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FDI, Economic Growth and Institutional Quality: Evidence from Countries with Different Income Levels

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Abstract

Abstract: Institutional quality and income level of countries can play different role in international trade, which can affect foreign direct investment and economic growth, both negatively and positively. Although the empirical evidence shows a mix result, few literatures specifically study the effect of FDI on economic growth and the role of institutions in FDI and economic growth in developing countries. This thesis is developed on the research of Roodman (2006, 2009) and Farole and Winkler (2012) but specifically focuses on the impacts of institutional quality on FDI-Growth nexus. This thesis is based on absorptive capacity theory and exogenous growth model to utilize dynamic panel GMM techniques robust to instrument proliferation. Finally, the thesis empirically tested the propositions through econometric models by regressing a static panel model and two-stage GMM equation. In summary, based on absorptive capacity theory, this dissertation not only contributes to literature by applying the theoretical model in FDI and economic growth in exploring interaction with the role of institutions and human capital on the FDI-growth nexus but also obtained some new empirical results in different income level groups to explore the impacts of macroeconomics situation that can affect our results. The results show that FDI can independently exert positive impact on economic growth and the positive effect only exists in high and upper-middle income countries. Institutional quality can have positive impact on FDI-induced growth but the results differ in different income groups. Human capital can act as a threshold in promoting FDI-growth nexus but the effects exist only in lower-income countries.

Keywords: FDI; Economic Growth; Institutional Quality; Absorptive Capacity; Dynamic panel model; GMM; Income level; Human Capital

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1. Introduction

This thesis aims at investigating the role of FDI flows in accelerating economic growth and provides empirical evidence in countries with different income levels. The research follows the model of Roodman (2006) and Nguyen (2019) but emphasizes the direct impact of FDI on economic growth in different groups of income based on absorptive capacity theory and the research of Farole and Winkler (2012), the impact of institutional factors on FDI-Growth nexus and the effects mediated by institution factors (control of corruption, rule of law, government effectiveness and regulatory) applied in Qian, Jesus and Garrett (2012). This thesis will firstly present the direct impact of FDI on economic growth in countries in terms of different level of income. Also, both static panel model and dynamic panel model will be used together and the thesis will focus on dynamic panel analysis, two-stage GMM estimation, in the research of Carkovic and Levine (2005) aiming at expanding the dataset and focusing on the countries in different income levels. This dissertation intends to combine human capital, country income level, institutional factors, FDI with economic growth over a period horizon and cover countries in different income level to explore the effects of institutional factors on FDI-induced growth. Therefore, this thesis not only contributes to the literature by furthering studying the FDI impact on economic growth in countries in terms of different level of income but also based on absorptive theory considers how institutional factors instead of traditional economic factors affect economic growth and FDI-Growth nexus, which is rarely discussed in previous studies.

Foreign Direct Investment (FDI) is defined as an investment where the enterprise can acquire substantial ownership in a firm overseas or create a subsidiary in a host country. The debate over the impacts of FDI on economic development continually draw attention in academia. Hansen and Rand (2006) claim that FDI is one of manifestations to promote economic growth as it may bring capital inflow to host country and indirect benefits through spillovers (Thirlwall, 1999; Herzer et al., 2008;

Elboiashi, 2011). For countries in the level of lower income, FDI can particularly be attractive for booming economy as it is efficient to tackle the lack of capital. In international business, benefits from FDI can be varied such as lower factor cost in host country or more convenient access to foreign markets. On the opposite side, some research show that FDI has weak or even negative impacts on economic growth (De Mallo, 1999; Sarkar, 2007; Shaikh, 2010). Bloomstrom et al. (1994) explore the relationship between FDI and economic growth in both developing and developed countries over the period of 1960 to 1985 and found that the impacts of FDI varied with the income level. Solomon (2011) used system GMM estimator and a panel of 111 countries to obtain that the impacts of FDI on economic growth are affected by income level, which support the research of Bloomstrom (1994). Most research also focus on the levels of human capital in host countries across developed and developing countries (Borensztein et al., 1998; Li and Liu, 2005; Solomon, 2011) although the results are ambiguous. Vu, Gangnes and Noy (2008) focused Asia countries and concluded that FDI had positive effect directly and indirectly with interaction with human capital on growth while there are few literatures focus on institutional quality in promoting FDI-Growth nexus and contains global datasets especially samples divided in terms of income level. Therefore, investigating the relationship between FDI and economic growth considering human capital and levels of income is essential.

In recent decades, the quality of institutions varied from country to country. For example, the figure of corruption in some country decreased but increased in others (Seldadyo and De Haan, 2011). Institutional quality is commonly discussed in international trade and bring significant impacts on the FDI and economic growth of host country. For example, corruption has been a part of business environment especially in developing economies (Transparency International, 2018). Recent analysis about economic factors, such as exchange rate, financial development, ect., and FDI reports that better institutional quality can stimulate economic growth

(Zhang, 2001; Durham, 2004; Lia and Liu, 2005). Therefore, more and more research focus on the role of institutional quality on FDI-induced Growth relationship.

Exploring the channels affecting FDI-Growth nexus has been conducted in many studies, focusing on the aspects of financial development, economic development, trade liberalization and so on (Blomstrom, Lipsey and Zejan, 1994; Balasubramanyam et al, 1996; Hermes and Lensink, 2003). Institutional heterogeneity has been considered in economic performance of countries in previous studies (James and Yanikkaya, 2006; Hayat, 2019). Stronger Institutions with better control of corruption, rule of law and government effectiveness can promote the spill-over effects and economic performance (Hayat, 2019).

This thesis supposes the absorptive capacity theory that countries receive benefits from FDI only when they have sufficient absorptive capacity related to relevant factors including human capital, institutional development, technology, financial system and so on. According to Bevan and Estrin (2004), FDI can be described as the international flow of capital, technology and know-how. The benefits from FDI do not automatically convert to be the spill-over effects in host country.

This thesis estimates the impacts of FDI on economic growth and role of institutional quality as well as human capital on FDI-growth nexus by regressing dynamic panel model derived from Roodman (2006) and theoretical model of Farole and Winkler (2012) by utilizing Generalized Method of Moments (GMM) estimators. Specially, the thesis deployed both difference and system GMM estimators to control instrument variables proliferation, endogeneity and heteroskedasticity problems (Arellano-Bond, 1991; Blundell and Bond, 1998; Bond et al., 2001). The first step is to explore the direct impacts of FDI on economic growth. Based on the results, the thesis will add human capital to explain whether the FDI impacts will be different in different level of human capital. Secondly, the institutional factors will be added to explain whether it will affect FDI-Growth relationship based on the absorptive capacity theory. The thesis

tries two methods. The first approach is to interact institutional quality with FDI. The second approach is to define a benchmark group following previous studies in terms of income level. In addition, the thesis will employ an institutional quality identifier based on the average figure of institutional quality in each income group.

This thesis is structured in the following steps. To begin with the Chapter 1, the review of previous studies and literature will start with a brief selective review of FDI theories. Following with theories of economic growth, this dissertation presents the previous studies that link FDI with economic growth and impacts of FDI on economic growth in section 2.1 and 2.2. In section 2.3, the thesis asserts the institutional factors from political economy perspective to investigate how they affect FDI-growth nexus. The results will show that the impacts of FDI on economic growth will see difference over developing economies to developed economies and institutional factors will affect the FDI-growth nexus, which is important to understand the reasons of having mixed empirical results, and the need of conducting further research on relationship between institutional factors, income level of countries, FDI and economic growth, which is described in section 2.4. Section 2.5 reviews the previous studies in exploring relationship among human capita, FDI and economic growth, which begins with an explanation about human capital and then, extends the review from its impacts in FDI and economic growth relationship. Section 2.6 reviews the previous empirical research on institutional factors, FDI and economic growth in developing countries. Finally, section 2.7 presents the contribution of this thesis.

Secondly, Chapter 3 presents the empirical strategy and theoretical framework of this dissertation. Section 3.1 will introduce some backgrounds theories of Generalized Method of Moments (GMM). Following with introduction to institutional factors, section 3.2 slightly modifies the GMM estimation model by adding the explanatory variable to fit the research questions. According to the model in Chapter 3, the thesis derives the empirical models and econometric specifications in Chapter 4 for the later

estimation part. Also, section 4.2 describes the data and variables included in the estimation.

The first sections in chapter 5 discuss the estimation results of FDI-Growth relationship and the role of institutional quality and human capital on FDI-induced growth relationship. Section 5.4 presents a robustness analysis. Based on the results of estimation, Chapter 6 concludes the direct impacts of FDI on economic growth in countries in term of different level of income and role of institutional quality in FDI-Growth nexus. One key point is that this dissertation will discuss the difference of impacts of FDI in different countries in terms of level of income. The thesis gives possible suggestions towards the estimation results and points out the possible further field of research.

2. Literature Review

Chapter 2 will present previous studies and relevant theories for FDI, economic growth and absorptive capacity, followed with an introduction to institutional factors and their relations with FDI and economic growth. This section will end with previous relevant studies in both developed and developing countries and contributions to current literature.

2.1 Foreign Direct Investment

In the early stage, the FDI theory works under the assumption that the perfect competition exists. MacDougall (1960) claims that if the price of capital is equal to marginal productivity, the marginal productivity should be equalized between two countries when the capital can move freely between two economies. This claim is developed by Kemp (1964) and both advocate that investing long-term abroad can bring higher income to domestic country so the decline of domestic output may not lead to decrease of national income. This argument, however, is disputed as multinational enterprise tend to seek for monopolistic profit when investing abroad under imperfect market assumption (Kindleberger, 1969).

2.1.1 Industrial Organization Theory

Based on Lemfalussy (1961) and Kindleberger (1969), new research in FDI have focused on imperfect competitive market assumption of FDI (Caves,1974; Cohen, 1975). Hymer (1976) proposed a new industrial oranization theory for FDI research in imperfect competitive market. The theory presents that some manifestation of market power must offset the disadvantages of operating abroad including some disadvantageous position in culture, language, customer's preference, institutions or even the exposure to foreign exchange risk. The market power, as mentioned by Hymer (1976), is in form of firm-specific advantages such as management skills, economies of scale and superior technology. In the theory of Hymer (1976), it is among

units of firm instead of the location that these firm-specific advantages can be transmittable. Therefore, the market power acquired from firm-specific advantages can be utilized to earn more profit when operate and invest abroad because of the imperfect market assumption. Based on the theory of Hymer, Graham and Krugman (1989) support Hymer's argument by explaining that the possessed technological advantage led European firms to investing in the United States, which is corresponding with Hymer's argument that protected-patent technology is the most significant factor driving FDI. However, Robock and Simmond (1983) challenged the argument of Hymer (1976) and assert that firm-specific advantages may affect the firm's choice between FDI and licensing/exporting. They also criticize the lack of explain on timing and location effect of FDI in the theory. Later, this theory is developed by eclectic theory of Dunning (1979) and Internalization theory proposed by Buckley and Casson (1976), which we will discuss later.

2.1.2 Monopolistic Power Theory

Kindleberger (1969) developed his theory from Hymer (1960) from a perspective of monopolistic power. The key point of his argument is that main advantages of firms' FDI only work under market imperfection. Therefore, Kindleberger (1969) assert that firms tend to invest abroad when the possibility of earning the monopoly profits becomes greater. The manifestation of FDI chosen by firms might be brand, patent-protected technology, etc. In the research of Kindleberger, it is less likely for host country that foreign firms are permitted into the local market.

2.1.3 Oligopolistic Theory and FDI

In the past theory of FDI, most research describe the motive of firm's FDI choice into two tracks: (a) companies seek increased access to foreign market; and (2) companies seek lower factor costs in host country's market. Based on market imperfections, Knickerbocker (1973) developed a new motivation that firms tend to invest abroad to follow their rivals' move because the new competitors in host country's market can reduce the risk and uncertainty in costs of host country (i.e., production, selling cost)

and can become quickly familiar with local market principles. This is supported by Altomonte and Pennings (2003)'s finding that most firms will follow the local competitors to know how to price products and how local market operates.

To keep the strategic strengths, firms tend to follow the internationalization of rivals and their location decision. Knickerbocker (1973) employs data from US over the period of twenty years and the results suggest that the theory suits oligopolistic industry that dominated by large companies and the entry choices of MNEs' subsidiaries are clustered, which means such oligopolistic market result from the increasing market concentration. Oligopolistic theory only follows uncertainty or risk of production cost existing in host country but fail to focus on the motive of firms that firstly enter the foreign market.

