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TITLE:

An empirical analysis of Chinese foreign direct investment trends and determinants

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Contents

Abstract

To increase our knowledge on determinants of FDI, we will examine potential determinants for Chinese FDI and their choice of continents allocation by testing them against three theories: *Dunning's OLI paradigm*, *the new theory of trade*, and *the institutional approach theory*.

We apply fixed-effect model and random-effect model on Chinese country-level panel data (from 2008-2016) to reveal the relationship and significance for determinants of Chinese FDI stock. In addition, we look at the relationship between continents characteristics and Chinese FDI stock. Similarly, we test the Belt Road countries to investigate their attractiveness as a location for Chinese FDI.

Econometric model tests reveal that allocation of Chinese FDI is significantly impacted by infrastructure, trade openness, market size, the economic stability and exchange rate as conclusive main determinants. Production cost, natural resource and protection of intellectual property rights have been found with conditional significance in specific models. When a host country's GDP declines, or experience higher inflation or unemployment, we will see a reduction in Chinese FDI stock.

Trade openness, infrastructure and economic stability are significant determinants of Chinese FDI stock to Belt Road countries. The investment from China to Belt Road countries are found to be comparably lower. However, the result is likely biased due to the period (2008-2016) used in our data sample, whereas the Belt Road policy was enacted in 2013 leading to a lagged effect in our test. Future research on this subject may reveal a different outcome from ours.

Key words:

Chinese foreign direct investment, FDI, determinants of Chinese FDI, Belt Road

1. Introduction and Background

Foreign direct investment (FDI) has been studied for many decades through numerous theoretical and empirical research publications. As a macro-economic driver in the global economy, its factors and trends impact individuals, multinational enterprises, and government interests.

China has experienced tremendous growth the past few decades and represents a significant portion of the current global FDI. This study seeks to address the main determinants of FDI and highlight the most significant country characteristics behind Chinese FDI and their country allocations.

1.1 Research question

The focus of this thesis is to investigate the significant determinants behind Chinese foreign direct investment trends and its continents allocation. To promote further knowledge on this subject, we will examine potential drivers for Chinese FDI and their choice of continents allocation by testing them against three theories: Dunning's OLI paradigm, the new theory of trade, and the institutional approach theory. From evaluating the significance and data relationships from these analysis, we hope to verify if any pattern exists in terms of geography or government policies and examine the Belt Road countries. Where a handful of earlier studies into this field of study have applied now outdated data, this research will provide an updated review using data from the period of accelerated growth in China from 2008 to 2016.

The 2016 Statistical Bulletin of China's Outward Foreign Direct Investment published by the Ministry of Commerce of the People's Republic of China, National Bureau of Statistics of China and State Administration of Foreign Exchange address Chinese FDI historical panel data detailed with country level breakdown from 2008 to 2016 (Ministry of Commerce of the People's Republic of China, National Bureau of Statistics of China, & State Administration of Foreign Exchange, 2017). Analyzing the data obtained from this report, we hope to find a pattern by testing several hypotheses and determine: if the country allocation of Chinese FDI is significant and does it have a positive or negative relationship with technology, natural resource endowment, market strategy demand, trade openness of the host country, and international trade relationship between China and host countries.

Previous studies on FDI has ranged from theoretical to empirical factors driver of FDI activities, and of the influence of FDI on a country's economy. In Dunning's location advantages theory, it is summarized as resource -seeking, market - seeking, efficiency - seeking, and strategic asset – seeking (Dunning, 2009). This thesis primarily analyses FDI stock to examine the various determinants for location of China's FDI activity, using logarithmic in both FDI stock (lnFDI_Stk) and the rate of change in FDI stock (lnCFDI_Stk = lnFDI_Stk – lnFDI_Stk1) as dependent variables.

The findings of this thesis are that the infrastructure, the openness of economics, market size, the exchange rate and the economics status are significant to Chinese FDI stock and the growth in stock. The better infrastructure and the more open of the host country can attract more Chinese FDI. The higher economic status in the host countries can lead higher Chinese FDI. When GDP declines, inflation or unemployment increases in the host countries, we will see a reduction in Chinese FDI stock. Production cost, natural resource and protection of intellectual property rights have been found to have significant effects on FDI in specific models.

1.2 Background

Rapid growth in FDI activities with added momentum from multinational enterprises (MNEs) has garnered some attention from the academic field into the study of FDI at country-level, region-level, and firm–level. Foreign direct investment, the transfer of the asset including tangible and intangible across states, has resulted in significant impact on countries.

Foreign Direct Investment (FDI) is the primary driver in the development of the global economy according to the World Investment Report (UNCTAD, 2017). However, the global FDI holds less momentum in 2016. The global FDI inflow has declined by 2% to 1.75 trillion dollars (UNCTAD, 2017). Meanwhile, since China's "openness" policy was effectuated in 1978, the Chinese economy has experienced a consistent level of growth.

Table 1.1 and figure 1.1 exhibit statistical data of global FDI outflow in 2016, sourced from "2016 Statistical Bulletin on China's Outward Foreign Direct Investment". The data presented in this report reviews FDI where data of countries other than China originates from World

Investment Report (UNCTAD, 2017). FDI flow is explained as the annual measurement of net flow of foreign direct investment at country's level.

Table 1.1

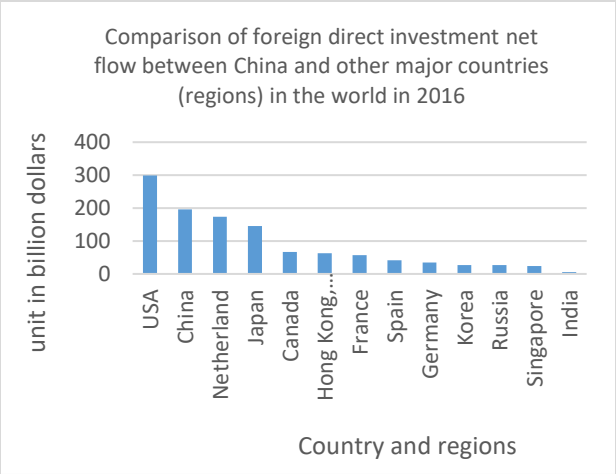
Comparison of foreign direct investment net flow between China and other major countries (regions) in the world in 2016

Unit: billion dollars

Country	Amount
USA	299.0
China	196.2
Netherland	173.7
Japan	145.2
Canada	66.4
Hong Kong, China	62.5
France	57.3
Spain	41.8
Germany	34.6
Korea	27.3
Russia	27.3
Singapore	23.9
India	5.1

Source: 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 4)

Figure 1.1



Source: 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 4)

Chinese foreign direct investment has observed a steady increase from 2002-2016 (shown in figure 1.3 and 1.4), the total amount of Chinese FDI net flow reached 196.15 billion dollars in 2016 and rank 2. worldwide behind USA (shown as in table 1.1). At the end of 2016, Chinese FDI activities covered approximately 190 countries or regions, with Chinese FDI stock reaching 1357.39 billion dollars. Chinese MNEs have actively participated in or initiated mergers & acquisitions, implementing over 765 events covering 74 countries and regions in 2016 only (Ministry of Commerce of the People's Republic of China et al., 2017).

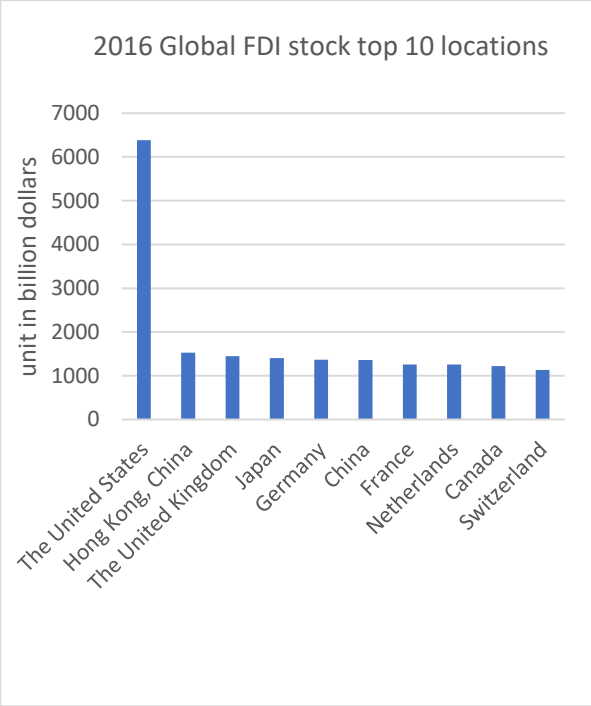
The diversity and tremendous volume of FDI from China has contributed to increased attractiveness of Chinese capital in the global market, leading to added demand for more knowledge and information surrounding behaviors and determinants behind Chinese investments.

Table 1.2 Global FDI Stock location top 10 countries and regions in 2016

No.	Countries / Regions	FDI Stock	unit: billion US dollars Shares %
1	USA	6383.75	24.4
2	Hong Kong	1527.88	5.9
3	UK	1443.94	5.5
4	Japan	1400.69	5.4
5	Germany	1365.37	5.2
6	China	1357.39	5.2
7	France	1259.38	4.8
8	Netherlands	1255.95	4.8
9	Canada	1219.99	4.7
10	Switzerland	1130.91	4.3

Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment. (Ministry of Commerce of the People's Republic of China et al., 2017, p. 5).

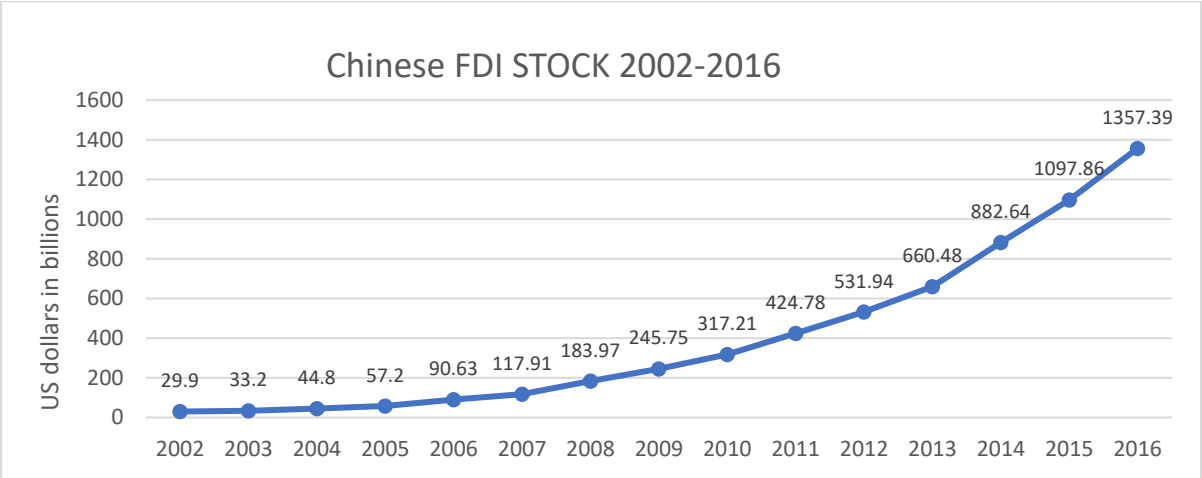
Figure 1.2



Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment.(Ministry of Commerce of the People's Republic of China et al., 2017, p. 5).

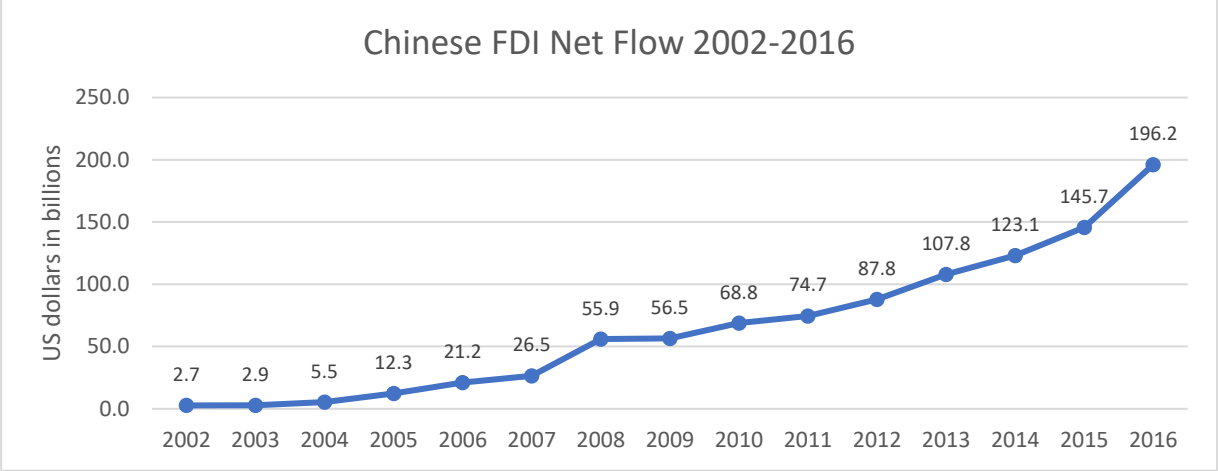
Table 1.2 and figure 1.2 describe the global FDI stock amount top 10 regions or countries comparison in 2016. FDI stock is the measurement of the cumulative at year-end aggregated value. China's FDI flow quantity has been in the second largest 196.15 billion dollars in 2016, while China's FDI stock is in the 6th place and Hong Kong holding 1527.9 billion dollars is the second place behind USA (Ministry of Commerce of the People's Republic of China et al., 2017).

