. As discussed in the literature review chapter, we selected the top citied papers in the Web of Science and Scopus databases, and manually filtered them to focus on studies that use PDA approach. However, most of the top-cited studies used a static panel data model, and few used dynamic panel data model. Considering that dynamic panel data model is an emerging technique used in field of Chinese OFDI in Africa and large citations are difficult to obtain in a small number of years, dynamic panel data model such as Utesch-Xiong & Kambhampati (2021)'s study is also reviewed even though their study is not a top cited paper. See the following Table 5-1 as summary of most cited related studies focusing on their empirical methods and major results. To better understand the difference between this study and previous studies, the data sample, methodology employed, independent variable used, and major results reached in previous studies are summarized in the table. Additionally, a comparison is made between results of these previous studies and the results of this study in the later section (Section 5.9).

Table 5-1 The Most Frequently Cited Related Literatures on Chinese OFDI in Africa Using PDA Approach

Studies	Data Sample	Independent Variable	Methodology	Results	Citation
Cheung et al. (2012)	(1) A panel data of 31Africa countries in 1991-2005;	(1) Approved ODI flow data % to population;	Static Panel Data Model with Tobit regression &	(1) Approved ODI: Economic condition risk (+*); Political system risk (+*); Corruption (-*); Going global*oil (+*)	123

	(2) A panel data of 33 Africa countries in 2003-2007	(2) IMF-OECD ODI flow data % to population	Heckman two-stage regression	(2) IMF-OECD ODI: GDP (+*); Economic condition risk (+*); Political system risk (+*); Corruption (-*); Law (-*); Mineral (+*); Going global*oil (+*)	
Sanfilippo (2010)	Panel data for 41 Africa countries in 1998-2007	FDI stock	Static Panel Data Model with two-way fixed LSDV estimation	National economic cooperation (+*); Oil (+*); Literacy rate (-); Number of Telephone lines (-); Inflation rate (+*); Conflict (-*); Political freedom (-*); GDP (-); Non-Chinese FDI received (-*)	80
Shan et al. (2018)	Panel data of 22 Africa countries in 2008-2014	FDI stock	Static Panel Data Model with Fixed Effect Within Regression	Natural resource rent (-); GDP (+*); Trade openness (-); Infrastructure index (-*); Inflation rate (-); Voice and accountability (+*); Political stability and absence of violence (-*); Regulatory quality (-*); Rule of law (-); Control of corruption (-)	41
Mourao (2018)	Panel data of 48 Africa countries in 2003-2010	FDI flow	Static Panel Data Stochastic Frontier Model with ML estimation	Population (+*); Forest Area (+*); Export Diversity (-*); Government Effectiveness (-*); Corruption (-*); Political Stability (-*); Regulatory Quality (-*)	38
Akhtaruzzaman et al. (2017)	Panel data of 41Afrca countries in 2004-2012	FDI flow	Panel Data Model with OLS estimation & Poisson Pseudo-Maximum-Likelihood estimation	Confucious Institutes (+*); Chinese Aid (+*); Mineral Exports to China (+*); GDP (+*); GDP per capita (-)	30
Ross (2015)	Panel data of 8 Africa countries in 2003-2012	FDI flow	Random Effect GLS Regression	GDP per capita (+); GDP growth rate (-); GDP per person employed (+); Total natural resource rent (+*); High-tech export (+); Mobile cellular subscription (+*); Electric power consumption (-); Inflation rate (+); Trade openness (-); Time to export (-*)	22
Utesch-Xiong	Panel data of 43	Number of	Dynamic	GDP (+*); Inflation (-);	4

& Kambhampati (2021)	Africa countries in 2002-2012	Approved Chinese FDI Projects	Panel Data Model with System GMM Regression	Infrastructure (+); Oil & Gas (-); Other Resources (+*); Institutions (-*)	

*Note: + indicates positive effect; - indicates negative effect; * indicates significant effect; Citation is counted by January of 2023.*

First, Cheung et al. (2012)'s study used 2 ODI data source, i.e., approved ODI data in 1991-2005 and OECD-IMF ODI data in 2003-2007 to analyze the determinants of Chinese OFDI in Africa. This study first uses Tobit regression for a reason that observations of Chinese OFDI flow in Africa are censored at zero and below. Additionally, Heckman two-stage regression is employed considering there are 2 steps before making investment decisions, i.e., step 1 to decide whether to invest or not and sept 2 to decide how much to invest. In the perspective explanatory variable, GDP, real GDP per capita, and GDP growth rate are used as proxies for market seeking motivation; the trade intensity with China and the number of Chinese projects in Africa are used as proxies for economic interaction; 6 indicators including corruption, social economic condition, conflict, social tension, and political system risk from ICRG are used as proxies for political risks; energy output and mineral export to China are used as proxies for resource seeking motivation. Although, reliable data and methodologies are employed, important determinants such as efficiency seeking motivation, strategic asset seeking motivation, and host country infrastructure, are missing. Additionally, it is doubted whether reducing the 12 indicators from ICRG to 6 variables by adding up every 2 related indicators is scientific or not.

Second, Sanfilippo (2010)'s study used OFDI stock as the dependent variable to investigate the determinants of Chinese OFDI with a sample of 41 African countries in

1998-2007. It used fixed-effect least square dummy variable (LSDV) estimation with a dummy variable, i.e., whether or not the countries participated in African Growth and Opportunity Act (AGOA). In terms of variable usage, Gross National Income (GNI) and AGOA were used as proxies for market seeking motivation; quantity of oil produced was used as proxy for natural resource seeking motivation; risk aversion including both economic risk and political risks was proxied by inflation, international debt, conflict, and civil liberties. Infrastructure proxied by main telephone lines and human capital proxied by adult literacy rate are used as control variables. Although Sanfillipo's study covered a lot independent variables, the use of OFDI stock as dependent variable is less efficient than OFDI flow. OFDI stock is an accumulative measure of foreign direct investment, which is more static. Under this condition, the panel dataset is very close to cross-sectional data and panel data are less meaningful (Yang et al., 2016). Thus, the results may be less robust.

Third, Shan et al. (2018) used a smaller sample of 22 Africa countries in year of 2008-2014 to estimate the determinant of Chinese OFDI in Africa. The study uses static panel data model with fixed-effect estimation. From the perspective of variables, Chinese OFDI stock in Africa was used as dependent variable; total natural resource rent was used as a proxy for natural resource seeking motivation; GDP was used as a proxy for market seeking motivation; four components were extracted from 12 indictors of the ICRG dataset via factor analysis and were used as proxies for political risks, i.e., voice and accountability, political stability and absence of violence, regulatory quality, rule of law and control of corruption. Inflation, infrastructure index, and trade openness

were used as control variable. The limitations of this study are similar to those of Cheung et al. (2012)'s study and Sanfilippo (2010)'s study. For one thing, it ignores important determinants of FDI, such as efficiency seeking and strategic asset seeking motivations. For the other, it also used OFDI stock as dependent variable, which is less sensitive than OFDI flow.

Fourth, Mourao (2018) employed Stochastic Frontier Model and used a sample of 48 Africa countries in 2003-2010 to analyze determinants of Chinese OFDI in Africa. By using Stochastic Frontier Model, both the commonalities affecting all African countries and each African country-specific random component could be analyzed. The variable usage in this study was also divided into 2 categories, i.e., the economic factors that influencing FDI flow and the determinants of the efficiency. The study used population, forest area, index of exports diversification, agriculture added value in GDP, inflation, and real GDP per capita as proxies for factors of FDI allocation, while Indexes of Government Effectiveness, corruption perception, political stability, and regulatory quality were used as proxies for determinants of efficiency. Although, this study covers more Africa countries, it only includes economic factors as influencing factor while political risks are only included as efficiency determinants, which is not sufficient. Additionally, existing studies have no supporting evidence for the separation of FDI factors and efficiency determinants.

Fifth, Akhtaruzzaman et al. (2017)'s study innovatively associated Chinese OFDI in Africa with Chinese Confucius Institutes in Africa. This study included a sample of 41 Africa countries in year of 2004-2012. It used both OLS estimation & Poisson

Pseudo-Maximum-Likelihood (PPML) estimation as this study suggested that log-liner OLS estimation can lead to overestimation of effect sizes while PPML produces more conservative coefficients. In the perspective of variables, Chinese OFDI was explained by GDP per capita, institutional quality (by summing 12 indicators of ICRG dataset), Chinese aid sourced from both ChinaAid.org and Rand aid data, mineral exports to China, mineral exports to the rest of world, as well as Chinese soft power proxied by number of Confucius Institutes, inflation, distance, and trade. Although different estimation methods and different data sources were employed to ensure the robustness of this study, the choice of determinants of this study is not based on classic theories of FDI studies. For example, it is redundant to use both mineral exports to China and mineral exports to the rest of world as two determinants, and it is better to directly use the ratio of mineral exports to China % to total mineral exports. Additionally, oil seeking motivation is traditionally considered more important but was ignored in this study. And by adding up all the 12 indicators from ICRG dataset, it is possible to reduce the significance of institutional quality by eliminating positive effect of some indicators with negative effect of the other indicators.

Sixthly, Ross (2015)'s study narrowed down the sample size to 8 Africa countries in 2003-2012 and employed a series of panel data models to estimate determinants of Chinese OFDI in Africa. Three static panel data estimations including Pooled OLS estimation, Fixed-effect estimation, and Random-effect estimation. In terms of variables, GDP growth rate and GDP per capita were used as proxies for market-seeking motivation; GDP per person employed was used as proxy for efficiency seeking

motivation; total natural resource rent was used as proxy for natural resource seeking motivation; high-technology exports as a percentage of manufactured export was used as proxy for strategic assets seeking motivation. The control variables include infrastructure proxied by both mobile cellular subscription rate and electric power consumption, economic stability proxied by inflation, government policy proxied by trade openness, and regulatory environment proxied by time to export. Although the study covers Duning (1993)'s 4 motivations, it was more focused on economic determinants of Chinese OFDI in Africa, and did not take the political risks and institutional determinants into consideration. Also, the study used both GDP per capita and GDP per person employed as the explanatory variables. However, in most cases the employment rate in a country is higher than 90%. Even during the Great Depression, the employment rate in U.S. remained in 75%. Thus, in normal cases, the number of employed should be close to the total population. This means GDP per capita and GDP per person employed should be very close. The use of both GDP per capita and GDP per person employed can cause a multicollinearity problem. Furthermore, the sample size of this study was limited to 8 Africa countries, which is not efficient to estimate complicated research question with many different variables.

Seventhly, Utesch-Xiong & Kambhampati (2021) used the number of FDI projects in Africa countries as dependent variable and analyzed market-seeking and resource-seeking motivations of Chinese OFDI in Africa as well as institutional effect proxied by 6 indicators in World Governance Indicator (WGI) via system GMM estimator. Two-step system GMM estimation was employed with a sample covering 43 Africa countries

over 11 years. From the perspective of variables, resource seeking motivation was proxied by oil & gas reserves and production of other minerals; market seeking motivation was proxied by GDP and internet users per 100 people; institutional determinants were proxied by average score of the 6 indicators. Although GMM estimation technique was firstly used in this study in the field of Chinese OFDI in Africa, it limited to market seeking motivation and resource seeking motivation, and ignored the efficiency seeking motivation and strategic assets seeking motivation. Additionally, the average score of 6 indicators in WGI was less comprehensive for determining the effect of different types of political risks.

In a conclusion, previous studies have conducted comprehensive research on the determinants of Chinese OFDI in Africa. However, it can theoretically and empirically go further. Theoretically, most previous studies were conducted under the theoretical framework of Duning's OLI paradigm, but many studies cannot cover all the 4 types of FDI motivations proposed by Dunning (1993), i.e., market seeking motivation, natural resource seeking motivation, efficiency seeking motivation, and strategic assets seeking motivation. Additionally, the significance of political risks in determining Chinese OFDI in Africa is underestimated when merely the sum or average score of 6 indicator of WGI or 12 indicators is used from ICRG (Akhtaruzzaman et al., 2017). Empirically, most previous studies used static Panel Data Model to analyze the determinants of Chinese OFDI in Africa. However, there is evidence that one country's FDI is more likely to flow to countries already with abundant FDI from either this country or the other countries as a result of agglomeration effect (Mijiyawa, 2015; Utesch-Xiong &

Kambhampati, 2021). Thus, dynamic Panel Data Model should be more efficient under this condition.

Compared with those existing studies, the major contributions of this chapter are concluded as follows. (1) This study used a panel approach with a sample size of 35 Africa countries in the time period of 2006-2019, which is a relatively recent and large sample. (2) This study used Factor Analysis to extract components from the 12 indictors of ICRG, which scientifically reduced the correlation among the 12 indicators while preserving the major types of political risks. (3) The determinants in this study are composed by 4 economic determinants (i.e., market, natural resource, efficiency, and strategic assets), 4 political determinants (i.e., conflicts, governance quality, government stability, and government accountability, extracted from 12 indicators of ICRG), as well as 3 control variables (i.e., inflation, infrastructure, and trade openness), which is quite comprehensive to study the possible determinants of Chinese OFDI in Africa. (4) This study establishes both static panel data model and dynamic panel data model to analyze the potential determinants of Chinese OFDI in Africa as well as the possible agglomeration effect of Chinese OFDI with the aim of ensuring the robustness of the estimation.

5.3 Data Description

In this section, the data are described and summarized in three subsections. First, the original data of both dependent variable and independent variable are statistically summarized. Second, the amount of Chinese OFDI stock and OFDI flow are further presented with charts. Third, the political risk scores for host African countries are

further shown with a table that presents the rankings of political risk in African countries.

5.3.1 Data Sample

The initial sample of this study is based on 36 independent African countries, and it cannot cover 54 African countries because of data gap, especially the data gap of political risks. And Zimbabwe is excluded from later estimation since it is found to be an outlier relative to the rest Africa countries. Therefore, in the estimation section, the observation sample is 35, and the 35 African countries are listed in detail in the following table. The observation period starts from 2006 because 2006 was the year when Chinese OFDI to Africa largely increased. And the observation period ends in 2019, the year before the outbreak of COV. 19, which may affect the foreign investment activities. Therefore, this research actually uses panel data of 35 African countries in time period of 2006-2019, i.e., $Y=OFDI_{it}$ (i=1, 2, 3 … 35; t=2006, 2007, 2008 … 2019).

Table 5-2 35 Africa Countries as the Sample of This Study

Algeria	Angola	Botswana	Burkina Faso
Cameroon	Congo	Congo_DR	Cote d'lvoire
Egypt	Ethiopia	Gabon	Gambia
Ghana	Guinea	Guinea-Bissau	Kenya
Liberia	Libya	Madagascar	Malawi
Mali	Morocco	Mozambique	Namibia
Niger	Nigeria	Senegal	Sierra Leone
South Africa	Sudan	Tanzania	Togo
Tunisia	Uganda	Zambia	

Note: Congo_DR is short for Congo Democratic Republic; Cote d'lvoire is also known as Ivory Coast.

The reasons for using panel data are as follows. First, panel data have considerable benefits over simple cross-section data or time-series data for its consideration of both

individual effect and time effect, which increased the accuracy of this research. Second, the sample size is expanded (n=35×14), and the degree of freedom is increased. Thirdly, it reduced multicollinearity to some extent.

The variables used in this research are as follows. Chinese OFDI flow as percentage to host country GDP is used as the dependent variable. Two kinds of explanatory variables, i.e., economic opportunities (including natural resources seeking motivation proxied by total resource rent % to GDP, market seeking motivation proxied by GDP growth rate, efficiency seeking motivation proxied by GDP per person employed, and strategic asset seeking motivation proxied by high-technology export to total export), and political risks (including conflicts, governance quality, government stability, and democratic accountability), are used. Additionally, inflation rate, infrastructure proxied by cellular subscription rate, and trade openness are employed as control variables. Data of these variables are all sourced from credible sources including Statistical Bulletin of China's OFDI, World Development Indicator (WDI), and International Country Risk Guide (ICRG) etc.

5.3.2 Statistical Summary of Economic Variables

The aim of statistical summary is to describe and summarize the data to show the general situation of data in a concise way in order to know the data distribution, range, deviation, etc. The data of both dependent variables and independent variables are summarized and described in terms of observation number, mean value, standard deviation, minimum value, maximum value, skewness, and kurtosis in the following table (Table 4-2), which helps us to better process the data. The following table shows

the statistical summary of related variables.

Table 5-3 Statistical Summary of Economic Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
ODIF	504	3.598	21.011	-30.307	391.538	15.476	265.021
RES	504	12.910	11.841	0.337	67.890	2.049	7.596
GDPGR	504	4.459	6.256	-50.339	86.827	2.825	75.164
GDPPE	504	17.520	20.448	1.959	124.831	2.292	9.598
HTECH	504	4.551	6.092	0	60.300	3.916	28.913
PR	504	56.397	8.787	35	79	0.113	2.934
CELL	504	70.060	39.773	1.104	175.873	0.387	2.365
INF	504	463402.3	1.03e+07	-7.67	2.31e+08	22.379	501.890
TRADE	504	65.877	24.742	1.219	130.777	0.447	3.137

Based on the statical summary of related variables, some conclusions can be reached. (1) Ratio of Chinese OFDI flow to host country GDP (*ODIF*) largely deviates, with standard deviation reaching 21.011%. Zimbabwe had the largest ratio reaching 391.538% in 2019. And Congo had the lowest ratio in 2018 reaching 30.307%. (2) The economies of Africa countries largely depended on natural resources. The average natural resource rent % of GDP (*RES*) in Africa reaches 12.910%, which means that 12.910% of Africa's GDP relied on different kinds of natural resources. Libya with a natural resource rent of 67.890%, was the most resource dependent country in Africa in 2006. Morocco, with a natural rent of 0.337% was the least natural resource relied country in 2019. (3) Compared to world average GDP growth rate of 2.960%, Africa is experiencing rapid economic growth in recent years with average GDP growth rate (*GDPGR*) reaching 4.459%. Libya had both the lowest *GDPGR* in 2011 reaching -50.339% and highest *GDPGR* in 2012 reaching 86.827%, which is partly due to the civil war. (4) The average GDP per person employed (*GDPPE*) in Africa reaches 17520 US dollars, but this is another variable that largely deviates. Libya had the highest

GDPPE in 2007 reaching 124,831 US dollars, while Mozambique had the lowest *GDPPE* in 2006 only reaching 1969 US dollars. (5) Africa countries did not perform well in the perspective of high technology export % to manufactured export (*HTECH*), with several countries having values close to 0. Niger performs relatively well with *HTECH* peaking at 60.3% in 2014. (6) Average cellular subscription rate (*CELL*) in Africa reaches 70.06%, which indicates the increasingly popularized cellular in Africa and the infrastructure in Africa is being improved. However, Ethiopia had the lowest *CELL* in 2006 down at 1.104 subscriptions per 100 people. (7) Inflation rate (*INF*) is exaggerated in Africa if Zimbabwe is included in the sample. The average inflation rate of Africa reached 463402.3% which was largely overestimated by the high inflation rate of Zimbabwe. Excluding Zimbabwe from the sample, the average inflation rate of the rest 35 Africa countries was 7.583% which was more reasonable though still higher than world average. And in the later estimations, Zimbabwe is excluded from the sample as it is outlier relative to the rest of sample. (7) Trade % to GDP (*TRADE*), i.e., trade openness in Africa, is increasingly better, with the average trade openness in Africa reached 72.44%, which means both import and export trade are encouraged, accounting a large percentage of host country GDP. However, Sudan only had lowest trade openness in 2019 down at 1.219%.

Additionally, the skewness and kurtosis of the above explanatory variables indicated that these variables are not normally distributed, and preprocessing of the original data is necessary. Based on previous empirical experience (Buckley et al., 2007; Biggeri & Sanfilippo, 2009), all the explanatory variables are transformed into natural

logarithms.

5.3.3 Statistical Summary of Political Risk

This subsection describes the general situation of political risk in Africa. The following Table 5-4 showed the scores and rankings of the 36 Africa countries in year 2006-2019, from the least risky country (highest scores) to the riskiest country (lowest scores). The African countries with low political risks include Namibia, Botswana, Morocco, etc. while the African countries with high political risks include Nigeria, Sudan, and Congo Democratic Republic, etc. Additionally, the scores for political risks in most African countries did not improve; instead, they experienced a downward development trend from 2006 to 2019. This finding means the situation of political risks in most Africa countries worsened in 2006-2019.

Table 5-4 Scores and Rankings of Political Risks in 2008-2019

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean	Rank
Namibia	77.50	77.54	79.00	79.00	78.88	76.75	75.50	75.00	75.00	75.00	74.42	74.33	74.00	73.00	76.07	1
Botswana	77.63	77.50	76.25	75.79	74.71	72.29	70.96	72.96	72.37	73.16	72.21	71.67	71.42	69.83	73.48	2
Morocco	72.63	70.72	70.25	69.67	69.54	68.21	67.08	64.33	64.20	64.25	65.13	64.96	63.50	63.58	67.00	3
Tunisia	72.92	72.25	72.08	72.00	72.50	63.99	64.59	60.88	59.99	62.75	63.21	63.84	62.21	63.25	66.18	4
South Africa	69.25	68.83	67.63	68.01	67.14	66.71	65.96	65.56	63.30	63.79	62.67	62.75	65.88	65.58	65.93	5
Ghana	68.33	68.17	67.04	66.63	64.93	65.33	65.80	64.25	64.00	63.29	64.09	64.81	66.83	66.50	65.71	6
Mozambique	68.92	69.17	69.50	69.67	69.25	66.84	66.71	65.75	64.12	63.80	59.96	58.33	59.25	58.54	64.99	7
Gambia	67.25	65.75	65.88	65.46	63.92	61.42	62.05	60.42	59.00	58.80	59.00	61.30	61.42	64.04	62.55	8
Zambia	64.13	63.04	63.17	63.46	63.00	62.68	63.00	62.01	60.54	62.38	63.09	62.75	61.29	60.29	62.49	9
Tanzania	62.59	62.87	63.55	63.71	63.29	63.67	62.09	60.92	58.46	59.00	59.54	57.79	57.63	58.79	60.99	10
Libya	67.46	67.55	68.42	67.88	67.38	56.37	59.29	54.38	51.71	52.04	52.55	53.29	53.50	53.17	58.93	11
Sierra Leone	61.54	61.42	60.46	60.50	61.25	59.88	58.55	57.84	56.25	54.96	56.80	57.04	58.38	59.96	58.92	12
Algeria	63.79	62.38	61.71	60.68	60.96	56.80	55.64	55.91	57.13	57.66	56.21	55.38	55.21	53.17	58.05	13
Gabon	60.68	59.50	59.88	59.46	59.93	57.99	59.51	58.38	57.21	55.96	54.71	55.39	55.92	56.38	57.92	14
Madagascar	61.75	62.38	62.50	58.32	55.34	56.87	55.13	52.46	55.17	54.71	57.65	58.22	56.46	57.92	57.49	15
Cameroon	64.42	65.33	65.50	64.84	62.41	58.13	55.17	56.13	53.84	52.50	53.00	51.30	48.13	47.21	56.99	16
Burkina Faso	61.75	61.88	60.83	60.29	59.59	54.39	52.55	52.88	52.34	52.55	57.26	56.29	57.92	57.17	56.98	17
Senegal	58.75	59.25	58.51	56.58	55.96	54.46	54.91	56.30	55.00	54.67	55.04	56.21	57.67	58.25	56.54	18
Kenya	56.96	55.71	56.42	56.06	56.84	55.12	53.42	55.56	55.42	56.50	57.21	56.67	57.63	59.17	56.34	19

Angola	56.75	56.96	57.33	59.00	58.75	57.25	55.47	55.80	54.12	52.50	51.71	51.47	53.29	55.63	55.43	20
Egypt	62.66	61.50	59.42	58.88	58.13	51.29	50.18	46.76	49.04	50.64	51.63	53.96	57.50	58.96	55.04	21
Malawi	56.34	56.05	55.54	58.30	58.71	56.42	53.83	52.95	52.00	51.71	51.42	53.54	53.71	55.46	54.71	22
Congo	55.58	55.84	56.00	55.83	55.50	54.25	53.88	54.00	54.00	56.38	55.29	52.25	51.63	53.17	54.54	23
Mali	58.42	58.23	58.42	58.96	59.13	57.67	53.16	50.63	51.46	51.38	51.75	52.46	50.88	49.29	54.42	24
Liberia	52.62	54.42	55.79	57.55	57.04	55.30	53.71	53.17	51.56	50.88	51.21	51.29	53.04	50.96	53.47	25
Guinea-Bissau	56.13	55.88	55.37	56.25	54.71	52.87	49.88	49.83	50.80	50.83	50.72	51.38	52.83	53.63	52.94	26
Togo	52.13	52.33	53.50	53.08	52.88	51.25	50.26	48.67	49.75	52.41	52.83	52.71	52.17	53.00	51.93	27
Uganda	55.25	55.09	53.80	54.00	53.37	50.71	49.55	48.33	48.29	51.84	51.04	50.92	52.00	52.38	51.90	28
Niger	55.91	54.63	54.01	53.30	48.68	49.93	49.55	47.88	47.76	48.59	49.04	49.37	49.17	49.42	50.52	29
Ethiopia	51.05	50.89	50.50	50.79	49.33	48.93	47.17	46.87	47.42	49.50	51.30	49.67	51.04	55.88	50.02	30
Cote d'lvoire	42.79	43.34	44.21	43.75	42.43	44.88	48.42	46.84	47.58	50.05	50.01	58.01	49.79	49.46	47.25	31
Guinea	47.58	44.42	43.62	44.38	43.42	47.09	45.59	43.46	44.04	45.72	50.00	49.25	49.83	48.08	46.18	32
Zimbabwe	45.67	42.33	41.32	42.63	43.13	43.04	43.83	46.14	47.00	47.05	47.75	48.49	53.54	51.67	45.97	33
Nigeria	46.01	43.84	43.50	45.63	45.29	46.00	45.00	44.42	42.79	44.25	44.08	44.21	45.92	47.79	44.91	34
Sudan	46.00	44.71	43.83	42.79	40.67	39.41	37.38	38.09	35.79	35.41	35.00	37.58	37.50	39.21	39.53	35
Congo_DR	36.46	37.84	38.42	40.63	40.22	38.21	38.38	37.71	36.50	38.63	39.38	38.04	38.17	41.33	38.57	36

5.3.4 Chinese OFDI Flow and OFDI Stock in Africa

This subsection presents annual Chinese OFDI flow and accumulative OFDI stock in host Africa countries with the aim of determining the general distribution and dynamic change in Chinese OFDI in Africa in 2006-2019. The following conclusions can be reached. (1) Either in the perspective of OFDI flow or OFDI stock, Chinese OFDI focused on several Africa countries, including South Africa, Congo Democratic Republic, Sudan, Angola, etc. (2) In terms of Chinese OFDI flow, Africa countries did not largely deviate in 2006-2019 except South Africa. (3) In terms of Chinese OFDI stock, most Africa countries experience steady increase except South Africa, Sudan, Algeria, etc. See Figure 5-1 and 5-2 as follows.