2.1.4 Internalization Theory and FDI

Transaction cost is considered in some literature in FDI analysis (Coase, 1937; Williamson, 1975 and 1993). Williamson (1985) suggests that a transaction occurs when goods or service are transferred in technological perspective while it may be difficult to sell input or share technology with unrelated firms. Therefore, the trade-off under transaction theory is choice between backward or forward integration or external agency to act as a participant in foreign market (Williamson, 1985). Buckley and Casson (1976) identified the five incentives that firms may internalize their knowledge gained from research and development production stage during the integration. The high transaction costs of transferring or selling to unrelated firms will push firms choose internalization and their subsidiaries can utilize the technology to produce and sell in foreign market. However, this theory strongly relies on Transaction Cost Theory (applied for domestic market), which is admitted by Buckley and Casson (2009). This theory also ignores the difference in the magnitude of host government intervention risk across domestic different industries.

2.1.5 Eclectic Paradigm to FDI

Based on the oligopolistic and internationalization theories, Dunning (1977, 1979) developed an OLI paradigm to FDI (Eclectic Paradigm to FDI). This can allow MNEs utilize ownership advantages that are specific to firms and transfer them to host countries that ownership advantages can be exploited through trade flow under the locational strengths to promote international gains. The major contribution of Dunning (1977) is its combinations of lots of complementary theories in FDI and this is empirically supported by his research (Dunning, 1980).

However, the critics of Dunning (1977, 1980) is that it contains too many physical attributes instead of local institutions. Focusing more on institutions in the paradigm, Dunning (2015) expands its estimation model and datasets by adding institutional factors, regulation, political right factor and other cultural distance factors while it fails to address lack of motivations of horizontal and vertical FDI. Although the criticism was intense, the research remains a helpful approach for us to understand FDI.

2.1.6 FDI in International Trade

In the early work of FDI, most scholars will consider explaining trade flow in different nations (Smith, 1776; Rocardo, 1817). According to UNCTAD (2004), nearly one third of international trade flows are in the form of intra firm flows. The early theory that connect FDI with International trade did not focus on the motive of horizontal and vertical FDI until the research of Helpman (1984) and Helpman and others (2004). Helpman (1984) presented a general equilibrium model of international trade that links FDI to international trade. He explains the theory based on firms producing one product at one single facility in host or home country and explain the motive of choosing location for production affected by factor endowment, including natural resource, capital and labor, is to minimize the factor costs and maximize the profits. The key point of Helpman (1984) 's research is comparing production cost in foreign countries and trade cost to home countries while he failed to explain the horizontal

motive of FDI because his research does not take the motive of access to foreign market into consideration and his model is based on a vertically integrated firm.

In another study, Helpman et al. (2003, 2004) developed the theory by proposing that enterprise will differ in their productivity and heterogeneity exists in industries. More specifically, the firms survive in the market are equipped with sufficient productivity and have ability to sell goods in foreign markets by local productive facilities but also serve the domestic market as well. By confirming productivity of a firm will affect or determine FDI decision, Helpman (2004) deployed US data of MNEs to provide empirical evidence to support his theory. The firms with sufficient productivity can have better choice while less productive firms have limited choice (exporting or serving only domestic market). The firms with multiple productive machines tend to choose produce goods in host countries to avoid high transport cost and benefit from economies of scale. While Yeaple (2009) refute that the empirical evidence is weak under the dataset of disaggregate data by industrial firm or industry, more comprehensive literature summarizes the progress of FDI theories by focusing on certain type of FDI such as mergers and acquisition and technologically improvements.

2.2 FDI and Economic Growth

The development of FDI theories contributes to the research in international trade while the acceleration of FDI's impact on economic growth is still controversial in academies. In neo-classical Solow growth model, the effect of FDI is to diminish the return to capital formation, resulting in constrained economic growth. Endogenous growth model tends to explain the impact of FDI as contribution to economic development through various mechanisms. FDI may positively affect host countries through channels including factor and product markets or spillovers (Navaretti and Venables, 2004). This section will firstly introduce two theories of economic growth and then poses channels that FDI benefits the economic growth.

2.2.1 FDI and Growth in Neo-classical Solow Model

Neo-classical Solow model is often referred as exogenous growth model and the theory is proposed by Solow (1956 and 1957). The exogenous-growth theory is based on assumption that economic growth is accelerated by accumulation of exogenous factors of production, including physical capital or labors. Cobb and Douglas (1928) developed theory and empirically studied the model on economic growth by using exogenous model. Hicks (1932) demonstrate the Cobb-Douglas production function consists of changing-over-time capital input, labor input and technological progress rate. The growth model shows that capital accumulation directly promotes economic growth by improving proportion of capital share in domestic output. According to Barro and Sala-I-Martin (1995), FDI accumulates the capital stock in domestic country and, in turn, affect economic growth.

It is explained that the introduction of technology from foreign countries can lead to increased labor and improved productivity. In the long-term, this improvement would lead to more return of investment and exogenous labor growth (De Jager, 2004). Barro and Sala-I-Martin (1995) outlines that capital accumulation can positively promote economic output. Herzer et al. (2008) demonstrate that FDI can act as one form of augmenting domestic investment to boom economy. The neo-classical growth model suggests that FDI can promote economic growth by accumulating capital and transforming foreign technology into production function of host countries. The channel can be summarized as increasing efficiency of investment in host countries.

2.2.2 FDI and Growth in Endogenous Growth Model

Endogenous growth model, the model different from neoclassical growth model assuming exogenous technological progress, suggests that economic growth is driven by technological breakthrough or accumulation of human capital (Lucas, 1988). The new growth models consider long-term growth as a manifestation of technological progress (Nair-Reicher and Weinhold, 2001). Therefore, FDI can perpetually

contribute to economic growth of host country by transferring technology and externalities.

The two growth models both present that economic growth can be promoted by capital formation but the channel of technology progress plays different roles. Elboiashi (2011) summarizes that, in the endogenous growth model, economic growth is driven by increasing technology knowledge and innovation such as patent while technological progress is exogenous in the Solow growth model (Borensztein et al., 1998). The growth factors of formation of human capital and research and development arise from tangible assets or development expenditures. Elboiashi (2011) highlights that FDI can boost economy by enhancing the stock of knowledge such as knowledge transfer in endogenous growth theory. It is summarized in OECD (2002) that FDI promotes economic growth by spill-over effects in technology generation, assistance in human capital accumulation, global trade integration or competitive business environment promotions.

2.2.3 Channels of FDI affecting Economic Growth

The scholars examine the impacts of FDI on economic growth in four fields: the impacts of FDI on growth, the determinants of FDI, channels of FDI affecting economic growth and causal relation between FDI and economic growth. A large body of research supports the positive effects of FDI on economic growth and local welfare of host countries since FDI brings new technology innovation, managerial skills, job opportunities and financial resources (De Mello, 1997; Hansen and Rand, 2006; Al Nasser, 2010). FDI also brings spill-overs effects to host countries and boom the economy (De Mello, 1999; Chowdhury and Mavrotas, 2006). Considerable literatures focusing on impacts of FDI on economic growth focus more on the channels that FDI affecting the growth, both positively or negatively.

Ford et al. (2008) asserts that FDI can encourage the transfer of new technology so firms can create positive externalities in the foreign market especially for middle-

income economies because innovation of technology can generate substantial technological spill-overs effects for developing countries. However, Sen (1998) argue that firms can transfer inappropriate patent-protected technology or the technology impeding the development of industries in host countries. The negative effect also contains stifling local entrepreneurship (Thirlwall, 1999).

Human capital accumulation is also recognized as an approach to enhance the economic growth (De Mello 1995). Bringing skilled person to host countries and introduction of modern managerial skills can enhance current knowledge stock. Borensztein et al. (1998) suggested that FDI can promote economic growth in host country with a specific level of human capital development. This is supported by Li and Liu (2015) showing that FDI can boom economy through the channel of human capital. On the opposite side, OECD (2002) argued that introduction of new technology may cause increase in job unemployment rate. Borensztein et al. (2005) further point out that technical knowledge may not be used for development of firms but for market competency. The worse situation is that new trained workers may leave the countries for better international opportunities (Vissak and Roolaht, 2005).

Mencinger (2003) used the results of over 30 countries to suggest that the integration into world economy of host country can benefit from FDI. Thrilwall (1999) claims that increase in FDI can be invested in tradable goods sector and, thus, increase the export and brings foreign exchange that are needed. MNCs can improve and sustain the export competitiveness of host countries according to the results of UNCTAD (2002). The channels can be sustaining high growth of export rates, improving value-addition of goods and technological content of exports, encouraging local firms to improve competence in the international market. Clark et al. (2011) point out that FDI through MNCs can help them reduce the entry costs in host countries through integration, improving the access to economies-of-scale. The negative consequences are also observed by Vissak and Roolaht (2005) that FDI can promote the economic through

channels of spreading economic challenges in international context to the currently host economy.

According to OECD (2002), local firms may react to foreign firms through reducing prices of products, improving performance or reforming the strategy of development and entry of FDI can also encourage competition in the market of host country. The increasing reactions of local firms may increase the R&D spending or improve the quality of products to sustain the market share. Moura and Forte (2010) claim that competition from foreign firms force the domestic companies utilize the resources more efficiently and updated the technologies more quickly to keep the pace with foreign firms. The increasing competition of foreign firms can also attract skilled labors to outperform in the host country. However, the invaded competition may cause the closure of local firms and worsely create the monopolies or oligopolies (OECD, 2002). Therefore, encouraging the competitive market should be together with relevant competitive polices and regulations in local market.

2.3 Quality of Institution

In traditional perspective, scholars would examine the impacts of FDI using economic factors including labor cost, exchange rate, transportation cost and others as explanatory factors in determinants of FDI-induced economic growth (Caves, 1974; Dunning, 1980). Wheeler and Mody (1992) develops the theory of North's (1990) and raise new determinants in institutional perspective. Institutions can be defined as 'Human design constraints to build human interaction' (North, 1993). Following the research of North (1990), Dunning and Lundan (2008) revisit the choice of institutions and they find choices tend to be affected by any individual decision makings including social mores and belief systems.

Bailey (2018) summarized a statistical literature review according to the previous empirical studies on effects of institution of FDI and economic growth. The review reveals that six institutional factors play vital role, and they are political environment,

the rule of law, control of rcorruption, tax rates, government effectiveness and regulatory quality. For these six institutional quality indicators, this dissertation focuses on four factors and following the research of Daude and Stein (2001) grouping them as "government efficiency" factor in institutions.

2.3.1 Control of Corruption

Peng et al. (2008) state that corruption is an important part of institutions in given locations. Scholars have demonstrated that corruption reflects the characteristics of institutions in legal, economic, cultural and political aspect within a country (Syensson, 2005; Qian and Sandoval-Hernandez, 2016). Based on literature review, the thesis summarizes the role of corruption on the impacts of FDI on economic growth.

The negative roles are latent taxes, production managerial cost and motive of illegal activities. Corruption can intangibly set a tax barrier on foreign direct investment and the rising concern of costs can deter FDI (Shleifer and Vishny, 1993). Lambsdorff (2003) points out that the legal costs from enforcement of contract may arise from corruption and investors will lose resource due to the illegal bribery. The firms still face other costs though corruption (Shleifer and Vishny, 1993). For example, the authority will refuse the approval of permit unless the firms pay the bribe, increasing the costs of foreign firms. Regulation traps are observed by De Soto (1989) and this will generate bribes from firms to increase the cost and discourage the investment abroad. Buehn and Schneider (2012) argue that negative impacts of corruption on FDI and economic growth primarily increase the possibility of incentives to engage in illegal activities. Buehn and Farzanegan (2012) concluded that the level of illegal trade is positively correlated with frequency of corruptive activities. A considerable number of literature results empirically support the positive correlation between illegal trade and corruption level (Wei, 2008; Hakkala et al., 2008). Although corruption seems deterring the FDI and economic growth in the previous studies, some literature still present corruption can act as a positive promoting factor on FDI and economic growth.

According to Gastanaga et al. (1998) and Robertson and Watson (2004), the corruption can bring negative effects on market efficiency and resource allocation, causing decreasing productivity. Corruptive legal system may reduce entry barrier for foreign investors since they have power under corruption and seeking money is prior to legal system. In this perspective, corruption may act as a helping hand for foreign firms to enter particular industries. Khanna and Palepu (2010) claim that corruption may encourage MNEs avoid inefficient bureaucracy and procedures to reduce the barrier of entry to attract FDI.