Figure 1.3 Chinese FDI Stock 2002-2016



Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 6).

Figure 1.4 Chinese FDI Net Flow 2002-2016



Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 7).

Figure 1.3 and figure 1.4 presents the Chinese FDI stock and Chinese FDI net flow trend graph from 2002-2016.

Chinese MNEs participated in 200 merger and acquisition projects abroad in 2016, valued at 30.1 billion US dollars in the manufacturing industry. Following that, the information transfer, computer and software service industry stands in the second place valued with 26.41 billion US dollars. The third industry (traffic storage and mail business) and the fourth industry (production and supply of electric power, gas and water) at top of mergers and acquisitions in 2016 are at 13.79 billion and 11.21 billion US dollars, respectively (Ministry of Commerce of the People's Republic of China et al., 2017). The largest abroad merger and acquisition events in terms of quantity in 2016 from Chinese MNEs, is the investments from QinDao Haier Co. Ltd who acquired General Electric Company Home Appliance Business Project by 5.58 billion US dollars; Tencent Holdings Co. Ltd acquired Finish Super Cell Corp by 4.1 billion US dollars with 84.3% equity; Tianjin Tianhai Logistics investment management Co. Ltd acquired American Ingram Micro International company for 6.01 billion US dollars; China Three Gorges Corporation invested 3.77 billion US dollars for 30 years of operating rights to Brazil's Juba Hydropower Station and Elias Hydropower Station (Ministry of Commerce of the People's Republic of China et al., 2017).

The rest of the thesis is organized as follows. Section 2 elaborates the theory and previous literatures review, the summary of the highlights of literatures. Data description and methodology will be presented in Section 3. The specified models and the empirical results and discussion is presented in Section 4. Section 5 provides the conclusions.

2. Theory and literature review

Foreign Direct Investment (FDI) has been studied for many decades. As the field of research expanded and international trade grew, FDI became commonly described as the economic activity of a country's investors to export tangible and intangible assets such as capital, equipment, technology, and management skills to obtain effective control over the management and operation of foreign companies. Hymer (1960) explained FDI as a means of transferring knowledge and other assets, both tangible and intangible, to organize production abroad in his groundbreaking contributions to the field of FDI.

The literature review covers theoretical and empirical review in two parts.

2.1 Review of theoretical literature

Through the emergence of global trade, FDI has grown to become an important driver to the growth of global economy. This has spurred extensive research into the field of FDI. Many of the important contributions to the theories, and determinants of foreign direct investment literature is reviewed by Teixeira (2011) in "Location determinants of FDI a literature review". In the study of FDI, Heckscher-Olin model or MacDougall-Kemp Model was discussed by Aliber (1970), who argued for return on the investment, lower labor cost and exchange fluctuations as central determinants to FDI activities. Hymer (1960) and Kindleberger (1969) in their study of market imperfections theory, view ownership benefits (product differentiation), economies of scale, and the government incentives as significant determinants of FDI. The effect of market failures or market inefficiencies on FDI is reviewed by Hennart (1982) and Casson (1987) through their research on internalization theory.

Dunning's holistic approach uses OLI paradigm that adopts both the internalization theory and other more traditional theories (Dunning, 1979). By employing the eclectic paradigm, it brings together several complimentary theories, proposing a set of variables that have relevant applications to trade.

Through examining FDI literature, we have identified three dominant theories in FDI location determinants field of study in: eclectic paradigm (OLI – Ownership, Location, and Internalization) (Dunning, 1979), the new theory of trade, and institutional approach.

Teixeira (2011) has summarized that Dunning's OLI theory– Ownership, Location, Internalization as the determinants of FDI, eclectic paradigm considers:

- *"Benefit of ownership, such as productive processes, patents, technology, management skills";*
- *"Advantage of location, such as protected markets, favorable tax systems, low production and transportation costs, lower risk";*
- *"Advantage of internalization, such as cutting transaction costs, lowering risk of copying technology, quality control."*

Dunning (1993) have discussed the variables for location of FDI that market size, market growth, barriers to trade, wages, production, transportation and other costs, political stability, psychic distance, and host government's trade and taxation regulations are determinants of FDI.

The different literature of OLI paradigm holds various infrastructure effect, for example, the number of internet connections are negative effect (Botrić & kuflić, 2006), and "Infrastructure index" (Vijayakumar, Sridharan, & Rao, 2010) as proxies of infrastructure have positive effect. It tests adult literacy rate as human capital proxies is positive (Asiedu, 2006). "Weighted average of main currencies adjusted for inflation" (Vijayakumar et al., 2010) are negative determinants factors. Unemployment rate has positive effect and wage as production costs has negative effect (Botrić & kuflić, 2006).

New theory of trade and institutional approach are the other two dominant theories of FDI determinants. New theory of trade argue that the market size (proxy GDP, GDP per capita), market growth (proxy GDP growth rate, industrial production index), openness of economy, and the factor endowments in natural resources all have positive affect on FDI (Teixeira, 2011).

Institutional approach examines the political variables, financial and economic incentives, tariff and taxes rate as important determinants of FDI (Grubert & Mutti, 1991). Under the theory of institutional approach, some studies discuss that protection of copyright index has positive effect (Biswas, 2002). Franklin and Ahmed (1978) find there is no effect of tax incentives as proxy and bilateral average effective tax rates negatively affect FDI (Bellak & Leibrecht, 2009).

From OLI perspective: FDI determinants can be infrastructure (infrastructure index), human capital (secondary education index), economic stability (financial sector development index, currency/GDP), and production cost (worker's wage). FDI determinants associated with the "New theory of trade": market size (GDP; GDP per capita; market growth (real GPD growth rate), openness of the economy, openness index; factor endowments in natural resources (industrial production index). For institutional approach, three determinants are considered: corruption, political instability, weak institutional quality. Summarized as table 7.1 in appendix.

2.2 Review of empirical literature

B. A. Blonigen (2005) has provided the empirical literatures review on location of FDI decisions. The determinants for FDI activities are divided by two sides as internal and external factors. The internal factors are firm-specific factors, while the external factors concerns the drivers of locations and magnitude of FDI made by MNEs (B. A. Blonigen, 2005).

Many studies of partial equilibrium explore the exogenous macroeconomic effects on the firm's FDI activities, by focusing on exchange rate movements, taxes, tariffs, and some extra factors (B. A. Blonigen, 2005). The data type of these studies varies from industry-level, country-level, firm-level, and plant-level. We will discuss further on the exchange rate effects, taxes, institutions, and trade effects, respectively.

1. Exchange rate effects

The changes of exchange rate between countries and the volatility of exchange rates are considered as the primary influence of the exchange rate effects on FDI. Depreciation in currency leads to increased inward FDI in US (B. A. Blonigen, 2005), while uncertainty of exchange rate reduces FDI activities (Campa, 1993). However, a study by Goldberg and Kolstad (1995) argue that the uncertainty of currency will increase FDI flow. Financial decisions of international investment firms tend to rely on the interaction of exchange rate expectations, trade, and other financial options as a means of profit for the firm (Cushman, 1985).

2. Taxes

The taxes effects on FDI is depended on the type of taxes, the magnitude of FDI activities, and the tax treatment difference between the parents and host countries. Hartman (1984) concludes that there is no way to avoid the foreign earnings taxes regardless the type of reinvestment of the earnings, either deal with the taxes in the host country or in the parent country. Due to the difference of taxes treatment in parent and host countries, the MNEs also take this factor into the decision of FDI activities. However, some studies argue that the tax treatment has little effect on FDI activities at any significant level ((Hallward-Driemeier, 2003), (B. A. Blonigen, Davies, R. B., 2004)).

3. Institutions

Protection of intellectual property, protection of assets and the degree of transparency has an influence on the flow of FDI. Quality of institutions influence the quality of infrastructure which in turn effect FDI. Wei (2000) argues that the institution (corruption), or the lack thereof has significant negative effect on FDI activities.

4. Trade protection

Studies find it challenging to use a consistent method to quantify the non-tariff form across industries, according to Grubert and Mutti (1991) and Kogut and Chang (1996). The standard hypothesis is that higher trade protection makes firms prefer to product from affiliate instead of cost of trade production. There might be endogenous relationship between FDI activities and trade protection. Bruce A Blonigen and Figlio (1998) presented empirical evidence that US Senators or house representative are more likely to vote for trade protection when the FDI into US Senator's State or house representative's district is increased.

5. Trade Effects

Buckley and Casson (1981) elaborates in their research that export grows into FDI activities when the demand of product in the foreign market is large enough, as the low fixed cost of export and the high cost of logistic and trade barrier, which results in serving the same market with affiliating marketing to reduce the variable costs. Exemplified from the automobile industry where supplier-assemble firms have the capability to affect the FDI activities.

Table 2.1 summarize relevant empirical literatures from Kechagia and Metaxas (2018).

Authors	Dependent variable	Data	Models	Main Determinants
Bevan and Estrin (2004)	FDI flow	Central and Eastern European countries 1994-2000	Panel dataset Random Effects	labor costs, gravity factors, market size, EU membership, Proximity
Tintin (2013)	log (FDI inflows)	6 European central and Eastern European countries 1996-2009	Panel OLS with fixed effect	GDP, trade openness, EU membership and the institutions
Seyoum, Wu, and Lin (2014)	Trade openness index (export + import) / GDP	Annual balanced panel data for 25 Sub-Saharan African economics, 1977-2009	Panel data analysis	Free trade positive effect on FDI
Thangavelu and Narjoko (2014)	ln(FDI +1)	39 OECD and ASEAN countries, 2000-2009	Gravity model fixed effect	Market size, multilateral trade agreements, AFTA, distance.
Cleeve, Debrah, and Yiheyis (2015)	FDI flow	35 Sub-Sahara African (SSA) countries 1980-2012	Panel analysis: Panel OLS, panel fixed effect, random effect, panel EGLS	Human capital effect on FDI inflow into SSA countries. FDI determined by the market size and growth, the natural resource endowments, the infrastructure, and the economic crises.
Suliman and Mollick (2009)	FDI inflows	29 Sub-Sahara African (SSA) countries 1980-2003	Fixed effect	the literacy ratio, the political freedom and civil rights are positive impact on FDI

Kasuga (2007)	GDP, the gross fixed capital formation	64 developing countries,1980-1999	An open-economy model, Panel dataset random effect, fixed effect	the host country's income level, financial structure and governance and institutional quality are FDI determinants.
Morrissey and Udomkerdmongkol (2012); Masron and Nor (2013)	Domestic private investment; FDI inflow	46 developing countries 1996-2009; 8 Association of Southeast Asian Nations (ASEAN)	Panel analysis	Effective governance and institutions quality.
Vijayakumar et al. (2010)	log (FDI inflows)	Annual dataset BRICS countries 1975-2007	Panel analysis, fixed effect, and random effect	Market size, the labor cost, infrastructure, currency value and the gross fixed capital formation, institution, trade openness.

Source: summarized by author from Kechagia and Metaxas (2018)

Table 2.1 is a summary of empirical literature on the field of FDI determinants, with relevance for our research. It provides an overview of the methodology, panel data, fixed-effect, random-effect, dependent variable, data sample and data period applied in their research. Several theories use FDI flow as the dependent variable, which used our test models in Chapter 4. However, it resulted in very few significances in our research, which lead us to modify our models to using logarithm form FDI stock as dependent variable in our continued study instead. While several studies in table 2.1 use FDI inflow, our data sample contains FDI net flow values, which has implications for our choice of dependent variable. It is discussed more in details under Chapter 4.

3. Data and methodology

The analyzed data are mainly acquired from three sources: 2016 Statistical Bulletin of China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017), the World Bank's databank for World Development Indicators 2008 – 2016 (World Bank, 2018), and IMD World Competitiveness Ranking (the IMD World Competitiveness Center, 2018). The methodology of the thesis will focus on fixed effect model and random effect model of panel data, which will be elaborated further.

3.1 Data

In this thesis we apply panel data of 184 countries from 2008-2016. There are certain indicators, and a few countries in the sample that does not contain enough available data. After running regression, we find that some models will experience reduced observation due to insufficient data. In the panel data, we establish a country code format from 1-184 in alphabet order, for example, Afghanistan is coded as "1" and Zimbabwe is coded as "184".