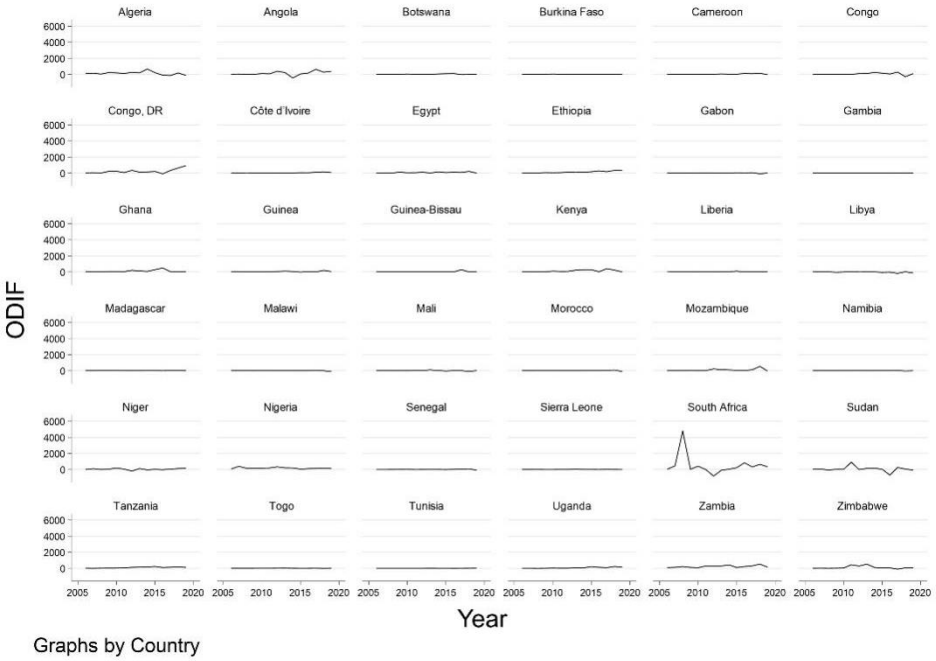


Figure 5-1 Chinese OFDI Flow in Africa in 2006-2019

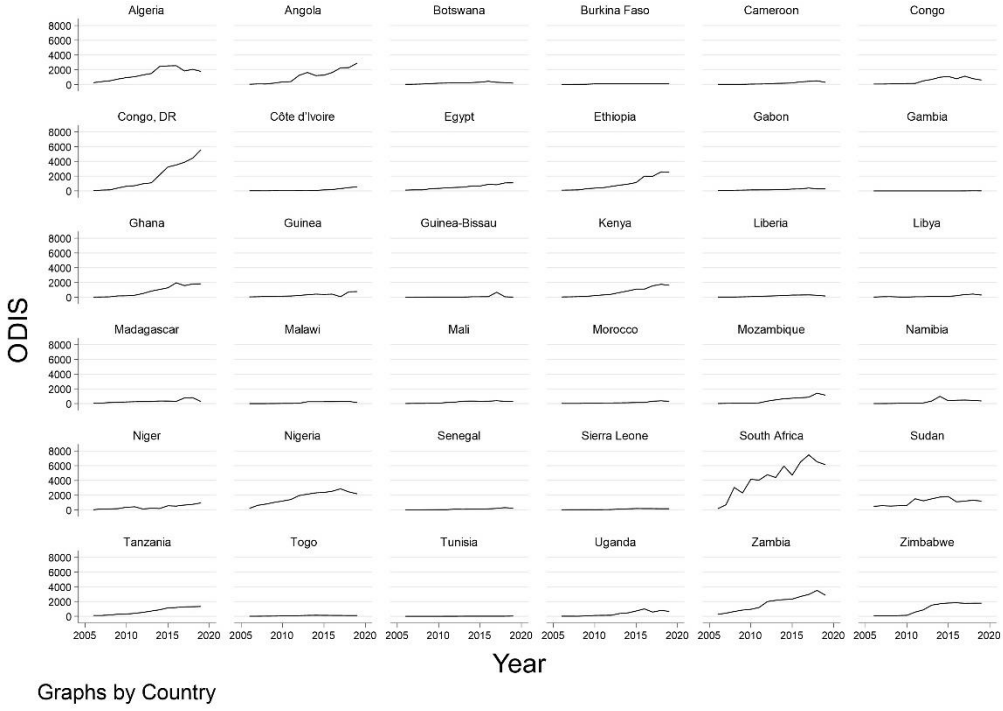


Figure 5-2 Chinese OFDI Stock in Africa in 2006-2019

5.4 Diagnostic Tests

5.4.1 Unit Root Test for Stationarity

It is essential to conduct panel data unit root test before any regression analysis in

order to ensure the data are stationary and spurious regression will not occur. Considering that the panel data in this study are balanced and T is finite (<N), the unit root test by Levin et al. (2002) (hereafter referred to as LLC), Im-Pesaran-Shin (2003) (hereafter referred to as IPS), and Harris & Tazavilis (1999) (hereafter referred to as HT) are used to test the stationarity of the panel data. The null hypothesis is that there is unit root in the variable, i.e., the data of this variable is not stationary. All the variables are transformed into logarithm form before unit root test. The test results with *p* values are listed as follows.

Table 5-5 Panel unit root test results from LLC, ADF-Fisher, PP-Fisher Tests

Variables	**LLC**		**IPS**		**HT**	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
ODIF	--7.579*** (0.000)	-11.150*** (0.000)	-6.314*** (0.000)	-14.462*** (0.000)	-15.075*** (0.000)	-22.286*** (0.000)
RES	-4.855*** (0.000)	-12.568*** (0.000)	-1.079 (0.1403)	-7.618*** (0.000)	1.031 (0.849)	-8.901*** (0.000)
GDPGR	-16.057*** (0.000)	-22.087*** (0.000)	-9.046*** (0.000)	-15.084*** (0.000)	-16.151*** (0.000)	-20.438*** (0.000)
GDPPE	-7.155*** (0.000)	-15.621*** (0.000)	0.1201 (0.5478)	-8.489*** (0.000)	-1.804** (0.036)	-12.115*** (0.000)
HTEC	-8.082*** (0.000)	-21.869*** (0.000)	-3.950*** (0.000)	-12.449*** (0.000)	-8.183*** (0.000)	-16.072*** (0.000)
PR	-4.655*** (0.000)	-13.053*** (0.000)	0.217 (0.586)	-6.677*** (0.000)	1.084 (0.861)	-8.595*** (0.000)
CONF	-6.706*** (0.000)	-13.020*** (0.000)	-1.438* (0.075)	-6.993*** (0.000)	0.738 (0.770)	-7.540*** (0.000)
GOV	-8.341***	-15.350*** (0.000)	-1.926**	-8.946***	1.060	-6.685***

	(0.000)		(0.027)	(0.000)	(0.856)	(0.000)
STAB	-7.788***	-13.699***	-2.549***	-7.701***	0.475	-8.697***
	(0.000)	(0.000)	(0.005)	(0.000)	(0.683)	(0.000)
ACCT	-4.806***	-12.598***	0.233	-7.640***	0.612	-6.282***
	(0.000)	(0.000)	(0.592)	(0.000)	(0.730)	(0.000)
CELL	-11.299***	-7.627***	-4.215***	-4.677***	1.602	-3.740***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.945)	(0.000)
INF	-11.147***	-17.172***	-7.549***	-13.302***	-8.725***	-14.779***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TRADE	-7.037***	-14.975***	-2.078**	-9.948***	-1.351*	-9.568***
	(0.000)	(0.000)	(0.019)	(0.000)	(0.088)	(0.000)

*Note: * p < 0.1, ** p < 0.05, *** p < 0.01; lag order is chosen by Bayesian Information Criterion (BIC).*

The table above showed LLC, IPS, and HT tests for stationarity in terms of level and first difference of all the variables. The following conclusions can be drawn. (1) The results of LLC test showed that all the data are stationary in terms of level and first difference. (2) The results of IPS test showed that all the data are stationary at the first difference. (3) Th results of HT test also showed that the data are stationary at the first difference. From LLC, IPS, and HT test, all the data are stationary and GMM estimation can subsequently be conducted.

5.4.2 VIF Test for Multicollinearity

Variance Inflation Factors (VIF) test is used to identify the problem of multicollinearity between explanatory variables, because multicollinearity increases the standard error of OLS estimation and further lead to unreliable estimation. And variables with value of 1/VIF less than 0.1 (i.e., VIF value larger than 10), can be considered to have multicollinearity (Hair et al., 1995). The table below shows the

results for VIF test (Table 5-6). The result of the VIF test shows that there is no VIF values larger than 10 and thus no high multicollinearity existed in the dataset. Thus, the study can proceed to regression process.

Table 5-6 VIF Test results for explanatory variables

Variables	VIF	1/VIF
GDPPE	2.57	0.389
GOV	2.21	0.453
CELL	2.17	0.462
CONF	1.95	0.514
RES	1.84	0.543
STAB	1.75	0.571
TRADE	1.67	0.598
ACCT	1.41	0.711
INF	1.29	0.774
HTEC	1.08	0.926
GDPGR	1.06	0.944

5.4.3 Pearson's Test for Cross-Sectional Dependence

Cross-sectional dependence can occur when there is a common correlated factor existed in disturbance term which makes $Cov\,(\mu_{it}, \mu_{jt}) \neq 0$ or $Cov\,(\mu_{it}, \mu_{it-k}) \neq 0$. Two semi-parametric tests proposed by Friedman (1937) and Frees (1995,2004), as well as the parametric testing procedure proposed by Pearson (2004) can be used to test the cross-sectional dependence. Considering that both static model and dynamic model are used in this study, Pearson (2004)'s Test is employed in this study to test for cross-sectional dependence. Null hypothesis of Pearson's test is that there is no cross-section dependence. And *Pr=0.449*, indicating that null hypothesis is not rejected. Thus, the

panel data in this study have no cross-section dependence.

5.5 Model Specification

Following Goswami and Haider (2014) and the other studies mentioned above, this study takes economic opportunities and political risks as two major types of FDI determinants. Therefore, the generalized model can be specified as follows.

$$FDI = f(Economic\ opportinities, Political\ risks) \quad (1)$$

However, there are other factors that affect Chinese OFDI in Africa, such as inflation, aid, trade openness of Africa countries, which are considered as control variables (*X*). And this research collected related data for 35 African countries in the period of 2006-2019, which composes a panel data of 35*14. Therefore, the equation can be further specified into a panel data model as follows.

$$ODIF_{it} = \alpha_i + \beta_1 ECOP_{it} + \beta_2 PORSK_{it} + \beta_3 X_{it} + \varepsilon_{it} \quad (2)$$

In the equation above, i refers to an individual African country while t refers to time. ODIF denotes the Chinese OFDI flow as percentage of host country GDP. ECOP denotes the vector of economic opportunities while PORSK denotes the vector of political risks. X is the vector of all the control variables including the other influence such as trade openness, infrastructures, and inflation. α_i is the individual intercept. The reason to use individual intercept α_i rather than time intercept α_t is that this study addresses a large N and small T; thus, using individual intercept model has larger data points, ensures more efficient estimation, and also takes individual heterogeneity into consideration (Goswami & Haider, 2014).

The following subsections aim to specify the models used in this research,

including both static model and dynamic model. This research started from static model to analyze the static effect of Chinese OFDI determinants. The dynamic model adds one-year lagged Chinese OFDI in Africa ($OFDI_{it-1}$) as the independent variable and analyzed the determinants of Chinese OFDI in Africa from dynamic perspective.

5.5.1 Static Model Specification

Following Okafor et al. (2015) and Mijiyawa (2015), this study uses the ratio of the annual Chinese OFDI flow to host country GDP as the dependent variable. To test marketing seeking motivation, GDP growth rate (*GDPGR*) is used, and a similar approach can be found in Cleeve (2012) and Ross (2015). Following Ross (2015), Okafor et al. (2015), and Shan et al. (2018), total natural resource rent % to GDP (*RES*) is used to test the resource seeking motivation. GDP per person employed (*GDPPE*) is used as proxy for efficiency seeking motivation, which can also be found in Ramasamy & Yeung (2020). Following Ross (2015), ratio of high-technology export to total export (*HTEC)* is used as a proxy for strategic assets. Total score of political risks (*PR*) is used as a proxy for the general situation of political risks in host Africa countries, while 4 components, i.e., conflicts (*CONF*), governance quality (*GOV*), government stability (*STAB*), and government accountability (*ACCT*), generated via factor analysis are used as proxies for risk of conflict, risk of governance quality, risk of government instability and risk of government unaccountability, respectively. Following Buckley et al. (2007), Miao et al (2021), Ross (2015), Okafor et al. (2015), Shan et al. (2018), Utesch-Xiong & Kambhampati (2021) etc., cellular subscription rate (*CELL*) proxies for infrastructure, inflation rate (*INF*), and trade openness (*Trade)*, are used as control variables.

As mentioned in Chapter 4 Subsection 4.2.2, following the experience of Goswami & Haider (2014), Akhtaruzzaman et al. (2017), etc., all the variables are transformed into natural logarithm form because of the expectation of non-linearities. The use of logarithm will not change the effect of variable, but the economic implication of explanatory variable coefficients will be different. After using natural logarithm for both dependent variable and independent variable, the economic implication of coefficient β is that 1% increase in X averagely leads to $\beta\%$ increase in Y. Also, as discussed in Chapter 4 subsection 4.2.2, that all the economic variables are lagged by one year to reduce the endogeneity and reverse causality.

The static model is expressed as follows. POLS estimation, random-effect GLS estimation and fixed-effect within estimation are used to estimate the static model and investigate possible economic and political determinants of Chinese OFDI in Africa.

$$\begin{aligned}\ln ODIF_{it} = {} & \alpha_i + \beta_1 \ln RES_{it-1} + \beta_2 \ln GDPGR_{it-1} + \beta_3 \ln GDPPE_{it-1} \\ & + \beta_4 \ln HTEC_{it-1} + \beta_5 CONF_{it} + \beta_6 GOV_{it} + \beta_7 STAB_{it} + \beta_8 ACCT_{it} \\ & + \beta_9 \ln INF_{it-1} + \beta_{10} \ln CELL_{it-1} + \beta_{11} \ln Trade_{it-1} + \varepsilon_{it}\end{aligned} \quad (3)$$

In the equation above, $ODIF_{it}$ indicates Chinese OFDI flow as percentage of host country GDP in country i at time t. α_i is the individual intercept; $\beta_2, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ are parameters of explanatory variables that need to be estimated; $\beta_9, \beta_{10}, \beta_{11}$ are the effect of control variables; ε_{it} is the error term or disturbance.

5.5.2 Dynamic Model Specification

The dynamic model is used for the following reasons. (1) Chinese OFDI in Africa

in different years are not independent. The static model is based on the hypothesis that Chinese OFDI in different years are independent. However, this is not always true. Enterprises in one country are very likely to consider previous OFDI experience. (2) Dynamic model is used to test the possible agglomeration effect of Chinese OFDI in Africa identified in previous studies (Okafor et al., 2015; Mijiyawa, 2015; Utesch-Xiong & Kambhampati, 2021). OFDI in current year may be affected by OFDI in previous years, and positive significance of lagged dependent variable is identified in previous studies and explained as agglomeration effect (Utesch-Xiong & Kambhampati, 2021; Mijiyawa, 2015). Therefore, it is necessary to add lagged dependent variable as another explanatory variable. (3) It is used to test whether the results in the static model are robust. As earlier mentioned, individual effect of the static model, may be correlated with explanatory variables. By using dynamic GMM estimation, the constant α_i and v_i in disturbance term ($\mu_{it}=v_i+\varepsilon_{it}$) can be eliminated.

Following the studies of (Afawubo & Mathey, 2017; Utesch-Xiong & Kambhampati, 2021), one-year lagged dependent variable is used. The dynamic model is listed as follows. The GMM estimation will be used to address the problem of lagged dependent variables, unobserved fixed effects, endogenous independent variables, as well as presence of heteroscedasticity and autocorrelation across and within individuals (Roodman, 2009).

$$\begin{aligned}\ln ODIF_{it} = {} & \alpha_i + \rho \ln ODIF_{it-1} + \beta_1 \ln RES_{it-1} + \beta_2 \ln GDPGR_{it-1} \\ & + \beta_3 \ln GDPPE_{it-1} + \beta_4 \ln HTEC_{it-1} + \beta_5 CONF_{it} + \beta_6 GOV_{it} \\ & + \beta_7 STAB_{it} + \beta_8 ACCT_{it} + \beta_9 \ln INF_{it-1} + \beta_{10} \ln CELL_{it-1} \\ & + \beta_{11} \ln Trade_{it-1} + \varepsilon_{it}\end{aligned} \tag{4}$$

In the above equation, ρ denotes the coefficient of one-year lagged OFDI. And the other parameters are the same as static model.

5.6 Empirical Results of Static Model

Since panel data are used, traditional panel data estimators, including Pooled Ordinary Least Square (POLS) estimation, Fixed-Effect (FE) estimation, and Random-Effect (RE) estimation are employed in this section. The principle of POLS estimator is to pool all the observation data from different *t* and different *i* together and run Ordinary Least Square (OLS) regression seeking for the smallest sum value of square of residuals. It is efficient and convenient to estimate the coefficients in linear regression model. However, this approach does not consider the individual character of *i* and the temporal character of *t*, and it is under the hypothesis that the intercept α_i and the coefficient β do not change, which may ignore the problem of heterogeneity.

Both FE and RE accept that intercept is changeable. FE assumes that the change in constant α_i is corelated with explanatory variable *X* while RE takes this change as random change and is not corelated with X. If the constant α_i is divided into $\gamma + \mu_i$, FE assumes that μ_i is correlated with *X*, i.e., corr(μ_i, *X*)≠0 while RE assumes that corr(μ_i, *X*)=0. Thus, the most efficient estimation method for FE is Within estimator while the most efficient estimation method for RE is GLS estimator. The principle of

GLS estimator is to divide the constant α_i into $\gamma + \mu_i$ and combine the μ_i with error term ε_{it}, forming and estimating the new error term v_i ($v_i = \mu_i + \varepsilon_{it}$). The principle of Within estimator is first to estimate β and then used the estimated β to estimate constant. The choice between FE and RE can be made via Hausman Test (1978).

$$Y_{it} - \overline{Y}_\iota = (X_{it} - \overline{X}_\iota)\beta + (\varepsilon_{it} - \overline{\varepsilon}_\iota) \quad (5)$$

$$\hat{\alpha} = \overline{Y}_t - \overline{X}_\iota\hat{\beta}, \qquad i = 1,2,3 \dots n \quad (6)$$

The first estimation in Subsection 5.6.1 used the total score of political risks of 12 indicators from ICRG dataset. Subsection 5.6.2 used the detailed 4 factors of political risks generated via factor analysis of 12 indicators, i.e., 4 components including conflicts, governance quality, government stability and democratic accountability, in order to know which type of political risks is more important in determining Chinese OFDI in Africa.

5.6.1 Political Risk as Whole

Following Akhtaruzzaman et al. (2017), total score of political risks is used as proxy for political determinant of Chinese ODI in Africa in this subsection. The results of POLS, FE, and RE estimations are showed in the following table (Table 5-7).

Table 5-7 Results of Static Model Using Total Score of Political Risk

	POLS	FE	RE
L.RES	0.027	0.053**	0.027*
	(0.018)	(0.025)	(0.017)
L.GDPGR	0.055*	-0.020	0.053
	(0.034)	(0.022)	(0.038)
L.GDPPE	-0.047***	0.328*	-0.047***
	(0.011)	(0.178)	(0.013)
L.HTECH	-0.007	-0.004	-0.007

	(0.011)	(0.017)	(0.009)
PR	0.056	0.004	0.057
	(0.054)	(0.104)	(0.077)
L.CELL	0.034**	-0.010	0.034**
	(0.015)	(0.027)	(0.016)
L.INF	0.041	0.061	0.042
	(0.026)	(0.034)	(0.025)
L.TRADE	0.023	-0.005	0.023**
	(0.018)	(0.018)	(0.014)
_cons	2.807***	2.616***	2.810***
	(0.294)	(0.741)	(0.402)
N	455	455	455
R^2	0.044	0.014	0.044

*Note: Robust standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01*

The difference between FE and RE lies in whether corr(μ_i, X)=0 or corr(μ_i, X)≠0, and the choice between RE and FE was made based on Hausman test. Hausman (1978) devised a specification test to examine for the relationship between the unobserved individual factor and the explanatory variables. The null hypothesis of Hausman test is that there is no difference between the fixed-effect estimator and random-effect estimator. And the results of Hausman test is listed as Table 5-8. The null hypothesis is not rejected, thus FE is not appropriate while RE is in favored.

Table 5-8 Results of Hausman Test

Test summary (H_0)	Chi square statistics	Degree of freedom	*p*-value
Difference in coefficients not systematic	8.85	9	0.452

POLS estimation differs from RE estimation for a reason that POLS takes the intercept of the model as fixed. The choice between RE and POLS is made via Breusch-Pagan LM test. The null hypothesis of Breusch-Pagan LM test is that $Var(\mu_i) = 0$. And it is found $Prob>Chibar^2=0.453$. Therefore, null hypothesis cannot be rejected, and POLS is the most appropriate model for this research. Therefore, the results of POLS estimation are focused in this study. Based on the above POLS results, following

conclusions can be reached.