2.3.2 Government Effectiveness, Regulatory Quality

The two indicators clustered in Government Effectiveness and Regulatory Quality are both used to measure the ability of the government to implement policy and the quality of public services. Government Effectiveness represents the ability and quality of bureaucracy and public provision, the competence and service quality of civil servants and the credibility of commitments that government made to policies (Kaufmann et al., 1999; Blonigen et al., 2002). Regulatory Quality also denotes the policies environment and aggregates the degree of market regulations that are friendly to investors such as price controls (Havranek and Irsova, 2011). These two variables are frequently grouped as one in many literature (Blonigen et al., 2002; Helpman et al., 2008) as both of them are related to measurements of good governance and capacity of governance to implement sound policies.

Results of previous studies in the field of government effectiveness and FDI are mixed. Steven and Daniel (2002) employed 144 countries as samples over the period of 1997 to 2004 and found that inward FDI is significantly affected by government effectiveness. This result is supported by Koen et al. (2012) who used 28 OECD countries as sources. Baharumshah and Law (2010) proposed its findings based on absorptive capacity theory and asserted that countries with higher government effectiveness absorb more benefits of FDI in booming economy. However, this argument is disputed by Bissoon (2012) who did research in Latin America and Africa

as the level of FDI inflow is significantly influenced by all governance indicators except government effectiveness and he explained it as the backward local development level. Although some literature shows no significance between government effectiveness and FDI or FDI-Growth nexus, there are still results supporting that government effectiveness positively attracts FDI and booms the economy (Busse and Groizard, 2008).

Regulatory quality captures the security environment of investment so supporting evidence show positive mediating effects of regulatory quality on FDI and economic growth (Globeman and Shapiro, 2003; Fazio and Talamo, 2008; Hayat, 2017). Buchanan et al. (2008) claim that regulatory quality can boost inward FDI and peer benefits of FDI through implementing market-friendly policies and increase the investment expectations of investors. Sabir S. et al. (2019) present empirical evidence that higher regulatory burdens can limit the spill-over effects from FDI. It is more difficult for economies with higher levels of regulation to obtain FDI returns, and this is especially true for relatively restrictive regulations. In their empirical results, most of the 20% of economies with the highest levels of regulation seem to be restricted from using FDI.

2.3.3 Rule of Law

Rule of law aggregates the perceptions on the effectiveness, predictability and reliability of the judiciary of host countries (Mauro, 1995). According to World Bank's World Governance Indicators (WGI), the rule of law aggregates the quality of contract enforcement (Kaufman et al. 2009). As an important institutional context, the rule of law provides protection against legal emergency. Dellis K.et al. (2017) suggests that rule of law contains considerable elements such as the fair judiciary, government policy and maintenance of social orders. Foreign investors tend to focus on the law level of country to guarantee their safety of funding (Pajunen, 2008). The government makes and implements the policies, but it is the legal authorities that sustain competitive advantages in host country, which makes rule of law driving economic

growth from the benefits of FDI (Wang et al. 2012). Moreover, legal system is more likely to protect investors from expropriation by insider organization or external governments especially in corruptive country (Nwabuzor, 2005)

Therefore, rule of law can affect the absorptive capacity of host country and, thus, bring impacts on FDI-Growth nexus. Hoff and Stiglitz (2005) found evidence that countries with stronger indicators in legal administration peers benefit the most from FDI when considering the income levels of them, producing a promoting effect on FDI and FDI-induced economic growth. They explained it that rule of law sets agreements where countries utilize FDI policies to protect future returns, which also encourage a friendly policies environment and reduces the risks of trade.

2.4 Institutional Quality, FDI and Economic Growth

FDI began rising since the early of 1990s, with increasing literature in researching on FDI and economic growth. Solow (1956) proposed neoclassical growth model and concluded that FDI could serve as an exogenous promoting factor on economic growth through increasing volumes or efficiency of foreign investment. Following endogenous growth model, economic expansions are driven by technological transfers, spill-over effects and capital formation (Romer, 1986; Lucas, 1988). Kalotay (2000) asserts that attracting more FDI inflows requires a country adequate absorptive capacity. Previous studies have shown a positive growth effect need a converting process and determinants of success are the absorptive capacity of host countries (Blomstrom et al. 1994; Borensztein et al, 1998; Grima, 2005). According to Hermes and Lansink (2003), to absorb the FDI spillovers to promote economic growth, host country should be equipped with conditional development in education and skilled human capital, R&D and good institution quality.

2.4.1 Absorptive Capacity

In the past few years, a growing number of studies identified the absorptive capacity of home country and associated them with FDI and economic growth (Crespo and

Fontoura, 2007). The factors contain human capital, financial system penetration and others in economic perspective (Borenstein et al., 1998; Li and Liu, 2005). Farole and Winkler (2012), however, presented some evidence in firm-level data that absorption capacity plays a vital role on FDI-growth nexus.

The benefits of FDI inflow are varied while converting benefits to spill-overs for host countries is a process that requires sufficient absorptive capacity of the countries. "Absorption" of FDI denotes assimilation of FDI in host country. Therefore, the ability of absorbing FDI in host country represents the maximum amount of FDI that the firms of host country can utilize and integrate into economy through meaningful channels (Nunemkamp, 2004; Fu, 2008). Previous studies presented two stages of absorbability and two manifestations, practicing the project or converting the benefits into local competences within the host country. In order to assimilate the prior knowledge and utilize the benefits of FDI, the host country should be equipped with initial development of related prior knowledge circumstances and capacities (Cohen and Levinthal, 1990). The capacity mentioned in the previous studies contains various factors. For the labor force, human capital and education, which tend to be essential for host countries to absorbing the new technology and generate long-term economic growth, is frequently mentioned (Nunemkamp, 2004). Levithal (1990) pointed out that Research and Development (R&D) factor also affects the absorptive capacity of host country because firms will need to exploit external knowledge through R&D. Kalotay (2000) focused more on institutions and used institutional indices such as control of corruption and rule of law to conduct empirical research and obtained the result that significant positive effects of institutions on absorptive capacity of FDI.

Previous studies tested the role of institutional quality on absorption capacity and the results show the positive relationship (Hermes and Lensink, 2003; Fu, 2008). Firms tend to firstly consider rights of using profits and potential profit in market. Once the property rights are protected securely, the expectation of investors will rise and they can feel secure about the investment that will not be nationalized or confiscated (Fu,

2008). In turn, the investors who feel safe about investment tend to expand the investment in the host country. The unstable regulated environment will cause a maze for investors. Krogstrup and Matar (2005) employed institutional quality indicators (control of corruption, government effectiveness, rule of law and regulatory environment) to explore the absorptive capacities in Arabian world. The finding is that the institutional factors can stimulate the absorptive capacity of FDI and, therefore, boom the economy. When address the administrative problems in host country, the firms tend to invest if the institution is more secure and efficient. Similarly, Nunnemkamp (2004) claims that stronger institutional development can lubricate the absorptive capacity in a convenient procedure and create a more efficient support from absorbing FDI benefits.

The absorption capacity is likely to be affected by institution factors in host countries (Blomstrom and Kokko, 2003). Therefore, the relationship between FDI and economic growth is mediated through such change in absorptive capacity. Prufer and Tondl (2008) assert that positive FDI-growth relationship requires stable political and legal framework within countries because functioning circumstances for investment can support spillover effects from benefits of FDI to promote economic growth. Income level, in some way, represents the levels of development, affecting the absorptive capacity and mediating the effects of FDI-Growth nexus. According to Khordagui and Saleh (2013) research in world economies, their results show that the impacts of FDI on growth depend on the income category to which income level groups the country belongs. Based on absorptive capacity theory, Farkas (2012) proposed his findings that the positive spillovers from FDI depend on the income level of host country, which is corresponding with the findings of Blomstrom, Lipsey and Zejan (1994) but he did not explain how the level of income affects FDI spillovers. Easterly (2001) explained FDI and economic growth by controlling the variable of income levels and find that insignificance of income levels with FDI-Growth nexus. The ambiguous results of

research on relationship between income level and FDI still need more supporting evidence to address and answer.

2.4.2 Role of Institution in FDI-Growth Nexus

Some previous studies examined the role of institutional quality terms on FDI-induced economic growth based on the absorptive capacity theory although the results are heterogenous. Institutional quality may affect the absorptive capacity of the host country and mediates the impacts of FDI on economic growth. Business-friendly investment circumstances can promote spill-over effects from FDI and improve the efficiency of FDI resources' allocation (Busse and Groizard, 2008). The empirical results of Prüfer and Tondl (2008) from both developed and developing countries show that the positive productivity-related spillover effects of foreign direct investment based on the economic system environment of the host country. The empirical evidence from Busse and Groizard (2008) present that higher regulatory burdens can reduce the effectiveness of FDI on booming local economy. Some empirical results show that regulated economies or countries with more corruption level are less able to reap the benefits from FDI spill-over effects and they find that top 15 percent regulated countries tend to be restricted from utilizing FDI (Prufer and Tondl, 2008; Meyer and Sinani, 2009). Farole and Winkler (2012) focused on regulatory environment and assert that low political risk will promote FDI-growth nexus on the channel of productivity growth in middle-income countries.

According to economic growth model, one significant channel that FDI promoting economic growth is knowledge spill-over effects. Fosfuri, Motta and Ronde (2001) concluded that spill-over effects from FDI can be created through skilled labor transfer moving from home countries to host countries. Better institutions can provide a healthy competitive environment and encourage firms engage in healthy competitions while worse institution quality can increase adaption costs and risk of transaction, therefore reducing commitments of government in host countries. Jude and Levieuge (2015) concluded that better institutional qualities such as the rule of

law and effective governance also provide investors with confidence, which may affect the way foreign direct investment enters the country and, or more exactly, absorptive capacity of the countries. Driffield and Love (2007) argue that a high-quality institutional framework can promote the FDI-Growth nexus in a healthy state.

In the research of Meyer and Sinani (2009) , the role of institution in FDI promoting economic growth is to enhance healthy competition in host countries. The institutional quality can encourage innovation and enable the firms to overcome challenges of being obsolete in the market. Hall and Jones (1999) presented the evidence that institution heterogeneity can affect the capital formation and productivity of labors and that capital accumulation will be another vital channel in which FDI stimulate economic growth. Alfaro et al. (2010) argue that better institutional quality can absorb foreign investment into industries with less competitors and attract capital formation in the sectors, supporting the conclusion that the sound institution circumstances can create increasing demand in the industries. Kaufmann, Kraay and Zoido-Lobaton (1999) find evidence that the countries with lower institutional quality in manufacturing sector achieved worse performance in economic development. Furthermore, the institutions can provide stable legal environment and, thus, government in host countries can develop policies for inward FDI promotion to improve economic framework and stimulate the growth.

2.5 Human Capital, FDI and Economic Growth

The endogenous growth theory suggests that FDI promotes economic growth through capital formation and technology transfer. The technology transfer from high-income countries to low-income countries has further increased the growth rate through labor and management training to obtain knowledge and human capital skills. Human capital and technological change are the main factors that determine the impact of enterprise technology. Therefore, human capital stock and technological changes are the main factors that determine the spillover effect of foreign direct investment on the host country's economic growth (De Jager, 2004).

Human capital was first proposed by Fisher (1996), and he thinks that human capital can be defined as the accumulation of knowledge and skills acquired by workers through investment in education, training, and practical experience. Such knowledge and skill can bring income to its owner, forming a specific capital (human capital) (Lucas, 1998). Barro and Sala-i-Martin (1995) proposed that human capital is endogenous, and the increase of human capital comes from the innovation and technological progress of new ideas. The innovation of this new idea is obtained by acquiring knowledge from research and development. Spillover effects of R & D and human capital accumulation are considered as determinants of long-term economic growth (Lund, 2010).

Previous studies have discussed the absorptive capacity of host country and the role of interaction terms of FDI and human capital in economic development. Li and Liu (2005) used the panel data over the period 1970-1999 to estimate the role of human capital in affecting FDI-Growth. The results support that human capital can improve the absorptive capacity for benefit from FDI and they find higher technology gap between source and receiving country tends to have positive on the absorptive capacity from FDI spillover effects in host country.