Table 3.1: The Chinese outward FDI top 20 locations in 2016

Chinese OFDI Flow locations top 20 countries and regions in 2016

No.	Countries/ Regions	FDI Flow unit: billion US dollars	Share%
1	Hong Kong, China	114.23	58.2
2	The USA	16.98	8.7
3	Cayman Islands	13.52	6.9
4	The British Virgin Islands	12.29	6.3
5	Australia	4.19	2.1
6	Singapore	3.17	1.6
7	Canada	2.87	1.5
8	Germany	2.38	1.2
9	Israel	1.84	0.9
10	Malaysia	1.83	0.9
11	Luxembourg	1.6	0.8
12	France	1.5	0.8
13	The United Kingdom	1.48	0.7
14	Indonesia	1.46	0.7
15	The Russian Federation	1.29	0.7
16	Vietnam	1.28	0.7
17	Netherlands	1.17	0.6
18	Korea	1.15	0.6
19	Thailand	1.12	0.6
20	New Zealand	9.10	0.5
Sum	Total	186.26	95

Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 15)

Table 3.1 exhibit Hong Kong as the most popular destination for Chinese FDI in 2016, that accounted for 58.2% of the total proportion. Hong Kong operates with a free trade policy, which contributes to their economy by attracting high degree of investments from all over the world. The rules of law and investment environment in Hong Kong is more flexible than mainland China. There is a free trade agreement between Hong Kong and mainland China (Economic Partnership Arrangement (CEPA)). The financial services and excellent legal system all contributes to the attractive advantages for companies investing in Hong Kong, maintaining Hong Kong as one of the major commercial hubs in Asia (Hong Kong Trade and Industry, 2016). In Chinese domestic company's point of view, Hong Kong is considered as a more open economy compared to mainland China and is seen as a close and convenient destination to conduct business with overseas partners. International companies consider Hong Kong as a convenient and strong economic hub which helps ease access into the mainland market. FDI rules is more open in Hong Kong in comparison to mainland China, which represent a major factor to the attractiveness for Chinese domestic companies' preference in transferring capital to Hong Kong as the first step for overseas investment (Hong Kong Trade and Industry, 2016).

Table 3.2:

2016 Chinese domestic region outward direct investment flows distribution overview

Unit: billion US dollars

Regions in China	FDI Flow	Weights %	Growth %
East region	125.60	83.4	63.9
Central region	10.11	6.7	59.7
West region	11.55	7.7	55.0
Northeast Provinces	3.25	2.2	1.4
Sum in total	150.51	100	60.8

Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 16)

The figures in table 3.2 summarize the domestic geographic distribution of China's FDI outward flow. East region holds the highest portion with 83.4% in the total. Table 3.3 below provides further domestic breakdown of the top 10 provinces of Chinese OFDI. All provinces in top 10 are populated by east and coast regions. These two tables reveal that east and coast regions in China holds a substantial weight of total Chinese FDI and drives Chinese overseas investments.

Table 3.3:

2016 Chinese regions OFDI Flow top 10 provinces (cities) unit: billion US dollars

No.	regions	FDI flow	Growth %
1	Shanghai	23.968	3.4
2	Guangdong Province	22.962	87.2
3	Tianjin	17.94	609.9
4	Beijing	15.574	26.8
5	Shangdong Province	13.024	83.2
6	Zhejiang Province	12.314	73.2
7	Jiangsu Province	12.202	68.3
8	Henan Province	4.125	214.2
9	Fujian Province	4.119	49.4
10	Hebei Province	3.013	220.4
Sum	Total	129.241	-

Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 17).

Table 3.3 shows impressive growth in all top 10 provinces in 2016, with Tianjin being the most noticeable achieving a growth rate of 609.9%. Tianjin is a coastal metropolis in northeastern China situated 120 kilometers from Beijing (which is at a very close proximity in Chinese geographical scale) and benefit from its geographical advantages. Its economic and innovative foundation is strong accommodating Tianjin's Economic Technological Development Area (TEDA), export processing zone, free trade zone, national marine high-tech development area and other industrial development parks (Tianjin Municipal People's Government, 2018).

Based on the primarily theories – OLI paradigm, the new theory of trade and the institutional approach, examines the significant determinant for Chinese FDI locations. Dependent variables are set as Y1 and Y2, (Y1=lnFDI_Stk, Y2=lnCFDI_Stk = ln (FDI-Stock) – ln (FDI_Stock1)). Independent variables contain GDP, GDP per capita, merchandise trade, mobile subscription, High technology export, inflation, exchange rate, compensations of employee, unemployment rate, tariff rate, total tax rate on profit, the total natural resource rent, protection of copyright and total R&D expense are in detail summarized in table 3.4. We use the lagged value of the following explanatory variables and omit the value in year 1 (value in year 2008). GDP1, GDPPC1, Mtrade1, Inf1, unemply1, TariffR1, TtlRD1, exc1 are set as lagged variable. There are

several dimensions of determinants, such as market size, the extent of the country's openness, economic stability, institution quality, tax and tariff effects, official exchange rate, compensation of employee, technology, infrastructure, and resource endowment factors - all set as proxy to the variables.

We are using Stata version 12 software to run the regressions. Table 3.4 below summarize our Stata setup containing Stata variable name, variable explanation, proxy, and original source:

Table 3.4 Explanation of variables in Stata

No.	Stata variable name	Variable	Proxy	Source
1	Ctry	Country has 184 countries as panel data setting		2016 Statistical Bulletin on China's Outward Foreign Direct Investment report
2	Yr	Years 2008-2016 as panel data setting		
3	lnFDI_Stock	Cumulative FDI stock* in natural logarithm form as dependent variable Y1		
4	lnCFDI_Stk	lnCFDI_Stk = ln(FDI_Stock) – ln (FDI_Stock1), as the growth in FDI stock, setting as dependent variable Y2		Rate of change in stock, calculated variable
5	lnGDP1	GDP (current US dollar)	Market size	World Bank national accounts data, and OECD National Accounts data files.
6	lnGDPPC1	GDP per capita (current US$)	Market size	World Bank national accounts data, and OECD National Accounts data files.
7	Mtrade1	Merchandise trade (% of GDP)	Openness economy	World Trade Organization, and World Bank GDP estimates.

* At the end of the year, the stock of foreign direct investment (FDI Stock): equal to the total amount of foreign direct investment at the end of the year minus the reverse investment accumulated by overseas enterprises for domestic investors. Foreign direct investment flow in the current period (FDI Flow): equal to the total foreign direct investment of the current period, less the reverse investment of overseas enterprises to domestic investors in the current period.

8	Hitech_Exp	High technology exports (% of manufactured exports)	Technology	United Nations, Comtrade database through the WITS platform.
9	Mob_S	Mobile celluar subscriptions (per 100 people)	Infrastructure	International Telecommunication Union, World Telecommunication/ICT Development Report and database.
10	Inf1	Inflation (%)	Economic stability	International Monetary Fund, International Financial Statistics and data files.
11	lnexc1	Official exchange rate (LCU per US$, period average)	Economic stability	International Monetary Fund, International Financial Statistics.
12	unemply1	Unemployment, total (% of total labor force) (national estimate)	Economic stability	International Labor Organization, ILOSTAT database. Data retrieved in November 2017.
13	cmp	Compensation of employees (% of expense)	Production cost	International Monetary Fund, Government Finance Statistics Yearbook and data files.
14	TariffR1	Tariff rate, applied, simple mean, all products (%)	Institutions support	World Bank staff estimates using the World Integrated Trade Solution system, based on data from United Nations Conference on Trade and Development's Trade Analysis and Information System (TRAINS) database and the World Trade Organization's (WTO) Integrated Data Base (IDB) and Consolidated Tariff Schedules (CTS) database.
15	TtlTaxR	Total tax rate (% of commercial profits)	Institutions support	World Bank, Doing Business project (http://www.doingbusiness.org/).
16	Protect	Protectionism of copyright	Institutions quality	IMD World Competitiveness Executive Opinion Survey based on an index from 0 to 10

17	TtlRD1	Total expenditure on Research and development (%) Percentage of GDP	Institutions quality	OECD Main Science and Technology Indicators 2/2016; UNESCO http://stats.uis.unesco.org
18	TtlNRR	Total natural resources rents (% of GDP)	Natural resource endowment factor	Estimates based on sources and methods described in "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium" (World Bank, 2011).

As our variables are mostly in percentages, we use the natural logarithm form for FDI stock, GDP, GDP per capita and exchange rate.

Table 3.5 Correlation matrix of variables:

	lnFDI_Stk	lnCFDI_Stk	lnGDP1	lnGDPPC1	Mtrade1	Mob_S	Hitech_Exp	Inf1	lnexc1	cmp	unemply1	TariffR	TtlNRR	TtlTaxR	Protect	TtlRD	lnFDI_Stk1
lnFDI_Stk	1.0000																
lnCFDI_Stk	0.0465	1.0000															
lnGDP1	0.6891	0.0039	1.0000														
lnGDPPC1	0.1488	0.0932	0.4249	1.0000													
Mtrade1	0.0149	-0.0907	-0.2218	0.0838	1.0000												
Mob_S	-0.1820	-0.0036	-0.1425	0.0669	0.1999	1.0000											
Hitech_Exp	0.3549	-0.0264	0.1299	0.0250	0.4240	-0.0055	1.0000										
Inf1	-0.1323	0.0436	-0.2340	-0.4719	-0.0143	0.0331	-0.1316	1.0000									
lnexc1	-0.0760	-0.0594	-0.4298	-0.5702	-0.0121	0.0175	0.1088	0.2749	1.0000								
cmp	-0.1336	0.0859	-0.4697	-0.3939	0.0022	-0.1106	0.3793	0.1051	0.2510	1.0000							
unemply1	-0.1093	-0.0836	-0.1838	0.0869	0.3283	0.1864	0.0034	-0.0662	-0.2281	0.0784	1.0000						
TariffR	-0.0257	0.0848	-0.3334	-0.4742	-0.2709	-0.1348	-0.1060	0.3109	0.3620	0.4049	-0.1428	1.0000					
TtlNRR	-0.0909	-0.0384	-0.1180	-0.0803	-0.0068	-0.1596	-0.0690	-0.0371	0.0942	0.1155	0.1252	0.0441	1.0000				
TtlTaxR	0.0886	0.0360	0.3338	-0.0092	-0.0742	0.1804	-0.0781	0.1267	-0.1059	-0.3266	0.0200	0.0114	-0.0929	1.0000			
Protect	0.2891	0.1610	0.3544	0.5790	-0.0521	0.0811	0.0828	-0.2286	-0.2512	-0.2281	-0.0953	-0.2471	-0.0035	-0.1284	1.0000		
TtlRD	-0.0980	0.2010	0.0494	0.6582	0.0070	0.1383	0.0489	-0.2250	-0.2387	-0.1117	-0.0420	-0.0624	-0.0948	-0.1348	0.3567	1.0000	
lnFDI_Stk1	0.9747	-0.1782	0.6779	0.1257	0.0350	-0.1785	0.3555	-0.1401	-0.0615	-0.1508	-0.0889	-0.0443	-0.0809	0.0793	0.2487	-0.1415	1.0000

Although the correlation matrix finds that the variables are not highly correlated with each other, it is necessary to be mindful of that the correlation of variables within each specific country may be highly correlated.

Table 3.6 Variable overall, between and within summary statistics

Variable		Mean	Std. Dev.	Min	Max	Observations		
lnFDI_Stk	overall	18.53652	2.665806	10.81978	27.38351	N	=	1605
	between		2.545254	12.3653	26.47377	n	=	184
	within		1.008535	13.33461	23.20178	T-bar	=	8.72283
lnCFDI_Stk	overall	.3009619	.613683	-5.82596	5.589743	N	=	1418
	between		.2437104	-.15957	2.261763	n	=	183
	within		.5829643	-5.74518	5.191987	T-bar	=	7.74863
lnGDP1	overall	24.24624	2.337334	18.68662	30.52808	N	=	1404
	between		2.333987	18.91572	30.40047	n	=	177
	within		.1705959	23.30636	24.73015	T-bar	=	7.9322
lnGDPPC1	overall	8.634916	1.509256	5.279376	12.09686	N	=	1404
	between		1.511126	5.535591	11.94388	n	=	177
	within		.1476186	7.767768	9.049801	T-bar	=	7.9322
Mtrade1	overall	69.95247	41.91786	13.04923	419.9623	N	=	1395
	between		40.96054	17.77284	371.734	n	=	176
	within		9.000915	15.22645	140.7656	T-bar	=	7.92614
Mob_S	overall	98.05151	45.09858	0	332.0907	N	=	1621
	between		41.70393	4.797268	268.1383	n	=	182
	within		17.96442	7.600769	170.5244	T-bar	=	8.90659
Hitech-Exp	overall	13.49772	74.34954	.0000327	1747.509	N	=	1162
	between		45.77942	.0009144	569.2901	n	=	157
	within		57.29248	-554.966	1191.717	T-bar	=	7.40127
Inf1	overall	5.617274	7.586988	-35.8366	121.7381	N	=	1329
	between		5.356288	.1011185	44.8018	n	=	169
	within		5.389005	-32.755	82.55356	T-bar	=	7.86391
lnexc1	overall	3.07539	2.877166	-1.54346	22.62881	N	=	1257
	between		3.181669	-1.26095	22.62881	n	=	163

	within		.265441	.5084348	5.872817	T-bar	=	7.71166
cmp	overall	26.20281	13.26746	3.528174	63.08684	N	=	1078
	between		13.43643	3.612944	62.3893	n	=	146
	within		2.61447	13.74224	48.91613	T-bar	=	7.38356
unemply1	overall	8.725269	6.199571	.2	37.6	N	=	930
	between		6.169357	.3	30.6	n	=	163
	within		2.275713	-5.24139	22.8586	T-bar	=	5.70552
TariffR	overall	5.21768	4.317425	0	20.75	N	=	1276
	between		4.245995	0	18.26833	n	=	166
	within		1.325602	-2.43732	12.39368	T-bar	=	7.68675
TtlNRR	overall	8.463732	12.18282	0	66.47585	N	=	1380
	between		10.35467	0	46.74507	n	=	181
	within		6.65287	-32.1001	62.94725	T-bar	=	7.62431
TtlTaxR	overall	44.33206	34.22795	7.4	339.1	N	=	1494
	between		28.5319	8.444444	217.2778	n	=	173
	within		18.25079	-109.556	216.2876	T-bar	=	8.63584
Protect	overall	5.858603	1.412291	1.625	8.977778	N	=	515
	between		1.278553	2.465063	8.191919	n	=	60
	within		.5723934	3.914801	7.811571	T-bar	=	8.58333
TtlRD	overall	1.502803	1.069121	.0156269	4.402017	N	=	467
	between		1.056881	.0783365	4.20474	n	=	61
	within		.1726968	.140067	2.342623	T-bar	=	7.65574

$$\rho_{xy} = \frac{\mathrm{Cov}(r_x, r_y)}{\sigma_x \sigma_y}$$

Where it shows correlation using the standard deviation formula, the formula implies that an opposite movement relationship between correlation and standard deviation, which means smaller standard deviation results in higher correlation.