(1) *In the perspective of economic opportunities, GDP growth rate (GDPGR) is positively significant while GDP per person employed (GDPPE) is negatively significant. GDPGR* is positively significant to Chinese OFDI at 90% significance level which indicates that Chinese OFDI is more likely to flow into Africa countries with higher GDP growth rate. This further confirms the market-seeking motivation of Chinese OFDI in Africa. And 1% increase of *GDPGR* in host country averagely will lead to ratio of Chinese OFDI in Africa to host country GDP increase by 0.055%. *GDPPE* is negatively significant at 99% level indicating that Chinese OFDI is more likely to invest in capital scarce Africa countries to seek for higher capital returns. 1% increase in host country's *GDPPE* would lead to 0.046% decrease of ratio of Chinese OFDI % to host country GDP. And this supports the hypothesis that Chinese ODI in Africa is market seeking and efficiency seeking, i.e., H_{1b} and H_{1c} is supported. Total natural resource rent % GDP (*RES*), high technology export % to total export (*HTEC*) are not significant in this estimation.

(2) *The total score of political risks (PR) is not significant.* There two possible reasons. First, political risk is a very broad term and composes many different aspects. Despite the use of the 12 indices in the ICRG dataset to evaluate the political risks, the 12 indices are correlated with each other and may even have opposite effects on Chinese OFDI in Africa. The sum of scores of 12 indices can offset the positive effects of some indexes with the negative effect of the other indexes. Second, it is possible that Chinese OFDI in Africa isn't constrained by the political risks in Africa, which is a result

believed by some previous studies that Chinese enterprises are not constrained by political risks since the political environment of China is quite similar to that in Africa (Buckley et al., 2008; Morck et al., 2008). In subsection 5.6.2, four components generated by factor analysis are further employed in estimation to determine which part of political risks will have significant effect on Chinese OFDI in Africa.

(3) *Regarding the control variables, the cellular subscription rate (CELL) which proxies for infrastructure in host countries is positively significant. CELL* is found positively significant at 99% level indicating that Chinese OFDI is more likely to invest in Africa countries with better infrastructure. Statistically 1% increase in *CELL* tends to lead percentage of Chinese OFDI to GDP increase by 0.034%. Trade openness (*TRADE*) and Inflation rate *(INF*) are not significant in this estimation.

In conclusion, according to the static estimation using total score of political risks, the positively significance of and negative significance of *GDPPE* support market seeking motivation and efficiency seeking motivation of Chinese OFDI, i.e., H_{1b} and H_{1c} are supported. The insignificance of *RES*, *HTEC*, and *PR* indicates H_{1a}, H_{1d}, and H_{2a} are not supported in this estimation.

5.6.2 Components of Political Risks

In this subsection, 4 types of political risks (conflict, governance quality, government stability, democratic accountability) generated by factor analysis are employed in the static model. As mentioned earlier, the insignificance of total score of political risks can be caused by the offset of opposite effect among the 12 indicators. Also, factor analysis is used to extract major component from 12 indicators because the

12 indicators are correlated with each other. See Subsection 4.2.3 for detailed process of factor analysis. The POLS, FE, and RE estimation results using 4 components of political risks are listed as follows.

Table 5-9 Results of Static Model Using 4 Components of Political Risks

	POLS	FE	RE
RES	0.030*	0.048*	0.030**
	(0.016)	(0.025)	(0.012)
GDPGR	0.058*	-0.029	0.058
	(0.037)	(0.023)	(0.042)
GDPPE	-0.033***	0.315**	-0.033***
	(0.010)	(0.148)	(0.011)
HTECH	-0.008	0.001	-0.008
	(0.012)	(0.015)	(0.008)
CONF	0.019*	-0.059	0.019
	(0.010)	(0.084)	(0.021)
GOV	-0.011	0.067	-0.011
	(0.010)	(0.052)	(0.013)
STAB	-0.017	0.020	-0.017
	(0.014)	(0.036)	(0.018)
ACCT	0.019***	-0.033	0.019***
	(0.007)	(0.037)	(0.007)
CELL	0.025*	-0.019	0.025*
	(0.063)	(0.028)	(0.014)
INF	0.033	0.062*	0.033
	(0.028)	(0.035)	(0.024)
TRADE	0.017	-0.002	0.017
	(0.018)	(0.017)	(0.014)
_cons	3.064***	2.721***	-3.064
	(0.169)	(0.304)	(0.203)
N	455	455	455
R^2	0.054	0.003	0.054

*Note: Robust standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$*

As described in Subsection 5.6.1, the Hausman test showed that $p>chi^2=0.041$, and FE is favored. The Breusch-Pagan LM test is used, and null hypothesis cannot be rejected with *p* value close to 1. Thus, the POLS results are the focus of this estimation, and the following conclusions can be reached.

(1) *In the perspective of economic opportunities, total natural resource rent (RES) and GDPGR are positively significant to Chinese OFDI in Africa, while GDPPE is negatively significant*. *RES* is positively significant to Chinese OFDI in Africa, which indicates that Chinese OFDI in Africa is resource seeking. And 1% increase of total natural resource rent in host Africa country will averagely lead to Chinese OFDI increase by 0.03%. *GDPGR* is positively significant indicates that Chinese OFDI in Africa is market seeking, which is statistically significant at 90% level. Averagely, 1% increase of *GDPGR* will lead to Chinese OFDI percentage to host country GDP increase by 0.058%. *GDPPE* is negatively significant which indicates that Chinese OFDI in Africa is seeking for higher capital returns instead of labor productivity. Statistically, 1% increase in *GDPPE* in host country will lead to Chinese OFDI percentage to Africa country GDP reduce by 0.033%. *HECT* is not statistically significant. And the results are quite consistent with the first estimation using total score of political risks.

(2) *In the perspective of political risks, conflict (CONF) and democratic accountability (ACCT) are positively significant*. The positive significance of *CONF* indicates that higher score of conflicts will increase Chinese OFDI inflow, i.e., the risk of conflicts does constrain Chinese OFDI in Africa. And 1 unit increase in score of CONF will lead Chinese OFDI % to GDP increase by 0.019%, which is statistically significant at the 90% level. Additionally, the positive significance of *ACCT* indicates that higher score of democratic accountability will increase Chinese OFDI inflow, i.e., the risk of democratic accountability constrain Chinese OFDI in Africa. And averagely 1 unit increase in *ACCT* will lead Chinese ODI as percentage of GDP to increase by

0.019%, which is statistically significant at the 95% level.

(3) *In the perspective of control variables, CELL is positively significant.* The positive significance of *CELL* indicates that Chinese ODI is more likely to be attracted by African countries with better infrastructure. And averagely 1% increase in *CELL* will cause a 0.025% increase in Chinese OFDI percentage of GDP. *INF* and *TRADE* are not significant. These results are consistent with earlier estimation.

In conclusion, the positive significance of *RES* and *GDPGR* support that Chinese OFDI in Africa is resource seeking and market seeking, i.e., H_{1a}, and H_{1b} are supported. Also, negative significance of *GDPPE* supports the efficiency seeking motivation of Chinese OFDI in Africa, i.e., seeking for higher capital return. Thus, H_{1c} is supported. And the positive significance of *CONF* and *ACCT* indicates that Chinese OFDI is constrained by risk of conflicts and democratic accountability of host Africa countries. Therefore, H_{2b} and H_{2e} are supported. *HTECH*, *GOV*, and *STAB* are not significant, i.e., H_{1d}, H_{2c}, and H_{2d} are not supported.

5.7 Empirical Results of Dynamic Model

The dynamic model is used in this section. Traditional PDA estimators, including POLS, RE and FE, cannot solve the autocorrelation problem of a dynamic model. One alternative way is to use the difference between Y_{it} and Y_{it-1}. See the following Equations (7-9).

$$Y_{it} = \alpha_i + \rho Y_{it-1} + \beta X_{it} + \varepsilon_{it} \quad (7)$$

$$Y_{it-1} = \alpha_i + \rho Y_{it-2} + \beta X_{it-1} + \varepsilon_{it-1} \quad (8)$$

$$\Delta Y_{it} = \rho \Delta Y_{it-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it} \quad (9)$$

By using the 1st difference, i.e., Equation (7) minus Equation (8), the individual effect (α_i) is eliminated. However, we still cannot use OLS, RE or FE estimation to estimate the Equation (9), because ΔY_{it-1} is correlated with $\Delta\varepsilon_{it}$. In this case, POLS, RE or FE results can be biased. In fact, the coefficient of $\overline{Y_{it-1}}$ in POLS estimation will overestimate the real Y_{it-1} while FE will underestimate the real value, i.e., the real value of Y_{it-1} will be between result of FE estimation and result of POLS estimation.

Propriate estimation methods for a dynamic model include: Generalized Method of Moment (GMM), Vector Autoregressive model (VAR), etc. GMM is our first choice for estimation of dynamic model, because the constant α_i and v_i in disturbance term ($\mu_{it}=v_i+\varepsilon_{it}$) can be eliminated by using GMM.

The principle of GMM is that Y_{it-2}, Y_{it-3}… are used as IVs to solve the problem that ΔY_{it-1} is correlated with $\Delta\varepsilon_{it}$ in Equation (20). GMM can be divided into Difference GMM (DIF-GMM) and Systematic GMM (SYS-GMM). SYS-GMM developed by Blundell and Bond (1998), has additional advantage over DIF-GMM in dealing with endogeneity by including both level and first difference.

Like Section 5.6, both the total score of political risks (model *GMM1*) and the 4 components of political risks (model *GMM2*) are used respectively in the dynamic model. The Arrellano-Bond autocorrelation test in the first order *AR (1)* and in the second order *AR (2)* are employed. The test shows that autocorrelation existed in the first order but not existed in the second order. The Hansen test supports the validity of instruments. Thus, the GMM results are reliable. See the following Table 5-10 for GMM estimation results.

Table 5-10 Results of SYS-GMM Estimation

	GMM1	GMM2
$ODIF_{it-1}$	-0.100**	-0.096**
	(0.037)	(0.043)
RES	0.020	0.027*
	(0.017)	(0.016)
GDPGR	0.036	0.034*
	(0.019)	(0.019)
GDPPE	-0.045***	-0.036**
	(0.014)	(0.014)
HTEC	-0.001	-0.002
	(0.010)	(0.010)
PR	0.025	
	(0.070)	
CELL	0.022	0.013
	(0.014)	(0.013)
INF	0.040*	0.032
	(0.023)	(0.026)
TRADE	0.031***	0.027*
	(0.011)	(0.013)
CONF		0.008
		(0.025)
GOV		-0.004
		(0.015)
STAB		-0.015
		(0.021)
ACCT		0.021**
		(0.008)
_cons	3.383***	3.518***
	(0.346)	(0.133)
N	455	455
AR(1)[8]	0.092	0.087
AR(2)[9]	0.621	0.603
Hansen Test[10]	0.695	0.621

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

From the GMM estimation above, the following conclusions can be reached. *In the perspective of lagged dependent variable, the one-year lagged OFDI flow % to host*

[8] AR(1) stands for the test of absence of autocorrelation in the first order.
[9] AR(2) stands for the test of absence of autocorrelation in the second order.
[10] Hansen Test stands for the test of validity of instruments.

country GDP ($ODIF_{it-1}$) is significant but not in a positive way, and instead it is in a negative way. The possible reasons for negative significance are as follows. (1) Chinese OFDI in Africa is still exploring, and invest in one African country in this year while withdraw quickly in next year. (2) In China, the total investment value is controlled by government approving procedure of FDI projects, i.e., too much investment in one year will lead to decreasing investment in next year. Additionally, inconsistent preferential policies and restrictive policies in both home and host country are also likely to result in the fluctuation of Chinese OFDI in Africa.

From the perspective of economic opportunities, RES and GDPGR are positively significant while GDPPE is negatively significant. RES is positively significant at the 90% level, which indicates that Chinese OFDI is more likely to invest in natural resource abundant African countries. 1% increase of total natural resource rent would averagely lead to Chinese OFDI increase by 0.027%. The positive significance of *GDPGR* supports the market seeking motivation of Chinese OFDI. And averagely 1% increase of GDPGR will averagely lead to Chinese OFDI increase by 0.034%. *GDPPE* is negatively significant at 99% level, which indicates that Chinese OFDI in Africa is more likely to invest in African countries with higher capital return while considers less about the labor productivity. 1% increase of *GDPPE* will lead to Chinese OFDI % to GDP decrease by 0.039%. The *HTEC* is not significant in this estimation.

From the perspective of political risks, score of ACCT is positively significant, i.e., risk of democratic accountability is negatively significant. ACCT is positively significant at the 95% confidence level, indicating that Chinese OFDI in Africa is more

likely to invest in countries with better democratic accountability. 1 unit increase in the score of democratic accountability will averagely lead to 0.021% increase of Chinese OFDI % to host country GDP. *PR*, *CONF*, *GOV* and *STAB* are not significant in the dynamic estimation.

From the perspective of control variable, trade is positively significant. TRADE is positively significant at the 90% level indicating Chinese OFDI in Africa is more likely to invest in countries with better trade openness. Averagely 1% increase in *TRADE* will lead to Chinese OFDI % to host country GDP increase by 0.031% in GMM1 and 0.027% in GMM2.

In conclusion, one-year lagged Chinese OFDI in Africa is found negatively significant in the dynamic estimation, i.e., no agglomeration is identified and instead Chinese OFDI in Africa is discrete. Both *RES* and *GDPGR* are found positively significant to Chinese OFDI in Africa, which supports the natural resource seeking motivation and ,arket seeking motivation, i.e., H_{1a} and H_{1b} are supported. And *GDPPE* is found negatively significant, indicating that Chinese OFDI in Africa is seeking for higher return on capital and considers less on productivity. Thus, H_{1c} is supported. The positive significance of *ACCT* suggests that risk of democratic accountability constrains Chinese OFDI, i.e., H_{2e} is supported. The insignificance of *HETC*, *PR*, *CONF*, *GOV*, and *STAB* indicates that, H_{1d}, H_{2a}, H_{2b}, H_{2c}, and H_{2d} are not supported in dynamic GMM estimation.

5.8 Robustness Check

This section conducts the robustness check by controlling the effect of Bilateral

Investment Treaty (BIT). BITs are believed having positive effect on FDI since having the BITs between China and host African countries means the investment would be more protected by the host government (Busse et al., 2010; Wang & Anwar, 2022). Thus, this study believes that it is necessary to control the effect of BIT and re-estimate the coefficients of determinants to check whether the results are still consistent and robust. Africa countries having BITs with China are encode with number "1" while Africa countries not having BITs with China are encode with number "0". See the following estimations results in Table 5-11.

Table 5-11 POLS and GMM Estimation after Controlling BIT

	POLS	GMM
RES	0.033**	0.030*
	(0.015)	(0.017)
GDPGR	0.062*	0.035*
	(0.037)	(0.020)
GDPPE	-0.029**	-0.030**
	(0.011)	(0.014)
HTECH	-0.007	-0.002
	(0.012)	(0.010)
CONF	0.016*	0.005
	(0.010)	(0.025)
GOV	-0.007	0.002
	(0.014)	(0.017)
STAB	-0.017	-0.016
	(0.014)	(0.021)
ACCT	0.021***	0.023**
	(0.008)	(0.009)
CELL	0.026*	0.013
	(0.013)	(0.013)
INF	0.034	0.034
	(0.029)	(0.026)
TRADE	0.009	0.019
	(0.023)	(0.013)
BIT	-0.037	-0.045
	(0.034)	(0.027)
$ODIF_{it-1}$		-0.104**

		(0.048)
_cons	3.068***	3.557***
	(0.165)	(0.146)
N	455	455
AR(2)		0.777
Hansen Test		0.612

Note: Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

After controlling the effect of BIT, the estimation results are consistent with previous estimations. First, $ODIF_{it-1}$ is still negatively significant, supports the discrete effect of Chinese OFDI in Africa. Second, both static POLS and dynamic GMM estimation support that *RES* is significantly positive to Chinese OFDI in Africa, which further supports the natural resource seeking motivation. Third, the positive significance of *GDPGR* suggests that Chinese OFDI in Africa is market seeking. Fourth, *GDPPE* is still negatively significant in both POLS and GMM estimation, indicating that Chinese OFDI in Africa is seeking for higher capital return instead of labor productivity. Fifth, *CONF* is positively significant in static estimation, which indicates that Chinese OFDI is more likely to flow into African countries with better score of conflict, i.e., risk of conflict constrains Chinese OFDI. Sixth, *ACCT* is positively significant in both static POLS and dynamic GMM estimation, supporting that Chinese OFDI is more likely to flow into Africa countries with better democratic accountability, i.e., risk of democratic accountability will constrain Chinese OFDI. In conclusion, both static and dynamic estimations with BIT controlled are consistent with earlier estimations; thus, earlier estimations are robust.

5.9 Discussion and Conclusion

This chapter collects a panel data of Chinese ODI flow in 36 African countries in

2006-2019. Zimbabwe is excluded from the panel data sample in regression phase because it is an outlier comparing to the other 35 Africa countries. After diagnostic tests including unit root test, VIF test, and Pearson test, both static model and dynamic model are used to analyze determinants of Chinese OFDI in Africa. The findings can be summarized as follows.

(1) *The coefficient of one-year lagged Chinese OFDI % to host country GDP is negatively significant indicating a discrete effect instead of agglomeration effect.* Using system GMM estimation, one-year lagged Chinese OFDI % to host country GDP ($ODIF_{it-1}$) is found to be negatively relate to Chinese OFDI % to host country GDP in current year. The possible reasons are twofold. For one thing, Chinese OFDI in Africa is still exploring, which leads to quickly inflow in a country in one year but quickly withdraw in the next year. For the other, in China, the total investment value is controlled by government approving procedure of FDI projects, i.e., too much investment in one year will lead to decreasing investment in next year.

(2) *The total natural resource rent is significantly positive to Chinese OFDI in Africa.* The total natural resource rent is positively significant in both static model and dynamic model. This indicates that Chinese OFDI in Africa is more likely to flow into African countries with higher natural resource rent, which further confirms the natural resource seeking motivation. The positive significance of natural resource is consistent with the results of Biggeri & Sanfilippo (2009) and Ross (2015), but it contradicts the results of Okafor et al. (2015) and Shan et al. (2018),

(3) *Host country GDP growth rate is significantly positive to Chinese OFDI in*

Africa. To avoid the endogeneity problem, this study uses GDP growth rate as proxy for market size. And GDP growth rate is found significantly positive in both static model and dynamic model. This suggests that Chinese OFDI is more likely to flow into African countries with higher GDP growth rate, which further supports that Chinese OFDI is market seeking. This is also supported by Cleeve (2012) where both GDP per capita and GDP growth rate are positively related to Chinese FDI in Africa, but it contradicts the results of Ross (2015).

(4) *GDP per person employed is negatively significant to Chinese OFDI in Africa.* GDP per person employed is negatively significant in both static model and dynamic model. This indicates that Chinese OFDI is more likely to flow into African countries with lower GDP per person employed, which further suggests that Chinese OFDI is more seeking for higher capital returns instead of labor productivity. This contradicts the results of Ross (2015) where *GDPPE* is found insignificant for Chinese OFDI in Africa. However, it can be supported by Ramasamy & Yeung (2020) where Chinese OFDI is efficiency seeking in the whole world sample.

(5) *High Technology export is not significantly related to Chinese OFDI in Africa.* The insignificance of the ratio of high Technology export to total export indicates that Chinese OFDI in Africa is not seeking for strategic assets. This is consistent with Ross (2015) where high technology export is found not a significant determinant for Chinese OFDI in Africa. However, this contradicts the results of Drogendijk & Blomkvist (2013) where strategic assets were considered as a significant motivation for Chinese enterprises investing in Africa.

(6) The total score of political risks is not significantly related to Chinese OFDI in Africa. The total political risks are found not significant in both static estimation and dynamic estimation. This does not mean political risk have no effect on Chinese OFDI in Africa. This is because the different types of political risks have different even opposite effect on Chinese OFDI, which makes the total effect insignificant.

(7) *The score of conflict is positively significant to Chinese OFDI in Africa, i.e., risk of conflict is negatively significant*. The score of conflict is positively significant in static model, indicating that Chinese OFDI is more likely to invest in countries having no wars and conflicts. This further suggests that risk of conflicts in host African countries will constrain Chinese OFDI. Supporting evidence can also be found in Cleeve (2012) where scores of militaries in politics and religious tension were found positively significant, as well as scores of internal wars and external wars were also found positive though not significant. However, this result contradicts that of Biggeri & Sanfilippo (2009)'s study, where the presence of conflicts was used as a dummy variable and was found having negative impact on Chinese investment decision.

(8) Governance quality and government stability is not significantly related to Chinese OFDI in Africa. Governance quality and government stability are negative but not significantly relate to Chinese OFDI in both static estimation and dynamic estimation. This indicates that China is not constrained by risk of poor governance quality and instability in host Africa countries. The possible reasons for the insignificance of governance quality and government instability can be as follows. First, the political and institutional environment of Africa is similar to that of China, which

enables China to adapt the risky and instable host Africa countries. Second, there are also opportunities in engaging with risk of governance quality and government stability. For example, the market is less competitive in countries with bad performance of governance quality and government stability; additionally, the legislation such as environmental regulation in these countries is loose, which is a benefit for investors. Third, China is increasingly capable in dealing risks of governance quality and government stability. For example, the bilateral treaties (e.g., BITs) between China and Africa may play a role in reducing the risk of instability. Similar findings can be found in Mourao (2018), where score of regulatory quality and government stability are found negatively to Chinese OFDI in Africa.

(9) *Score of democratic accountability is significantly positive to Chinese OFDI in Africa.* Both static estimation and dynamic estimation supports the positive significance of democratic accountability. This indicates that Chinese OFDI is more likely to invest in Africa countries with better democratic accountability, which further suggests that risk of democratic accountability in host African countries will constrain Chinese OFDI in Africa. Supporting evidence can be also found in Shan et al. (2018).

In conclusion, this chapter uses panel data approach to analyze the economic and political determinants of Chinese OFDI in Africa with both static and dynamic model, where natural resource seeking, market seeking, and efficiency seeking motivations are supported. From the perspective of the political risks, conflicts and democratic accountability are found to constrain Chinese OFDI in Africa. However, this chapter did not take the spatial relationship of Africa countries into consideration. Since Africa

countries are not spatially isolated, the Chinese OFDI in one's neighboring countries or some characteristic of one's neighboring countries are possible to affect Chinese OFDI in this particular country, i.e., the third-country effect. Therefore, further studies can take spatial characteristic of Africa countries into consideration and employ spatial econometric approach to study the third-country effect of Chinese OFDI in Africa.

Chapter Six: Determinants of Chinese OFDI in Africa in Perspective of Third-Country Effect: Using Spatial Econometric Approach

6.1 Introduction

This chapter analyzes the determinants of Chinese OFDI in Africa in the perspective of the third-country effect. It is necessary to consider the third-country effect since African countries are not isolated. Instead, the characteristics of one African country may have an effect on Chinese OFDI in the other African countries via geographical proximity or economic proximity. Thus, this chapter employed spatial econometric approach to analyze the third-country effect of Chinese OFDI in Africa.

In Section 6.2, related studies employing spatial econometric approach are reviewed and compared. In Section 6.3, Exploitative Spatial Data Analysis is conducted via software ArcGIS 10.8 to show the general geographical distribution of Chinese OFDI in Africa. Section 6.4 analyzes the descriptive spatial autocorrelation of Chinese OFDI flow in Africa, i.e., spatial cluster effect (also known as agglomeration effect) or spatial disperse effect of Chinese OFDI flow in Africa, which is calculated based on

Moran's I and Geary's C. Section 6.5 is a model specification section, and it illustrates the difference among 3 major types of spatial models, i.e., Spatial Autoregression Model, Spatial Error Model, and Spatial Durbin Model, as well as 4 spatial weight matrices that used in this study. Section 6.6 analyzes the third-country effect and determinants of Chinese OFDI in Africa via Spatial Autoregression Model with geographical binary weight matrix, Spatial Error Model with geographical distance weight matirx, and Spatial Autoregression Model with trade bloc binary weight matrix. Section 6.7 is a conclusion section summarizing results of the study and offering suggestions for further studies.