Human capital has been regarded as one of the most important indicators to measure technological progress in the new growth theory (Haddad and Harrison, 1993). Lucas (1998) uses the two-sector endogenous growth theory model to find human capital production. It is a substitute factor for technological progress. The existence of human capital reduces the diminishing marginal constraints for broad capital, which will lead to long-term per capita growth in the absence of exogenous technological progress. Borensztein et al. (1998) constructed the endogenous growth model of human capital and FDI and found that the coefficients of interaction term between FDI and human capital is greater than the coefficient of FDI, indicating that the effect of FDI on economic growth is affected by the threshold of human capital in the host country. They also found that only when human capital of host country is sufficiently abundant

can the host country absorb the technological spillovers of FDI. Dunning (1977) proposed that the necessary condition for the host country to obtain technology spillovers is that the host country has reached a minimum of human capital threshold. In eclectic theory, he suggested that the large gap between the quality of the labor force of the host country and the needs of multinational companies will increase the cost of technology entry for multinational companies. Benhabib and Speiegel (1994) empirically estimated the role of human capital in economic growth and found that human capital can affect economic growth through two channels: (a) Human capital can directly affect the technological innovation of the host country; (b) The stock of human capital can affect economic growth. Affect the ability to learn from abroad. They also pointed out that a country's human capital determines its ability to absorb technology transfer from multinational companies, and this impact is more significant in developing countries. The possible explanation is that insufficient human capital will restrict the host country's application of advanced technology by multinational companies. Borensztein, Gregorio, and Lee (1995) used human capital as a representative indicator of absorptive capacity to quantify the host country's novice capacity and construct an endogenous growth model that contains human capital and FDI. The empirical results present that the combination of FDI and the human capital of the host country plays a significant role in promoting economic growth. The results also show that FDI inflow may not directly lead to technology spillover effects but is affected by the critical value of human capital in the host country. Keller (1996) asserts that only when the host country's human capital accumulation matches the type of technology transfer FDI will have significant economic growth. M. Lankhuizen (2001) found that the human capital structure can improve the absorptive capacity of host country, so the host country should encourage R&D personnel to participate in the actual production, and business activities of the enterprise. Bin Xu (2000) used panel model regression to study the FDI absorption capacity of 20 developed countries and 20 less developed countries. The results show that human capital in developed countries plays a significant role in absorbing technological spillovers of multinational

companies. Since low-income countries have insufficient human capital, the spillover effects of technology transfer in these countries are not significant.

Based on the previous literature, human capital can improve the host country's ability to absorb FDI and thus positively impact FDI and economic development.

2.6 Relevant Studies in Developing Countries

Previous scholars also focused the relevant topics in developing countries. For the relationship between FDI and economic growth, Edrees (2005) examined 39 African countries and tested the relationship by two groups (low- and middle-income groups). The results show that FDI has statistically significant but negative impact on economic growth, implying that FDI inflows does harm to economic growth in African countries. The negative results are also obtained by Elboiashi (2011). The FDI in 39 African countries hamper the economic growth. Tiwari and Mutascu (2011) estimate the impact of FDI on economic growth in Asian countries over the period from 1986 to 2008. The results support the importance of FDI and underline that the dependence of FDI is significant for domestic economic growth. However, there are considerable literature emphasizing that FDI can exert positive impact on economic growth. Blomstrom et al. (1994) examine 78 developing countries by grouping them into higher-income and lower-income country and the results show that the positive impact of FDI on economic growth in higher-income groups, but the negative impact is seen in lower-income countries. Mello Jr. (1997) investigated developing countries over the period from 1970-1990 and find that impact of FDI on economic growth is significantly positive. Carkovic and Levine (2005), however, conclude no direct impact of FDI on economic growth in developing countries. Durham (2004) supported this conclusion, but he finds that better institutional quality can exert FDI promoting economic growth. Institutional quality has been great concern in academy when researching on relationship between FDI and economic growth. Most previous studies have shown that institutional quality can promote the positive impact of FDI on economic growth (Blomstrom and Kokko, 2003; Busse and Groizard, 2008). Better

legal and institutional framework can uphold positive FDI-growth nexus. Meyer and Sinani (2009) conclude that institutional environment can affect spillovers from FDI, thus mediating the FDI-Growth relationship. Busse and Groizard (2008) assert that higher burden of regulations environment in host country has significantly negative impact on FDI attractiveness and FDI-Growth nexus, especially in developing countries. Prufer and Tondl (2008) explored Latin American countries and suggest stable legal environment has positive impact on FDI-growth nexus and this conclusion supports developing countries require better institutional quality to absorb the spillovers from FDI. Furthermore, endogenous growth model argues that FDI can promote economic growth through capital formation. The role of human capital is important in upholding the FDI-growth nexus.

2.7 Contribution to Literature

The reviews of literature present that research on impact of institutional factors on FDI-Growth nexus is still a young topic and previous scholars rarely research on the impact of FDI on economic growth in countries globally in terms of income levels. The analysis of this thesis contributes to the literature in two aspects. The thesis firstly investigates the impact of FDI on economic growth by regressing both static and GMM model in different income level defined in the world development indicators of World Bank. This methodology and aim of research are rare in previous studies because scholars tended to focus on one income group or one type of countries (i.e., Transition Economies). Secondly, previous literatures mention the role of institutions in explaining the impact of FDI on economic growth but few of them will compare the impacts across countries with different income levels. This thesis also follows the previous studies to interact FDI with institutional quality in analyzing the effects of institutional quality on FDI-induced growth to give more explanations in this topic and will estimate the impact in countries with different income levels for comparison.

In addition, the thesis also interacts human capital and FDI to explore the role of human capital in FDI-Growth nexus to investigate whether human capital can act as

a threshold in FDI-induced economic growth. This thesis tries to provide comprehensive explanation on the direct impacts of FDI on economic growth in terms of income level and the role of institutional qualities and human capital in affecting FDI-Growth nexus.

3. Empirical Strategy

This dissertation employs simplified theoretical model for institutional factors, FDI and economic growth, established by neo-Solow growth and heterogenous firm theory. In this part, this dissertation will describe Generalized Method of Moments (GMM) applied in the empirical research. Section 3.1 introduces the system and difference GMM approaches and previous studies about them. This article also uses fix-effects regression method for comparisons and have taken entity and time specific effect into consideration. Following with GMM estimation, this dissertation will present dynamic panel procedure to account for lagged dependent variables and endogeneity effects on our results. This dissertation presents the backgrounds information of research in section 2 of this chapter. Section 3 will summarize the propositions from the models and description and then comes up with hypothesis for empirical testing in the later part.

3.1 Review of GMM estimation in FDI and Economic Growth

Nowadays, GMM estimators has become one of most frequent used methods in investigating relationship between FDI and growth for dynamic panel methods. GMM estimators provide a series of advantages and are superior to least square estimation approach (Roodman, 2006). The estimators of GMM approaches are based on two dimensions. One is the Arellano-Bond methodology (1991), which is also called difference GMM, and the other is Arellano and Bover (1995) and they refer it as system GMM. If the dataset is full of variables potentially endogenously determined, the two estimators allow correction for endogeneity. By deploying the orthogonality conditions, GMM approaches can address the problem of heteroskedasticity of unknown form. Before introducing dynamic panel model, the review of static panel model will be presented.

In the Arellano-Bond GMM (Difference-GMM) developed by Roodman (2006), the model consists of a system of separate equations for each period. In the Difference

GMM, in order to explain the possible existence of endogeneity between the variables, the first difference of the endogenous variable is measured by the lag of its own level. Thus, endogenous variables are determined and regressors can be regarded as exogenous and other instruments can be used for estimation in the first differences. The key points of first difference lagged dependent variable can also be used to mitigate the serial correlation.

The GMM model was expanded the new System GMM was used to address the problem of lagged variables that are weak instruments (Arellano and Boverand, 1995). The developed model adds equations that can allow more additional instruments in levels to regression run in the first differences. The estimation is believed to be more efficient with more moment conditions. Bond et al. (2001) used system GMM and suggested that finite sample bias should be considered with persistent variables that served as weak instruments in the first difference.

Baum (2002) asserts that the effectiveness of instruments, which are correlated with endogenous instruments variables and the errors should meet the requirements of orthogonal conditions, determines the consistency of GMM estimators. The specification tests for difference and system GMM is Hansen-J test (Roodman, 2006). The effectiveness of instruments is presented with the null hypothesis and the J statistics is followed the distributions of χ^2 (Hansen, 1982). The high p-value under the tests can confirm the effectiveness of instruments and the results of GMM estimation. However, the number of instruments should be controlled, or it will damage the estimation quality of GMM. According to Roodman (2006, 2009), higher number of instruments in empirical estimation can cause the existence of overfitting endogenous variables while it seems impossible that lower instruments may satisfy moment conditions though the instruments are invalid. Therefore, the thesis will follow Roodman (2009) to keep number of instruments lower than the number of groups. In research of GMM estimation, time dummies are included to avoid contemporaneous correlation problems. Arellano Bond test, a test given that lags are regarded as

instruments in GMM estimation, for autocorrelation in first difference is under assumption that idiosyncratic errors are not correlated (Roodman, 2009).

GMM estimation is also widely used in investigating FDI and economic growth. Agosin and Machado (2005) focused on the data of 12 countries over the period of 1971 to 2000 and employed GMM to obtain negative results between FDI and economic growth. Seiko (2016) investigated 14 eastern African countries over the period of 1980 to 2013 using dynamic GMM estimators and obtained positive relationship between FDI and economic growth. Similarly, Bayer and Marius (2018) focused on central and eastern European countries and used GMM to support that FDI can stimulate the economic growth of host countries. Hayat (2019) used dynamic GMM estimators to suggest a positive role of institutional quality in promoting FDI-Growth nexus.

3.2 Backgrounds

The static panel model will firstly be used for testing the impact of FDI on economic growth, through F-test and LM test. The pooled OLS regression has been tested less reliably than static panel model through F-test.

This dissertation also deploys the Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond (1991) and employs system GMM estimation for empirical research, which follows the instruction of Roodman (2006)'s literature. Firstly, the following equation is given:

$$Y_{i,t} - Y_{i,t-1} = (a-1)Y_{i,t-1} + b'X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

Y represents real GDP per capita[1] (proxy of economic activity in the first empirical research). $Y_{i,t} - Y_{i,t-1}$ represents the economic growth rate. X contains a group of explanatory variables. η_i is the country specific effect that is not observed. Time

[1] The thesis uses the logarithm of GDP per capita as Y.

dummies are included in our research and used for observing the time specific effect. Thus, equation (2) is rewritten as following,

$$Y_{i,t} = aY_{i,t-1} + b'X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (2)$$

In equation (3), this dissertation eliminates country specific effect and rewrite equation to first difference as followed:

$$Y_{i,t} - Y_{i,t-1} = a\left(Y_{i,t-1} - Y_{i,t-2}\right) + b'\left(X_{i,t} - X_{i,t-1}\right) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (3)$$

The lagged independent variables will be used as instrument variables. At the same time, the regression method follows moment conditions followed:

$$E\left[Y_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})\right] = 0 \; s \geq 2; t = 3, \dots, T$$

$$E\left[X_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})\right] = 0 \; s \geq 2; t = 3, \dots, T$$

$$E\left[(Y_{i,t-s} - Y_{i,t-s-1}) * (\eta_i + \varepsilon_{i,t})\right] = 0 \; s = 1$$

$$E\left[(X_{i,t-s} - X_{i,t-s-1}) * (\eta_i + \varepsilon_{i,t})\right] = 0 \; s = 1$$

This is known as first difference GMM estimation under the assumption that exogeneity of regressors is weak in investigating direct impact of FDI on economic growth and moment conditions follow strict rules as listed. The possibility of weak instruments will need more system GMM regression to be run with more moment conditions (Blundell and Bond, 1998). In addition, this dissertation will follow Carkovic and Levine (2005) and employ two period lagged term because the less number of period lagged term can reduce overidentification. The problem of overidentification will be tested by Hansen's J test and Arellano and Bond autocorrelation test used for second order autocorrelation in error term to confirm the consistency of research procedures. This dissertation will run robustness check by reporting Wndmeijer corrected standard errors. Im-Pesaran-Shin unit-root test will be

run for checking stationarity of variables in first difference and this test can be utilized for checking the reliability of GMM or static model.

In our estimation strategy, this dissertation will instrument lagged FDI, lagged formation of capital and lagged growth with their further lags.