Results in table 3.6 reveals relatively smaller standard deviation “within group”, which means that there is relatively little variation in variables over time within each specific country. This can have implications for the significance of coefficient estimates.

Some variables contain only around 60 countries, such as “Protect” and “TtlRD”. When the regression model holds these variables with less countries, the number of observations is reduced.

Table 3.7 Belt Road and continents dummy variables description

No.	Stata variable name	Definition
1	BeltRoad	BeltRoad =1 if country *i* is «The Belt and Road» country, otherwise BeltRoad =0
2	EU	EU =1 if located in Europe, otherwise EU =0
3	Asia_MidEast	Asia_MidEast = 1 if located in Asia and middle east, otherwise Asia_MidEast =0
4	Africa	Africa = 1 if located in Africa, otherwise Africa=0
5	NCA	NCA = 1 if loacted in North and central America, otherwise NCA = 0
6	S_America	S_America = 1 if located in South America, otherwise S_America=0
7	Oceania	Oceania =1 if located in Oceania, otherwise Oceania=0

The dummy variable of continents is shown in table 3.7 above. To explore potential patterns of Chinese FDI in regions and continents, countries are categorized into seven groups based on their respective geographic continent and those that are classified as a belt road country. We have dropped EU dummy variable and only include other five continent dummy variables (Asia_MidEast, Africa, NCA, S_America and Oceania) in our section 4.6 test. If we use all six dummy variables for the continents EU, Asia_MidEast, Africa, NCA, S_America and Oceania, a perfect collinearity would arise because EU + Asia_MidEast + Africa + NCA + S_America + Oceania =1, which means EU is a perfect linear function of the other continents dummy variables (dummy variable trap).

Belt Road countries can be found in Europe and other continents. A designated dummy variable is made for Belt Road countries, where a country can be present in both the dummy variable for their respective continent and in the Belt Road dummy variable. Due to the overlapping of some

countries found in more than one category caused by the Belt Road designation, it may cause collinearity. To avoid that the independent variables are collinearity which leads to biased regression output, it is managed by running two tests. The test on Belt Road variable is explained under chapter 4.5, whereas the test of the other continents is elaborated under chapter 4.6 where EU is set as the base group. See chapter 4 for more details.

3.2 Method

Panel data (i.e. longitudinal data) is applied most commonly in policy analysis. Sometimes we include year dummy and interact a year dummy with key independent variables to check if the effect of that variable has changed over a certain time. The fixed-effects model controls all time-invariant variables. The omitted time-invariant characteristics (i.e. culture, religion, gender, race, etc.) will not lead to bias of coefficients. Difficulties of panel data: it is difficult to track an individual or firms for years, as they move over time. Schools, cities and countries are relatively easier to track down (Wooldridge, 2014).

To find the impact of variables that vary over time, the fixed-effects model (FE) can be applied. The relationship between predictor and explanatory variables can be explained by applying Fixed-effects model (FE) within an entity (person, firm, country, etc.).
The individual characteristics of each entity may affect the predictor variables. Under our thesis hypothesis, the characteristics of every country may affect Chinese FDI towards their country. The key assumption of fixed-effects model (FE) is that something within the individual may bias the predictor or explanatory variables, that means there is a correlation between entity's error term and predictors (Wooldridge, 2014).

Fixed effects model or unobserved effect model show the example equation as below:

$$y_{it} = \beta_0 + \beta_1 x_{it1} + \cdots + \beta_k x_{itk} + a_i + u_{it},\ \text{t= 1, 2, …. T,}$$

When the key assumption of fixed effect is unobserved effect a_i is correlated with each independent variable in all the periods:

$$Cov(x_{itj}, a_i) \neq 0, t = 1,2, \dots, T;\ \ i, j = 1,2, \dots, k.$$

However, random effect model can include time invariant variables.
Random effect model:

We still based on this equation for random effect:

$$y_{it} = \beta_0 + \beta_1 x_{it1} + \cdots + \beta_k x_{itk} + a_i + u_{it},$$

When the key assumption of random effect is unobserved effect a_i is uncorrelated with each independent variable in all the periods:

$$Cov(x_{itj}, a_i) = 0, t = 1,2, \dots, T;\ \ j = 1,2, \dots, k.$$

The key difference between fixed and random effects is that a_i and x_{itj} are correlated in the fixed effects, while random effect is not allowed that correlation.

We utilize the Hausman test to choose between fixed-effects and random-effects. Hausman test is a test that whether the errors are correlated with the regressors, the null hypothesis is they are not correlated with the regressors. When the Chi-squared value is smaller than 0.05 (i.e. significant), we use fixed effects (Cameron & Trivedi, 2010).

We build different regression models under the various circumstance. To choose the appropriate model, we apply the log likelihood ratio test (LRT). We use LRT defined as LR = 2*(lnL1-lnL2), where lnL1 is log likelihood of model (1), similarly lnL2 is log likelihood of model (2). We can read the chi-value to check if it is significant. When Chi-squared value < 0.05 means significant difference between simpler model and original model, that concludes we failed to choose the simpler model (2) to replace the original model (1). Notice that these models are using the same sample and the simpler model is nested in the original model (Cameron & Trivedi, 2010).

4. Model and Empirical Results

In this chapter, we will use models from the three theories *theory of location advantages by Dunning OLI*, the *new theory of trade*, and the *institutional approach theory* to test each determinant. The two dependent variables for each test is: Y1= lnFDI_Stk (logarithm form of FDI stock); Y2 = lnCFDI_Stk (rate of change in FDI stock).

Section 4.1 will test base model using fixed-effect, followed by section 4.2 testing infrastructure and high technology, both determinants in Dunning's OLI theory. Section 4.3 test natural resource, economic stability, exchange rate and compensation of employee, determinants which derives from the new theory of trade. Institutional approach theory is tested under section 4.4. All

sections from 4.1 to 4.4 are using fixed-effect model, determined by using Hausman test. In section 4.5 and 4.6, the belt road dummy variable and continents dummy variables are tested using random effect model due to being time-invariant variables.

4.1 Base models

The new theory of trade is a traditional theory that believes the market size, market growth, the openness of the economy and the factor endowments in natural resource are important determinants for FDI stock. The base models include the market size and openness of economy, which are GDP, GDP per capita, merchandise trade in percentage of GDP and the lagged value of FDI stock in logarithm form. As dependent variables are in logarithm from, the independent variables are either in logarithm form or they are in percentage of GDP.
To choose between fixed effect model and random effect model, we check with Hausman's test. The result of Hausman test shows Chi-squared value < 0.05 among the models which is significant, we will therefore apply fixed effect in the base models. Nevertheless, from section 4.5 to 4.6 we will be testing the determinants of Chinese FDI stock using the Belt Road dummy variable and continents dummy variables. Random effect model will be applied for this test as the dummy variables are considered time-invariant variables. Details explained in section 4.5.

Hypothesis 1 is tested in all base models under section 4.1.

Hypothesis 1 a: The market size (GDP, GDP per capita) is positive effect of FDI stock and the rate of change in FDI stock

- *By testing the coefficients of GDP, GDP per capita, which are lnGDP1, and lnGDPPC1 variables.*

Hypothesis 1 b: The openness of economy that trade factor is positive effect on FDI stock and change in FDI stock.

- *By testing the coefficient of merchandise trade, Mtrade1.*

Equation 4.11 base model Y1 = lnFDI_Stk without $lnFDI\_Stk1$:

$$\text{lnFDI\_Stk}_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2 lnGDPPC1_{it} + \beta_3\, Mtrade1_{it} + \varepsilon_{it}$$

Table 4.11 Econometric base model estimates with ln of FDI stock as dependent variable, based on equation 4.11 using modified models.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk
lnGDP1	8.184***	2.271***	
	(0.000)	(0.000)	
lnGDPPC1	-7.050***		2.082***
	(0.000)		(0.000)
Mtrade1	0.00547*	0.00239	0.000417
	(0.024)	(0.350)	(0.875)
_cons	-119.9***	-36.75***	0.654
	(0.000)	(0.000)	(0.646)
N	1348	1348	1348
R^2	0.287	0.196	0.124
Model	Fixed Effect	Fixed Effect	Fixed Effect

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. GDP and GDP per capita are highly significant at 0.1% level in every column above. The coefficient of lnGDP1 and lnGDPPC1 are the elasticity to FDI stock. But the sign of lnGDPPC1 in column (1) is negative, which is not consistent with hypothesis one. Mtrade1 lose significance when lnGDPPC1 and lnGDP1 are omitted in column (2) and column (3), respectively. By testing impact of GDP per capita and GDP in this model, they are each omitted in column 2 and 3 respectively. To help identify the most appropriate model from the three columns in table 4.11, log likelihood ratio test was utilized.

The output of log likelihood test column (1) VS column (2) for table 4.11 is shown below:

Output 4.11:

```
Likelihood-ratio test                                 LR chi2(1)  =      0.34
(Assumption: m2 nested in m1)                         Prob > chi2 =    0.5587
```

The above output 4.11 implies that there is no significant difference between column (1) and column (2), as Chi-squared value = 0.5587 > 0.05. We should therefore apply column (2) as the format for our model and replace the original model in column (1).

The output of log likelihood test column (1) VS column (3) for table 4.11 in shown below:

Output 4.12:

```
Likelihood-ratio test                                 LR chi2(1)  =     34.96
(Assumption: m3 nested in m1)                         Prob > chi2 =    0.0000
```

The output 4.12 shows the Chi-squared value = 0.0000 < 0.05, that means there is significant difference between column (1) and column (3). We cannot use column (3) to replace the original model column (1).

Column (2) model including lnGDP1:

$lnFDI\_Stk_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2 Mtrade1_{it} + \varepsilon_{it}$ is the most appropriate model among the three models tested in table 4.11.

Equation 4.12 (base model $Y_1 = lnFDI\_Stk$ with $lnFDI\_Stk1$):

$lnFDI\_Stk_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2 lnGDPPC1_{it} + \beta_3\, Mtrade1_{it} + \beta_4 lnFDI\_Stk1 + \varepsilon_{it}$

Table 4.12 Econometric base model estimates with ln of FDI stock as dependent variable, adding lagged value of ln of FDI as explanatory variable. Based on equation 4.12 using modified models.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk
lnGDP1	1.648***	0.438***	
	(0.000)	(0.000)	
lnGDPPC1	-1.373**		0.378***
	(0.001)		(0.000)
Mtrade1	0.00225	0.00162	0.00128
	(0.167)	(0.318)	(0.431)
lnFDI_Stk1	0.699***	0.722***	0.737***
	(0.000)	(0.000)	(0.000)
_cons	-22.56***	-5.340*	1.795*
	(0.000)	(0.017)	(0.040)
N	1336	1336	1336
R^2	0.678	0.675	0.672
Model	Fixed Effect	Fixed Effect	Fixed Effect

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. Based on table 4.11, we add the lagged value of FDI stock in logarithm form yielding the results shown in table 4.12. It reveals that the R-squared is much higher in table 4.12 than in table 4.11, which indicates that the lagged value of FDI stock has significant impact of FDI stock. Similarly, the sign of lnGDPPC1 has changed in column (3) when we omitted lnGDP1. We utilize the log likelihood ratio test to find the most appropriate model. The outputs are shown below:

Output 4.2

```
Likelihood-ratio test                                 LR chi2(1)  =      2.82
(Assumption: m2 nested in m1)                         Prob > chi2 =    0.0933

Likelihood-ratio test                                 LR chi2(1)  =      2.73
(Assumption: m3 nested in m1)                         Prob > chi2 =    0.0985
```

Results implies that both Chi-squared values are greater than 0.05, which means neither column (2) nor column (3) are significantly difference from column (1). The most appropriate model is to include both GDP and GDP per capita in equation 4.12 with lagged value of FDI stock.

Equation 4.13 (base model Y2 = lnCFDI_Stk):

$$\text{lnCFDI\_Stk}_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2 lnGDPPC1_{it} + \beta_3\, Mtrade1_{it} + \beta_4 lnFDI\_Stk1 + \varepsilon_{it}$$

Table 4.13 Econometric base model estimates with rate of change in FDI stock, lnCFDI_Stk (lnCFDI_Stk = lnFDI_Stk – lnFDI_Stk1) as dependent variable. Based on equation 4.13 using modified models.