6.2 Previous Studies

According to Tobler (1970)'s First Law of Geography, "everything is related to everything else, but near things are more related to each other". This inspired a lot of scholars to employ spatial econometric approaches in different disciplines, including geoeconomics, political geography, and the other social studies. Baltagi et al. (2007) initiated the spatial econometric perspective in FDI studies by suggesting the importance of third-country effect on FDI for a reason that the average country pair is relatively small as compared to the rest of the world. In other words, FDI in one given country can be affected by characteristics of the other countries, especially its neighboring countries. Subsequently, increasingly more studies on FDI determinants choose to employ spatial methods, which can be categorized into 4 types.

(1) Related Studies employing Spatial Auto Regression model. Spatial Auto Regression (SAR) model also known as Spatial Lag Model (SLM), focuses on the

spatial lag of dependent variable. For example, Escobar Gamboa (2013) used SLM to analyze determinants of inward FDI in Mexico's 32 states, and the positive spatial autocorrelation supports complementarity effect instead of substitution effect in inward FDI. Employing SAR model, Garretsen & Peeters (2009) analyzed determinants of Dutch FDI to 18 host countries, and third-country effects are found significant.

(2) Related Studies employing Spatial Error Model. Spatial Error Model (SEM) considers the fact that the spatial correlation can also exist in error term, i.e. the spatial correlation transmitting through some unknown channels. And based on this fact, Martínez-Martín (2011) used both SLM and SEM to analyze the determinants of Spanish outflow FDI in top 50 countries as well as the FDI spatial autocorrelation in SLM and unidentified transmission mechanism in SEM, in which both spatial interdependence of FDI and error term were found positively significant. Similarly, Hoang & Goujon (2019) employed both SAR and SEM model and examined determinants of extra-ASEAN and intra-ASEAN FDI in ASEAN countries.

(3) Related Studies employing Spatial Durbin Model. Spatial Durbin Model (SDM) combines the advantages of SAR and SEM into one model by considering spatial lag effect of both dependent variable and independent variable. For example, Lemi et al. (2021) employed SDM to analyze the location determinants of Chinese and US firms in Africa, in which study it is found the spatial interdependence of explanatory variables is significant for both US FDI and Chinese FDI while spatial lag is more significant in US FDI. Focusing on the spillover effect of corruption and democracy on territorial attractiveness of inward FDI in sub-Saharan Africa, Zallé & Ouédraogo (2020) also

chose the SDM after a series specification test including LM test, robust LM test, and Global Moran's I.

(4) Related studies employing the other spatial models, including Spatial Auto Regressive model with Spatial Auto Regressive Disturbance, Spatial Lagged X, etc. In addition to the above mentioned three major types of spatial model, there are still other types of spatial model but less likely to be used in the field of FDI determinants. For example, Nsiah & Wu (2014) employed Spatial Auto Regressive model with Spatial Auto Regressive Disturbance (SARAR) model, and take both spatial-autoregressive of dependent variable and spatial-autoregressive disturbances into consideration to analyze determinants of FDI inflows in Africa. Another case is that Fonseca & Llamosas-Rosas (2019) employed Spatial Lagged X (SLX) model to analyze FDI flow in 32 states of Mexico, and positive direct and indirect effects of explanatory variables including human capital, agglomeration, and states' fiscal margins, were identified.

In conclusion, increasingly more studies on FDI determinants have begun to adopt spatial econometric methods to analyze the third-country effect, which have made great theoretical contribution to FDI studies. However, only few studies on Chinese OFDI in Africa considers the third-country effect of Chinese OFDI in African countries in the perspective of spatial econometric approach. To be exactly, both the Web of Science and Scopus databases are searched, and only 1 research paper i.e., Lemi et al. (2021) is found analyzing the third-country effect of determinant on Chinese OFDI in Africa (till 01/08/23). Additionally, most studies on FDI determinants used single spatial weight matrix especially using single type of geographical proximity weight when setting up

spatial models, and few studies employed different spatial weight matrices to analyze different transmission channels of the third-country effect. Nevertheless, in addition to the geographical proximity weight, economic proximity also has been found to play an important role in measuring spillover linkage of international business activities (Asgharian et al., 2013; Huang & Liu, 2022). Thus, employing spatial econometric approach this study uses both geographical proximity and economic proximity to analyze the third-country effect of Chinese OFDI in Africa which can be transmitted through both geographical related channels and economic related channels.

6.3 Geographical Distribution of Chinese OFDI in Africa

Employing Exploitative Spatial Data Analysis (ESDA) and the software ArcGIS 10.8, this section firstly analyzes geographical distribution of Chinese OFDI stock in Africa by 2019. As mentioned earlier, only 36 Africa counties are included into sample because of data gap of political risks. Based on the amount of Chinese OFDI in Africa, the sampled 36 Africa countries are divided into 4 categories, i.e., 0<Chinese OFDI<500, 500<Chinese OFDI<1000, 1000<Chinese OFDI<5000, 5000<Chinese OFDI<10000. The lighter color indicates African countries with lower Chinese OFDI stock while the redder color indicates Africa countries with higher Chinese OFDI stock by 2019.See Figure 6-1.

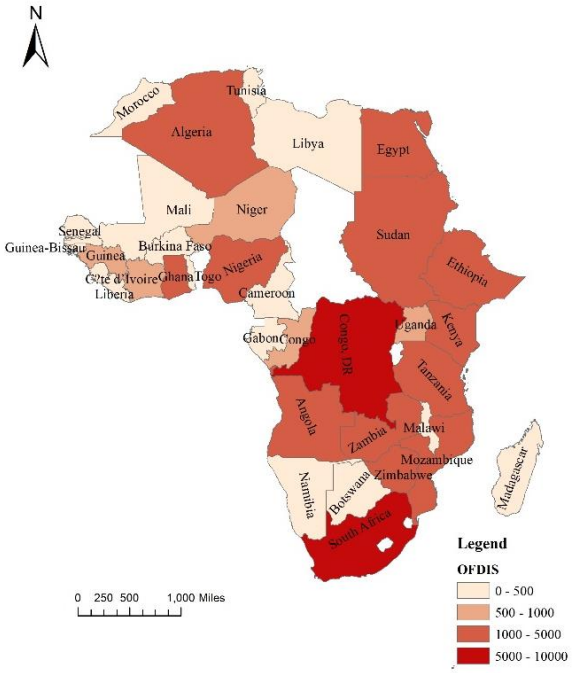


Figure 6-1 Distribution of Chinese OFDI Stock in the Sampled 36 African Countries by 2019

As shown in the figure above, Chinese OFDI stock in Africa is not equally distributed, i.e., spatial heterogeneity existed. To be more particular, this figure shows that Chinese OFDI is more likely to cluster in southern Africa such as South Africa, Congo Democratic Republic. However, Chinese OFDI is less likely to flow into small countries in northern Africa such as Tunisia, Libya, and less likely to flow into countries in western Africa such as Mali, Burkina Faso.

In order to better analyze the spatiotemporal characteristic of geographical distribution of Chinese OFDI in Africa in the time period of 2006-2019, distribution of Chinese annual OFDI flow in Africa in 2006 (the starting year of observation), 2010, 2014, and 2019 (the ending year of observation) are computed via ArcGIS 10.8. The green color denotes a negative annual Chinese OFDI flow, i.e., Chinese OFDI outflow, while the red color denotes a positive annual Chinese OFDI flow, i.e., Chinese OFDI

inflow. See the following figures (Figure 6-2).

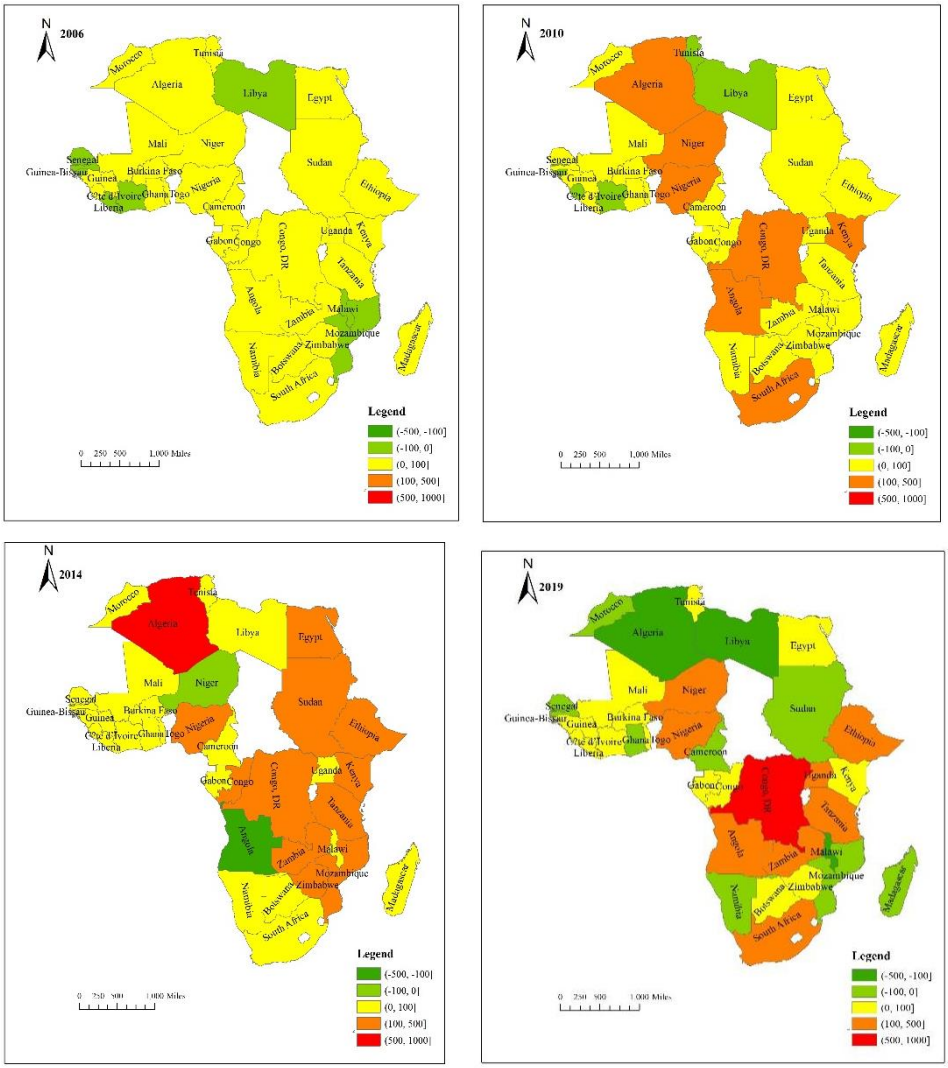


Figure 6-2 Distribution of Chinese OFDI flow in Sampled 36 Africa Countries in 2006, 2010, 2014, and 2019

Following conclusions can be drawn from the above four figures. (1) Spatial deviation is increasingly significant from 2006 to 2019. In 2006, Chinese OFDI flow in most African countries were within the range of (0~100) million US dollars (only Libya, Senegal, Guinea-Bissau, Cote d'Ivoire, Malawi, and Mozambique were in the range of (-100~0). When it comes to 2019, Chinese OFDI flow in Africa are more deviated with Congo Democratic Republic in the range of (500~1000) while Algeria and Libya in the range of (-500~-100). (2) In recent years, a cluster effect has gradually formed. In earlier

years, Chinese OFDI in Africa is relatively even while in recent years African countries with high Chinese OFDI inflow is more likely to neighbor with the other Africa countries with high Chinese OFDI inflow while African countries with Chinese OFDI outflow are neighbored the other Africa countries with Chinese OFDI outflow. For example, African countries cluster around Congo Democratic Republic have abundant Chinese OFDI inflow while Africa countries cluster around Algeria is more likely to have Chinese FDI outflow.

6.4 Spatial Autocorrelation of Chinese OFDI in Africa

6.4.1 Global Moran's I & Geary's C

Moran's I, originally devised by Moran (1950), is a widely used measure of spatial autocorrelation. And Geary's *C* is another measure of spatial relation firstly defined by Geary (1954), and subsequently discussed and developed by Cliff and Ord (1969). Both Moran's I and Geary's C have two forms, i.e., the global indicator and local indicator. Global indicators of Moran's I or Geary's C can reflect the strength of spatial association in the interested quantitative variable across the whole areal data set while local indicators decompose the spatial association in interested quantitative variable across component areas (Bivand & Wong, 2018). In this subsection, spatial association of Chinese OFDI flow in Africa is measured in the global Moran's I and Geary's C in two-tail way. The computation of the Global Moran's I is achieved through the following Formulas (10-12); the Global Geary's C is achieved through Formulas (13-14).

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X \tag{10}$$

$$S^2 = \frac{1}{n}(X_i - \bar{X})^2 \tag{11}$$

$$I = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\,(X_i - \bar{X})(X_j - \bar{X})}{S^2 \sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}} \tag{12}$$

$$S_0 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij} \tag{13}$$

$$C = \frac{n-1}{2S_0} \times \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\,(X_i - X_j)^2}{\sum_{i=1}^{n}(X_i - \bar{X})^2} \tag{14}$$

In the equations above, X refers to the variables used to calculate the spatial association; w_{ij} is the binary contiguity matrix. In this study, natural logarithm of Chinese OFDI flow in Africa, i.e., *OFDIF* in 2016-2019 are tested based on global Moran's I and Geary's C. And the results are listed as follows.

Table 6-1 Global Spatial Autocorrelation of Chinese OFDI Flow Based on Moran's I and Gear's C

Moran's I					
Year	*I*	E(*I*)	sd(*I*)	z	p-value*
2006	-0.137	-0.029	0.116	-0.934	0.350
2007	-0.044	-0.029	0.103	-0.152	0.879
2008	-0.003	-0.029	0.019	-0.152	0.879
2009	-0.198	-0.029	0.117	-1.449	0.147
2010	-0.053	-0.029	0.111	-0.220	0.826
2011	-0.016	-0.029	0.088	0.145	0.885
2012	-0.078	-0.029	0.104	-0.479	0.632
2013	-0.001	-0.029	0.115	0.238	0.812
2014	-0.191	-0.029	0.112	-1.446	0.148
2015	0.146	-0.029	0.124	1.406	0.160
2016	-0.073	-0.029	0.107	-0.414	0.679
2017	0.235	-0.029	0.120	2.192	0.028**
2018	0.021	-0.029	0.122	0.410	0.682
2019	0.159	-0.029	0.103	1.810	0.070*
Geary's C					
Year	C	E(C)	sd(C)	z	p-value*
2006	1.377	1.000	0.162	2.328	0.020**
2007	0.936	1.000	0.195	-0.327	0.744
2008	0.964	1.000	0.280	-0.129	0.897

2009	1.319	1.000	0.160	1.985	0.047**
2010	1.051	1.000	0.177	0.291	0.771
2011	1.282	1.000	0.221	1.273	0.203
2012	1.047	1.000	0.192	0.244	0.807
2013	0.953	1.000	0.166	-0.282	0.778
2014	1.334	1.000	0.173	1.932	0.053*
2015	0.877	1.000	0.136	-0.907	0.364
2016	1.176	1.000	0.185	0.951	0.342
2017	0.752	1.000	0.151	-1.648	0.099*
2018	1.060	1.000	0.146	0.411	0.681
2019	0.908	1.000	0.194	-0.474	0.636

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

Based on results in the table above, following conclusions can be drawn. (1) Spatial association of Chinese OFDI flow in Africa is found significant in 2006, 2009, 2014, 2017, and 2019. (2) A negative spatial association of Chinese OFDI flow can be found in 2006-2016 with Moran's I < 0 and most of their Geary's C > 1. This means there is a disperse effect of Chinese OFDI flow in Africa in 2006-2016. (3) In recent years of 2017-2019, positive spatial association of OFDI flow is supported by both Moran's I and Geary's C with Moran's I > 0 and most of their Geary's C < 1. This means there is a cluster effect of Chinese OFDI in Africa in 2017-2019. In other words, the Chinese OFDI flow in Africa is experiencing a transition from disperse effect in early years to cluster effect in recent years.

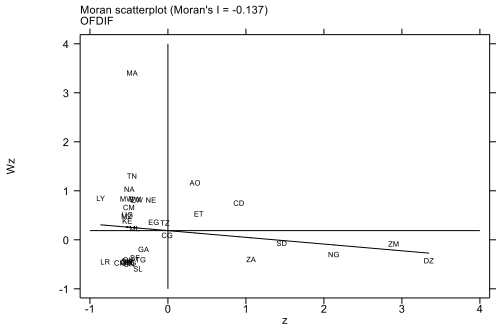
6.4.2 Local Moran's I & Geary's C

Different from global indicators, Local Moran's I is used to investigate the spatial association in a local way, i.e., a way to show spatial association based on each individual Africa country. Local Moran's I is computed and Local Moran's I scatter plot is employed in this subsection.

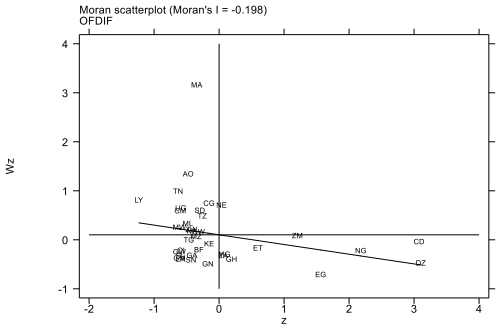
The Moran's I scatter plot has four quadrants, i.e., high-high (H-H) quadrant, low-

high (L-H) quadrant, low-low (L-L) quadrant and high-low (H-L) quadrant. The H-H quadrant indicates that African countries have high Chinese OFDI neighbor the other Africa countries that have high Chinese OFDI while L-L quadrant indicates African countries have low Chinese OFDI neighbor the other Africa countries that have low Chinese OFDI. Both H-H quadrant and L-L quadrant reflect a positive spatial association, i.e., cluster effect. L-H quadrant indicating Africa countries with low Chinese OFDI that cluster with African countries with high Chinese OFDI; H-L quadrant indicates African country with high Chinese OFDI that cluster with Africa countries with low Chinese OFDI. And both L-H and H-L quadrant reflect a negative spatial association, i.e., disperse effect.

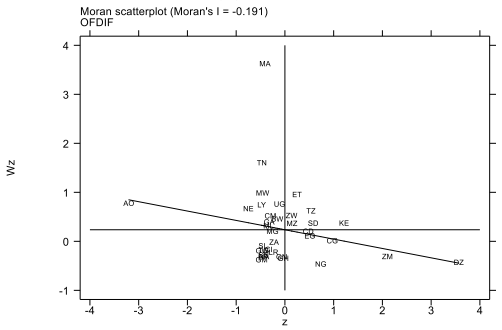
The Local Moran's I is calculated in the observation starting year (2006), two middle and significant years (2009 & 2014), and the observation ending year (2019), and local Moran's I scatter plots are generated. See the following scatter plots.



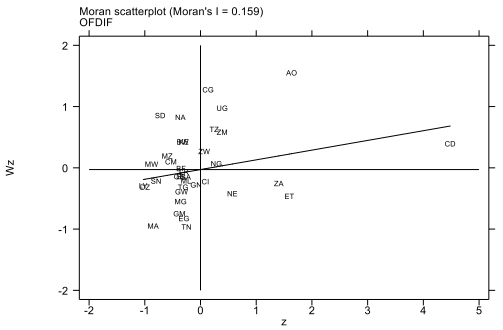
(1) 2006



(2) 2009



(3) 2014



(4) 2019

Figure 6-3 Local Moran's I scatter plot of Chinese OFDI flow in Africa in 2006, 2009, 2014, and 2019

From the local Moran's I scatter plots, following conclusions can be drawn. (1) There was a negative spatial correlation in 2006, 2009, and 2014, and more Africa countries were in the L-H and H-L quadrant where a disperse effect of Chinese OFDI in Africa was identified. Local Moran's I scatter plots in 2006, 2009, and 2014 indicate that more African countries having lower Chinese OFDI flow tend to neighbor with African countries with higher Chinese OFDI flow or Africa countries having higher Chinese OFDI flow tend to neighbor with countries having lower Chinese OFDI. For example, Morocco, Tunisia, etc. are in the L-H quadrant while Algeria, Nigeria, etc. are in the H-L quadrant. (2) More Africa countries entered H-H and L-L quadrant in 2019 where a cluster effect of Chinese OFDI in Africa was identified. In other words, Africa countries with high Chinese OFDI tend to neighbor other Africa countries with high Chinese OFDI flow while Africa countries with low Chinese OFDI tend to neighbor other Africa countries with low. For example, Morocco, Madagascar, etc. are in the L-L quadrant while Angola, Congo Democratic Republic, etc. are in the H-H quadrant. (3) Additionally, the results of Local Moran's I scatter plot supported Global Moran's I and Geary's C in that the spatial association of Chinese OFDI flow in Africa turned from disperse effect into cluster effect.

6.5 Methodology

According to Tobler (1970)'s First Law of Geography, "everything is related to everything else, but near things are more related to each other". This law inspires us to consider the spatial association of Chinese OFDI in different African countries for the

reason that the African countries are not spatially isolated, which violates the pre-assumption of classic regression methods. Therefore, this study employs spatial econometric methods to investigate the role of third-country effect not only transmitting through geographical proximity and economic proximity.

6.5.1 Spatial Weight Matrix

The basis of spatial analysis is to decide the spatial weight matrix. Spatial estimation is conducted using 2 types of geographical proximity weight matrices, namely, geographical binary weight matrix (W_b) & geographical distance weight matrix (W_d), 2 types of economic proximity weight matrices, namely, economic distance weight matrix (W_e) & trade block binary weight matrix (W_t). W_b can be established via following Equations (14) and (19); W_d can be established via Equations (16) and (19); W_e can be established via Equations (17) and (19); W_t can be established via Equations (18) and (19).

$$W_{ij} = \begin{cases} 1 & if\ i\ and\ j\ were\ neighboring\ with\ each\ other \\ 0 & if\ i\ and\ j\ were\ not\ neighboring\ with\ each\ other \end{cases} \quad (15)$$

$$W_{ij} = 1/direct\ difference\ between\ capital\ of\ country\ i\ and\ capital\ of\ country\ j \quad (16)$$

$$W_{ij} = 1/\left|GDPPC_i - GDPPC_j\right| \quad (17)$$

$$W_{ij} = \begin{cases} 1 & if\ i\ and\ j\ belong\ to\ the\ same\ \ trade\ union\ bloc \\ 0 & if\ i\ and\ j\ do\ not\ belong\ to\ the\ same\ trade\ union\ bloc \end{cases} \quad (18)$$

$$w_{ij} = W_{ij}/r_i \quad (19)$$

In geographical binary weight matrix, if country *i* and country *j* neighbor with each other, the spatial weight W_{ij} equals to 1; otherwise, the spatial weight equals to 0. W_{ij} is row standardized by dividing its row sum. As Madagascar is an island country isolating from all the other countries in the mainland Africa, Mozambique, the closest country to

Madagascar is assigned as its neighbor country.

In geographical distance weight matrix, W_{ij} equals to the reciprocal value of direct distance between capital of country i and capital of country j. And W_{ij} is row standardized by dividing its row sum.

In economic distance weight matrix, W_{ij} equals to the reciprocal value of the GDP per capita gap between country i and country j. W_{ij} is row standardized by dividing its row sum. The economic distance weight is used because of Preference Similarity Theory where two countries are believed to have more interdepended demand if the two countries have similar economy development level and income level (Dahi & Firat, 2017).

In trade bloc binary weight matrix, if country i and country j are in the same international trade bloc, the spatial weight W_{ij} equals to 1; otherwise, the spatial weight equals to 0. Similarly, W_{ij} is row standardized by dividing its row sum. The trade block weight is used because of the increasingly closeness of regional trade integration and cooperation among international trade blocs in Africa (Gnimassoun, 2018). This kind of closeness can be caused by close cooperation or preferential policies among the member countries, and it is believed to be more important than geographical closeness in international business linkage (Asgharian et al., 2013; Huang & Liu, 2022). As discussed in Chapter 2 Subsection 2.2.2, 6 international trade blocs gradually formed in Africa with the development of international activities. The 6 international trade blocs include the East African Community (EAC), the Southern African Development Community (SADC), the Common Market of Eastern Southern Africa (COMESA),

Union of the Arab Maghreb (UMA), Economic Community of Western African States (ECOWAS), Economic Community of Central African States (ECCAS). The 6 international trade blocs and their member countries are listed as follows.