3.3 Propositions

In previous sections, this thesis reviews the classical Neo-Solow Growth model and how FDI stimulates economic growth in host country. Nakije (2014) uses Cobb - Douglas Model to explain how FDI promotes the economic growth. By considering results of Durnel (2012), Nakije (2014) describes the total approximate economic growth (GDP per capita growth rate) as

$$gt^{y} = agt^{k} + (1-a)gt^{A}$$

Equation suggests that increase of production growth can be affected by two channels: (a) capital accumulation and (b) technological progress (Sorensen et al., 2010.). In order to complete the empirical growth model, some specifications such as country specifications cannot be ignored. Islam (1995), thus, reconstructed the growth equation with dynamic models and this approach is to allow other explanatory variables that is related with economic growth to be included in the panel data.

Following the work of Islam (1995), Huang (2009) reestablished the Solow Growth model by adding human capital and inflows of foreign direct investment.

$$\begin{aligned}\ln\frac{Y_{t+1}}{L_{t+1}} = {} & \left(1-e^{-\lambda t}\right)e\frac{\alpha}{1-\alpha-\beta}\ln s_k + \left(1-e^{-\lambda t}\right)\frac{\beta}{1-\alpha-\beta}\ln s_h \\ & -\left(1-e^{-\lambda t}\right)\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) + e^{-\lambda t}\ln\frac{Y_t}{L_t} + \theta\left(1-e^{-\lambda t}\right)\ln F \\ & +\left(1-e^{-\lambda t}\right)\ln A_0 + g(t+1\left(-e^{-\lambda t}\right)\end{aligned}$$

The Y_{t+1}/L_{t+1} represents the economic growth per worker at each time t+1. S_k represents the saving rate in physical capital investment and S_h represents human capital saving rates. Depreciation rate is δ and Huang (2009) points out that this figure is constant. n represents the labor force growth and g reflects on technology development. F measures trade openness of host country that trades with foreign countries and A_0 represents technology level of host country before FDI spill-over effects.

This equation suggests that population growth is negatively related with growth of economic output per worker but the physical investment and human capital has positive impacts on economic growth. Huang (2009) suggests the sign of FDI is positive and this thesis follows his assumptions to give proposition (1): FDI can independently exert economic growth. For comparison, this thesis will also observe the signs of FDI when exploring the role of institutional quality and human capital in promoting FDI-Growth nexus.

The next step of this dissertation is to investigate the impact of institutional factors on altering relationship between FDI and growth. The GMM approaches deployed are divided into two methods, namely difference GMM (Arellano-Bond methodology, 1991) and system GMM. Firstly, the thesis will present the propositions based on previous theories and literature. This thesis will first consider the FDI-induced growth model of Borenztein et al. (1998).

In section 2.5, the thesis suggests that human capital can act as a threshold in FDI-induced growth. According to the McCloud and Kumbhakar (2012), the absorptive capacity of FDI in promoting economic growth is higher in middle-income countries. Therefore, the thesis will follow the research of McCloud and Kumbhakar (2012) using calculation and empirical tests to confirm the assumption. Borensztein, De Gregorio and Lee (1998) proposed that human capital can affect the FDI-Growth nexus in developing countries. Therefore, the thesis makes the proposition (2) intended to give more supporting evidence.

In the research of Busse and Groizard (2008), the absorptive capacity of host countries is likely to be affected by institutional quality and this can mediate the effects of FDI on domestic growth. Prufer and Tondl (2008) also assert that stable business environment and government can stimulate spillover effects from FDI and, thus, promote economic growth. In section 2.4, the previous studies related to impacts of institutional qualities on FDI-Growth relationship have been discussed.

Thus, the proposition (3) is given. All three propositions are presented as followed:

Proposition (1)

FDI can independently exert a positive impact on economic growth in host countries.

Proposition (2)

The effect of FDI on economic growth will vary in countries in terms of different level of income and the effect is higher in upper-middle income countries. Human capital can act as a threshold for impacts of FDI on upper-middle income countries.

Proposition (3)

Countries with better institutional quality (higher control of corruption, better regulatory frameworks, more efficient government frameworks and more robust rule of law) can bring positive impacts on FDI-Growth nexus.

4. Methodology

This section starts from an introduction to econometric models used for empirical research and specification used for estimation in testing proposition (3), which is followed by the methodology of Hayat (2019). The derive following the economic work of Farole and Winkler (2012), this dissertation will present the final specification. Section 4.1 also summarizes the model and its specific details in estimation procedures. Section 4.2 presents the data and variables used for empirical estimation.

4.1 Empirical Model

The thesis will run F-test and LM test in static panel model to confirm the reliability of both fixed and random effects model is higher than pooled OLS. The robust Hausman test will be applied to test individual and time effects in regression. Therefore, this dissertation considers using fixed-effect regression to estimate of FDI on economic growth, which will be presented in section 5.4. The clustered robust standard error will be tested followed by a report to avoid heteroscedasticity and autocorrelation. The equation (7) is given as followed:

$$GROWTH_{i,t} = \beta_0 + \beta_1 FDI_{i,t} + \gamma'\left[CONTROL_{i,t}\right] + \tau_i + \mu_i + \varepsilon_{i,t} \quad (7)$$

As table A2 shown, FDI represents the net inflows of inward direct investment as a percentage of GDP from non-resident investors in the host country. Control variables contains initial income, trade openness, government size, inflation and population growth, which are presented in the table A2. *Growth,* the independent variable, is the real GDP per capita growth rate.

4.1.1 Direct Impact of FDI on Growth

Followed with static panel model, this dissertation will run dynamic panel model regression and use Generalized Method of Moments (GMM) estimator to implement two-step system GMM to estimate the direct impact of FDI on economic growth in host country. Equation (8) shows the regression equation:

$$GROWTH_{i,t} = \beta_0 GROWTH_{i,t-1} + \beta_1 FDI_{i,t} + \gamma'[CONTROL_{i,t}] + \tau_i + \mu_i + \varepsilon_{i,t} \quad (8)$$

The details of variables are shown in Table A2. *FDI* represents the net inflows of inward direct investment as a percentage of GDP from non-resident investors in the host country. Control variables contains initial income, trade openness, government size, inflation and population growth. *Growth,* the independent variable, is the real GDP per capita growth rate.

4.1.2 Impact of Institutional Factors on FDI-Growth

In order to explore the role of institutional factors on affecting FDI-Growth relationship, this dissertation will follow Busse and Groizard (2008) to add institutional quality and interaction variable between FDI inflow and institutional quality. Following the research of Farole and Winkler (2012), this dissertation run the regression in three groups of countries in terms of income level. The regression equation (10) is given as follows:

$$GROWTH_{i,t} = \beta_0 GROWTH_{i,t-1} + \beta_1 FDI_{i,t} + \beta_2 Instit_{i,t} + \beta_3 (FDI_{i,t} * Instit_{i,t}) + \gamma'[CONTROL_{i,t}] + \tau_i + \mu_i + \varepsilon_{i,t} \quad (10)$$

The details of variables are shown in Table A3. FDI represents the net inflows of inward direct investment as a percentage of GDP from non-resident investors in the host country. Control variables contains initial income, trade openness, government size, inflation and population growth. *Instit* variable is used as proxy of institutional factors, including control of corruption, government effectiveness, regulatory environment and rule of law, and the interaction between FDI and Institution factors to measure the impacts of institutional factors on FDI and economic growth relationship. *Growth,* the independent variable, is the real GDP per capita growth rate. This equation is based on the model of Farole and Winkler (2012) and suggests that better institutions will bring positive effect on FDI-Growth nexus.

4.1.3 Human Capital and FDI-Growth

In line with the argument that FDI-Growth nexus may be affected by the level of human capita, the thesis will investigate the role of level of human capital on FDI-Growth nexus. Therefore, the thesis will introduce human capital level as explanatory variable in the equation. Following the finding of Borensztein, De Gregorio and Lee (1998), human capital is more likely to *Growth* act as a threshold for the impacts of FDI on developing countries than on developed countries. To keep consistent with proposition (2), this dissertation adds the interaction term of *FDI* and human capital variable to investigate whether impact of FDI on countries in terms of different human capital level will present varied results.

Human Capital Index (HCI) from PWT 9.0, a proxy calculating the average years of secondary school and return rate to secondary education, will be used as proxy of the level of human capital (Schooling) in this estimation. Then, this dissertation will construct the interaction term between *FDI* and *School* to investigate the role of human capital on FDI-Growth relationship. These factors have been proved efficient for FDI attractiveness. The thesis attempts to investigate the impacts of human capital on FDI-Growth across country income groups identified in World Bank, so we construct the equation (11):

$$GROWTH_{i,t} = \beta_0 GROWTH_{i,t-1} + \beta_1 FDI_{i,t} k + \beta_2 School_{i,t} + \beta_3 \left(FDI_{i,t} * School_{i,t}\right) + \gamma' \left[CONTROL_{i,t}\right] + \tau_i + \mu_i + \varepsilon_{i,t} \quad (11)$$

The details of variables are shown in Table A4. *FDI* represents the net inflows of inward direct investment as a percentage of GDP from non-resident investors in the host country. Control variables contains initial income, trade openness, government size, inflation and population growth. *School* is used as proxy of human capital and the interaction between *FDI* and *School* to measure the impacts of FDI in different level of human capital. *Growth*, the independent variable, is the real GDP per capita growth rate. This equation is based on the model of Borensztein, De Gregorio and Lee (1998)

and suggests human capital tends to act as a threshold for the impacts of FDI and FDI-induced growth.

4.2 Data

This dissertation collects data from three databases and World Bank. To perform the empirical research with global coverage, the thesis obtains GDP per capita growth, FDI and other control variables data from World Development Indicators (WDI) and institutional data from World Governance Indicators (WGI). The FDI inflow also uses data from United Nation Conference on Trade, Development (UNCTD) as a supplement source. A detailed description of variables is presented in Table A1 in Appendix. The panel data covers the data over the period of 1999 to 2018 for countries and across the world. The detail of sample countries is included in Table A1 in Appendix.

The dependent variable is growth rate of real GDP per capita in each period, the proxy of economic growth. The explanatory variables are varied in equations in order to fit the research propositions. By controlling potential variables affecting economic growth, the dependent variable in the analysis is real GDP per capita growth, a proxy of economic growth. FDI is the explanatory variable in the research. The thesis uses FDI net inflows as a percentage of GDP, defined as net inflows of inward direct investment from non-resident investors in the host country. The control variables are employed in previous literature.

Table 1 presents the summary statistics of variables, including figure of mean, median, max figure and minimum. For the governance indicators from WGI, the thesis chooses four institutional quality variables that are proved efficiently in previous literature in FDI attractiveness. The ranges are from -2.5 to +2.5 while positive figures represent stronger institutional quality and control. Other data samples used in the thesis are from 102 countries in terms of their income levels that are classified by World Bank database. The thesis forms the sample panel over the period of 1999-2018. Lower

figure in institutional quality data means worse institutional quality while higher figure means better institutional quality in host countries.

The table show that FDI as a percentage of GDP ranges from -2.338% to 52.348% in Cyprus. The maximum GDP growth per capita is 32.997% in Azerbaijan while the minimum figure is seen in Madagascar in 2002, with the figure of -15.042%. Population growth rate is recorded ranging from -1.291% to 4.315%. Trade openness sees a great variation from 23.728% to 364.365%.

Table 1 Descriptive Statistics of variables

Variable	Mean	Std. Dev.	Min.	Max.
GDP Growth (%)	2.427	3.617	-15.042	32.997
FDI (% of GDP)	4.563	7.361	-2.338	52.348
Initial Income (Log)	11.467	2.336	6.639	17.329
Government Size (%)	15.553	4.728	5.128	25.951
Capital (% of GDP)	22.777	5.831	10.039	42.843
Inflation (%)	4.895	6.088	-1.614	39.256
Trade Openness (%)	85.835	54.989	23.728	364.365
Population Growth (%)	1.206	1.155	-1.291	4.315
Control of Corruption	0.198	1.052	-1.388	2.347
Government Effectiveness	0.306	0.963	-1.425	2.199
Regulatory Environment	0.346	0.907	-1.458	2.008
Rule of Law	0.234	0.982	-1.407	1.996
Human Capital Index	0.731	0.152	0.259	0.956

4.2.1 Institutional Data

This dissertation uses four indices of institutional quality from World Governance Indicators (WGI) database in World Bank to proximate the institutional quality level of each country.