	(1) lnCFDI_Stk	(2) lnCFDI_Stk	(3) lnCFDI_Stk
lnGDP1	1.648***	0.438***	
	(0.000)	(0.000)	
lnGDPPC1	-1.373**		0.378***
	(0.001)		(0.000)
Mtrade1	0.00225	0.00162	0.00128
	(0.167)	(0.318)	(0.431)
lnFDI_Stk1	-0.301***	-0.278***	-0.263***

	(0.000)	(0.000)	(0.000)
_cons	-22.56***	-5.340*	1.795*
	(0.000)	(0.017)	(0.040)
N	1336	1336	1336
R^2	0.193	0.186	0.180
Model	Fixed Effect	Fixed Effect	Fixed Effect

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The R-squared is between 18%-19.3%. lnFDI_Stk1 coefficient in table 4.13 is negative, in contrast to the positive coefficient in table 4.12. lnGDP1 and lnGDPPC1 are highly significant at 0.1% level. Mtrade1 is not significant in any column. The output of likelihood ratio test is shown as below:

Output 4.3

```
Likelihood-ratio test                                 LR chi2(1)  =      2.33
(Assumption: m2 nested in m1)                         Prob > chi2 =    0.1266

Likelihood-ratio test                                 LR chi2(1)  =     27.78
(Assumption: m3 nested in m1)                         Prob > chi2 =    0.0000
```

Difference between column (2) and original model in column (1) is not significant, as Chi-square value = 0.1266 is greater than 0.05. Difference between column (3) and column (1) is significant, as Chi-square value = 0.0000 is smaller than 0.05.

We reach to the conclusion that the column (2) model in table 4.13 is the most appropriate model: $lnCFDI\_Stk_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2 Mtrade1_{it} + \beta_3 lnFDI\_Stk1 + \varepsilon_{it}$.

4.2 Infrastructure, High Technology - Dunning OLI theory

Dunning OLI theory holds that infrastructure, human capital, economic stability, and production costs are the important determinants for FDI locations. This section will test infrastructure and high technology determinants with Chinese FDI stock data. We choose Mob_S[1] as the proxy of

[1] Mob_S = Mobile cellular subscriptions (per 100 people), described detailed in section 3.1 data.

infrastructure and Hitech_Exp[2] as proxy of high technology export. Variables explained more in details in table 3.4.

Hypothesis 2 a: The infrastructure has positive effect on FDI stock and the rate of change in stock

- *By testing the coefficient of Mob_S variable*

Hypothesis 2 b: The high technology factor has positive effect on FDI stock and the rate of change in stock

- *By testing the coefficient of High technology export, Hitech_Exp variable.*

Hypothesis 2 c: The lagged FDI stock factor has positive effect on FDI stock and the rate of change in stock

- *By testing the coefficient of FDI_Stk1*

We still use dependent variables FDI stock and the rate of change in FDI stock (i.e. Y1 = lnFDI_Stk and Y2 = lnCFDI_Stk the same as the above descriptions in section 4.1). Regression output in Table 4.21 follows equation 4.21 and modified versions of the equation, in order to test the regression output between columns.

Equation 4.21 (Y1= lnFDI_Stk):

$$\text{lnFDI\_Stk}_{it} = a_i + \beta_1 lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3 Mob\_S_{it} + \beta_4\, Hitech\_Exp_{it} + \beta_5\, FDI\_Stk1_{it} + \varepsilon_{it}$$

Table 4.21 Econometric model estimates with ln of FDI stock as dependent variable, based on equation 4.21 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value is reported in the parentheses. Dependent variable is FDI stock in logarithm form. Based on equation 4.21, we have a combination of variables InGDP1, Mtrade1, Hitech_Exp and lnFDI_Stk1 in each column to test the impact of individual variables.

[2] High technology exports (% of manufactured exports), described detailed in section 3.1 data.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk	(4) lnFDI_Stk	(5) lnFDI_Stk
lnGDP1	1.545***	1.633***	0.239		
	(0.000)	(0.000)	(0.092)		
Mtrade1	0.000922	0.00452	0.000796		
	(0.713)	(0.130)	(0.682)		
Mob_S	0.0142***	0.0175***	0.00541***	0.0300***	0.00654***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Hitech_Exp		0.000113	-0.0000172	0.000403	0.0000352
		(0.797)	(0.952)	(0.384)	(0.901)
lnFDI_Stk1			0.714***		0.724***
			(0.000)		(0.000)
_cons	-20.48***	-24.01***	-0.977	15.51***	4.725***
	(0.000)	(0.000)	(0.772)	(0.000)	(0.000)
N	1337	979	973	1121	985
R^2	0.242	0.261	0.691	0.256	0.688

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

We can clearly see that when the equation includes lnFDI_Stk1, the R-squared is noticeably increased in column (3) and column (5). lnGDP1 and Mob_S are both positive and significant at 0.1% level in column (1) and column (2). Majority of the estimated coefficients have positive elasticity in table 4.21, that means these variables have positive impact on Chinese FDI stock. The variable Mob_S is significant at 0.1% through all five columns, which means that the infrastructure has significant effect on Chinese FDI stock. Nevertheless, the estimated coefficient of Mob_S is relatively small. Hitech_Exp is not statistically significant in any column. The R-squared ranges from 24.2% to 69.1%, which indicates the percentage in variance of dependent variables that are explained by the independent variables. We can conclude that infrastructure has statistically significant and positive impact on FDI stock.

Equation 4.22 (Y2 = lnCFDI_Stk):

$$\text{lnCFDI\_Stk}_{it} = a_i + \beta_1 lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3\, Mob\_S_{it} + \beta_4\, Hitech\_Exp_{it} + \beta_5\, lnFDI\_Stk1_{it} + \varepsilon_{it}$$

Table 4.22 Econometric model estimates with rate of change in FDI stock, lnCFDI_Stk (lnCFDI_Stk = lnFDI_Stk – lnFDI_Stk1) as dependent variable. Based on equation 4.22 using modified models.

We test the same hypothesis with dependent variable Y2 = lnCFDI_Stk. The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value is reported in the parentheses. Equation 4.22 exclude lnGDP1 and Mtrade1 to test the separate impact without GDP and merchandise trade. The significant level and estimated coefficient of Mob_S and lnFDI_Stk are very similar in both two columns, and R-squared are very close 18.6%-18.9%. It indicates that the GDP and merchandise trade affected little on the change in FDI stock.

	(1) lnCFDI_Stk	(2) lnCFDI_Stk
lnGDP1	0.239 (0.092)	
Mtrade1	0.000796 (0.682)	
Mob_S	0.00541*** (0.001)	0.00654*** (0.000)
Hitech_Exp	-0.0000172 (0.952)	0.0000352 (0.901)
lnFDI_Stk1	-0.286*** (0.000)	-0.276*** (0.000)
_cons	-0.977 (0.772)	4.725*** (0.000)
N	973	985
R^2	0.189	0.186

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The dependent variables are about 18.6% or 18.9% explained by independent variables in these two models in column (1) and column (2). Although Mob_S the proxy of infrastructure is significant, the estimated coefficient is relatively low. The lagged value of FDI stock has negative

significant coefficient. However, merchandise trade is not statistically significant in the above models.

4.3 New Theory of Trade

The new theory of trade is traditional theory that believes the market size, market growth, the openness of the economy and the factor endowments in natural resource are important determinants for FDI stock. Under this section, we will test the impact of economic stability, production cost and natural resource endowment.

Hypothesis 3 a: Natural resource endowment factor has a positive effect on FDI stock and the rate of change in stock

- *By testing the coefficient of total nature resource rent (TtlNRR).*

Hypothesis 3 b: Economics stability has a negative effect on FDI stock and the rate of change in stock

- *By testing the coefficient of the inflation (Inf1) and unemployment (unemply1).*

Hypothesis 3 c: Exchange rate and the compensation of employee has a negative effect on FDI stock and the rate of change in stock

- *By testing the coefficient of the exchange rate (lnexc1) and compensation of employee (cmp).*

Equation 4.31 (Y1 = lnFDI_Stk):

$$\text{lnFDI\_Stk}_{it} = a_i + \beta_1 lnGDP1_{it} + \beta_2 Mtrade1_{it} + + \beta_3 Inf1_{it} + \beta_4 unemply1_{it} + \beta_5 lnexc1_{it} + \beta_6 cmp_{it} + \beta_7 lnFDI\_Stk1_{it} + \beta_8 Mob\_S_{it} + \beta_9 Hitech\_Exp_{it} + \beta_{10} TtlNRR_{it} + \varepsilon_{it}$$

Table 4.31 Econometric model estimates with ln of FDI stock as dependent variable, based on equation 4.31 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value are reported in the parentheses.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk	(4) lnFDI_Stk
lnGDP1	1.987***	0.550**	2.443***	
	(0.000)	(0.001)	(0.000)	
Mtrade1	0.00234	-0.000615		
	(0.481)	(0.807)		
Inf1	-0.0223***	-0.00400	-0.0238**	-0.00322
	(0.000)	(0.384)	(0.002)	(0.588)
unemply1	-0.0288*	-0.00763	-0.0276*	-0.0136
	(0.011)	(0.349)	(0.045)	(0.210)
lnexc1	0.534***	0.105	2.529***	0.283
	(0.000)	(0.238)	(0.000)	(0.214)
cmp		-0.00242	-0.00608	-0.00537
		(0.799)	(0.736)	(0.722)
lnFDI_Stk1		0.792***		0.812***
		(0.000)		(0.000)
Mob_S			0.00609	0.00433
			(0.069)	(0.077)
Hitech_Exp			0.000670	-0.0112
			(0.947)	(0.176)
TtlNRR				-0.00647
				(0.162)
_cons	-31.20***	-9.589*	-48.75***	2.998***
	(0.000)	(0.017)	(0.000)	(0.000)
N	738	502	440	381
R^2	0.289	0.749	0.472	0.737

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Column (1) only test the economic stability, we can see that GDP, inflation and exchange rate are highly significant at 0.01% level. The estimated coefficient of lnGDP1 is the elasticity that when lagged value of the host country's GDP increases by 1%, the Chinese FDI stock will increase by 1.987%. Exchange rate elasticity of FDI stock is 0.534 in column (1). Inflation and

unemployment rate represent the economic stability, they are negative and significant. It means when the host country's economic stability goes down, or experience higher inflation or unemployment, we will see a reduction in Chinese FDI stock. Evident from column (1), 1% increase in inflation leads to 2.23% reduction in Chinese FDI stock. Similarly, 1% increase in unemployment leads to 2.88% reduction in Chinese FDI stock. Column (2), when we add the lagged value of FDI stock (i.e. lnFDI_Stk1), the R-squared increases from 28.9% to 74.9%, and the other variables (except lnGDP1) is no longer significant. Column (3) has the same significant level as column (1), which indicates the inflation, unemployment and exchange rate have significant impact to Chinese FDI stock. The comparison of column (1) and column (3) shows that the R-squared is increased from 28.9% to 47.2%. Column (4) shows that when the lagged value of FDI stock is included in the model, the other variables will lose their significance to some extent.

Equation 4.32 and table 4.32 described the dependent variable as the change rate in FDI stock (i.e. lnCFDI_Stk)

Equation 4.32 (Y2 = lnCFDI_Stk):

$$\text{lnCFDI\_Stk}_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3\, lnFDI\_Stk1_{it} + \beta_4 Mob\_S_{it} + \beta_5\, Inf1_{it} + \beta_6\, unemply1_{it} + \beta_7\, lnexc1 + \beta_8\, cmp + \beta_9\, TtlNRR + \varepsilon_{it}$$

Table 4.32 Econometric model estimates with rate of change in FDI stock, lnCFDI_Stk (lnCFDI_Stk = lnFDI_Stk – lnFDI_Stk1) as dependent variable. Based on equation 4.32 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value are reported in the parentheses. The observation numbers reduce as some variables contain insufficient data within the host countries.

	(1)	(2)	(3)	(4)
	lnCFDI_Stk	lnCFDI_Stk	lnCFDI_Stk	lnCFDI_Stk
lnGDP1	0.157		0.311	
	(0.222)		(0.101)	

Mtrade1	-0.000313		-0.00139	
	(0.877)		(0.581)	
lnFDI_Stk1	-0.278***	-0.303***	-0.223***	-0.169***
	(0.000)	(0.000)	(0.000)	(0.000)
Mob_S	0.00511***	0.00726***	0.00553**	0.00544**
	(0.001)	(0.000)	(0.006)	(0.007)
Inf1	-0.00614	-0.00847*	-0.00257	-0.00332
	(0.088)	(0.017)	(0.576)	(0.472)
unemply1	-0.00928	-0.0123	-0.00728	-0.00767
	(0.184)	(0.093)	(0.368)	(0.396)
lnexc1		-0.0284	0.0317	0.00962
		(0.642)	(0.731)	(0.921)
cmp			-0.00293	-0.000628
			(0.755)	(0.953)
TtlNRR				-0.00883*
				(0.036)
_cons	1.172	5.341***	-3.752	2.933***
	(0.693)	(0.000)	(0.403)	(0.000)
N	790	741	502	434
R^2	0.181	0.219	0.125	0.094

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The R-squared is relatively lower in table 4.32 and range from 9.4% to 21.9%. Column (1) and column (3) include lnGDP1 and Mtrade1, while column (2) and column (4) exclude lnGDP1 and Mtrade1. The lagged value of FDI stock has negative relationship with the change in FDI stock. The higher the lagged FDI stock, the lower the rate of change in FDI stock. The variable Mob_S has positive significant coefficient to FDI stock rate of change. It means that the infrastructures in the host country will positively affect the Chinese FDI stock rate of change. Inflation is only 5% level significant in column (2), and the natural resource rent is negative and significant at 5% in the column (4).