Table 6-2 Six International Trade Blocs in Africa and Their Member Countries Within Sample

Trade Blocs	Members
East African Community (EAC)	Kenya, Uganda, Tanzania, Burundi, Rwanda, South Sudan
Southern African Development Community (SADC)	South Africa, Angola, Botswana, Zimbabwe, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Mauritius, Democratic Republic of Congo, Seychelles, Madagascar, Comorin
Common Market of Eastern Southern Africa (COMESA)	Burundi, Comorin, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe
Union of the Arab Maghreb (UMA)	Algeria, Libya, Mauritania, Morocco, Tunisia
Economic Community of Western African States (ECOWAS)	Benin, Burkina Faso, Mali, Niger, Senegal, Togo, Guinea-Bissau
Economic Community of Central African States (ECCAS)	Angola, Burundi, Cameroon, Central Africa, Chad, Congo, Democratic Republic of Congo, Gabon, Equatorial-Guinea, Sao Tome and Principe

Note: This table only lists the member countries within the sample of this study.

6.5.2 Spatial Model Specification

Spatial models are used to investigate the third-country effect of Chinese OFDI in different African countries. The general spatial model can be established in Formulas (20)-(21). Base on the spatial correlation existed in different parts of spatial model, there are 3 major types of spatial models including Spatial Auto Regression (SAR) model, Spatial Error Model (SEM) and Spatial Durbin Model (SDM). SDM considered spatial correlation existed both in dependent variable (($\rho W_{it} y_{jt}$) and explanatory variables ($\theta W_{it} x_{jt}$). SAR is mainly used to analyze the spatial correlation existed in the dependent variable ($\rho W_{it} y_{jt}$), i.e., the spatial correlation is caused and transmitted

through the spatial lag of dependent variable. SEM is mainly used to analyze the spatial correlation of disturbance term ($\lambda W_{it}\varepsilon_{jt}$), i.e., the spatial correlation is caused and transmitted through the spatial lag of disturbance term. Since SDM considered both spatial-lagged dependent variable ($\rho W_{it}y_{jt}$) and spatial-lagged independent variables ($\theta W_{it}x_{jt}$) from which the spatial correlation can be extracted into disturbance term ($\lambda W_{it}\varepsilon_{jt}$), SDM can be considered as a combination of SAR and SEM.

$$y_{it} = \alpha_i + \rho W_{it}y_{jt} + \theta W_{it}X_{jt} + \beta x_{it} + \varepsilon_{it} \quad (20)$$

$$\varepsilon_{it} = \lambda W_{it}\varepsilon_{jt} + \mu_{it} \quad (21)$$

In the above equation, $\rho W_{it}y_{jt}$ is the spatially lagged dependent variable; $W\mu_{it}$ is the spatially lagged disturbance term; $\theta W_{it}X_{jt}$ is the spatially lagged independent variables.

According to the general equation of spatial model, SAR can be used under the hypotheses that $\rho \neq 0;\ \lambda = 0;\ \theta = 0$ while SEM can be used under the hypotheses that $\lambda \neq 0;\ \rho = 0;\ \theta = 0$. And SDM can be used under the hypotheses λ=0; $\rho \neq 0;$ $\theta \neq 0$. And the choice among the 3 spatial models can be made by the Langrange Multiplier (LM) test. The LM test is used to test the existence of spatial dependence as well as the transmission channel of spatial dependence, i.e., spatial lag, spatial error, or both spatial lag and spatial error (See Section 5.5 for details). If the LM test supports existence of spatial lag, SAR will be used. If the LM test supports the existence of spatial error, SEM will be used. If the LM supports both existence of both spatial lag and spatial error, SDM is favored, and Likelihood Ratio Test (LR test) would be further used to test if the SDM model can be replaced by SAR or SEM.

The variables used in this chapter is exactly the same as those used in Chapter four with a sample size of 35*14 i.e., 35 Africa countries in years of 2006-2019 (Zimbabwe is excluded in estimation because of being an outlier; See Chapter 5 Subsection 5.3.1).

6.6 Empirical Results from Spatial models

6.6.1 Langrange Multiplier Test

The Langrange Multiplier Test (LM Test) proposed by Aselin et al. (2008), is used here to test whether the spatial dependence existed or not and where it existed. The null hypothesis of LM-lag test is that there is no spatial dependence existed in the spatially-lagged dependent variable. The null hypothesis of LM-error test is that there is no spatial dependence in error term. The LM test results are listed as follows.

Table 6-3 Results of LM Test Using Geographical Proximity & Economy Proximity Weight Matrixes

Spatial Weight Type	Test	Statistic	*df*	*p*-value
W_b	Spatial error:			
	Lagrange multiplier	0.188	1	0.664
	Robust Lagrange multiplier	0.043	1	0.835
	Spatial lag:			
	Lagrange multiplier	5.167	1	0.023**
	Robust Lagrange multiplier	5.022	1	0.025**
W_d	Spatial error:			
	Lagrange multiplier	5.517	1	0.019**
	Robust Lagrange multiplier	5.049	1	0.025**
	Spatial lag:			
	Lagrange multiplier	1.268	1	0.260
	Robust Lagrange multiplier	0.800	1	0.371
W_e	Spatial error:			
	Lagrange multiplier	0.180	1	0.672
	Robust Lagrange multiplier	0.228	1	0.633
	Spatial lag:			
	Lagrange multiplier	0.237	1	0.626
	Robust Lagrange multiplier	0.286	1	0.593
W_t	Spatial error:			
	Lagrange multiplier	0.040	1	0.841
	Robust Lagrange multiplier	0.014	1	0.906
	Spatial lag:			

Lagrange multiplier	3.263	1	0.071*
Robust Lagrange multiplier	3.237	1	0.072*

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; W_b denotes the geographical binary weight matrix; W_d denotes the geographical distance weight; W_e denotes the economic distance weight; W_t denotes the trade bloc binary weight.

From the above LM test results, following conclusions can reached. (1) When using geographical binary weight, neither the LM-error nor the robust LM-error cannot reject that null hypothesis that there is no spatial dependence in the error term while both the LM-lag and the robust LM-lag reject the null hypothesis, i.e., spatial lag is supported. Thus, SAR is favored when geographical binary weight is employed. (2) Both the LM-error and robust LM-error reject the null hypothesis in geographical distance weight while both LM-lag and robust LM-lag cannot reject the hull hypothesis, i.e., spatial error is supported. Thus, SEM is favored when geographical distance weight is used. (3) In the trade bloc binary weight, both LM-error and robust LM-error cannot reject the null hypothesis while both LM-lag and robust LM-lag reject the null hypothesis, i.e., spatial lag is supported. Thus, SAR is supported when using trade bloc binary weight. (4) In the economic distance weight matrix, neither spatial-lag and spatial-error are supported in LM test. Thus, the subsequent estimation will focus on geographical binary weight, geographical distance weight, and trade block binary weight.

6.6.2 Empirical Results

As mentioned earlier, LM test supports spatial lag in geographical distance weight matrix, supports spatial error in geographical distance weight matrix, and supports spatial lag in trade bloc binary weight matrix. ML estimator proposed by Elhorst (2003) is employed in this subsection. The process of ML estimator is listed as follows. (1) The

residuals from OLS are used to estimate ρ or θ in Equation (20), and λ in Equation (21). (2) It then takes ρ into likelihood function to estimate covariance matrix of disturbance term. (3) It uses the covariance matrix of disturbance term to do the GLS estimation. (4) The residuals from GLS are used to estimate ρ again, i.e., move back to step (1). And after a few integrations, the estimation would reach the best accuracy.

Therefore, this subsection uses three types of spatial weight matrices that passed in LM test, i.e., geographical distance weight matrix, geographical binary weight matrix, and trade bloc binary weight matrix, to estimate the third-country effect as well as the determinants of Chinese OFDI in Africa via ML estimator. Additionally, the Hausman Test supports random-effect in all the three models. Thus, the SAR-RE using geographical binary weight matrix (SAR-RE1), the SEM-RE using geographical distance weight matrix (SEM-RE), and the SAR-RE using trade block binary weight matrix (SAR-RE2) are estimated as follows.

Table 6-4 Spatial Estimation Results Using W_b, W_d, and W_t

	W_b	W_d	W_t
	SAR-RE1	***SEM-RE***	***SAR-RE2***
RES	0.017*	0.018*	0.016
	(0.013)	(0.013)	(0.012)
GDPGR	0.036	0.036	0.038
	(0.042)	(0.042)	(0.044)
GDPPE	-0.033***	-0.032***	-0.034***
	(0.010)	(0.010)	(0.010)
HTECH	-0.008	-0.009	-0.009
	(0.007)	(0.007)	(0.006)
CONF	0.017	0.018	0.017
	(0.021)	(0.020)	(0.020)
GOV	-0.014	-0.014	-0.017
	(0.012)	(0.012)	(0.012)
STAB	-0.019	-0.019	-0.019
	(0.017)	(0.017)	(0.017)

ACCT	0.014**	0.015**	0.015**
	(0.006)	(0.006)	(0.006)
CELL	0.033***	0.032***	0.036***
	(0.012)	(0.012)	(0.013)
INF	0.019	0.019	0.025*
	(0.015)	(0.015)	(0.015)
TRADE	0.018	0.018	0.021*
	(0.012)	(0.012)	(0.013)
_cons	3.390***	3.181***	3.114***
	(0.185)	(0.191)	(0.202)
rho	-0.060**		0.009*
	(0.026)		(0.005)
lambda		-0.065*	
		(0.039)	
N	490	490	490
R^2	0.045	0.046	0.048

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Robust standard error in the parentheses. W_b denotes the geographical binary weight matrix; W_d denotes the geographical distance weight matrix; W_e denotes the economic distance weight matrix; W_t denotes the trade bloc binary weight matrix.

From the above estimation results, following conclusions can be drawn. (1) Chinese OFDI in Africa has a significant negative third-country effect via the geographical proximity, while it has a significant positive third-country effect via the economic proximity. The negative significance of *rho* in SAR-RE1 indicates a significant negative spillover of Chinese OFDI flow in Africa, i.e., there is a substitution effect of Chinese OFDI in Africa countries. A 1% increase of Chinese OFDI in one's neighboring countries will averagely lead to 0.06% decrease in this country. Also, the negative significance of *lambda* in SEM-RE indicates that a significant negative third-country effect, i.e., substitution effect also transmits through some unknown channels. The possible reason for substitution effect in geographical proximity can be that the unfriendly geopolitical relationship among neighboring Africa countries and frequent conflicts affect a coordinated regional cooperation (Frederick, 2021). However, the *rho*

turned positive in SAR-RE2 with trade block binary weight. This indicates that the Chinese OFDI in Africa has a positive spillover among the international trade blocs, i.e., complementary effect is identified. Averagely a 1% increase of Chinese OFDI in the other members of an international trade bloc will lead to 0.009% increase in this member country. The possible reason for this can be that close cooperation, preferential policies and monetary integration among the member countries within trade blocs strengthen the benign and coordinated cooperation in terms of attracting OFDI (Anyanwu & Yameogo, 2015).

(2) Total natural resource rent as percentage of GDP (*RES*) is significantly positive, supports the resource seeking motivation of Chinese OFDI. Natural resource seeking motivation proxied by total natural resource rent is positively significant at 90% level, which indicates that China OFDI is more likely to flow into resource abundant African countries. A 1% increase of *RES* will averagely lead Chinese OFDI in Africa increase by 0.017% in terms of geographical binary weight and increase by 0.018% in terms of geographical distance weight.

(3) GDP per person employed (*GDPPE*) is significantly negative, suggesting that Chinese OFDI in Africa is efficiency seeking, and it is seeking for higher capital returns instead of labor productivity. Efficiency seeking motivation proxied by *GDPPE* is negatively significant at 99% significance level, which indicates that Chinese OFDI flow in Africa is more likely to invest in Africa countries with lower GDP per person employed, which further indicates that Chinese OFDI is seeking for higher capital returns instead of labor productivity. And Averagely 1% increase of Africa country's

GDPPE will lead to a decrease of 0.032% in Chinese OFDI flow in terms of geographical binary weight, a decrease of 0.033% in terms of geographical distance weight, and a decrease of 0.034% in terms of trade block binary weight.

(4) Democratic accountability (*ACCT*) is a positively significant factor in attracting Chinese OFDI. *ACCT* is positively significant at 95% level, i.e., a higher score of democratic accountability will attract larger Chinese OFDI and risk of democratic accountability will decrease Chinese OFDI. And averagely 1% increase in score of government accountability will lead to Chinese OFDI in Africa increase by 0.014% in terms of geographical binary weight, increase by 0.015% in terms of geographical distance weight and trade binary weight.

(5) Infrastructure proxied by cellular holding rate (*CELL*) is significantly positive to Chinese OFDI in Africa. *CELL* is positively significant at 99% level, i.e., Chinese OFDI is more likely flow to Africa countries with better infrastructure. Averagely 1% increase of cellular holding rate in Africa countries will lead to 0.033% increase of Chinese OFDI increase in terms of geographical binary weight, 0.034% increase in terms of geographical distance weight, and 0.036% increase in terms of trade block binary weight.

In conclusion, spatial models with geographical binary weight, geographical distance weight, and trade bloc binary weight are established to analyze the third-country effect of Chinese OFDI in Africa in this section. In the SAR model with geographical binary weight, the significant third country effect is identified as the negative spillover of Chinese OFDI in Africa, i.e., substitution effect. The SEM with

geographical distance weight also identifies a significant negative third-country effect transmitting through the unknown transmission channel. In the SAR model with trade bloc weight, the significant positive third-country effect is identified as positive spillover of Chinese OFDI among the trade bloc members, i.e., complementary effect. Except the third-country effect, GDP per person employed is found negatively significant which is consistent in all the three models. This indicates Chinese OFDI his efficiency seeking, and especially seeking for higher capital returns instead of productivity of labors. In the perspective of political risks, score of democratic accountability is positively significant which is consistent in all the 3 estimations, i.e., risk of democratic accountability is a significant risk for Chinese OFDI in Africa. Thus, H_{1a}, H_{1c} and H_{2e} are supported. The other hypotheses are not supported in this estimation.

6.7 Discussion & Conclusion

This chapter complements Chapter Four for a reason that the African countries are not isolated, and instead they have geographical proximity and economic proximity to each other. Thus, when analyzing the determinants of Chinese OFDI in Africa, it is also necessary to consider the third-country effect. This study employs spatial econometric techniques including Exploitative Spatial Data Analysis (ESDA), Moran's I, Geary's C, and spatial models with both geographical proximity weight matrices and economic proximity weight matrices to analyze the third-country effect of Chinese OFDI in Africa as well as determinants of Chinese OFDI in Africa. Through spatial econometric techniques, following conclusions have been reached.

(1) Employing Exploitative Spatial Data Analysis via ArcGIS 10.8, the Spatial deviation became increasingly significant from 2006 to 2019. In early years, most Africa countries had positive Chinese OFDI flow. When it came to 2019, some African countries including Congo Democratic Republic, South Africa, Tanzania, etc. had positive Chinese OFDI flow while the other African countries including Algeria, Libya, Namibia, etc. had negative Chinese OFDI flow.

(2) Based on Moran's I and Geary's C index, it was found that Chinese OFDI flow in Africa gradually transmitted from negative spatial association to positive association, i.e., transmitting from disperse effect to cluster effect in the observation period 2006-2019. In early years including 2006-2016, Africa countries with high Chinese OFDI flow tend to neighbor with Africa countries with low Chinese OFDI flow in earlier years. However, in recent years including 2017-2019, Africa countries with high Chinese OFDI flow tend to neighbored with other Africa countries with high Chinese OFDI flow.

(3) Chinese OFDI in Africa has a significant negative third-country effect, i.e., substitution effect via the geographical proximity weight matrices while it has a significant positive third-country effect, i.e., complementary effect via economic proximity weight matrices. The negative significant *rho* in SAR with geographical binary weight indicates that there is a negative spillover of Chinese OFDI in Africa, i.e., increase of Chinese OFDI in one Africa country's neighboring countries will lead to Chinese OFDI decrease in this Africa country. Except the negative spillover of Chinese OFDI, a significant negative third-country effect is identified in SEM with geographical

distance weight transmitting through some unknown channels. The significant negative third-country effect in geography-related spatial weight can be caused by the unfriendly geopolitical relationship among neighboring Africa countries and frequent conflicts (Frederick, 2021). This finding is different from Lemi et al. (2020)'s study where spatial lag of Chinese OFDI in Africa is found insignificant when using geographical weight, which is possibly due to different spatial model chose. Although economic distance weight matrix did not pass the LM test, the SAR with trade bloc binary weight passes the LM test and supports that there was a significant positive spillover of Chinese OFDI among the members within international trade blocs, i.e., increase of Chinese OFDI in one's partner countries in one trade bloc will lead to Chinese OFDI also increase in this member country. The possible reason for this could be that close cooperation, preferential policies, and monetary integration among the member countries within trade blocs strengthens the benign and coordinated cooperation in terms of attracting OFDI (Anyanwu & Yameogo, 2015). This suggests policy makers in Africa to participate in trade blocs and strengthen trade and business cooperation with partner countries within trade blocs.

(4) Total natural resource rent as percentage of GDP was found significantly positive, which supports resource seeking motivation of Chinese OFDI in Africa. The natural resource seeking motivation proxied by Total natural resource rent as percentage of GDP was found significant positive in both SAR model with geographical binary weight and SEM with geographical distance weight. This finding support that Chinese OFDI is natural resource seeking, which is a consistent result with Chapter Four, and it

is also supported by previous studies such as Biggeri & Sanfilippo (2009) and Ross (2015).

(4) Efficiency seeking motivation of Chinese OFDI in Africa is supported. Efficiency seeking motivation proxied by GDP per person employed was found negatively significant to Chinese OFDI in Africa in SAR with geographical binary weight, SEM with geographical distance weight, and SAR with trade bloc binary weight. This indicates that Chinese OFDI in Africa is more likely to seek for higher capital returns instead of labor productivity, i.e., H_{1c} is supported. This is consistent with results of Chapter Four using panel approach, and it is also supported by studies of Ramasamy & Yeung (2020) where Chinese OFDI is found efficiency seeking in the whole world sample.

(5) The risk of democratic accountability is a significant constraint to Chinese OFDI in Africa. SAR model with geographical binary weight, SEM with geographical distance weight, and SAR with trade bloc binary weight all supported that score of democratic accountability was positively significant to Chinese OFDI flow in Africa. This indicates that Chinese OFDI in Africa is more likely to invest in countries with democratically accountable government, i.e., risk of democratic accountability is a significant constraint to Chinese OFDI. This is a consistent result comparing to Chapter Four, and it is also supported by studies of Shan et al. (2018) where score of voice and accountability was found significantly positive to stock of Chinese OFDI in Africa.

In conclusion, this chapter analyzes the determinants of Chinese OFDI in Africa in the perspective of third-country effect. However, both this chapter and Chapter Five

are based on aggregate country-level data, which limits our study to overall determinants of Chinese OFDI in Africa in the national perspective. Nevertheless, as it is mentioned in literature review chapter that the institutional environment for Chinese SOEs and POEs are quite different. Additionally, enterprises of different sizes and in different industry sectors may not be the same in economic motivation and risk perception when making FDI decisions. In other words, determinants of Chinese OFDI in Africa can vary in the perspective of enterprise ownership structures, industry sectoral characteristic, and enterprise size etc. Thus, further studies can focus on correlation between enterprises characteristics and perceptions on FDI in Africa; and it is meaningful to employ firm-level data generated from survey or interview so as to analyze and compare the economic motivation and risk perception of different types of enterprises.

Chapter Seven: Determinants of Chinese Outward Foreign Direct Investment in Africa: In Perspective of Firm-Level Data

7.1 Introduction

This chapter is conducted for the reason that the data used in Chapter Four and Chapter Five are aggregate country-level data, and country-level data can only reveal general determinants of total Chinese FDI investing in Africa. However, the motivations and risk perceptions for state-owned enterprises (SOEs) and private-owned enterprises (POEs) are different, partly due to different domestic institutional environments for SOEs and POEs (discussed in Chapter 2, Subsection 2.1.2). Additionally, the effect of determinants can vary for enterprises of different sizes, in different sectors, etc. In addition to providing a general conclusion as to which determinants are significant for the entire Chinese OFDI in Africa and which is not, this chapter uses firm-level data to analyze the different perception of Chinese enterprises with different ownership, size, and sector.

In section 7.2, related studies on OFDI determinants using firm-level data are reviewed. Section 7.3 describes two types of data used in this chapter, i.e., first-hand data collected via survey and the transaction-level data collected from Chinese Ministry of Foreign Trade and Commerce. Section 7.4 presents the empirical results from survey, concentrating on evaluating index of host Africa country attractiveness, the weight of which is determined by Structure Entropy Method. Additionally, three-step coding based on Grounded Theory and word cloud figure are employed based on follow-up

interview with SOEs and POEs to compare the different perception of SOEs and POEs. Section 7.5 presents the empirical results from transaction-level data focusing on log-linear regression where the total number of Chinese OFDI projects in Africa is used as independent variable and the number of POE projects, the number of SOE projects, the number of projects from listed enterprises, the number of projects from non-listed enterprises, the number of projects from primary sector, secondary sector, and tertiary sector are used as dependent variable. Section 7.6 is a discussion and conclusion section to summarize findings of this chapter.

7.2 Previous Studies

Most previous studies on determinants of Chinese OFDI in Africa rely on aggregate data to analyze potential FDI determinants (Sanfilippo, 2010; Shan et al., 2018; Mourao, 2018). However, the perception of motivations and risks are different if enterprise ownership and sectoral characteristics are considered (Estrin et al., 2016)). This difference leads to a few scholars to investigate determinants of Chinese OFDI employing micro-level data. The related studies employing micro-level data in field of Chinese OFDI in Africa can be categorized into the following 3 aspects.

The first category is studies on FDI determinants for firms with different ownership structures. It is widely accepted that the different institutional environment of SOEs and POEs affect their internationalization strategies (Estrin et al., 2016). Thus, instead of using aggregate data, some scholars began to separate the SOEs and POEs when analyzing Chinese OFDI in Africa. For example, focusing on Chinese SOEs' FDI in Africa, Fon & Alon (2022) used the firm-level greenfield FDI data of Chinese SOEs

in 2003-2014 in 21 Africa countries as dependent variable to analyze the effect of governance quality and moderating effect of aid, where the negative significance of governance and negative moderating effect of aid were found between Chinese SOEs' FDI and host country governance. The result is reasonable for that the Chinese aid in host Africa countries builds a good diplomatic relationship with host countries and enables enterprises to further ignore the governance quality in host countries.

The second category is studies on FDI determinants for firms in different sectors. Sectoral characteristic is another important factor to influence the motivation and risk perception of the Chinese enterprise investing in Africa. Chen et al. (2018) used the transaction-level Chinese ODI data and categorize the ODI data into 25 sectors based on UN industry classification to analyze the sectoral characteristic of Chinese OFDI in Africa; it was found that Chinese ODI is relatively more concentrated in skill-intensive sectors in skill-abundant countries while more concentrated in capital-intensive sectors in capital-scarce countries. The reason for this is that capital is flowable and rent of capital is more expensive in capital-scare countries, which offers higher returns to investment. Basing on 1,216 foreign-owned firms participating in the UNIDO Africa Foreign Investor Survey, Henley et al. (2008) found that FDI from China, India, and South Africa target at specific sectors, with China mainly targeting at manufacture sector textile or garments subsectors, India mainly targeting at manufacturing sector chemicals or plastic subsectors, and South Africa targeting at service sector. No shared operating-level features are identified except market-seeking.