Empirical literature mentioned focusing on institutions driving FDI or economic growth used WGI or Corruption Perception Index (CPI) or both. The earliest using CPI is Wei (2000) and he measures the level of institutional quality of public sector following experts and business. The indicators in WGI are widely used in many literature (Globerman and Shapiro, 2003). For example, Control of Corruption captures the perception of the public power exercised for private gain (i.e. bribery)

and is used as an indicator of corruption levels in Ballos and Subasat (2012). The data of four institutional quality indicators (Control of Corruption, Government Effectiveness, Regulatory Quality and Rule of Law) are obtained from World Bank for empirical tests. Control of Corruption is the index that measures perceived levels of public sector corruption and it measures how public power is exercised over private grain, including small-scale and large-scale forms of corruption. Government Effectiveness represents the index that measures the quality of public services and it measures the quality of public services, civil servants, policy-making and policy implementation, and the credibility of the government's commitment to improve or maintain the quality. Rule of Law is the index that measures authority and influence of law in society and Regulatory Quality is the index that measures perceptions of the ability of the government to implement policy. The expected signs of these variables are positive based on results of previous studies and propositions.

4.2.2 Variables

Control variables are a standard package summarized from literature review. The variables vary in the three equations from propositions in order to fit the research questions in each proposition. Control variables selected by this thesis are initial income, trade openness, government size, inflation rate, capital formation and population growth. All these variables are ever tested in previous studies. This thesis obtains initial income data by dividing the 20 years into four periods and selects the real GDP per capita figure at the beginning of each period. Initial income is equal to the logarithm of real GDP per capita at each beginning period in the panel estimation. Initial income is actually a component of economic growth and regression with this variable may bias the coefficients of other variables and standard errors, which is the reason why this thesis uses panel analysis. Trade openness measures the sum of exports and imports as a percentage of GDP. Some previous studies argue that controlling trade openness variable is inappropriate in the regression because openness to trade may be associated with openness of FDI (Sazali, Bakar and Huey,

2018). This thesis is against this argument. It is vital to distinguish whether the independent relationship between FDI and growth exists or whether FDI can be a measurement of trade openness instead of representing how much effect FDI has on economic growth. In statistical view, the results of FDI-Growth nexus do not hold in OLS regressions, which is confirmed in previous studies. Without controlling openness to trade, the estimation results of FDI-Growth nexus can vanish in panel analysis so it is necessary to control trade openness in our analysis. Inflation rate variable is annual inflation rate based on consumer price index. Inflation directly affects economy of host countries and the level of inflation can be a sign of economic stability of host country because low rate of inflation can increase the return on FDI (Abdul and Taskeen, 2019). When the level of inflation rate is low, the interest rate tends to fall, so the cost of capital can reduce. When the cost is low, capital is easier to be available, which enables foreign investors to find better partners in the host country, thereby increasing their return on investment. When the level of inflation rate is high, it may create uncertainty and destroys the economy. High inflation rate can make exports more expensive and may result in reducing the international competitiveness of host countries. Government size captures government final consumption expenditure as a percentage of GDP. Government expenditure can be regarded as one of the government's intervention strategies to control the failed market and ensure sustained economic development. The adjustment of government expenditure can ensure stability of economy and accelerate economic growth by increasing employment opportunities (Ahuja, 2013). Government expenditure can stimulate economic growth through the field of health, transport, agriculture, etc. and thereby increase the attractiveness of FDI. Capital represents gross capital formation as a percentage of GDP. The neoclassical growth model assumes that if sufficient capital stock is injected, developing economies with low initial capital stock tend to have high marginal rate of return (productivity) and growth rate. The high level of capital formation ensures the funds needed for the growth and development of the industry in host countries. Population growth in this thesis is annual population growth rate

and this variable has been discussed with model in section 3.3. The relationship between population growth and economic growth (GDP per capita growth) can be explained by neo-Malthusian theories that argue population growth can cause depletion of per capita income and thus has negative effects on economic growth. In summarize, the expected signs of government size, inflation rate and population growth are negative while the signs of capital formation and trade openness are positive. These expectations would be tested in chapter 5.

GDP per capita growth data describes a metric for determining a country's economic output per each person living within the country. The data of GDP per capita is extracted from World Development Indicator (WDI) in the database of World Bank. Since the thesis estimates in a cross-country level, the data will use GDP per capita 'in constant 2011 US dollar' adjusted by Purchasing Power Parity (PPP) for the cross-country comparability. The FDI inflow data is obtained both from WDI from World Bank and UNCTAD dataset because of the missing values in some developing countries.

5. Results

This section will present the empirical results that corresponding with the propositions shown in section 3.3. In chapter 5.1, this thesis present estimation of direct impact of FDI on economic growth using both static and dynamic GMM model. Section 5.2 will investigate the role of institutional quality affecting FDI-Growth nexus. Interaction term of FDI and institutional quality will be constructed, and both applied for GMM estimation. Section 5.3 will present the impacts of human capital on FDI-induced growth. The robustness of analysis results is presented followed with regression results. The thesis uses different specifications and regression methods to confirm the robustness of estimation results. Each empirical research contains the estimation results in countries with different income levels to test heterogeneity of results.

5.1 Direct Impact of FDI on Economic Growth

The thesis investigates the direct impact of FDI on economic growth by using GMM estimation. Controlling the potential effect of physical capital (domestic investment), government size, inflation rate, human capital and trade, the thesis identifies FDI, domestic investment (capital formation) and economic growth not strictly exogenous and thus instrumenting them subject to endogeneity correction. According to Roodman (2009), the thesis employs the collapse instruction in Stata 15.0 to reduce the number of instruments.

By controlling initial GDP, government size, domestic capital, inflation, trade openness and population growth, table 3 presents the estimation results with the stepwise regression method at this stage. The models computed in Table 3 have passed joint test of significance. In dynamic model approach, we cannot reject the null hypothesis of Hansen's J-test. Therefore, the estimation does not suffer the overidentification in the GMM model at this stage. The results of AR (2) test indicate that the second-order autocorrelation in the error term does not exist in the estimation.

The major variables are significant in our model specifications. The key explanatory variable, FDI, has positive impact on economic growth with coefficients ranging from 0.0876 to 0.115, which indicates that FDI inflows can enhance the economic growth of host countries in the global datasets. Therefore, the proposition 1 has been confirmed. The coefficients of Initial Income are negative, which is corresponding with our expectations and the research of Helpman and Grossman (1991) and Bruno and Campos (2013). Lagged value of GDP growth per capita shows significantly positive results in our estimation, indicating that economies that developed faster in previous year continues growing faster in the following years. It can be observed that government size, inflation and population growth have significantly negative impact on economic growth while capital (physical capital investment variable) is positive with GDP per capita growth. The negative sign of government size suggests that the efficiency of consumption and resources allocation in public sector might be lower than private sector. The sign of these control variables are in line with expectations. Previous research about impact of FDI on economic growth consider trade openness as a significantly positive factor because the trade might be correlated with the openness of FDI. This thesis, however, see insignificant result in column (7) and the reason might be the collinearity. Although trade is insignificant in this column, the coefficients of trade in other columns are significant and the sign of coefficients is still meaningful. The positive impact of trade on economic growth is because open host country can be better positioning to exploit world-wide supply chain externalities. Therefore, the estimates can be reasonably interpreted.

In order to investigate the impact of FDI on economic growth across countries with different income levels, this thesis run the estimation in three groups with classification in World Bank. High, Upper-Middle, Lower-Middle and Low represent four different income levels. Since the samples in low-income levels are limited and literature such as Hayat (2017) combines group of middle-income and low-income

Table 3 Results of estimation of the direct effect of FDI on growth——Full Samples

Economic Growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
L.GDP Growth	0.322***	0.277***	0.214***	0.211***	0.217***	0.213***	0.211***
	(123.67)	(149.76)	(41.49)	(44.26)	(51.21)	(70.84)	(43.55)
FDI	0.115***	0.112***	0.114***	0.101***	0.0980***	0.0876***	0.0879***
	(48.52)	(34.82)	(23.98)	(23.48)	(20.58)	(18.07)	(17.43)
Initial Income		-1.656***	-1.738***	-1.621***	-1.704***	-1.602***	-1.208***
		(-40.26)	(-38.45)	(-78.09)	(-53.78)	(-30.56)	(-29.99)
Government			-0.645***	-0.619***	-0.643***	-0.667***	-0.784***
			(-46.57)	(-37.06)	(-37.49)	(-43.14)	(-37.67)
Capital				0.0927***	0.103***	0.107***	0.121***
				(20.48)	(19.54)	(20.68)	(21.49)
Inflation					-0.082***	-0.084***	-0.085***
					(-20.08)	(-26.19)	(-32.19)
Trade						0.0116***	0.00207
						(9.98)	(1.50)
Population							-1.325***
							(-17.70)
Constant	1.152***	20.29***	31.40***	27.51***	29.00***	27.27***	26.65***
	(48.17)	(43.07)	(66.81)	(51.51)	(56.41)	(37.53)	(54.83)
AR (2) (p-value)	0.3439	0.4210	0.4034	0.3030	0.4054	0.5047	0.6059
Hansen (p-value)		0.079		0.217		0.246	0.312

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income).

countries with high income countries to run comparable regression, this thesis combines lower-middle income and low-income samples for further research. Table 4 present the estimation results in three groups when controlling initial GDP, government size, physical capital investment, population growth and trade openness. The estimation passes the AR (2) and Hansen's test. The coefficients of FDI in countries of high income and upper-middle income are positively significant while it shows negative sign in lower-middle and low-income countries pairs. This is corresponding with the finding of Johnson (2006) and Fu (2008). It is observed that the positive impact in upper-middle income countries is higher than that in high income countries, indicating better stimulation of FDI on economic growth in the emerging developing markets. The possible reason for negative sign of low-income countries can be the weak absorptive capacity in countries with low income so they may not transfer the benefits of FDI into the engine of economic growth. Therefore, the thesis proves that FDI has better stimulation impact on economic growth in upper-middle income countries and absorptive capacity may affect the impact of FDI on growth in low-income countries. By and large, the physical capital has positive impact on economic growth. Such effects are from capital accumulation through traditional production function mechanism. Inflation shows significantly negative sign, indicating that higher inflation can damage the system of host country and destroy the sustainable economic growth. Trade openness show positive sign and possible explanation can be that host country benefits from global supply chain through international trade.

The regression results show that the impact of FDI is statistically significant and positive across our global samples expect lower-middle- and low-income countries. The significant coefficient of FDI in lower-middle- and low-income countries, implies that although FDI plays vital role in stimulating economic growth, the impact of FDI varies from different macroeconomic situation (i.e., domestic absorptive capacity). Other control variables see inconsistent results for different income groups. The coefficients of trade are significantly negative in developed countries while the

coefficients see positive results in upper-middle and lower-middle income groups. The results show that trade openness and domestic investment can play vital role in the economic development in developing countries but the opposite effects of trade are observed on the domestic economic growth of developed countries. The coefficients of domestic investment in developed countries are insignificantly negative, which indicates that domestic capital formation in development can't significantly promote the growth so FDI becomes a more important part in developed host countries.

Table 4 Estimates for Direct Impact of FDI on Economic Growth in Countries with Different Income Levels

	High	Upper-Middle	Lower-Middle and Low
	GMM***	GMM***	GMM***
L.GDP Growth	0.150***	0.250***	0.105***
	(7.79)	(8.16)	(4.45)
FDI	0.0781***	0.127***	-0.0442**
	(3.31)	(3.95)	(-2.25)
Initial Income	-0.478	-1.268***	-1.306
	(-0.77)	(-8.62)	(-1.48)
Government	-0.742***	-1.455***	-0.229***
	(-15.89)	(-14.33)	(-3.52)
Capital	0.0334	0.0946***	0.0670***
	(0.60)	(4.21)	(3.31)
Inflation	-0.123***	-0.0727***	-0.103***
	(-6.27)	(-8.11)	(-6.66)
Trade	-0.0128***	0.0293***	0.0305***
	(-2.79)	(4.19)	(3.91)
Population	-0.724**	-2.415***	0.261
	(-2.22)	(-4.07)	(0.38)
Constant	22.79***	36.26***	16.87*
	(3.22)	(18.86)	(1.90)
Obs.	589	741	608
Hansen (p-value)	0.289	0.347	0.254
AR(2)	0.634	0.499	0.712

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income). High, Upper-Middle, Lower-Middle and Low represent the income level of samples. The classifications of income level are from World Bank.

5.2 FDI and Economic Growth: Role of Institution Quality

The role of institutional quality has been discussed in literature review. The thesis will investigate the impact of institutional quality in altering FDI-economic growth in two estimation approach. This section interacts institutional factors with FDI and adds it into the equation to estimate how institutional quality affects FDI-Growth nexus.