4.4 To test institutional approach

Institutional approach reflects the relationship between the quality of the institution and FDI locations. Corruption or protection of copyright for intellectual property are important determinants. Political variables and incentives from financial institutions i.e. the tax or tariff rate has influence on trade and business activities. The tariff and tax could potentially have an impact on FDI locations. We are using the dependent variables Y1 and Y2 to test the following hypotheses:

Hypothesis 4 a: Tariff and tax has a negative effect on FDI stock and the rate of change in stock

- *Testing the coefficient of TariffR and TtlTaxR*

Hypothesis 4 b: Protection of copyright has a positive effect on FDI stock and the rate of change in stock

- *Testing the coefficient of Protect*

Hypothesis 4 c: R&D has positive effect on FDI stock and the rate of change in stock

- *Testing the coefficient of TtlRD*

Equation 4.41:

$$lnFDI\_Stk_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3\, Mob\_S_{it} + \beta_4\, Hitech\_Exp_{it} + \\ + \beta_5\, Inf1_{it} + \beta_6\, unemply1_{it} + \beta_7\, lnexc1_{it} + \beta_8\, Protect_{it} + \beta_9\, TariffR_{it} + \\ \beta_{10}\, TtlTaxR_{it} + \beta_{11} TtlRD_{it} + \beta_{12} lnFDI\_Stk1_{it} + \varepsilon_{it}$$

Table 4.41 Econometric model estimates with ln of FDI stock as dependent variable, based on equation 4.41 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value are reported in the parentheses.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk	(4) lnFDI_Stk	(5) lnFDI_Stk
lnGDP1	2.891***	2.908***	3.437***		
	(0.000)	(0.000)	(0.000)		
Mtrade1	0.00440	0.00503	-0.00477	-0.00553	
	(0.425)	(0.384)	(0.529)	(0.514)	

Mob_S	0.0111	0.0119	0.00445	0.0333***	0.0133*
	(0.139)	(0.131)	(0.650)	(0.001)	(0.028)
Hitech_Exp	0.0297*	0.0477	0.0580	0.0493	0.0110
	(0.048)	(0.052)	(0.092)	(0.200)	(0.650)
Inf1	-0.0398	-0.0386	-0.0310	-0.0270	-0.00297
	(0.090)	(0.111)	(0.257)	(0.376)	(0.871)
unemply1	-0.0560*	-0.0543*	-0.0586	-0.0779*	-0.0274
	(0.011)	(0.017)	(0.084)	(0.039)	(0.247)
lnexc1	2.789***	2.809***	3.801***	2.121**	-0.124
	(0.000)	(0.000)	(0.000)	(0.007)	(0.805)
Protect	0.0971	0.0927	0.0793	0.0777	0.0399
	(0.303)	(0.350)	(0.490)	(0.545)	(0.619)
TariffR		0.00585	-0.0450	0.0378	-0.0197
		(0.955)	(0.758)	(0.816)	(0.847)
TtlTaxR			-0.0314	-0.0131	0.00557
			(0.127)	(0.562)	(0.695)
TtlRD			0.816*	0.785	0.104
			(0.042)	(0.079)	(0.698)
lnFDI_Stk1					0.767***
					(0.000)
_cons	-63.26***	-64.02***	-76.73***	11.90***	2.791*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.028)
N	219	209	175	175	176
R^2	0.468	0.463	0.443	0.299	0.722

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

R-squared ranges from 29.9% to 72.2% in table 4.41. Column (1), (2) and (3) uses a combination of the variables Protect, TariffR, TtlTaxR and TtlRD. No variables are found significant in these institutional tests (i.e. Protect, TariffR, TtlTaxR and TtlRD) among these five columns in table 4.41, except TtlRD which is significant at 5% in column (3). No significance was found because there is a high variation in the tariff rate variable between countries (bilateral policies or agreements), which leads to a biased outcome. Mob_S is positive and significant at 0.01% in

column (4) and significant at 5% in column (5). Column (4) and (5) are omitted lnGDP1 and Mtrade1. GDP shows as significant and has positive elasticity in column (1) to column (3).

Equation 4.42:

$$lnC\text{FDI\_Stk}_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3\, lnFDI\_Stk1_{it} + \beta_4\, Inf1_{it} + \beta_5 lnexc1_{it} + \beta_6\, Protect_{it} \;\; \beta_7\, TariffR_{it} + \beta_8\, TtlTaxR_{it} + \beta_9 TtlRD_{it} + \varepsilon_{it}$$

Table 4.42 Econometric model estimates with rate of change in FDI stock, lnCFDI_Stk (lnCFDI_Stk = lnFDI_Stk – lnFDI_Stk1) as dependent variable, based on equation 4.42 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value are reported in the parentheses.

	(1) lnCFDI_Stk	(2) lnCFDI_Stk	(3) lnCFDI_Stk	(4) lnCFDI_Stk
lnGDP1	0.458*	0.462	0.675*	
	(0.040)	(0.050)	(0.028)	
Mtrade1	0.00171	0.00158	0.000227	
	(0.556)	(0.601)	(0.955)	
lnFDI_Stk1	-0.262***	-0.266***	-0.271***	-0.220***
	(0.000)	(0.000)	(0.000)	(0.000)
Inf1	-0.0199*	-0.0213*	-0.0306*	-0.0207*
	(0.027)	(0.025)	(0.046)	(0.011)
lnexc1	0.637*	0.681*	0.870*	0.100
	(0.015)	(0.015)	(0.045)	(0.589)
Protect	0.126**	0.128**	0.124*	0.115*
	(0.006)	(0.007)	(0.027)	(0.011)
TariffR		-0.00567	-0.0492	
		(0.869)	(0.385)	
TtlTaxR			0.000672	
			(0.951)	
TtlRD			0.114	
			(0.600)	

_cons	-8.652	-8.707	-14.39	3.770***
	(0.139)	(0.162)	(0.076)	(0.000)
N	376	358	296	381
R^2	0.205	0.208	0.198	0.193

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In Table 4.42, we add Protect, TariffR, TtlTaxR and TtlRD variables to test the institutional quality's impact on Chinese FDI stock growth rate. From column (1) to column (3), we have included these four variables (i.e. Protect, TariffR, TtlTaxR, TtlRD), gradually in the models. However, the R-squared was not increased as we expected when more independent variables were included. Column (4) excluded lnGDP1, Mtrade1, TariffR, TtlTaxR and TtlRD, which resulted in a lower R-squared. The range of R-squared is from 19.3% to 20.8%. From the overview of table 4.42, the lagged value of FDI stock (i.e. lnFDI_Stk1) is highly significant at 0.1% level across all the columns. The estimated coefficient of lnFDI_Stk1 is negative, that means they are moving in the opposite direction. From column (1) to column (4) we can see that inflation rate and protection of copyright are significant at 5% level and 1% level, respectively. The exchange rate is also significant at 5% level from column (1) to column (3). The model shows that elasticity of Chinese FDI stock to inflation is -1.99% in column (1).

4.5 The Belt Road countries test

Since 2013, Chinese government announced "One Belt, One Road" to lead the transnational economic belt. The scope of the economic zone covers Asia and Mediterranean countries, where the ancient Silk Road were built. A high portion of Chinese capital is invested in infrastructure, transport and energy along the belt road countries. While the data sample in this thesis details the period from 2008-2016, the Belt Road policy was announced in 2013. Thus, the lagged effect of Belt Road investment in the latter stage of our data sample period may not be as visible in our analysis as hypothesized.

Table 4.51

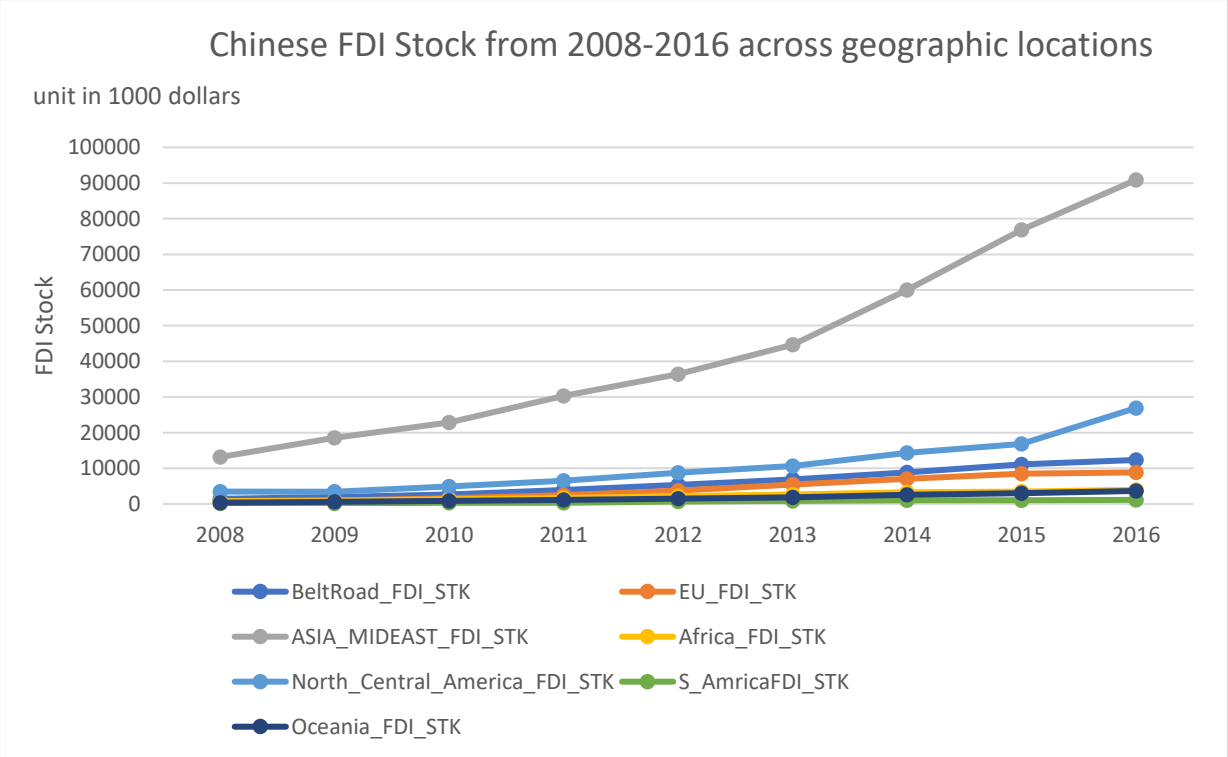
Chinese Outward FDI Flow continents comparison in 2016

Unit: billion US dollars

Regions	Amount	Growth %	Shares %
Asia	130.27	20.2	66.4
South America	27.23	115.9	13.9
North America	20.35	89.9	10.4
Europe	10.69	50.2	5.4
Oceania	5.21	34.6	2.7
Africa	2.4	-19.4	1.2
Total	196.15	35.9	100

Note: source from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017, p. 15).

Figure 4.52



Note: Figure 4.52 is calculated by author and data obtained from 2016 Statistical Bulletin on China's Outward Foreign Direct Investment (Ministry of Commerce of the People's Republic of China et al., 2017).

Figure 4.52 summarized China's accumulated FDI stock trend, distributed by continent and with added category for the Belt Road. This data detailed in 2016 Statistical Bulletin on China's Outward Foreign Direct Investment visualize an accelerated growth from 2013 in both Chinese

FDI stock and the category of Belt Road, bearing in mind that the Belt Road policy was adopted from 2013.

Equation 4.51:

$$ln\text{FDI\_Stk}_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3\, BeltRoad_{it} + \beta_4\, Mob\_S_{it} + \beta_5 Inf1_{it} + \beta_6 Inexc1_{it} + \beta_7 Protect_{it} + \beta_8 TtlNRR_{it} + \beta_9 TtlTaxR_{it} + \beta_{10}\, TariffR_{it} + \beta_{11}\, Hitech\_Exp_{it} + \beta_{12} TtlRD_{it} + \varepsilon_{it}$$

Table 4.51 Econometric model estimates with ln of FDI stock as dependent variable, adding BeltRoad dummy variable as explanatory variable. Based on equation 4.51 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value are reported in the parentheses. Table 4.51 test the impact on FDI stock if the host country is in the range of Belt Road countries.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk	(4) lnFDI_Stk
lnGDP1	0.819***	1.153***	1.248***	
	(0.000)	(0.000)	(0.000)	
Mtrade1	0.00507*	0.0151***	0.0132**	0.0135*
	(0.022)	(0.000)	(0.002)	(0.017)
BeltRoad	-0.895**	-0.704	-0.636	-2.324**
	(0.006)	(0.231)	(0.235)	(0.004)
Mob_S	0.0154***	0.0196***	0.0173**	0.0257***
	(0.000)	(0.000)	(0.001)	(0.000)
Inf1	-0.0250***	-0.0579***	-0.0434*	-0.0926***
	(0.000)	(0.000)	(0.014)	(0.000)
lnexc1	0.386***	0.633***	0.433***	0.359*
	(0.000)	(0.000)	(0.000)	(0.021)
Protect		0.131	0.110	0.171
		(0.084)	(0.235)	(0.103)

TtlNRR			-0.00235	-0.000286
			(0.790)	(0.982)
TtlTaxR			-0.0222	0.00862
			(0.068)	(0.558)
TariffR			0.102	-0.0271
			(0.129)	(0.758)
Hitech_Exp				0.0471*
				(0.048)
TtlRD				0.0779
				(0.779)
_cons	-4.088*	-15.89***	-16.97***	13.53***
	(0.015)	(0.000)	(0.000)	(0.000)
N	1150	378	283	245
Model	*Random Effects*	*Random Effects*	*Random Effects*	*Random Effects*

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

lnGDP1 is positive and significant at 0.01% level from column (1) to column (3), and the merchandise trade (i.e. Mtrade1), mobile subscription (i.e. Mob_S) and exchange rate (lnexc1) are positive and significant from column (1) to column (4). The inflation rate is negative and significant across columns. It means that the inflation in the host countries has negative relationship with the FDI stock from China. From table 4.51, we can conclude that for Belt Road countries, the economic openness and the infrastructure are positive and significant to Chinese FDI stock. When dummy variable Belt Road equals to one, the FDI stock decreases, which is not consistent with the hypothesis of comparably higher investment in Belt Road countries. However, the result may be biased due to the period (2008-2016) used in our data sample, whereas the Belt Road policy was enacted in 2013. There is a high likelihood that we are experiencing a lagged effect in our test.