The third category is studies on FDI determinants for firms of different size. Firm

size is a relative concept since there is no global consensus on criteria for defining the size of a firm. In the field of Chinese OFDI in Africa, Small and Medium-Scale enterprises (SMEs) of which are the majority of investors and listed companies of which are investors with better publicity, are usually attracted more attention in the existed literatures. Employing the first-hand survey data from 178 stakeholders in related SMEs, Gyamerah et al. (2021) analyzed the factors that influence the implementation of Belt and Road Initiative (BRI) in Sub-Saharan Africa via picture fuzzy projection-based TOPSIS technique, where transparency of BRI policy, subsidy for SMEs, flexible trade agreements, and clarity in the BRI policy framework are identified as the top four factors. Using a sample of listed Chinese firms investing in Africa in 2000-2014 comprising 49 listed Chinese companies and their 110 investment projects, Lu et al. (2018) analyzed the relationship between entry mode and political hazards as well as the moderating effect of host country experience and aid. And they found that host country experience and aid had a negative moderating effect.

To draw a conclusion, in the field of Chinese OFDI in Africa, the existing literature has noticed the different motivation and risk perceptions from the perspectives of sectoral characteristic, enterprise ownership, and enterprise size. However, sectoral characteristic, enterprise ownership, and enterprise size in many cases are intercorrelated, and focusing on one angle of them cannot reveal the full picture of Chinese OFDI in Africa. Thus, employing both first-hand data from survey and second-hand transaction-level data from Minster of Commerce, this study analyzed the different risk and motivation perceptions in the perspective of sectoral characteristic,

enterprise ownership, and enterprise size, which is composed of the following 2 parts. (1) Using the transaction-level data of 2554 projects in 45 Africa countries, this study analyzes the firm-level determinants of Chinese OFDI. Also, this study further separates the full sample into SOE projects, POE projects, projects from listed enterprises, projects from non-listed enterprises, projects from primary sector, secondary sector, and tertiary sector to compare the different motivation and risk perceptions of enterprises with different ownership, of different size, and in different sectors. (2) Using the first-hand survey data of 63 related administrators of Chinese enterprises in Africa, this study establishes an evaluating index system of attractiveness of host Africa countries for Chinese OFDI with 13 indicators, and the weight of each indicator is calculated via Structured Entropy Method. (3) A follow-up interview is conducted after survey, and the interview transcripts are coded with Grounded Theory and analyzed with word could in order to compare different perceptions from SOE respondents and POE respondents.

7.3 Quantitative Research Design

The quantitative research of this chapter is composed of two parts, i.e., the establishment of Host Country Attractiveness Evaluation Index System with weight determined by Structured Entropy Method and log-linear regression model of transaction-level project data.

7.3.1 Host Country Attractiveness Evaluation Index System

Based on the survey data, a Host Country Attractiveness Evaluation Index System will be established with 2 subsystems and 13 specific indicators. See Table 7-3 in

Section 7.5.1. And the weight of each indicator is determined with Structure Entropy Method.

The basic principle of Structure Entropy Method is to analyze the system indicators and their interrelationships, and decompose them into several independent hierarchies. Then, the expert opinions collected by the Delphi survey method are combined with the fuzzy analysis method to "typically rank" the indicators, analyze the entropy value and blindness, and obtain the ranking of the relative importance of each determinant at the same level so as to evaluate the weight of each determinant (Liang et al. 2019; Hua et al., 2021). The detailed calculating steps are shown below.

Step 1: Gather experts' opinions and form a "typical ranking". Economic Determinants and Political & Institutional Determinants are considered as 2 subsystems that are used to evaluate the attractiveness of host Africa countries for Chinese investment in Africa. The subsystem of Economic Determinants is composed by 7 economic related indicators, i.e., Natural Resource Reserves, Market Size, Cost Efficiency, Strategic Assets, Inflation Rate, Trade Openness, and Infrastructure Convenience. And the subsystem of Political & Institutional Determinants is composed by 6 political related indicators, i.e., Voice & Accountability, Political Stability & Non-Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Based on indicators to be evaluated in 2 subsystems, "Questionnaire on Experts' Choice of Indicator Importance" is designed. The political and institutional determinants subsystem is used as an example and is shown in Table 7-1.

Table 7-1 Questionnaire on Experts' Choice of Indicator Importance in Political & Institutional Determinant

Indicators	Expert NO.	1st Choice	2nd Choice	3rd Choice	4th Choice	5th Choice	6th Choice

P1	1	√					
	2		√				
	3	√					
P2	1		√				
	2	√					
	3			√			
P3	1			√			
	2			√			
	3		√				
P4	1					√	
	2					√	
	3					√	
P5					√		
				√			
					√		
P6						√	
							√
							√

Step 2: Quantitatively transform the "typical ranking". The ranking in step one for one particular indicator from one particular expert is quantitively transformed based on the following formula.

$$\mu(a_{ij}) = \frac{\ln(m-S)}{\ln(m-1)} \tag{22}$$

where a_{ij} denotes the evaluation of i_{th} expert on j_{th} indicator; m refers to the total number of indicators +2; S denotes the rank of i_{th} expert on j_{th} indicator; $\mu(a_{ij})$ are transformed value of a_{ij}. Assume b_{ij}=$\mu(a_{ij})$, the overall recognition of index j among k experts can be computed via following formula.

$$b_j = [\mu(a_{1j}) + \mu(a_{2j}) + \cdots \mu(a_{kj})]/k \tag{23}$$

Step 3: Blindness analysis of experts' uncertainty. Typical rankings of experts will possibly have potential biases and uncertainties due to data noise. Therefore, the blindness analysis is necessary, and the calculation process is listed as follows.

$$Q_j = \{[\max(b_{1j}, b_{2j} \cdots b_{kj}) - b_j] + [\min(b_{1j}, b_{2j} \cdots b_{kj}) - b_j]\}/2 \quad (24)$$

$$x_j = b_j \times (1 - Q_j) \quad (25)$$

where Q_j denotes the blindness of experts toward indicator j; x_j denotes "overall awareness" of k experts about the j_{th} indicator.

Step 4: Normalization Process. The evaluating vector $X=(x_1,x_2,\ldots x_j)$ obtained from Formula (25) is normalized, and the Structure Entropy Weight of indicator j, i.e., W_j can be calculated with following formula.

$$W_j = \frac{x_j}{\sum_{i=1}^{m} x_j} \quad (26)$$

7.3.2 Transaction-level Data and Log-linear Regression Model

The transaction-level data are obtained from Chinese Ministry of Foreign Trade and Commerce (MOFCOM), which are composed by name of Chinese domestic company, name of invested oversea company, and host country. Instead of annual-release data, the dataset is an instant-updated data and cannot be traced to the historical data. As the data were accessed via website of Ministry of China in December of 2022, the 2021 data of explanatory variables were used because of time lag effect of the explanatory variables. Thus, cross-sectional data is employed in this chapter.

Transaction-level project data from MOFCOM covering 2556 projects in 45 African countries (statistics were counted by the end of 12/2022). The observation sample is further narrowed down to 2432 projects in 38 Africa countries because of data gap in some explanatory variables. Based on transaction-level project data, a log-linear model is established to analyze the firm-level determinants of Chinese OFDI in Africa.

The number of Chinese OFDI projects in different African countries is used as dependent variable, while both 4 economic related determinants and 6 institutional and political risks related determinants from WGI, i.e., Democratic Accountability, Stability and Non-violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption, are used as independent variables. This section uses 6 indicators from WGI instead of 4 components from ICRG dataset because WGI dataset covers more Africa countries and ICRG data in 2021 is not available yet in 2022 when this study is conducted its analysis. Like Chapter 4 and Chapter 5, infrastructure, trade openness, and inflation were used as control variables. Therefore, cross-section data is used in this chapter and the baseline model is established as follows.

$$\ln ODIP = \alpha_i + \beta_1 \ln RES + \beta_2 \ln GDPGR + \beta_3 \ln GDPPE + \beta_4 \ln HTECH + \beta_5 ACCT + \beta_6 STAB + \beta_7 GOV + \beta_8 REGULA + \beta_9 LAW + \beta_{10} CORRUP + \beta_{11} INF + \beta_{12} \ln CELL + \beta_{13} \ln Trade + \varepsilon_i \quad (27)$$

In addition to the baseline model with the total number of projects being used as dependent variable, the number of SOE projects, POE projects, projects from listed enterprises, projects from non-listed enterprises, projects from primary sector, projects from secondary sector, and projects from tertiary sector are used to replace the total number of projects respectively in order to further investigate the economic and risk perception of different types of enterprises.

7.4 Qualitative Research Design

According to Ketokivi and Choi (2014), the intense focus on the quantification on study results and refinement of statistical methods turns out that it is easy to ignore the

qualities of a study and quantify the results on a wrong background. Qualitative research is used in the second phase of this study. The qualitative part firstly uses survey to extensively collect enterprises and investment information so that enterprises with Africa experience can be sampled out. A follow-up in-depth interview is conducted after collecting survey information with the aim of revealing the underlying motives of interviewee's attitudes and perceptions. Grounded Theory and Textual Analysis will be used to analyze the interview data.

7.4.1 Survey and Sampling

Through the website of MOFCOM, a list of enterprise that may have FDI experience is obtained. Based on principle of convenience samplings, 350 survey questionnaires were widely distributed via emails to the administrators whose enterprises have or used to have OFDI experience. See the survey questionnaire in the appendix. And 169 effective responses were received, among which 63 enterprises with FDI experience in Africa are further sampled out by the one survey question, i.e., "Does your company have or used to have FDI experience in Africa".

Among the 63 respondents, 8 respondents were from SOEs and 55 respondents were from POEs; 10 respondents from listed enterprises while 53 respondents from non-listed enterprises; 3 respondents were from the Primary Sector, 54 respondents were from the Secondary Sector, and 6 respondents were from the Tertiary Sector.

The survey questions are centered on 13 determinants including natural resource seeking motivation, market seeking motivation, efficiency seeking motivation, strategic asset seeking motivation, Voice & Accountability, Political Stability & Non-Violence,

Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption, infrastructure, inflation, and trade openness, which were related determinants used in Chapter 4 and Chapter 5. After some semi-structured questions on perceptions of the 13 determinants, 63 respondents were asked to rank the 13 potential determinants of Chinese OFDI in Africa, which is further used to determine the weight of 13 determinants via Structure Entropy Method. After survey, follow-up interviews are conducted with 25 respondents based on principle of convenience sampling.

7.4.2 Semi-Structured Interview

Compared to the survey that focuses on FDI determinants choice, interviews paid more attention to the motivation and risk perception behind the FDI decision. A follow-up semi-structured interview is conducted after survey questionnaire. Semi-structured interview is a kind of interview using a set of predesigned questions mixed with structured and unstructured questions, and expect different and unstructured answers from interviewees. The interview guides used almost different for every one because of their different responses in survey, but it will mainly focused on following parts: basic information about the enterprise and its investment in Africa, the economic benefits they expected or already obtained from their investment in Africa, the political risks they encountered, industry characteristics and ownership characteristics that influence its investment in Africa, as well as the other factors important for investment decision in Africa. And there would be several questions designed for each part, from general questions to very specific questions.

And the interview respondents are listed as Table 7-2 shows. To keep the privacy

of respondent information, the real names of respondent and company are omitted.

Table 7-2 Information of Interview Respondents

Respondent	Investing Country	Ownership	Listed/ Non-listed	Industry Sector
R1	Algeria	POE	Listed	Telecommunication Industry (Secondary Industry)
R2	Algeria	SOE	Listed	Oil Exploitation Industry (Secondary Industry)
R3	Angola	POE	Non-listed	Fishing Industry (Primary Industry)
R4	Nigeria	POE	Non-listed	Chemical Manufacturing Industry (Secondary Industry)
R5	Nigeria	SOE	Listed	Construction Industry (Secondary Industry)
R6	South Africa	POE	Non-listed	Trade Agent Industry (Tertiary Industry)
R7	South Africa	POE	Non-listed	Real Estate Industry (Secondary Industry)
R8	South Africa	SOE	Listed	Logistic Service Industry (Tertiary Industry)
R9	Zambia	SOE	Listed	Mineral Exploitation Industry (Secondary Industry)
R10	Zambia	POE	Non-listed	Agriculture Industry (Primary Industry)
R11	Zimbabwe	POE	Non-listed	Textile Manufacturing Industry (Secondary Industry)
R12	Zimbabwe	POE	Listed	Telecommunication Industry (Secondary Industry)
R13	Ethiopia	POE	Non-listed	Textile Manufacturing Industry (Secondary Industry)
R14	Ethiopia	POE	Listed	Equipment Manufacturing Industry (Secondary Industry)
R15	Kenya	SOE	Listed	Construction Industry (Secondary Industry)
R16	Kenya	POE	Non-listed	Tourism Industry (Tertiary Industry)
R17	Tanzania	POE	Non-listed	Chemical Manufacturing Industry (Secondary Industry)
R18	Tanzania	POE	Non-listed	Finance Industry (Tertiary Industry)

R19	Ghana	POE	Non-listed	Daily Necessity Manufacturing Industry (Secondary Industry)
R20	Egypt	POE	Non-listed	Equipment Manufacturing Industry (Secondary Industry)
R21	Gabon	POE	Non-listed	Forest Industry (Primary Industry)
R22	Uganda	SOE	Listed	Mineral Exploitation Industry (Secondary Industry)
R23	Mozambique	SOE	Listed	Construction Material Manufacturing (Secondary Industry)
R24	Liberia	POE	Non-listed	Trade Agent Industry (Tertiary Industry)
R25	Bening	POE	Non-listed	Garment Manufacturing Industry (Secondary Industry)

Note: The division of industry sector is based on criteria of National Bureau of Statistics of China.

7.4.3 Grounded Theory

Grounded Theory, which originated from work of Glaser and Strauss (1967), is a theory that extensively used in qualitative research methods. It involves collecting qualitative data, analyzing and coding the data into a desired frame, and ultimately established a new theory (Charmaz, 2006). And coding analysis is a very important part of Grounded Theory because it can code related information in an abductive way within the framework of Grounded Theory.

Coding is an analytical method for transforming and restructuring the collected raw data into theoretical constructions of social process (Glaser, 1978). Coding procedure based on Grounded Theory consists of three steps, i.e., Open Coding, Axial Coding, and Selective Coding. (1) Open Coding refers to the process in which the interview transcript is opened up to expose the thoughts, ideas and meanings of the interviewees (Rahmani & Leifels, 2018) and the researcher can freely code the related

information into categories without any concepts. (2) Axial Coding is the process to link the categories based on their core meanings, and this can be achieved through using a coding paradigm involving conditions, context, action/interaction strategies and consequences (Strauss & Corbin, 1990). (3) Selective Coding is the last step involving integrating and refining the categories with concepts so that a new theory can be formed.

7.4.4 Textual Analysis

The textual analysis techniques, including world cloud figures and word frequency statistics, is employed to present the qualitative research results in a more direct way. The textual analysis and coding of interview transcripts were performed via the analysis software NVivo 12 plus. The qualitative data can be stored, processed, and analyzed in the NVivo. An automatic frequency statistic function and word cloud figures can be computed by the software to indicate how frequently one word is occurred in all the interview text or how much one statement is supported by all the interview transcript text.

7.5 Empirical Results from Survey & Interview Data

7.5.1 Host Country Attrativeness Evaluation Index System

Based on the survey data, host country attractiveness evaluation index system is established with 2 subsystems and 13 specific indicators. Economic Determinants and Political & Institutional Determinants are the 2 subsystems of evaluation index system for host African countries' attractiveness for Chinese investors. Under the evaluating index system, the subsystem of Economic Determinants has 7 specific indicators including Natural Resource Reserves, Market Size, Cost Efficiency, Strategic Assets,

Inflation Rate, Trade Openness, and Infrastructure Convenience. The subsystem of Political & Institutional Determinants has 6 specific indicators including Voice & Accountability, Political Stability & Non Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The weight for each indicator and subsystem is calculated by Structured Entropy Method. See the Table 7-3 for evaluating index system.

Table 7-3 Evaluation Index System of Host Africa Country Attractiveness for Chinese Investors

Subsystem	Indicator	Abbr.	Weight
Economic Determinants Subsystem (0.419)	Natural Resource Reserves	E1	0.102
	Market Size	E2	0.168
	Cost Efficiency	E3	0.141
	Strategic Assets	E4	0.122
	Inflation Rate	E5	0.135
	Trade Openness	E6	0.167
	Convenience of Infrastructure	E7	0.167
Political & Institutional Determinants Subsystem (0.581)	Voice & Accountability	P1	0.116
	Political Stability & Non-Violence	P2	0.235
	Government Effectiveness	P3	0.194
	Regulatory Quality	P4	0.193
	Rule of Law	P5	0.178
	Control of Corruption	P6	0.084

From the Table 7-3 of evaluation index system, following conclusions can be drawn. (1) Comparing the two subsystems, political and institutional risks in Africa are more emphasized by Chinese investors than economic opportunities. The Political & Institutional Determinant Subsystem has a weight 0.581, while Economic Determinant Subsystem has a weight of 0.419. (2) Within the subsystem of Economic Determinants, Market Size is most important motivation for Chinese OFDI in Africa, with a weight of 0.168, followed by Convenience of Infrastructure. (3) Within the subsystem of Political & Institutional Determinants, Political Stability & Non-Violence is the most important

constraint for Chinese OFDI in Africa, with a weight of 0.235, followed by Government Effectiveness.

7.5.2 Three-step Coding with Grounded Theory

This study recorded the answers of the respondents in interviews via interview transcripts, and the interview transcripts are coded into more structured nodes. The coding technique used in this study is based on Grounded Theory which consists of three phases, i.e., opening coding, axial coding and selective coding in sequence.

First, Opening Coding is a phase that information is coded directly from the interview transcripts without any modification without any concepts. Second, Axial Coding is the process to link transcripts information to categories based on their core meanings. Third, Selective Coding is the last step to integrate and refine the categories with concepts so that it can form a theory. See the following coding process of part respondents from SOEs and POEs in Table 7-4 and Table 7-5 respectively, where different perceptions are quite significant.

Table 7-4 Part of Coding Process Based on Interviews of Respondents from SOEs

Selective coding	Axial coding	Open coding	Original information Collected	Respondent NO.
Political Motivation	Home country policies and initiatives	BRI	In the background of Belt & Road Initiative (BRI) and Community of Shared Future for Mankind, Chinese government sign many projects with Africa countries. And we engaged in one of the projects.	R9
		FOCAC	President Xi promised 10 cooperation projects on Form of China Africa Cooperation (FOCAC), and one of the 10 projects is that China will help Africa build infrastructure facilities. Railway is advantageous industry in China while Nigeria is short of railway during its fast development. So, we are here to help Nigeria with railway	R10

			construction and also fulfill President Xi's promise.	
	ECCO set by home country	Assist from ECCO	Economic and Commercial Counselor's Office (ECCO) plays a role of bridge between Chinese enterprises and host countries, either helping Chinese enterprises to access to local government or helping local government to find suitable Chinese enterprises to address a particular need.	R10
			The website of ECCO provided information of host country, including general information of host countries, information of potential host country partners, etc.	R31
	Need of friendly diplomatic relationship	Friendly diplomatic relationship	Our branch campus has trained more than 300 local youth, and many of them are young officials who accept Chinese training and are likely to be local leaders who will be friendly to China.	R31
	Laws and policies in host country	Privatization policies in host country	The law in host country is not as strict as domestic country	R20
Political constraints	Control of state assets in home country	No loss to the state assets	Being a SOE, the first thing to consider is to keep the state assets safe. After meeting this precondition, it is better to keep the value of state assets in a steady increase. It's OK if increase rate is slow as long as there is no loss of state assets.	R31
		No output of state-owned machines	Some state-owned machines and production facilities are not allowed to output to foreign countries. However, these machines and production facilities are usually very needed in oversea operation. On some occasions, we can only output outdated machines to host countries.	R10
	Employment Policy	Visa policy	Many Chinese workers have problems in getting visas.	R9
			The visa problem forced us to employ local workers who are less efficient than Chinese workers.	R10
	Corrupted local officials in host country	Claiming for bribery	Yes, we have been encountered with local officials claiming for bribery.	R10
	Bureaucratic quality in host country	Inefficiency of local government	The local government is very inefficient in license approval, customs clearance, etc.	R31
Neutral political consideration	Image of China	Beneficiary for the image of China	For state-owned enterprises, we have to fulfill both economic objective and political objective. We have to consider the influence of their	R9

			strategies and operations, i.e., to think whether it is beneficiary for the image of China.	
	Aid	Bring benefits to host countries	Our main objective is not profit. We help them with mining technology, metallurgical technology, offering employment, purchasing local materials. All are bringing benefits to host countries.	R12
Economic Motivation	Funded projects	Home country funded projects	A project must be valued more than 10 million USD to get loan from China EXIM. And such a large valued projects usually is bided by SOEs which have sufficient capacity and management experience.	R12
		Host country funded Projects	There are also many projects funded by host countries that we can tender for. If the project is funded by host country, it would require a minimum local procurement.	R9
		International organization funded projects	We also engaged in some international organizations funded projects, fully funded or partly funded by international development banks like World Bank, Africa Development Bank, etc. However, it will also limit our procurement from China in this case.	R9
	Market	Market need	Kenya government paid much attention to infrastructure construction and has a large need for it. So, we offered engineering equipment to local people who can use these machines to take part in these infrastructure construction projects.	R10
Economic constraints	Exchange rate	Fluctuated exchange rate	Money exchange rate is largely fluctuated. So, we have to prepared some US dollars and using US dollars to do business.	R10
	Local employees	Unreliable and inefficient local employees	Local employees sometimes are unreliable. They come when they need money but leave when they think earn enough. Also, some of them are very inefficient when they do their jobs.	R12
			The local labors are protected by local labor unions and these labor unions are very different from Chinese labor unions. They will take fierce actions like strikes once they though rights of labors are infringed.	R9
	Machines and materials	Insufficient Machines and materials	No proper machines and sufficient materials are offered here. Thus, we transported from China or from a third country.	R12
	Infrastructure	Electricity	Electricity is not stable here and electricity cut frequently occurred. We negotiated this problem	R20

			with local government. They promised that they will try their best to fulfill our electricity need. However, we still need to buy electricity generating machines by ourselves.	

Table 7-5 Part of Coding Process Based on Interviews of Respondents from POEs

Selective coding	Axial coding	Open coding	Original information from transcripts	Respondent NO.
Political motivation	ECCO set by home country	Assist from ECCO	We can get related market information on the website of ECCO.	R1
	Laws and policies in host country	Privatization of telecommunication industry	Nigeria liberalized the telecommunication industry and encouraged foreign investors in 2012. And it offers a lot of opportunities.	R16
		Laws for financial industry	Uganda allows private loans and private loans have very high interest rate.	R13
	Business environment	Ease business environment	Uganda has an ease environment for business.	R13
Political constraints	Financial support policy in home country	Limited financial support from home country	The most severe problem for private enterprises, especially private SMEs, is the financing problem. It's very difficult for private enterprises to get a loan from banks for their oversea investment, partly because of government's control of capital outflow. And some private enterprises were forced to get a loan from illegal private banks, which increase the risks of their investment.	R3
	Investment withdraw policy	Difficulties in investment withdraw	It's easy to invest or increase investment, but it's difficult to withdraw investment, especially in developing countries for institutional reasons.	R14
	Employment policy	BEE	South Africa proposed Black Economic Empowerment (BEE), which requires Chinese enterprises to hire local employees.	R4
		Visa policy	It's difficult and time-consuming to apply or renew visa.	R5
	Security & order	Severe security issues	South Africa has severe security issues, especially when Chinese businessman in South Africa who likes to do business with cash are very likely to be robbed.	R4
	Government stability	Government instability & policy in consistency	The frequent change of power and inconsistent policy had large effect to our business. The investment incentive policy is abolished by the government.	P13
			When the power change hand or different	R5

			parties come to power, the license we already get was cancelled.	
Neutral political consideration	Relationship with home country government	Build good relationship with government	Although POEs do not need to consider much political influence when making investment decision, we still need maintain good relation with local government.	R2
			We need to build good relation with related government departments in the business filed because they supervise business activities like tax payment, license approval, etc.	R1
Economic motivations	Market	Market availability	We start from doing trading business with Nigeria. However, in 2003 Nigeria issued a decree to ban importing of shoes, textile products, etc. Instead of giving up large Nigeria market, we built a plant in Nigeria.	R16
		Market segment	Our products are mainly in the middle and low end, which meets the market needs of Africa countries.	R14
		Complementary market	There are many big projects carried by Chinese SOEs in this country. So, we sell some spare parts, materials and other complementary products to these SOEs.	R2
		Less competitive market	Zimbabwe has even better tobacco leaves, but Zimbabwe already has 6 Chinese cigarette plants. The market competition is fierce. In Malawi, there are only 2 cigarette plants including us.	R15
			We came to Angola just 2 years after the civil war in Angola. We believe that many companies in west countries are cautious of doing business in a country right after civil war. This would be an opportunity for us.	R17
		Regional market	Uganda is the center of East Africa. Our business in Uganda is not only aiming at Uganda but also aiming at other neighboring countries around Uganda, including Kenya, Tanzania, Democratic Republic of Congo and Sothern Sudan.	R13
	Natural Resource	Plant resource	Malawi has very good tobacco leaves. So, we built this plant to produce cigarettes.	R15
		Forest resource	Gabon has abundant forest resources which is an opportunity for us to set up a wooden product plant.	R2
	Trade tariff	Avoid high trade	The EU increase the tariff for Chinese glass	R18

		tariff	products. Then we move to Egypt to avoid high trade tariff.	
Economic constraints	Infrastructure	Roads	The roads in Africa are terrible especially after raining. The vehicles have difficulty in passing these mud roads, and our products and large equipment cannot successfully transport in and out.	R16
		Electricity	The electricity cut frequently occurred in our production process. And we are forced to buy expensive power machines and generate electricity by ourselves.	R5
			We waited 7 or 8 months to get our plant connected to power supplies.	R15
	Local employees	Inefficient local labors	Comparing to diligent Chinese workers, local labors are inefficient. One local worker even stole things.	R15
	Exchange rate	Ununited exchange rate	Many Africa countries have both official exchange rate and black-market exchange rate. Some sell currencies to black market in order to exchange more home currency; Some buy currencies from black market due to that local government is short of foreign exchange reserve. No matter under what condition, it is not good for business environment of host Africa countries.	R14
	Machines & materials	Insufficient Materials	Many production materials and even the construction materials for building this plant are transported from home country. No proper materials can be found in this country.	R15
Neutral Economic consideration	Incentives from home country	Verbal encouragement instead of physical incentives	The government do encourage enterprises to "go out" and to go to Africa. However, the encourage stays with verbal words and no fiscal incentives.	R18

Through the coding process above, Table 7-4 and Table 7-5 show that Chinese SOEs and POEs have both shared and differentiated motivations and constraints when making investment decision in regard to Africa. The political and economic considerations of SOEs and POEs are compared and analyzed in the following 4 aspects.