This thesis follows Acemoglu and Johnson (2005) to run a similar SYSTEM-GMM estimation with different control variables and the results are computed in Table 5. The results present how four institutional quality affect FDI-Growth nexus, and the thesis runs the model with two different specifications for each institutional quality factor. The four institutional quality variables obtained by this thesis are control of corruption, government effectiveness, regulatory environment and rule of law.

The coefficients of initial income (logarithm of initial GDP) and government size are negative, which is corresponding with expectations and previous literature in FDI and economic growth (Acemoglu and Johnson, 2005; Havranek and Irsova, 2011). According to Roodman (2009), the thesis employs the option of collapse in Stata to reduce the number of instruments.

The control variables are all significant in the estimation and the coefficients of our variables are consistent with the expectations (Busse and Groizard, 2008; Jude & Levieuge, 2017). The coefficients of FDI are all significantly positive in each specification, which is corresponding with section 5.1. Each institutional quality variable is found to be statistically significant and has positive impact on economic growth. More importantly, the interaction terms between FDI and institutional quality are also statistically significant and positive. This implies that better institutional quality can have positive impact on economic growth, and they also influence the relationship between FDI and economic growth. Such results are corresponding with Jude & Levieuge (2017) and the similar role of institutional quality factor can positively affect economic growth and enhance FDI-growth nexus. Possible

explanation for these results might be better institutional quality can improve the absorptive capacity of host country so the country can benefit from the technology spill over effects. Chaib and Siham (2014) employs VECM and institutional data over the period from 1995 to 2011 to investigate institutional quality and FDI inflow as well as economic growth. They find that institutional quality can positively influence the FDI-Growth relationship and better help host country absorb the benefits of FDI inflows. This thesis finds supporting evidence that higher control of corruption can exert positive influence on FDI-induced growth. The positive effect is also seen in regulatory quality, which is consistent with the previous studies (Dellis K. et al. 2017; Hayat, 2017). According to Buchanan et al. (2012), government effectiveness captures the quality of public and the extent to which public servants are not affected by political pressure. The positive correlation indicates that better quality of public services can benefit the economic development and FDI-Growth nexus. Regulatory quality can boost FDI through the channel of market-friendly policies. Countries with stronger rule of law can peer more benefits from FDI through channel of agreements that can protect future returns and reduce commerce risks (Hoff and Stiglitz, 2005).

Similarly, the thesis also did heterogeneity tests based on the income level of countries (High Income, Upper-Middle Income and Lower-Middle-&Low Income). Table 5 to 8 present the tests for each institutional quality in three income groups. The results are consistent with previous literature (Hoff and Stiglitz, 2005; Hayat, 2016; Dellis K. et al., 2017). The coefficients of FDI are all statistically significant across all income level groups although FDI sees week significance at the level of 10% in lower-middle- and low-income countries. All institutional quality variables are statistically significant and have positive impact on economic growth for high-income countries. However, the results are not in line with those in upper-middle income countries and lower-middle-&low- income countries.

For upper-middle income countries, control of corruption is not significant though the coefficient of this institutional quality variable is positive, but other institutional

variables are statistically significant. The possible explanation is that control of corruption can have some positive impact on the economic development of upper-middle income countries, but the effect is not clear compared with the other three institutional quality variables.

For lower-middle- and low-income countries, only control of corruption and government effectiveness see significant coefficients although rule of law and regulatory environment see positive coefficients. The results show that better quality in control of corruption and government effectiveness can have positive impact on economic growth. According to the research of Jude and Levieuge (2015) in low-income countries, control of corruption can speed up the technology spill over effects and improve the efficiency of promotion impact of FDI on economic growth. The coefficients of interaction terms, however, are not corresponding with the finding of Jude and Levieuge (2015). The thesis observes that rule of law and regulatory environment indicators see positive but statistically insignificant coefficients. The results imply that control of corruption and government effectiveness can enhance FDI-Growth and speed up the spill over effects in low-income developing countries. Therefore, there is no significant heterogeneity in the impact of these two institutional quality indicators on economic growth or FDI-induced economic growth in countries with different income levels.

As for control variables, the major coefficients of control variables are consistent with expectations. Although some control variables are not significant, the signs of the coefficients are still in line with expectations.

Table 5 Estimates of Institutional Quality on FDI-Growth Nexus (SYS-GMM estimation)

Economic Growth	Control of Corruption		Government Effectiveness		Regulatory Environment		Rule of Law	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
L.Growth	0.209***	0.207***	0.197***	0.187***	0.197***	0.186***	0.197***	0.190***
	(33.40)	(38.43)	(36.93)	(33.32)	(41.47)	(27.21)	(55.13)	(48.03)
FDI	0.0854***	0.0621***	0.0776***	0.0207***	0.0811***	0.0277***	0.0817***	0.0516***
	(13.69)	(10.77)	(16.12)	(5.41)	(17.09)	(4.73)	(12.81)	(12.24)
Initial Income	-1.251***	-1.267***	-1.168***	-1.214***	-1.361***	-1.436***	-1.190***	-1.195***
	(-21.76)	(-19.21)	(-23.51)	(-15.21)	(-25.79)	(-21.34)	(-24.94)	(-16.57)
Government	-0.762***	-0.756***	-0.729***	-0.727***	-0.707***	-0.725***	-0.707***	-0.702***
	(-39.51)	(-31.93)	(-42.83)	(-36.64)	(-35.40)	(-28.59)	(-37.05)	(-23.87)
Capital	0.124***	0.136***	0.133***	0.154***	0.141***	0.158***	0.130***	0.140***
	(23.56)	(20.20)	(21.83)	(27.45)	(21.58)	(21.68)	(23.06)	(16.96)
Inflation	-0.094***	-0.093***	-0.107***	-0.102***	-0.109***	-0.105***	-0.109***	-0.104***
	(-19.03)	(-21.31)	(-25.79)	(-22.06)	(-24.74)	(-26.97)	(-22.90)	(-26.53)
Trade	0.0114***	0.0118***	0.0211***	0.0228***	0.0247***	0.0259***	0.0213***	0.0206***
	(7.56)	(5.76)	(12.09)	(10.48)	(16.25)	(11.08)	(15.36)	(12.77)
Population	-1.379***	-1.396***	-1.628***	-1.645***	-1.635***	-1.422***	-1.402***	-1.514***
	(-15.64)	(-15.49)	(-18.90)	(-15.60)	(-13.60)	(-10.42)	(-13.05)	(-10.58)
Institution	1.217***	1.355***	2.449***	2.681***	2.832***	2.854***	2.643***	2.614***
	(8.81)	(8.14)	(19.38)	(18.23)	(14.94)	(11.86)	(18.23)	(12.89)
Institution*FDI		0.0287***		0.0600***		0.0531***		0.0439***
		(5.27)		(8.29)		(8.96)		(6.26)
Constant	26.34***	26.06***	24.77***	24.81***	26.43***	26.87***	24.34***	24.33***
	(37.86)	(31.57)	(31.53)	(26.71)	(42.87)	(27.32)	(39.61)	(36.91)
Obs.	1938	1938	1938	1938	1938	1938	1938	1938
AR (2) (p-value)	0.443	0.407	0.287	0.316	0.307	0.411	0.341	0.402
J-test (p-value)	0.267	0.317	0.337	0.235	0.192	0.248	0.301	0.356

Table 6 Estimates of Institutional Quality Impacting on FDI-Growth Nexus in terms of income level——Control of Corruption

	High		Upper-Middle		Lower-Middle and Low	
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
L.Growth	0.109***	0.128***	0.248***	0.243***	0.0936	0.145***
	(5.98)	(3.80)	(10.36)	(9.92)	(1.51)	(3.43)
FDI	0.0721***	0.0196	0.0838**	0.0622**	0.0306*	0.0446*
	(4.69)	(0.45)	(2.35)	(2.01)	(1.54)	(1.59)
Initial Income	1.072	-0.168	-1.111***	-1.169***	-1.940**	-3.282**
	(1.13)	(-0.27)	(-5.11)	(-5.33)	(-2.10)	(-2.10)
Government Size	-0.896***	-0.888***	-1.476***	-1.424***	-0.371***	-0.288***
	(-10.09)	(-6.05)	(-11.31)	(-9.25)	(-4.92)	(-2.77)
Capital	0.114**	0.149**	0.114***	0.134***	0.0933***	0.0768***
	(2.16)	(2.21)	(4.99)	(4.94)	(9.85)	(3.19)
Inflation	-0.0804**	-0.0450	-0.0637***	-0.0760***	-0.0639***	-0.0826***
	(-2.37)	(-0.87)	(-6.02)	(-4.92)	(-2.95)	(-4.99)
Trade	-0.0166***	-0.0168**	0.0192***	0.0211**	0.0217*	0.0270***
	(-2.80)	(-2.36)	(2.86)	(2.49)	(1.94)	(3.72)
Population Growth	-1.089***	-1.183**	-2.877***	-3.063***	-0.979	0.678
	(-3.17)	(-2.08)	(-5.78)	(-5.65)	(-1.03)	(0.80)
Control of Corruption	3.937***	4.032***	1.240	0.431	3.918*	2.941***
	(3.86)	(8.53)	(1.14)	(0.34)	(1.71)	(5.02)
FDI*Control of Control		0.0430**		0.0746*		0.145***
		(2.32)		(1.91)		(3.30)
_cons	13.56	27.66***	35.77***	35.11***	30.68**	41.13***
	(1.13)	(4.10)	(12.04)	(9.40)	(2.23)	(2.58)
Obs.	589	589	741	741	608	608
AR (2) (p-value)	0.751	0.724	0.566	0.499	0.458	0.849
Hansen (p-value)	0.914	0.870	0.756	0.685	0.294	0.248

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income). High, Upper-Middle, Lower-Middle and Low represent the income level of samples. The classifications of income level are from World Bank.

Table 7 Estimates of Institutional Quality Impacting on FDI-Growth Nexus in terms of income level——Government Effectiveness

	High		Upper-Middle		Lower-Middle and Low	
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
L.Growth	0.117***	0.0648**	0.231***	0.211***	0.0639***	0.0453
	(5.43)	(2.26)	(5.90)	(6.21)	(3.38)	(1.37)
FDI	0.0652***	0.0698*	0.0796**	0.0727***	0.0345**	0.0191*
	(4.19)	(-1.90)	(2.53)	(3.26)	(2.12)	(1.75)
Initial Income	-0.687	-0.0601	-1.422***	-1.185***	-2.568***	-1.830**
	(-0.90)	(-0.09)	(-5.20)	(-4.11)	(-2.75)	(-2.36)
Government Size	-0.896***	-0.955***	-1.266***	-1.274***	-0.207**	-0.265***
	(-11.62)	(-10.84)	(-7.15)	(-7.17)	(-2.09)	(-3.45)
Capital	0.095**	0.109**	0.104***	0.134***	0.0501*	0.0809**
	(0.96)	(0.78)	(4.41)	(5.12)	(1.80)	(2.56)
Inflation	-0.101***	-0.0715**	-0.0697***	-0.0652***	-0.0831***	-0.0851***
	(-3.22)	(-2.14)	(-5.07)	(-4.85)	(-7.05)	(-5.20)
Trade	-0.0157***	-0.0129**	0.0431***	0.0434***	0.0303***	0.0198
	(-2.79)	(-2.41)	(5.52)	(5.35)	(3.23)	(1.00)
Population Growth	-1.288**	-1.890***	-2.456***	-3.171***	-0.614	-0.640
	(-2.52)	(-3.09)	(-4.12)	(-4.95)	(-0.80)	(-0.59)
Government E	3.609***	3.380***	1.579	2.083	2.174**	2.108**
Effectiveness	(2.65)	(4.03)	(1.10)	(1.31)	(2.12)	(2.04)
FDI*Government		0.0825***		0.0562*		0.0591**
Effectiveness		(3.49)		(1.88)		(2.23)
_cons	18.10**	24.02**	34.16***	31.37***	31.92***	26.70**
	(2.17)	(2.44)	(8.69)	(7.02)	(3.43)	(2.41)
Obs.	589	589	741	741	608	608
AR (2) (p-value)	0.812	0.721	0.612	0.299	0.695	0.327
Hansen (p-value)	0.942	0.914	0.564	0.592	0.294	0.248

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income). High, Upper-Middle, Lower-Middle and Low represent the income level of samples. The classifications of income level are from World Bank.