4.6 Continent comparison

Each continent has its geographical advantages and disadvantages, and their unique set of natural resources among other set of factors. We want to test the influence from these determinants on

Chinese FDI stock. Dummy variables have been created for each continent which will be tested in this section. Table 4.61 presents the result of the regression.

Equation 4.61:

$$ln\text{FDI\_Stk}_{it} = a_i + \beta_1\, lnGDP1_{it} + \beta_2\, Mtrade1_{it} + \beta_3\, Asia\_MidEast_{it} + \beta_4\, Africa_{it} + \beta_5\, NCA_{it} + \beta_6\, S\_America_{it} + \beta_7\, Oceania_{it} + \beta_8\, MOb\_S_{it} + \beta_9\, Inf1_{it} + \beta_{10} lnexc1_{it} + \beta_{11}\, Protect_{it} \;\; \beta_{12}\, TtlNRR_{it} + \beta_{13}\, TtlRD_{it} + \beta_{14} TtlTaxR_{it} + \beta_{15} TariffR_{it} + \varepsilon_{it}$$

Table 4.61 Econometric model estimates with ln of FDI stock as dependent variable, adding continents dummy variable as explanatory variable. Based on equation 4.61 using modified models.

The symbols***, ** and * denote significant at the 0.1%, 1% and 5% levels, respectively. The p-value are reported in the parentheses. EU is set as the baseline continent, and the EU dummy variable have therefore been omitted from regression models in this section. From previous models, we have included the determinants infrastructure, economic stability, institutional quality, and added the continents dummy variables to test the different impact across continents.

	(1) lnFDI_Stk	(2) lnFDI_Stk	(3) lnFDI_Stk	(4) lnFDI_Stk
lnGDP1	0.971***	1.149***	1.412***	
	(0.000)	(0.000)	(0.000)	
Mtrade1	0.00767**	0.0138***	0.0168***	
	(0.008)	(0.001)	(0.000)	
Asia_MidEast	1.953***	1.223	0.943	3.068***
	(0.000)	(0.088)	(0.183)	(0.001)
Africa	3.145***	3.317*	3.163*	4.315*
	(0.000)	(0.048)	(0.031)	(0.048)
NCA	0.343	1.743	1.134	3.433*
	(0.590)	(0.161)	(0.305)	(0.029)
S_America	1.051	0.835	1.180	1.535
	(0.151)	(0.313)	(0.134)	(0.172)
Oceania	4.987***	4.483***	3.602***	2.826*

	(0.000)	(0.000)	(0.000)	(0.045)
Mob_S	0.0151***	0.0211***	0.0143*	0.0176*
	(0.000)	(0.000)	(0.030)	(0.016)
Inf1	-0.0274***	-0.0502**	-0.102***	-0.108***
	(0.000)	(0.002)	(0.000)	(0.000)
lnexc1	0.310***	0.440***	0.260*	0.0929
	(0.000)	(0.000)	(0.021)	(0.549)
cmp	-0.0215*	-0.00521	0.00349	-0.0700*
	(0.030)	(0.824)	(0.900)	(0.015)
Protect		0.157	0.143	0.255*
		(0.065)	(0.145)	(0.016)
TtlNRR		-0.00451	-0.0136	-0.00973
		(0.568)	(0.214)	(0.412)
TtlRD			-0.0927	0.221
			(0.626)	(0.365)
TtlTaxR			-0.0108	0.0138
			(0.395)	(0.375)
TariffR			0.114	0.00620
			(0.188)	(0.950)
_cons	-9.357***	-16.64***	-22.23***	15.01***
	(0.000)	(0.000)	(0.000)	(0.000)
N	800	308	243	244
Model	*Random Effects*	*Random Effects*	*Random Effects*	*Random Effects*

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

From column (1) to column (4), GDP, merchandise trade, mobile subscriptions, inflation rate and the exchange rates are similar to tests in previous sections in that they are found positive and significant. The determinants natural resource rent, research and development expense, tax rate and tariff rate are not significant in the table 4.61. The suspected reason can be the high variation of these variables. The variable Protect (protection of copyright) is only significant in column (4), where the model excludes lnGDP1 and Mtrade1. The Chinese FDI stock in African and Oceanian countries are larger compared to the other continents. In column (1), Asian and middle eastern

countries FDI stock are 195.3% greater than European countries. Africa has 314.5% higher Chinese FDI stock compared to European countries. Oceanian countries have 498.7% higher Chinese FDI stock compared to European countries. Similar interpretation can be found in column (2) to column (4). We can conclude that the economic openness, the infrastructure, and economic stability are all the important factor for Chinese FDI stock locations. Production cost (i.e. compensation of employee) has negative relationship with FDI stock shown in all columns except column (3).

4.7 Discussion

Various regression models have been tested in section 4.1 to section 4.6. GDP is found consistently positive and significant within the majority of regression models. The elasticity of GDP approximately ranges from 0.15% to 3.4% across all the regression models in the thesis. It implies that GDP in the host countries have significant positive effect on Chinese FDI stock.

In section 4.1 base models, we found estimated coefficient of lnGDP1 and lnGDPPC1 to have opposite sign (positive / negative) and significant at 0.01% level in column (1), table 4.11. When we separately test GDP and GDP per capita, the coefficients of these two variables is positive and significant. We suspect that the high correlation between GDP and GDP per capita within countries, leads to the opposite movement of GDP and GDP per capita. The log likelihood ratio test helps determine the most suitable base model, which concluded to drop GDP per capita in section 4.1. Using the suitable base models, we gradually add more indicators as variables to test the different theories.

Dunning's OLI theory suggests that FDI benefit of ownership, advantages of locations and advantages of internalization. Based on Dunning's theory, we choose to test if the determinants infrastructure and technology influences FDI in section 4.2. We have found that the elasticity of Mob_S to FDI stock are statistically significant at 0.01% level and positive across the models in table 4.21. Mob_S is the proxy of infrastructure, and our regression result reveals that infrastructure is significantly positive to Chinese FDI stock. The better infrastructure, the higher Chinese FDI stock to the host countries. The coefficient of Hitech_Exp is statistically insignificant and relatively smaller than 1% in the table 4.21. This result rejects our hypothesis 2,

where we hypothesized that Chinese FDI stock would have a positive relationship with high technology export rate. Similar results are visible in table 4.22, where the dependent variable was modified to the rate of change in FDI stock (lnCFDI_Stk). Each model with the rate of change in FDI stock (i.e. lnCFDI_Stk) as dependent variable, when it consistently includes the lagged value of FDI (i.e. lnFDI_Stk1), the result of the coefficient of lnFDI_Stk1 is invariably significant. It implies that the lagged value of FDI has significant effect on the growth in FDI stock.

By testing the new theory of trade, we discovered that the elasticity of inflation and unemployment are negative (approx. -2%) and significant in the column (1) and (3) in table 4.31. The elasticity of exchange rate is consistent with our hypothesis, it is significant and positive in column (1) and (3) in table 4.31. High inflation and unemployment rate means lower economic stability. It indicates that better economic stability leads to higher Chinese FDI stock.

When we include the lagged value of FDI stock (lnFDI_Stk1), it results in noteworthy increase of R-squared. However, while the lagged FDI stock shows significant effect on Chinese FDI stock, the estimated coefficient of lnFDI_Stk1 shows positive in table 4.31 and negative in table 4.32, which means there is an uncertainty in the direction of movement. When the dependent variable is modified to the rate of change in FDI stock (lnCFDI_Stk), coefficient of Mob_S is significant and positive. The coefficient of inflation (-0.00847) and natural resource (-0.00883) are statistically significant at 5% level and negative in table 4.32 column (2) and (4), respectively. The infrastructure and the lagged value of FDI stock still have the positive effect on the growth in FDI stock. All other variables coefficient, except the natural resource rent, is significant and negative in column (4) in table 4.32.

When variables from institutional approach is applied, the regression results show very few estimated coefficients are significant among the institution variables in the models. A majority of the other variables in this test, shows results that are consistent with findings from earlier sections. When the dependent variable changes to lnCFDI_Stk, the coefficients of FDI_Stk1, Inf1, lnexc1, and Protect are significant. The estimated elasticity of exchange rate is around 2.121-3.801. The estimated coefficients of tax and tariff are uncertain and not significant.

Nevertheless, the estimated coefficient of protection of copyright is positive and significant in table 4.42, where the dependent variable is the rate of change in FDI stock.

In the Belt Road test, the result from a majority of the variables coefficients are consistent with the previous models. The coefficient of BeltRoad is negative and significant in column (1) and column (4). When testing Belt Road countries, we discover that Chinese FDI stock comparably decreases when the country of allocation is a Belt Road country. The finding rejects our hypothesis, that we would see a higher Chinese FDI stock in Belt Road countries. However, we suspect that the result may be biased due to the period (2008-2016) used in our data sample, whereas the Belt Road policy was enacted in 2013. We hypothesize that there is a lagged effect experienced in our test. Mob_S, Inf1 and lnexc1 are significant, which are consistent with the previous models. The economic openness and the infrastructure are significant and positive to Chinese FDI stock.

Continents regression tests in the table 4.6 model identify Asia_Middle East, Africa, and Oceania as the continents with significant and positive estimated coefficients. EU countries is set as the base group for these models. The coefficient of these continents dummy variables implies that they have a higher percentage in FDI stock compared to European countries. For example, if the host country is located in Asia and middle east, the Chinese FDI stock is almost two times higher than the countries in Europe (applying the figure in table 4.61 column (1)). Similarly, Chinese FDI stock to Africa is more than three times higher than Europe, and FDI stock to Oceania is more than four times higher than Europe. The determinants lnGDP1, Mtrade1, Mob_S, Inf1 and Protect, are the five variables identified as positive and significant. Inflation and compensation of employee are found statistically significant with a negative relationship to FDI stock.

Robustness checks:

Sensitivity analysis exercises were employed into our research to check our regression results robustness. First, we checked FDI flow as dependent variable in the regression models. However, too few estimated coefficients were found significant, and is inconclusive. Second, we have utilized the log likelihood ratio test to choose nested models. Third, we checked the lagged value of the variables. Fourth, we modified the regression models to check if the result of modified

models is different from the original models. The tables in chapter 4 only presents the main outputs.

5. Conclusion

Based on the verifiable results from models applied in chapter 4, our observations provide considerable empirical evidence to support that infrastructure, market size, openness of trade and the economic stability are conclusive as the macro-economic determinants of Chinese FDI.

The empirical results correspond to determinants suggested by Dunning's theory and the new theory of trade. However, while the production of copyright is conclusive as a determinant to the rate of change in Chinese FDI stock, the other determinants suggested by Institutional approach had no conclusive support through our observations.

Exploring Chinese FDI by continents reveals through empirical observations that the determinants are consistent with the empirical conclusion at country level. Through our analysis, we have identified Oceania, Africa, and Asia & Middle East, in descending order respectively, as preferred destinations of Chinese FDI.

While the empirical results rejected our Belt Road hypothesis, we may find that the results are biased due to the data sample period (2008-2016) that were used, bearing in mind that the Belt Road policy was adopted in 2013 leading to a lagged effect in our test. Examples of significant investments has been made in 2017 and 2018 in what is characterized as Belt Road countries, and future research on this subject may reveal a different outcome from ours. In 2017 alone, a total of US $14.36 billion were reported by the Ministry of Commerce of China as non-financial direct investments made by Chinese companies into 59 countries along the "One Belt and One Road" policy, in addition to mergers and acquisition transactions and contracted overseas projects that were made (Ministry of Commerce of the People's Republic of China, 2018).

The challenge we experience with our data sample is the relatively smaller standard deviation "within group", which indicates that there is limited variation in variables over time within each

specific country, explained more in table 3.6. This leads to some extent of insignificant coefficient of variables and low R-squared.

Future research into this area would benefit from reviewing firm-level data and explore suitable additions of variables that could be applied into the empirical study. Such an investigation would verify determinants to firm level allocations and reveal further knowledge on trends and preferences (industry, growth rate, life cycle, etc.) of Chinese FDI stock.

6. Bibliography

Aliber, R. Z. (1970). A theory of direct foreign investment. *The international corporation: a symposium*, 17-34.