(1) *The same political consideration for both SOEs and POEs*. First, both SOEs

and POEs mentioned that Chinese government assist in offering some host country information, including host country general information, market information and information about potential partners whom they can cooperate with. Second, both SOEs and POEs mentioned that the visa policies in host countries increased difficulties of bringing Chinese workers into these countries and forced them to employ local employees. Third, both SOEs and POEs mentioned that they have been constrained by political risks or ineffectiveness of host country to some degree.

(2) *Different political consideration between SOEs and POEs.* First, SOEs are believed to receive more assistance from home country government, including introducing SOEs to local governments, etc. However, the POEs have fewer physical incentives. Second, SOEs are more cautious of risks such as government effectiveness, while POEs are more likely to be constrained by the instability in host African countries. Third, SOEs are founded more capable to deal with the political and institutional risks than POEs. Fourth, SOEs are more likely to stress that they are brining benefits to local economy and have to consider the "image of China as being a big country" ("da guo xing xiang" in Chinese).

(3) *The same economic consideration for both SOEs and POEs.* First, both SOEs and POEs mentioned that market is an important determinant. Second, both SOEs and POEs mentioned that they have been bothered by inefficient local employees, who are protected by local labor unions. Third, both SOEs and POEs mentioned the exchange rate problem, including exchange rate fluctuation, inflation, exchange rate ununited problem, etc. Fourth, both SOEs and POEs suffered from the lagged infrastructure in

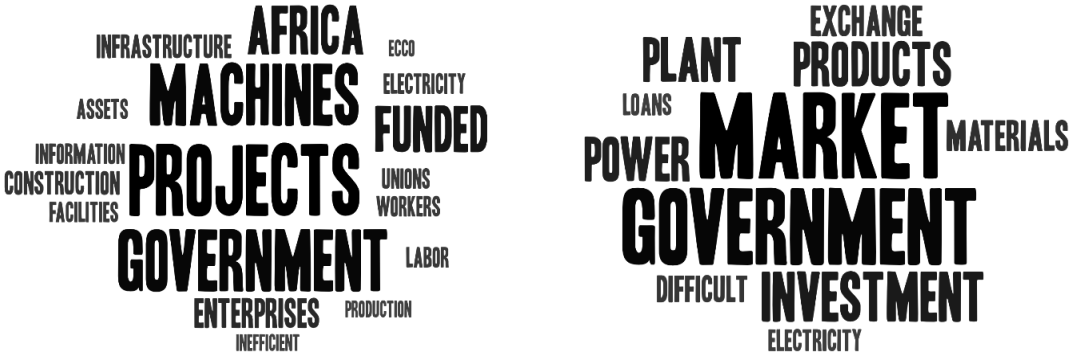
Africa, including electricity availability, road for transportation, etc. Fifth, both SOEs and POEs mentioned the insufficient production equipment and availability of production materials.

(4) *Different economic consideration between SOEs and POEs.* First, most SOEs engaged into Africa through funded projects, including home country funded projects, host country funded projects or even funded projects from international institutions such as World Bank, Africa Development Bank, etc. However, much less POEs tender for these funded projects. Second, although both suffered from poor infrastructure in Africa, SOEs are more capable to deal with this problem than POEs. For example, SOEs deal with electricity cut problem by either negotiating with local government or using electricity generating machine, while POEs are less capable of addressing with such problem. Third, although both POEs and SOEs mentioned the market is an influential determinant when making FDI decisions, POEs paid more attention to economic opportunities in host country including market and natural resources, while the surveyed SOEs paid less attention to market and natural resources. Fourth, SOEs are more likely to receive financial support from home country banks, while POEs especially private SMEs are less likely to get financial support from such banks.

7.5.3 Word Cloud

Word Cloud is an important textual analysis instrument that can provide a visualization of word frequency by giving prominence to words with high frequency (Shahid et al., 2017). Based on the interview transcript recorded from both SOEs and POEs, interviewees word cloud analysis was conducted to show the different

perceptions between SOEs and POEs. The word cloud figure for SOEs and POEs were generated via NVivo, showing the top frequent words based on the recondense to interviews. Function words such as articles, prepositions, pronouns, etc. were manually deleted from high frequent word list. See the word cloud figures shown below.



(1) Word cloud for SOEs (2) Word cloud for POEs

Figure 7-1 Word Cloud for Motivation and Risk Perception of SOEs and POEs

From the figures above, it is found that the most frequently mentioned word of SOEs is “projects” followed by “government”, “machines”, etc., while the most frequently mentioned word of POEs is “market” followed by “government”, “investment”, etc. This indicates that most SOEs engaged into Africa in the form of projects while POEs are more likely to be motivated by market size and market potential in host country.

7.6 Empirical Results from Transaction-Level Data

7.6.1 Data Description of Transaction-level Data

The total number of Chinese projects in Africa reached 2554 and were distributed in 45 Africa countries. The 2554 Chinese investment projects in Africa can be further divided into 1060 SOE projects in 45 countries and 1494 POE projects in 41cuntries; 779 projects from listed enterprises in 44 African countries and 1775 projects from non-

listed enterprises in 44 African countries; 201 projects from primary sector in 35 African countries, 1864 projects from secondary sector in 45 African countries and 489 projects from tertiary sector in 38 African countries according to related enterprise information recorded in National Enterprise Credit Information Publicity System. The number of projects in Top 20 African countries are listed in Table 7-6 below.

Table 7-6 Number of Projects in Top 20 Africa Countries

Host Countries	Projects	Projects from SOEs	Projects from POEs	Projects from Listed Co.	Projects from Non-listed Co.
Ethiopia	240	79	161	54	186
Kenya	224	98	126	76	148
Nigeria	203	72	131	62	141
South Africa	161	52	109	57	104
Tanzania	144	44	100	38	106
Ghana	130	48	82	33	97
Egypt	129	50	79	54	75
Zambia	120	47	73	32	88
Uganda	110	46	64	28	82
Angola	92	41	51	23	69
Mozambique	75	31	44	19	56
Algeria	71	35	36	21	50
Seychelles	70	1	69	17	53
Guinea	69	40	29	32	37
Zimbabwe	55	20	35	17	38
Morocco	55	21	34	17	38
Senegal	48	23	25	17	31
Cameroon	47	27	20	22	25
Mauritius	47	22	25	14	33

Namibia	42	24	18	12	30
…	…	…	…	…	…
Total	2554	1060	1494	779	1775

Based on Table 7-6, the following conclusions can be drawn. (1) Ethiopia is the largest recipient of Chinese OFDI projects reaching 240 projects, followed by Kenya, Nigeria, and South Africa. (2) SOEs covered all the 45 Africa countries while POEs covered only 41 countries, i.e., no POEs invested in South Sudan, Burundi, Comoros, and Guinea-Bissau. (3) Despite covering more Africa countries, projects carried out by SOEs are slightly fewer than projects carried out by POEs, accounting for 47% of the total number of projects. (4) Regarding company size, the investing majority are non-listed companies, accounting 69.50% of the total number of projects.

Instead of focusing on detailed subsectors, this study focuses on 3 main industry sectors, namely, the Agriculture Sector (a.k.a., Primary Sector), the Industrial & Manufacturing Sector (a.k.a., Secondary Sector), and the Service Sector (a.k.a., Tertiary Sector), because of limited sample size. Most Chinese OFDI projects in Africa are carried out by the Industrial & Mining Sector (72.98%), which are further distributed mainly in Ethiopia, Nigeria, Kenya, South Africa, etc. The detailed allocation of Chinese OFDI projects in Africa is illustrated in following Figure 7-2.

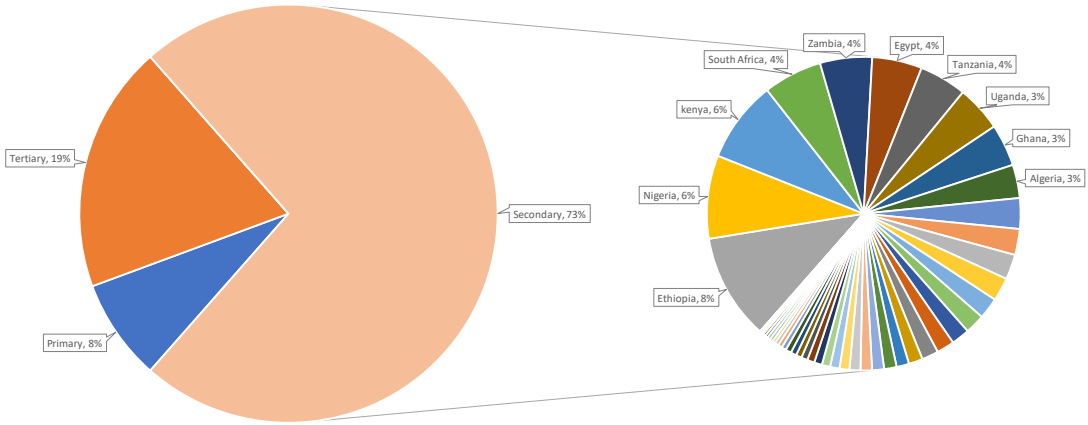


Figure 7-2 Allocation of Chinese OFDI Projects Carried out by Three Sectors

7.6.2 Estimation results of Log-Linear Regression Model

Employing the transaction-level project data obtained from MOFCOM, firm-level determinants of Chinese OFDI in Africa are analyzed with log-linear regression model. Using total number of projects, projects from SOEs, projects from POEs, projects from listed enterprises, projects from non-listed enterprises, projects in primary sector, project in secondary sector, projects in tertiary sector respectively as dependent variable, the motivation and risk perception among enterprises with different ownership structure, of different sizes, and in different industry sectors. See the estimation results in following Table 7-7.

Table 7-7 Cross-sectional OLS estimation for Firm-level Determinants of Chinese OFDI in Africa

Variable	Projects	Ownership		Size		Sector		
		SOE	POE	Listed	Non-listed	Primary	Secondary	Tertiary
RES	-0.040	0.023	-0.133	-0.128	-0.030	-0.040	-0.015	-0.223
	(0.169)	(0.158)	(0.195)	(0.174)	(0.190)	(0.182)	(0.156)	(0.238)
GDP	0.753***	0.560***	0.933***	0.629***	0.833***	0.502**	0.782***	0.639**
	(0.019)	(0.153)	(0.260)	(0.184)	(0.235)	(0.239)	(0.161)	(0.283)
GDPPE	-0.242	-0.117	-0.312	-0.224	-0.249	-0.432*	-0.301	0.106
	(0.287)	(0.201)	(0.251)	(0.232)	(0.241)	(0.250)	(0.194)	(0.327)
HTEC	-0.099	-0.093	-0.092	0.081	-0.178	0.226	-0.153	-0.259
	(0.506)	(0.118)	(0.196)	(0.161)	(0.177)	(0.215)	(0.136)	(0.212)
ACCT	0.002	0.000	0.007	0.001	0.003	0.008	0.001	0.005

	(0.008)	(0.007)	(0.009)	(0.008)	(0.009)	(0.018)	(0.007)	(0.015)
STAB	0.018	0.009	0.026*	0.018	0.019	0.032**	0.015	0.011
	(0.111)	(0.009)	(0.014)	(0.012)	(0.013)	(0.013)	(0.010)	(0.016)
GOV	0.025*	0.025**	0.018	0.023**	0.020	0.013	0.021*	0.012
	(0.014)	(0.011)	(0.020)	(0.010)	(0.018)	(0.030)	(0.012)	(0.026)
REGULA	0.003	0.014	-0.010	-0.003	0.005	0.005	0.001	0.037
	(0.017)	(0.011)	(0.024)	(0.012)	(0.022)	(0.025)	(0.014)	(0.026)
LAW	-0.016	-0.022**	-0.009	-0.012	-0.019	-0.022	-0.010	-0.034
	(0.014)	(0.011)	(0.019)	(0.013)	(0.018)	(0.029)	(0.012)	(0.024)
CORRUP	-0.016	0.014	-0.016	-0.017	-0.012	-0.029	-0.012	-0.022
	(0.013)	(0.010)	(0.017)	(0.010)	(0.016)	(0.017)	(0.011)	(0.017)
INF	0.252	0.178	0.218	0.176	0.250	0.064	0.226	0.233
	(0.196)	(0.160)	(0.250)	(0.157)	(0.237)	(0.284)	(0.165)	(0.250)
TRADE	0.221	0.077	0.392	0.046	0.338	0.205	0.199	-0.185
	(0.377)	(0.322)	(0.494)	(0.318)	(0.474)	(0.427)	(0.321)	(0.510)
CELL	-0.613	-0.563	-0.664	-0.212	-0.758	-0.309	-0.507	-0.960
	(0.396)	(0.375)	(0.399)	(0.412)	(0.412)	(0.450)	(0.355)	(0.509)
_cons	-10.887**	7.661**	-15.414**	-9.961**	-12.931**	-6.339	-11.667***	-9.108
	(4.490)	(3.635)	(6.330)	(4.415)	(5.798)	(5.434)	(3.864)	(6.243)
N	38	38	38	38	38	38	38	38
R^2	0.778	0.776	0.729	0.724	0.724	0.423	0.812	0.618
AIC	85.065	72.234	102.300	86.363	97.379	111.064	78.675	113.292

Note: * p < 0.1, ** p < 0.05, *** p < 0.01; Robust standard errors in parentheses.

From the above table, following conclusions can be drawn. (1) *Using the total number of Chinese OFDI projects as dependent variable, it is found that Chinese OFDI projects are more likely to invest in countries with larger market size and better Government Effectiveness*. Market size proxied by GDP is positively significant for Chinese OFDI projects, indicating that Chinese OFDI projects are market motivated. On average, 1% increase of host country GDP will lead to Chinese OFDI projects increase by 0.753%. Among the 6 types of political risks, Government Effectiveness (*GOV*) is the only significant one, indicating that Chinese OFDI in Africa is more likely to be constrained by Government Effectiveness. On average, 1 unit increase of Government Effectiveness score in host Africa country will lead to the number of Chinese OFDI projects increase by 0.025%.

(2) *Using the number of SOE projects and POE projects as dependent variable, the risk perceptions for SOE projects and POE projects are found different.* It is found that both SOE projects and POE projects are significantly motivated by host country market size, while the coefficient is larger in the POE group. On average, a 1% increase of host Africa country GDP, will lead to Chinese SOE OFDI projects increase by 0.56% and lead to Chinese POE OFDI projects increase by 0.933%. The number of SOE projects is positively significant to Government Effectiveness (*GOV*) while the number of POE projects is positively significant to Political Stability & Non-Violence (*STAB*). This finding indicates that SOE projects are more concerned about the effectiveness of host country government, and 1 unit increase of government effectiveness score in host Africa country will averagely lead to Chinese SOE OFDI projects increase by 0.025%. Nevertheless, POE projects are more concerned about the political stability, and 1 unit increase of Stability and Non-violence score in host African country will averagely lead to the number of Chinse POE projects increase by 0.026%. Possible reasons for this difference in perception is twofold. For one thing, larger SOEs are more capable to deal with severe political risks like instability and violence and thus cares more on mild institutional efficiency, while POEs are less capable of dealing with severe political risks like instability and violence thus cares less on the efficiency of host country. For the other, it is believed that SOEs face more pressure from host country government than POEs to demonstrate their legitimacy (Meyer, 2014).

(3) *Using the number of projects from listed enterprises and non-listed enterprises as the dependent variable respectively, the risk perceptions for listed enterprises and*

non-listed enterprises are found different. Chinese OFDI projects carried out by both listed enterprises and non-listed enterprises are significantly influenced by host country market size, although the coefficient of GDP is larger in the non-listed group. A 1% increase in host country GDP will lead to projects from Chinese listed enterprises increase by 0.629% and projects from Chinese non-listed enterprises increase by 0.833%. Like SOEs, projects from listed enterprises are more likely to be constrained by Government Effectiveness. On average, 1 unit increase of Government Effectiveness score in host country, will averagely lead to Chinese projects from listed enterprises increase by 0.023%. The possible reason for this is that listed enterprises have higher demand to deal with government departments (Xuan, 2020).

(4) *Using the number of projects from primary, secondary, and tertiary sectors as dependent variable respectively, the motivation and risk perception for enterprises in different sectors are found different.* OFDI projects carried out by Chinese primary, secondary, and tertiary sectors share the same market motivation, i.e., GDP is positively significant in all the three estimations. And the coefficient of GDP is largest for secondary sector, followed by tertiary sector and primary sector. Statistically, 1% increase of host country GDP will lead to Chinese OFDI projects increase by 0.502% in primary sector, increase by 0.782% in secondary sector, and increase by 0.639% in tertiary sector. In other words, projects from secondary sector are more market motivated. One different perception for economic opportunities shows in efficiency seeking motivation proxied by GDP per person employed (*GDPPE*), i.e., Chinese OFDI projects from primary sector showed a weak negative significance for efficiency seeking motivation while the other

two sectors does not have a significant efficiency seeking motivation. In terms of perception for political risks, Chinese OFDI projects from primary sector has a significant positive association with *STAB* while OFDI projects from secondary sector has a significant positive association with *GOV*, i.e., a better score of Stability and Non-Violence in host country will attract more Chinese OFDI projects from primary sector while better score of Government Effectiveness in host country will attract more Chinese OFDI projects from secondary sector. Statistically, a 1 unit increase in Stability and Non-violence score in host African country will averagely lead to Chinese primary OFDI projects increase by 0.032%; 1 unit increase in the Government Effectiveness score of host African country will averagely lead to Chinese secondary OFDI projects increase by 0.021%. This is partly due to OFDI projects in primary industry are more likely to be long-term projects and are usually carried out by small private enterprises, which leads to higher possibility to be affected by the government instability and violence. For projects from secondary sector including manufacturing, construction, mining, etc., they have a larger possibility to deal with government departments so that government effectiveness is more important.

7.7 Discussion & Conclusion

This chapter used firm-level data, both transaction-level data from MOFCOM and first-hand survey data, to analyze the role of enterprise ownership, enterprise size, and industry sector in Chinese OFDI in Africa. Using the survey data, an evaluating index system for host country attractiveness is established, of which the weights are determined by Structured Entropy Method. Additionally, the respondence to the follow-

up interview are recorded with interview transcript and analyzed by Three-Step Coding and Word Could techniques. Using the transaction-level data, a log-linear model is established with the number of Chinese projects in Africa used as dependent variable and related economic determinants and political determinants used as independent variables.

(1) *From the perspective of firm-level data, Chinese projects in Africa are more likely to be motivated by market and more likely to be constrained by government effectiveness.* The results from survey data and transaction-level data both support that market is a significant motivation for Chinese enterprises. The results from the survey data showed that market size is the most important indicator, accounting for 0.168 under the economic subsystem of evaluation index system for host country attractiveness. The results from log-linear regression shows that market size proxied by GDP is a significant determinant for every type of enterprises including SOEs, POEs, listed enterprises, non-listed enterprises, and enterprises from all the three sectors. Additionally, results from both survey and transaction-level data show that Government Effectiveness is an important political determinant for Chinese projects in Africa. The weight of Government Effectiveness is the second largest under the political subsystem of host country attractiveness evaluation index system. Government Effectiveness is also positively significant in the log-linear regression using the total number of OFDI projects, the number of SOE projects, the number of projects from listed company, and the number of projects from secondary sector as dependent variables.

(2) *Comparing the motivation and risk perception of Chinese SOEs and POEs*

investing in Africa, POEs are more sensitive to market size than SOEs and POEs are more likely to be constrained by stability and violence, while SOEs are more likely to be constrained by government effectiveness. Results from log-linear regression show that the coefficient of market is larger when using the number of POE projects as dependent variable, i.e., POEs are more sensitive to market size than SOEs. This is supported by the follow-up interview where "market" is the most frequently-mentioned word in the group of POE enterprises while it is less mentioned in the SOE group. In the perspective of risk perception, results from regression analysis of transaction-level data showed that government effectiveness is significant only when using the number of SOE projects is used as dependent variable, while stability and non-violence is significant only when using the number of POE projects as dependent variable. This indicates that Chinese SOE projects in Africa are more likely to be constrained by the inefficiency of host country government, while Chinese POE projects are more likely to be constrained by instability and violence in host Africa country. The possible reason for this different risk perception lies in twofold. For one thing, larger SOEs are more capable of dealing with severe political risks like instability and violence and thus cares more on mild institutional problems such as institutional efficiency, while POEs are less capable of dealing with severe political risks such as instability and violence and thus cares less on the efficiency of host country. For the other, it is believed that SOEs faces more pressure from host country government than POEs to demonstrate their legitimacy (Meyer, 2014), which needs a higher requirement for government effectiveness.

(3) *Comparing the motivation and risk perception of Chinese listed enterprises and non-listed enterprises investing in Africa, non-listed enterprises are more sensitive to market size, and listed enterprises are more likely to be constrained by government effectiveness.* The results from regression analysis of transaction-level data show that the coefficient of market size proxied by GDP is larger for the non-listed enterprises, which indicates that the non-listed enterprises are more sensitive to market size than listed enterprises. Additionally, government effectiveness is significant only when using the number of projects from listed enterprises as dependent variable, i.e., listed enterprises have a higher demand for efficiency of host country government. The possible reasons for this are just the same as SOEs. For one thing, listed-enterprises are more likely to deal with government departments. For the other, the legitimacy requirement for listed enterprises is higher.

(4) *Comparing the motivation and risk perceptions of enterprises in three sectors, Chinese FDI projects from secondary sector are more sensitive to market size and more likely to be constrained by government effectiveness, while projects from primary sector are more likely to be constrained by instability and violence in host Africa country.* The results from regression analysis of transaction-level data support that the coefficient of market size proxied by GDP is larger in the group of secondary sector projects. This indicates that Chinese OFDI projects from secondary sector toward Africa are more sensitive to market size. In the perspective of political risks, projects from primary sector are found more likely to be constrained by instability and violence when using the number of projects from primary sector as dependent variable, while projects from

secondary sector is found more likely to be constrained by government effectiveness when using the number of projects from secondary sector as dependent variable. However, FDI projects from tertiary sector are not significantly related to these political risks. The risk perception difference is partly due to the sunkness of the investment (Colen et al., 2016), where investment in primary sector and secondary sector has a higher percentage of sunk investment which is more difficulty to withdraw and are more likely to be constrained by political risks in host countries. In contrast, projects from tertiary sector have a lower percentage of sunk investment, which is less likely to be constrained by political risks in host countries.

Due to the sample size, this study does not divide the enterprises into more detailed subdivision. In the analysis of survey data, this study only compares the risk and motivation perception between SOEs and POEs because of limited sample size. Additionally, in the analysis of transaction-level data, this study only compares the risk and motivation perception among three major sectors and cannot divide the data into more detailed industry sectors because of limited survey data. Further studies can expand the sample size and analyze risk and motivation perception differences among more detailed industry subsectors.

Chapter 8 Conclusion

8.1 Summary of Findings

This thesis explores the determinants of Chinese OFDI in Africa with an aim of revealing the economic motivations and risk perceptions of Chinese enterprises in Africa. Under the theoretical framework of OLI paradigm (Dunning, 1977) and Internalization Theory (Buckley & Casson, 1976), this study focuses on economic opportunities and political risks in host Africa countries that determine Chinese OFDI. In order to reveal the full picture of determinants of Chinese OFDI in Africa, three different perspectives are focused in this study.

Employing panel data approach, Chapter Four analyzed the economic and political determinants of Chinese OFDI in Africa from the perspective of aggregate country-level data. Considering that possibility of lag-effect and endogeneity in the time dimension, both static panel data model and dynamic panel data model were employed. The static model used POLS estimation, while the dynamic model used GMM estimation.

Employing spatial econometric approach, Chapter Five analyzed the role of third-country effect in determining Chinese OFDI in Africa. Taking both geographical proximity and economic proximity into consideration, geographical proximity weight matrices and economic proximity weight matrices were established. The SAR and SEM model are conducted with both geographical proximity weight matrices and economic proximity weight matrices.

From the perspective of firm-level data, Chapter Six analyzed the different

perceptions of opportunities and risks for enterprises with different characteristics. Employing both quantitative approach and qualitative approach, Chapter Six analyzed the different perceptions of economic opportunities and political risks among enterprises with different ownership structures, of different sizes, and in different sectors via transaction-level data from MFCOM and first-hand survey data.

The major findings of the thesis can be summarized as follows.

(1) From the perspective of aggregate country-level panel data, the natural resource seeking motivation, market seeking motivation, and efficiency seeking motivation of Chinese OFDI in Africa are supported. Chinese OFDI in Africa is found positively correlated with total natural resource rent as percentage of GDP in both static and dynamic estimation, which indicates that Chinese OFDI is resource seeking. The positive significance of *GDPGR* in the both static and dynamic estimation suggests that Chinese OFDI in Africa is market seeking. Additionally, GDP per person employed is found negatively correlated with Chinese OFDI in Africa, which suggests that Chinese OFDI is efficiency seeking, especially seeking for higher capital returns instead of labor productivity.

(2) The panel data approach with aggregate country-level data also supports that risk of conflict and democratic accountability are significant constraint for Chinese OFDI in Africa. Score of conflict is positively significant to Chinese OFDI in Africa in static model, i.e., Chinese OFDI is more likely to invest in Arica countries with less conflicts. This indicates that the conflict in Africa is a significant constraint for Chinese OFDI. Additionally, Score of democratic accountability is positively significant in both

static model and dynamic model, indicating that risk of democratic accountability is a significant constraint for Chinese OFDI.

(3) Based on the dynamic panel data model, it is found that Chinese OFDI in Africa is discrete, and no agglomeration effect is identified. Employing GMM estimation, the one-year lagged Chinese OFDI in Africa is found negatively correlated to Chinese OFDI in current year. One possible reason is that Chinese OFDI in Africa is still in exploration stage which leads to the fact that more Chinese OFDI quickly flows in a country in one year and quickly flows out in the next year.

(4) From the perspective of third-country effect, Chinese OFDI in Africa is found having significant negative third-country effect via geographical proximity, while it has a significant positive third-country effect via economic proximity. Employing Spatial Autoregression Model (SAR) and Spatial Error Model (SEM) with geographical binary weight matrix and geographical distance weight matrix, it is found that Chinese OFDI in Africa has a significant negative third-country effect, i.e., substitution effect is identified. The substitution effect in geographical proximity is very likely to be caused by the unfriendly geopolitical relationship and vicious competition among neighboring countries (Frederick, 2021). Employing SAR with trade bloc binary weight, it is found that Chinese OFDI has a significant positive third-country effect, i.e., complementary effect is identified. The reason for complementary effect in economic proximity is due to the preferential policies among international trade blocs, including but not limit to monetary integration, tax reduction, etc. (Anyanwu & Yameogo, 2015).

(5) From the firm-level perspective, the risk and motivation perceptions on

investing in Africa is different between Chinese POEs and SOEs. From both results of log-linear regression of transaction-level project data as well as analysis of survey and interview, it is found the coefficient of GDP is larger in the group of POE projects. This indicates that Chinese POEs investing in Africa are found more sensitive to market size than SOEs. Score of stability and score of violence are only positively significant in the POE group, which indicates that instability and violence are significant political risks for Chinese POEs. Additionally, score of government effectiveness is only positively significant in the SOE group, suggesting that Chinese SOEs are more likely to be constrained by risk of government effectiveness. The possible reason for this different risk perception lies in twofold. For one thing, larger SOEs are more capable of dealing with severe political risks such as instability and violence and thus cares more on mild institutional efficiency, while POEs are less capable of dealing with severe political risks such as instability and violence and thus POEs care less on the efficiency of host country. For the other, it is believed that SOEs faces more pressure from host country government than POEs to demonstrate their legitimacy (Meyer, 2014), which needs a higher requirement for government effectiveness.

(6) The listed Chinese enterprises and non-listed Chinese enterprises differentiate in terms of perception for market size and government effectiveness. From the log-linear regression analysis of transaction-level project data, the coefficient of GDP is larger in the non-listed group, indicating that non-listed enterprises are more sensitive to market than listed enterprises. Additionally, score of government effectiveness is only significant in the group of listed enterprises, suggesting that listed enterprises are more

likely to be constrained by risk of government effectiveness in host African countries. The reason for this is similar to that for SOEs, i.e., listed enterprises have a higher legitimacy requirement and thus have a greater demand to deal with business affairs from the government end.

(7) Comparing industry sectoral characteristics, risk and motivation perception for FDI from primary, secondary, and tertiary sector are different. From log-linear regression analysis, it is found that the coefficient of GDP is largest in the secondary sector group, which suggests enterprises from secondary sector are more sensitive to market size in Africa. In terms of political risks, score of stability and violence are only positively significant in primary sector group, which indicates that primary enterprises are more likely to be constrained by risk of non-stability and violence. And government effectiveness is only significant in secondary sector group, which indicates enterprises from secondary sector are more likely to be constrained by government effectiveness in host Africa country. The risk perception difference can be explained by the sunkness of the investment (Colen et al., 2016), where projects in primary sector and secondary sector have a higher percentage of sunk investment and thus are more likely to be constrained by political risks in host countries, while projects from tertiary sector has lower percentage of sunk investment and they are less likely to be constrained by political risks in host countries.

The determinants of Chinese OFDI in Africa considering both autocorrelation in both temporal and spatial dimensions are summarized in Figure 8-1 below.

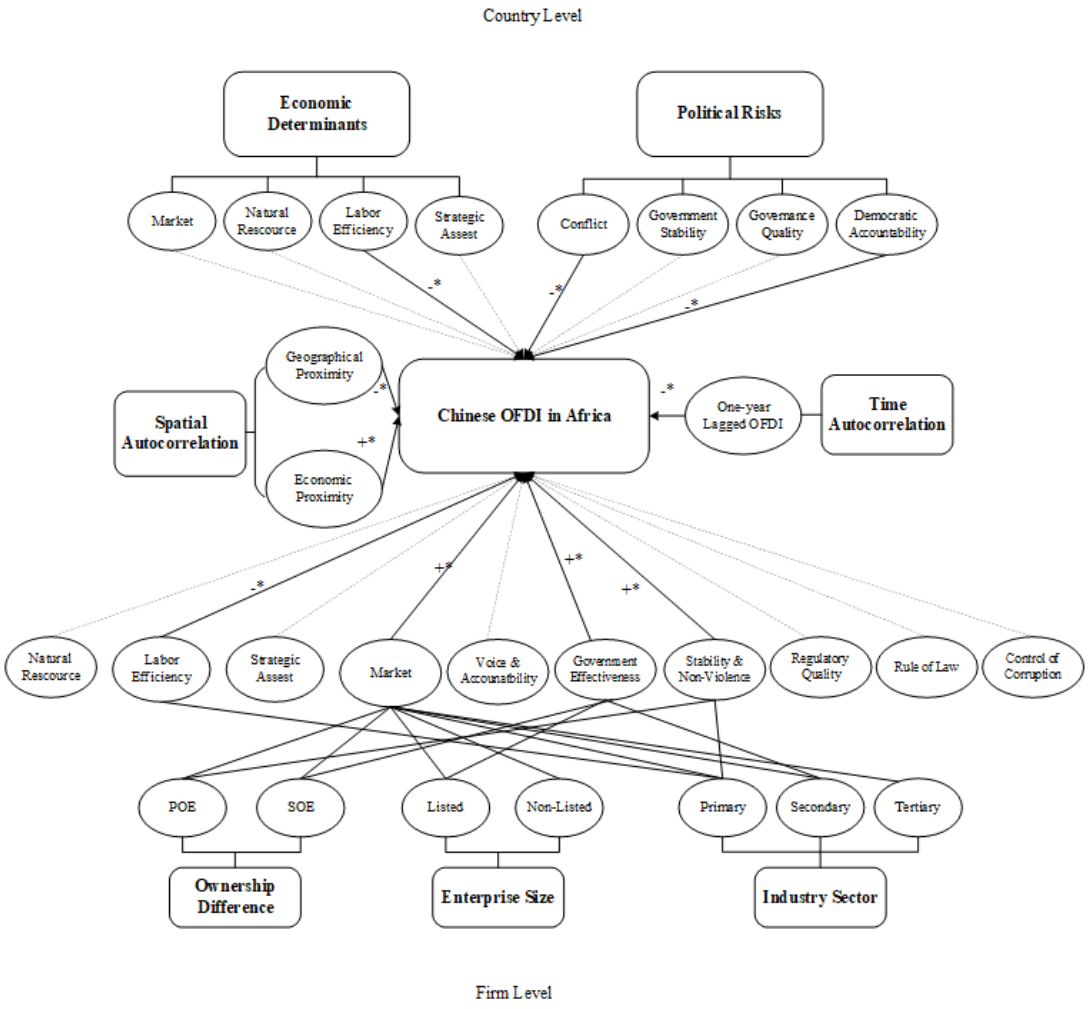


Figure 8-1 The Major Determinants of Chinese OFDI in Africa and Their Effect

8.2 Policy Implications

This study reveals the determinants of Chinese OFDI in Africa, especially the economic opportunities and political risks of Chinese OFDI in Africa, with aggregate country-level panel data with 35 African countries in 2006-2019 and firm-level data from both MOFCOM and survey. Taking time-lag and third-country influence into consideration, this study investigates the agglomeration and cluster effect of Chinese OFDI in the temporal and spatial dimensions. Additionally, this study uses firm-level project data of Chinese OFDI in Africa and compares the risk and motivation perceptions among Chinese enterprises with different ownership structures, of different

sizes, and in different industry sectors. By doing so, following feasible policy implications are proposed and offered to Chinese enterprises, the Chinese home country government, and African host country governments.

(1) Implications for Chinese enterprises. First, in addition to economic determinants, Chinese enterprises should pay more attention to political determinants in Africa host countries. Using both aggregate country-level data and firm-level data, there is significant evidence showing Chinese OFDI in Africa can be determined by economic determinants, including natural resource seeking motivation, market seeking motivation, efficiency seeking motivation, and infrastructure in host country. However, the total score of political risks is insignificant to Chinese OFDI in Africa. And among the political determinants only score of democratic accountability and score of conflict are found positively significant to Chinese OFDI in Africa, while score of governance quality and government stability are not significant to Chinese enterprises. These findings indicate that Chinese enterprises take inadequate consideration of political determinants. Thus, it is suggested for Chinese enterprises should pay enough attention to political risks in host countries.

Second, Chinese enterprises should have a better evaluation system before investment, especially for evaluation political risks. Both aggregate country-level data and firm-level transactional data identifies some determinants in the perspective of economic motivations and political risks. These empirical results can be used to establish an attractiveness evaluation index system of host country, which helps Chinese enterprises to choose proper host country and avoid possible risks.

Third, private enterprises should pay more attention to increase their capabilities in dealing with political risks in host Africa countries. Employing firm-level transactional data with log-linear regression, it is found that, compared to SOEs, POEs are more likely to suffer from risk of instability and violence, which is also supported by the survey analysis showing that Chinese SOEs are constrained by mild institutional risk such as governance effectiveness while POEs will suffer from wars and stabilities. Moreover, POEs are less capable of dealing with political risks than SOEs. Thus, it is of greater importance for POEs to improve its risk dealing capabilities.

(2) Implications for Chinese government. First, related government departments such as MOFCOM, NDRC, etc. or mass organizations such as Chamber of Commerce, China Council for the Promotion of International Trade (CCPIT) should develop a risk evaluation indicator system to help enterprises to evaluate attractiveness and risks of host Africa country. Compared to developed countries, Chinese enterprises has less experience in investing in Africa because it was not opened up till 1978. Thus, most Chinese enterprises investing in Africa are still in exploratory stage. In the dynamic panel data model, the one-year lagged Chinese OFDI in Africa is found having a negative significant effect on current year investment. This indicates that Chinese investment in Africa flows in and out frequently, i.e., most enterprises are still in exploratory stage. It is the responsibility of government to establish a scientific and feasible evaluating indicator system of attractiveness and risk of host country to help enterprises making proper FDI decisions.

Second, when formulating FDI policies, Chinese government needs to consider

the different motivations and risk perception among different enterprises. In addition to slight difference in FDI polices for enterprises with different ownership structures, most FDI policies by the Chinese government are the same for enterprises of different sizes and in different sectors. However, using the firm-level transaction data, it is found that risk and motivation perception for POEs & SOEs, listed & non-listed enterprises, and enterprises in three industry sectors are different. Thus, it is suggested that related government departments should refine FDI policies based on enterprises size and industry sector.

Third, Chinese government needs to pay more attention to supervising and guiding private enterprises investing in Africa. After analyzing and comparing motivation and risk perception of Chinese enterprises with transactional data, it is found that POEs are more likely to be motivated by market size, while more likely to be constrained by instability and violence risk in host countries. Additionally, it is widely mentioned in the follow-up interview that Chinese POEs in Africa get less assistance from government. Thus, it is suggested that Chinese government should pay more attention to guide and assist POEs.

(3) Implications for Africa host governments. First, Africa governments can offer preferential policies to attract capital intensive Chinese OFDI. Using both static model and dynamic model, GDP per person employed is found negatively significant, indicating that Chinese OFDI is efficiency seeking especially seeking for higher capital returns instead of labor productivity. Additionally, the abundant natural resource and increasing large market are also advantage of Africa in attracting Chinese investment.

Africa government should make reasonable of the resource and market advantages to use the investment capital to develop its own economy. It would be short-sighted to rely entirely on exporting natural resources.

Second, Africa government should improve the business environment including better government accountability and better infrastructure. Score of government accountability are found positively significant in both static estimation and dynamic estimation, which indicates Chinese enterprises are more likely to invest in Africa with better accountable governments. Additionally, the infrastructure proxied by cellular holding rate is found positively significant to Chinese OFFDI in Africa. Thus, it is important for African host governments to improve the infrastructure. And it is suggested that host African governments can build industrial park with stable electricity supply and convenient transportation, and offer preferential policies such as rent reduction policies to attract more FDI.

Third, African countries should expand the coordinated cooperation within trade bloc, while reinforce the geographical regional cooperation among neighboring countries. Using the Spatial Autoregressive Model with geographical binary weight matrix and Spatial Error Model with geographical distance weight matrix, a significant negative third-country effect is identified. This indicates a substitution effect existed among neighboring African countries in attracting Africa countries. Additionally, a positive third-country effect is identified in Spatial Autoregressive Model with international trade bloc binary weight matrix, i.e., a complementary effect is identified. In other words, there is a positive spillover of Chinese OFDI within the international

trade bloc. Thus, it is suggested that Africa countries should improve a benign regional cooperation in geographical proximity in attracting Chinese OFDI, and expand the economic cooperation by joining regional economic integration organization such as trade union blocs.

8.3 Limitations & Further Studies

Using both aggregate country-level data and firm-level transactional data, this study mainly analyzes the political and economic determinants of Chinese OFDI in the Africa from different perspectives. However, this thesis still has several limitations that require further study.

First, this study does not consider the push factor from home country side. This study focuses on determinants from host country side, i.e., the locational determinants of Chinese OFDI. And further studies can take home country factors such as political closeness between China and African country, cultural proximity, country and provincial level policies, etc. into consideration.

Second, this study does not cover all the African countries because of data gap. The aggregate country-level data limits to 36 African countries because of data gap in ICRG dataset, and further reduced the sample to 35 by excluding Zimbabwe as an outlier. The firm-level FDI project data can cover 45 African countries, but it also limit to 38 African countries when conducting regression analysis because of data gap in explanatory variables such as high technology export.

Third, due to the limited sample size this study, it does not divide the enterprises into more detailed subdivisions in firm-level analysis. In order to compare FDI risk and

motivation perceptions of different Chinese enterprises, this study only divide enterprises into POEs & SOEs, into listed & non-listed enterprises, and into the primary sector, secondary sector and tertiary sector. However, there are more detailed subdivisions of ownership, enterprise size, and industry sectors. And further studies can use more subdivision of enterprises with larger sample size.

Appendix

Survey on Chinese Outward Foreign Direct Investment in Africa

Dear Respondents,

Thanks for your attention to this project! This project mainly studies the determinants of China's Foreign Direct Investment (FDI). This questionnaire survey mainly focuses on managers with overseas investment experience or staff who have participated in overseas projects. This questionnaire will take you about five minutes! The personal information such as name and contact information involved in the questionnaire are only used for possible follow-up interview visits! After that, your relevant personal information will be deleted and will not be released! The person in charge of this project is Mr. Hua Yidi, a doctoral student majoring in International Studies at the University of Nottingham Ningbo, China. If you have any questions about this project, please contact via 13968237392! Thank you again for your attention to this project!

1. Your name: *

_____

2. Your company name: *

_____

3. Your position: *

_____

4. Your mobile phone: *

_____

5. What is the ownership of your enterprise *

○State-owned

○Private-owned

○Other _____ *

6. What is your company's sector of activity [Tick at least one] *

□Agriculture

□Mining and metals

□Energy

□Tourism and hospitality

□Infrastructure

□Consumer products

□Real estate and construction

□Telecommunications

□Financial services

□Other services

□Information technology

□Public sector

□Other _____*

7. Which country or countries did you or your company have investment experience:

*

_____

8. Will you consider to invest in Africa *

○Yes

○No

9. Please rank the following determinants of oversea investment by their importance

[Ranking from most important to least important] *

[ ] Natural Resource

[ ] Market

[ ] Cost Efficiency

[ ] Strategic Assets

[ ] Internal and External Wars

[ ] Socioeconomic Order

[ ] Government Stability

[ ] Government Accountability

[ ] Infrastructure

[ ] Inflation

[ ] Net Aid Received

[ ] Trade Openness

10. What are the economic drivers for your outward FDI decision [Tick at least one] *

□Natural Resource

□Market

□Cost Efficiency

□Strategic Assets

□Other _____*

11. Will you consider the cost efficiency of host country when you making FDI decision *

○Yes

○No

12. Did you use any production material from the host country *

○Yes

○No (Skip to 14)

13. Comparing to China, the price of production material in host country is *

○Higher than China

○Lower than China

○Similar to China

14. Did you employ local employee in host country *

○Yes

○No (Skip to 17)

15. Comparing to China, cost of local labor is *

○Higher than China

○Lower than China

○Similar to China

16. Comparing to China, the skill capability of local labor force is *

○Higher than China

○Lower than China

○Similar to China

17. Will you consider the market size of host country when you make FDI decision *

○Yes

○No (Skip to 19)

18. How would you define a large market size [Tick at least one] *

□Country with large population

□Country with high population growth rate

□Country with high GDP

□Country with high GDP growth rate

□Country with high GDP per capita

□Country with high GDP per capita growth rate

□Other _____*

19. Will you consider natural resource in host country when you make FDI decision *

○Yes

○No (Skip to 22)

20. Which types of natural resource are important for you [Tick at least one] *

□Metal and Mining

□Gas

□Oil

□Land

□Other _____*

21. Comparing to China, the advantage of host country in this type of resource is *

○Availability of resource

○Price of resource

○Quality of resource

○Other _____ *

22. Will you consider the strategic assets (like knowledge property) of host country when you make FDI decision *

○Yes

○No

23. Have you ever used any type of knowledge property assets in host country *

○Yes

○No (Skip to 25)

24. Which types of assets have you ever used [Tick at least one] *

□Trade marks

□Patents

□Secrecy

□Other _____*

25. Which of the following economic drivers do you think Africa countries possibly have to attract Chinese FDI [Tick at least one] *

□ None

□Large market

□Less competitive emerging market

□Cheap production material

□Cheap labor cost

□Rich natural resource

□R&D capabilities

□Other _____*

26. What do you think are the major deterrents for you to foreign investment [Tick at least one] *

□Risk of exchange rate fluctuation and inflation

□Political risks

□Incomplete infrastructure

□Information asymmetry caused by culture, language and preference difference

□Other _____*

27. Will you consider wars and conflicts of host country when you make FDI decision *

○Yes

○No (Skip to 30)

28. Have you ever experienced wars or conflicts during your operation overseas *

○Yes

○No

29. The war or conflict you experience belongs to *

○External conflict

○Internal conflict between religious groups

○Internal conflict between political parties

○Internal conflict between ethnic groups

○Other _____ *

30. Will you consider socioeconomic order of host country when you make FDI decision *

○Yes

○No (Skip to 33)

31. Are you familiar with socioeconomic order and legislation system of host country *

○Not at all

○Have limited knowledge

○know some

○very familiar

32. Is the legislation system in host country fair enough for your operation oversea *

○Yes

○No

33. Will you consider government stability of host country when you make FDI decision *

○Yes

○No (Skip to 37)

34. Have you or your company experience irregular government change (like coup) *

○Yes

○No (Skip to 37)

35. Did the irregular government change bring any effects to your operation in host country *

○Yes

○No (Skip to 37)

36. What kind of effect did it bring to you [Tick at least one] *

□Riots affect safety of both staff and property

□Inconsistency of policies

□Unable to have normal production or operation

□Other _____*

37. Will you consider government accountability of host country when you make FDI decision *

○Yes

○No (Skip to 41)

38. Have you ever experienced government expropriation during your operation oversea *

○Yes

○No

39. Have you ever experienced the situation that your partner or customer in host country cannot perform the contract accordingly *

○Yes

○No

40. Have you ever experienced the situation that host government or government officials directly or indirectly claiming for a bribery *

○Yes

○No

41. What are the major deterrents for Africa to attract Chinese FDI [Tick at least one] *

□Wars and Conflicts

□Socioeconomic Order

□Government Stability

□Government Accountability

□Incomplete Infrastructure

□Inflation

□Other _____*

42. Will you consider the infrastructure of host country when you make FDI decision *

○Yes

○No

43. What kind of infrastructure are important for your operation oversea *

○Production facilities (e.g., Plants, Land, etc.)

○Electricity supply

○Water supply

○Transportation facilities (e.g., Roads, Ports, Railways, etc.)

○Telecommunication facilities (e.g., Telephone lines, Internet connection)

○Other _____ *

44. Will you consider the inflation rate of host country when you make FDI decision *

○Yes

○No

45. Will you consider trade openness of host country when you make FDI decision *

○Yes

○No

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