Asiedu, E. (2006). Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability. *World Economy, 29*(1), 63-77. doi:10.1111/j.1467-9701.2006.00758.x

Bellak, C., & Leibrecht, M. (2009). Do low corporate income tax rates attract FDI? – Evidence from Central- and East European countries. *Applied Economics, 41*(21), 2691-2703. doi:10.1080/00036840701320217

Bevan, A. A., & Estrin, S. (2004). The determinants of foreign direct investment into European transition economies. *Journal of Comparative Economics, 32*(4), 775-787. doi:10.1016/j.jce.2004.08.006

Biswas, R. (2002). Determinants of Foreign Direct Investment. *Review of Development Economics, 6*(3), 492-504. doi:10.1111/1467-9361.00169

Blonigen, B. A. (2005). A Review of the Empirical Literature on FDI Determinants. *Atlantic Economic Journal, 33*(4), 383-403. doi:10.1007/s11293-005-2868-9

Blonigen, B. A., Davies, R. B. (2004). The effects of bilateral tax treaties on U.S. FDI activity. *International Tax and Public Finance, 11*(5), 601-622. doi:10.1023/B:ITAX.0000036693.32618.00

Blonigen, B. A., & Figlio, D. N. (1998). Voting for protection: does direct foreign investment influence legislator behavior? *The American Economic Review, 88*(4), 1002-1014.

Botrić, V., & kuflić, L. (2006). Main Determinants of Foreign Direct Investment in the Southeast European Countries. *Transition Studies Review, 13*(2), 359-377. doi:10.1007/s11300-006-0110-3

Buckley, P. J., & Casson, M. (1981). The Optimal Timing of a Foreign Direct Investment. *The Economic Journal, 91*(361), 75. doi:10.2307/2231697

Cameron, A. C., & Trivedi, P. K. (2010). *Microeconometrics using Stata* (Rev. ed. ed.). College Station, Tex: Stata Press.

Campa, J. M. (1993). Entry by Foreign Firms in the United States Under Exchange Rate Uncertainty. *The Review of Economics and Statistics, 75*(4), 614-622. doi:10.2307/2110014

Casson, M. (1987). *The firm and the market: Studies on multinational enterprise and the scope of the firm*: MIT Press.

Cleeve, E. A. (2008). How Effective Are Fiscal Incentives to Attract FDI to Sub-Saharan Africa? *The Journal of Developing Areas, 42*(1), 135-153. doi:10.1353/jda.0.0015

Cleeve, E. A., Debrah, Y., & Yiheyis, Z. (2015). Human Capital and FDI Inflow: An Assessment of the African Case. *World Development, 74*, 1.

Cushman, D. O. (1985). Real Exchange Rate Risk, Expectations, and the Level of Direct Investment. *The Review of Economics and Statistics, 67*(2), 297-308. doi:10.2307/1924729

Deardorff, A. V. (2001). Fragmentation in simple trade models. *North American Journal of Economics and Finance, 12*(2), 121-137. doi:10.1016/S1062-9408(01)00043-2

Deichmann, J. I., Eshghi, A., Haughton, D. M., Ayek, S., & Teebagy, N. C. (2003). Foreign Direct Investment in the Eurasian Transition States. *Eastern European Economics, 41*(1), 5-34. doi:10.1080/00128775.2003.11041039

Dixit, A. K., & Grossman, G. M. (1982). Trade and Protection With Multistage Production. *The Review of Economic Studies, 49*(4), 583-594. doi:10.2307/2297288

Dunning, J. H. (1979). Explaining changing patterns of international production: In defence of the eclectic theory. *Oxford Bulletin of Economics and Statistics, 41*(4), 269-295. doi:10.1111/j.1468-0084.1979.mp41004003.x

Dunning, J. H. (1993). *The Theory of transnational corporations* (Vol. vol. 1). London: Routledge.

Dunning, J. H. (2009). Location and the multinational enterprise: a neglected factor?(2008 Decade Award Winning Article)(Report). *Journal of International Business Studies, 40*(1), 5. doi:10.1057/jibs.2008.74

Franklin, R. R., & Ahmed, A. A. (1978). The influence of policy instruments on manufacturing Direct Foreign investment in developing countries. *Journal of International Business Studies, 9*(3), 81. doi:10.1057/palgrave.jibs.8490670

Goldberg, L. S., & Kolstad, C. D. (1995). Foreign Direct Investment, Exchange Rate Variability and Demand Uncertainty. *International Economic Review, 36*(4), 855-873. doi:10.2307/2527262

Grubert, H., & Mutti, J. (1991). Taxes, Tariffs and Transfer Pricing in Multinational Corporate Decision Making. *The Review of Economics and Statistics, 73*(2), 285-293. doi:10.2307/2109519

Hallward-Driemeier, M. (2003). Do bilateral investment treaties attract foreign direct investment? Only a bit - and they could bite. In (Vol. 3121): The World Bank.

Hartman, D. G. (1984). Tax policy and foreign direct investment in the United States. *National Tax Journal, 37*(4), 475-487.

Hennart, J. F. (1982). *A theory of multinational enterprise*: University of Michigan Press Ann Arbor, MI.

Hong Kong Trade and Industry. (2016). Hong Kong the facts: Trade and Industry. Retrieved from https://www.gov.hk/en/about/abouthk/factsheets/docs/trade%26industry.pdf

Hymer, S. H. (1960). *The international operations of national firms: A study of direct investment.* (Ph.D. dissertation), Massachusetts Institute of Technology, MIT Press, 1976.

Kasuga, H. (2007). Evaluating the impacts of foreign direct investment, aid and saving in developing countries. *Journal of International Money and Finance, 26*(2), 213-228. doi:10.1016/j.jimonfin.2006.11.002

Kechagia, P., & Metaxas, T. (2018). Sixty years of FDI empirical research: Review. *Journal of Developing Areas, 52*(1), 169.

Kindleberger, C. P. (1969). *American business abroad : six lectures on direct investment*. New Haven: Yale University Press.

Kogut, B., & Chang, S. J. (1996). Platform investments and volatile exchange rates: Direct investment in the U.S. by Japanese electronic companies. *Review of Economics and Statistics, 78*(2), 221-231. doi:10.2307/2109924

Ledyaeva, S. (2009). Spatial Econometric Analysis of Foreign Direct Investment Determinants in Russian Regions. *World Economy, 32*(4), 643-666. doi:10.1111/j.1467-9701.2008.01145.x

Masron, T. A., & Nor, E. (2013). FDI in ASEAN-8: Does institutional quality matter? *Applied Economics Letters, 20*(2), 186-189. doi:10.1080/13504851.2012.687090

Mhlanga, N., Blalock, G., & Christy, R. (2010). Understanding foreign direct investment in the southern African development community: an analysis based on project-level data. *Agricultural Economics, 41*(3-4), 337-347. doi:10.1111/j.1574-0862.2010.00440.x

Ministry of Commerce of the People's Republic of China. (2018). China's investment cooperation in countries along the "One Belt and One Road" in 2017. Retrieved from http://www.mofcom.gov.cn/article/tongjiziliao/dgzz/201801/20180102699459.shtml

Ministry of Commerce of the People's Republic of China, National Bureau of Statistics of China, & State Administration of Foreign Exchange. (2017). *2016 Statistical Bulletin of China's Outward Foreign Direct Investment*. Beijing.

Mohamed, S. E., & Sidiropoulos, M. G. (2010). Another look at the determinants of foreign direct investment in MENA countries: an empirical investigation. *Journal of economic development, 35*(2), 75-95.

Morrissey, O., & Udomkerdmongkol, M. (2012). Governance, Private Investment and Foreign Direct Investment in Developing Countries. *World Development, 40*(3), 437-445. doi:10.1016/j.worlddev.2011.07.004

Schneider, F., & Frey, B. S. (1985). Economic and political determinants of foreign direct investment. *World Development, 13*(2), 161-175.

Seyoum, M., Wu, R., & Lin, J. (2014). Foreign Direct Investment and Trade Openness in Sub-Saharan Economies: A Panel Data Granger Causality Analysis. *South African Journal of Economics, 82*(3), 402-421. doi:10.1111/saje.12022

Suliman, A. H., & Mollick, A. V. (2009). Human Capital Development, War and Foreign Direct Investment in Sub-Saharan Africa. *Oxford Development Studies, 37*(1), 47-61. doi:10.1080/13600810802660828

Teixeira, A. (2011). Location determinants of FDI: A literature review. In (Vol. H035345): Universidade do Porto, Faculdade de Economia do Porto.

Thangavelu, S. M., & Narjoko, D. (2014). Human capital, FTAs and foreign direct investment flows into ASEAN. *Journal of Asian Economics, 35*, 65-76. doi:10.1016/j.asieco.2014.11.002

the IMD World Competitiveness Center. (2018). IMD World Competitiveness ranking. Retrieved from https://worldcompetitiveness.imd.org/customsearch

Tianjin Municipal People's Government. (2018). Investing in Tianjin. Retrieved from http://www.tj.gov.cn/tj/tztj/

Tintin, C. (2013). The determinants of foreign direct investment inflows in the Central and Eastern European Countries: The importance of institutions. *Communist and Post-Communist Studies, 46*(2), 287-298. doi:10.1016/j.postcomstud.2013.03.006

UNCTAD. (2017). *World investment report 2017*. In.

Vijayakumar, N., Sridharan, P., & Rao, K. C. S. (2010). Determinants of FDI in BRICS countries: A panel analysis. *International Journal of Business Science and Applied Management, 5*(3), 1-13. doi:10.3184/095422913X13579272982532

Wei, S.-J. (2000). How Taxing is Corruption on International Investors? *Review of Economics and Statistics, 82*(1), 1-11. doi:10.1162/003465300558533

Wooldridge, J. M. (2014). *Introduction to econometrics* (Europe, Middle East and Africa ed. ed.). Andover: Cengage Learning.

World Bank. (2018). World Development indicators. Retrieved from http://databank.worldbank.org/data/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators

7. Appendix

We have summarized the different theoretical approaches from Teixeira (2011), that presents in the following tables.

Table 7.1 the summary of theoretical approaches

Theoretical approach	Determinants	Author(s) (year)
Heckscher-Olin model / MacDougall-Kemp Model	Higher return on investment, lower labor costs, exchange risk	Aliber (1970)
Market imperfections	Ownership benefits (product differentiation), economies of scale, government incentives	Hymer (1976), Kindleberger (1969)
Internalization	Market failures/inefficiencies; Know – how (leads to horizontal internalization), market failures (leads to vertical internalization)	Buckley and Casson (1976); Hennart (1982, 1991), Casson(1987)
Eclectic paradigm (OLI-ownership, location, internalization)	Benefit of owning productive processes, patents, technology, management skills; Advantage of locating in protected markets, favorable tax systems, low production and transport costs, lower risk; Advantage of internalization cutting transaction costs, lowering risk of copying technology, quality control	Dunning (1979)
New theory of trade	Market size; transportation costs; Barriers to entry; Factor endowments	Dixit and Grossman (1982), Deardorff (2001)
Institutional approach	Political Variables: Financial and economic incentives; Tariffs; Tax rate	Grubert and Mutti (1991)

Source: (Teixeira, 2011, p. 3)

Table 7.2 list of examples in Dunning's OLI paradigm theory

Dunning's OLI paradigm:

Determinants	**Proxy**	**Effect**	**Authors**
Infrastructure	Number of internet connections	Negative	Botrić and kuflić (2006)
	Infrastructure index	Positive	Vijayakumar et al. (2010)
	Installed net electricity generation capacity per capita	Positive	Biswas (2002)
Human Capital	% adult literacy	Positive	Asiedu (2006)
Economic stability	Inflation rate	Negative	Schneider and Frey (1985)
	Unemployment rate	Positive	Botrić and Škuflić (2006)
	Weighted average of main currencies adjusted for inflation	Negative	Vijayakumar et al. (2010)
Production costs	Wage	Negative	Biswas (2002), Botric and Skuflic (2006)

Source: (Teixeira, 2011, p. 8)

Table 7.3 list the previous literature of the new theory of trade.

New theory of trade:

Determinant	**Proxy**	**Effect**	**Authors**
Market size	GDP per capita	Positive	Cleeve (2008)
	GDP	Positive	Asiedu (2006), Vijayakumar et al. (2010)
Market growth	GDP growth rate	Positive	Mhlanga, Blalock, and Christy (2010),

	Industrial production index	Positive	Vijayakumar et al. (2010)
Openness of the economy	(X+M)/GDP	Positive	Botric and Skuflic (2006)
	Openness index ICRG (International Country Risk Guide)	Positive	Asiedu (2006)
	Investment in extractive industry (dummy)	Positive	Mhlanga et al. (2010)
Factor endowments in natural resources	Variable = 0 weak NR endowment; Variable = 1 moderate endowment; Variable = 2 high endowment.	Positive	Deichmann, Eshghi, Haughton, Ayek, and Teebagy (2003)
	Industrial production index oil+gas	Positive	Ledyaeva (2009)

Source: (Teixeira, 2011, p. 14)

Table 7.4 list of examples of institutional approach

Institutional approach:			
Determinant	**Proxy**	**Effect**	**Authors**
Corruption, political, instability and institutional quality	Corruption index	Negative	Mohamed and Sidiropoulos (2010)
	Protection of copyright index	Positive	Biswas (2002)
Financial and economic incentives	Tax incentives	None	Franklin and Ahmed (1978)
	Bilateral effectives average tax rates	Negative	Bellak and Leibrecht (2009)

Source: (Teixeira, 2011, p. 11)