Table 8 Estimates of Institutional Quality Impacting on FDI-Growth Nexus in terms of income level——Regulatory Environment

	High		Upper-Middle		Lower-Middle and Low	
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
L.Growth	0.106***	0.123***	0.202***	0.214***	0.104***	0.0945***
	(3.53)	(4.03)	(6.72)	(7.64)	(4.37)	(4.45)
FDI	0.0685***	0.119***	0.0654*	0.0565	0.0445**	0.0114**
	(3.91)	(3.19)	(1.82)	(0.18)	(2.22)	(2.44)
Initial Income	-0.610	-0.151	-1.524***	-1.507***	-1.375	-2.729*
	(-0.93)	(-0.13)	(-5.01)	(-6.59)	(-1.12)	(-1.73)
Government Size	-0.782***	-0.827***	-1.336***	-1.269***	-0.232***	-0.275***
	(-8.81)	(-8.70)	(-10.36)	(-8.75)	(-3.08)	(-4.03)
Capital	0.115**	0.130**	0.154***	0.153***	0.0674***	0.0544*
	(2.26)	(2.16)	(4.60)	(5.34)	(3.21)	(1.78)
Inflation	-0.125***	-0.154***	-0.0698***	-0.0932***	-0.102***	-0.0897***
	(-4.38)	(-3.87)	(-4.14)	(-6.21)	(-5.39)	(-3.99)
Trade	-0.0117**	-0.0156***	0.0528***	0.0563***	0.0307***	0.0391***
	(-2.34)	(-3.52)	(5.19)	(6.17)	(3.35)	(2.61)
Population Growth	-0.787*	-0.934*	-2.681***	-3.372***	0.293	0.680
	(-1.87)	(-1.66)	(-4.04)	(-5.14)	(0.35)	(0.81)
Regulatory	1.871*	2.446**	3.263**	5.181***	0.0266	0.925
Environment	(1.77)	(2.53)	(2.53)	(3.53)	(0.03)	(0.83)
FDI*Regulatory		-0.0282		0.142**		0.186
Environment		(-1.32)		(1.97)		(1.11)
_cons	12.27	23.34	35.84***	35.29***	17.61	32.91**
	(1.34)	(1.63)	(10.85)	(11.90)	(1.38)	(1.97)
Obs.	589	589	741	741	608	608
AR (2) (p-value)	0.922	0.694	0.704	0.369	0.316	0.274
Hansen (p-value)	0.999	0.999	0.213	0.124	0.650	0.611

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income). High, Upper-Middle, Lower-Middle and Low represent the income level of samples. The classifications of income level are from World Bank.

Table 9 Estimates of Institutional Quality Impacting on FDI-Growth Nexus in terms of income level——Rule of Law

	High		Upper-Middle		Lower-Middle and Low	
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
L.Growth	0.0331	0.0586	0.196***	0.189***	0.105***	0.119***
	(0.83)	(1.61)	(5.25)	(3.41)	(5.56)	(2.75)
FDI	0.0616***	0.107***	0.0729**	0.0455	0.0276**	0.0191***
	(3.35)	(2.62)	(2.49)	(1.62)	(2.38)	(2.80)
Initial Income	-0.832	-0.345	-1.052***	-1.072***	-1.255***	-0.635
	(-1.11)	(-0.34)	(-3.97)	(-5.19)	(-3.98)	(-0.37)
Government Size	-0.980***	-1.026***	-1.205***	-1.313***	-0.328***	-0.258**
	(-13.77)	(-7.81)	(-8.05)	(-6.94)	(-7.23)	(-2.27)
Capital	0.0702	0.091***	0.144***	0.157***	0.0785***	0.0834**
	(1.42)	(2.62)	(4.35)	(4.20)	(4.35)	(2.19)
Inflation	-0.0497	-0.111***	-0.0720***	-0.0704***	-0.0971***	-0.0969***
	(-1.18)	(-4.11)	(-4.16)	(-5.69)	(-8.88)	(-5.44)
Trade	-0.0159***	-0.0219***	0.0532***	0.0483***	0.0146	0.0242*
	(-3.80)	(-4.57)	(7.14)	(7.24)	(1.31)	(1.94)
Population Growth	-1.441*	-2.374***	-3.201***	-3.072***	-0.338	-0.401
	(-1.95)	(-3.22)	(-5.88)	(-4.29)	(-0.95)	(-0.65)
Rule of Law	-4.825***	-5.391***	4.304***	3.666**	0.626	0.604
	(-5.23)	(-8.32)	(3.83)	(2.22)	(1.07)	(0.56)
FDI*Rule of Law		0.0176		0.0971*		0.0395
		(0.58)		(1.95)		(1.59)
_cons	17.39*	36.02***	27.68***	29.75***	20.07***	11.38
	(1.85)	(2.67)	(7.08)	(6.44)	(5.73)	(0.60)
Obs.	589	589	741	741	608	608
AR (2) (p-value)	0.477	0.686	0.411	0.207	0.412	0.298
Hansen (p-value)	0.999	0.874	0.119	0.172	0.099	0.129

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income). High, Upper-Middle, Lower-Middle and Low represent the income level of samples. The classifications of income level are from World Bank.

5.3 FDI and Economic Growth: Role of Human Capital

Apart from direct impact of FDI on economic growth and role of institutional factor in altering FDI-induced growth, this thesis also considers the role of human capital and constructs interaction term between FDI and human capital to confirm the findings of Bengoa and Sanchez-Robles (2003) and Borensztein et al. (1998). Table 10 presents the estimation results and all estimation results have passed Hansen's J-test and AR (2) test.

The results show that human capital has statistically significantly positive impact on economic growth, which is corresponding with the work of Borensztein et al. (1998) in his global dataset. More importantly, the interaction term of human capital (measured by Human Capital Index) and FDI is included in the regression model as independent variable for our full samples. The coefficient of the interaction term is statistically positive with the figure of 0.005 and the coefficient of FDI is statistically positive. This implies that the stock of human capital in the host country can impact the growth effect of FDI.

To evaluate whether the results vary given the macroeconomic difference in countries in terms of income groups, the thesis follows the section 5.1 and 5.2, and presents the estimation in three sample groups (High Income Group, Upper-Middle Income Group and Lower-Middle- & Low-Income Group). The estimation results are presented in Table 10.

For Low-Income and Lower-middle income groups, the interaction term of human capital and FDI is positive and significant and the coefficient of FDI is negative but significant. This notable result show that the lowest level of human capital is essential for absorbing the spill over effects of FDI in lower-income host country. Human capital can also have positive impact on economic growth as shown in the estimation results.

The upper-middle income groups, however, see the opposite results. The interaction term of human capital and FDI is insignificantly negative but the coefficient of FDI is positive. Therefore, human capital is less likely to act as a threshold in upper-middle income countries to absorbing the benefits from FDI. Compared with upper middle-income countries, the lower-income countries may lack of capacity to absorb and implement new technologies derived from FDI. Therefore, improving human capital level can have more significant improvements and positive effects on lower-income countries than upper-income countries. The significantly positive coefficient of human capital is also observed, indicating the level of human capital in upper-middle income host country plays a vital role in promoting economic growth. Zhang (2001) suggests that the transfer of technology from developed countries is applicable when human capital in host countries can absorb new skills methods.

The coefficient of human capital level is insignificant but positive in high-income country. The interaction term of human capital and FDI is also insignificantly negative, which keep consistent with upper-middle income countries.

The coefficient of trade openness shows that all the results have a statistically significant positive impact on the economic growth of developing countries. In addition, the results show that inflation and government expenditure have consistent adverse effects on the economic growth of developing countries, and the coefficients of them are statistically significant. The results of control variables are consistent with the results in section 5.1 and 5.2.

Table 10 Estimates for Direct Impact of FDI on Economic Growth in Countries with Different Income Levels

	(1)	(2)
	GMM***	GMM***
L.GDPgrowth	0.166***	0.160***
	(33.99)	(35.30)
FDI	0.0602***	0.094***
	(12.90)	(10.54)
School	0.199***	0.228***
	(19.23)	(23.28)
School*FDI		0.005***
		(11.96)
Initial Income	-0.526***	-0.617***
	(-9.17)	(-8.58)
Government	-0.720***	-0.701***
	(-28.15)	(-24.73)
Capital	0.145***	0.159***
	(20.23)	(22.15)
Inflation	-0.113***	-0.106***
	(-31.53)	(-27.52)
Trade	0.041***	0.039***
	(29.79)	(17.57)
Population	-1.912***	-1.873***
	(-19.22)	(-19.29)
_cons	29.66***	32.25***
	(27.49)	(24.82)
Obs.	589	741
AR (2) (p-value)	0.143	0.201
Hansen (p-value)	0.139	0.298

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income).

Table 11 Estimates of Human Capital Impacting on FDI-Growth Nexus in terms of income level

	High		Upper-Middle		Lower-Middle and Low	
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
L.GDP Growth	0.148***	0.148***	0.154***	0.167***	0.056	-0.013
	(6.96)	(6.12)	(4.34)	(5.44)	(1.03)	(-0.23)
FDI	0.087***	0.124	0.062***	0.107	-0.044*	-1.554***
	(3.55)	(0.26)	(3.26)	(0.14)	(-1.96)	(-2.68)
School	0.0654	0.0606	0.203***	0.223***	0.0502	0.182***
	(1.59)	(0.70)	(5.18)	(3.22)	(0.46)	(2.62)
School*FDI		-0.000		-0.001		0.025***
		(-0.08)		(-0.08)		(2.67)
Initial Income	-0.532	-0.571	-0.990***	-0.753***	-2.725	-0.664
	(-0.47)	(-0.45)	(-5.93)	(-4.34)	(-1.64)	(-0.90)
Government	-0.736***	-0.732***	-1.478***	-1.398***	-0.190*	-0.234**
	(-7.55)	(-6.54)	(-14.51)	(-10.34)	(-1.93)	(-2.38)
Capital	-0.0231	-0.0236	0.136***	0.150***	0.0250	0.102***
	(-0.40)	(-0.39)	(5.09)	(3.14)	(0.71)	(4.77)
Inflation	-0.136***	-0.137***	-0.113***	-0.110***	-0.098***	-0.099***
	(-6.80)	(-4.79)	(-8.21)	(-6.84)	(-6.20)	(-5.48)
Trade	0.014***	0.013***	0.058***	0.059***	0.026***	0.025*
	(4.18)	(2.92)	(11.02)	(8.61)	(3.10)	(1.70)
Population	-0.741**	-0.730*	-2.249***	-2.409***	0.216	-1.072
	(-1.96)	(-1.65)	(-4.24)	(-3.44)	(0.10)	(-0.58)
_cons	28.95**	28.88**	45.54***	42.99***	37.03***	22.64*
	(2.39)	(2.38)	(15.23)	(10.84)	(3.27)	(1.90)
Obs.	589	589	741	741	608	608
Hansen (p-value)	0.127	0.214	0.098	0.147	0.237	0.645
AR (2) (p-value)	0.101	0.212	0.147	0.252	0.382	0.748

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; GMM is the Generalized Method of Moments estimation; Initial Income are included as ln (Initial Income). High, Upper-Middle, Lower-Middle and Low represent the income level of samples. The classifications of income level are from World Bank.

5.4 Analysis of Results

In the first three sections in chapter 5, this thesis employs stepwise regression methods and different specifications. The results are robust for all specifications. For direct impact of FDI on economic growth, the thesis uses fixed effect model for robustness analysis and compares the results with GMM estimation results. Table 12, 13 and 14 compute the results of fixed effect model estimation with stepwise regression.

All specifications in Table 12, 13 and 14 have passed the joint test for significance (Chi2-statistics). In the fixed-effects model, the thesis also finds that FDI can exert positive impact on economic growth independently under fixed-effects model. Table 12 shows that coefficients of FDI are all positive and statistically significant in major conditions at the level of 5%. Thus, regardless of estimation method, the positive impact of FDI on output growth is observed and confirmed. The thesis also observes that the positive coefficients of FDI in the fixed effects regression model are consistent with the previous literature adopting similar models for estimation (Herzer et al., 2008). Furthermore, the coefficients of FDI in fixed-effects model are lower than that in GMM model. The thesis disputes the conclusion proposed by Chowdhury and Mavrotas (2006) that exogenous component of FDI has no significant impact on output growth. The thesis also obtains that adopting different conditional information have no significant impacts on the final estimations. Consistent with most previous literature that adopts the macroeconomic approach, this thesis does confirm that the relationship between FDI and economic growth is positive and empirically confirmed robust. Therefore, it can be concluded that FDI can independently exert a positive impact on the economic growth in host country and that the proposition (1) is confirmed.

This thesis also uses fixed-effect model to estimate the impacts of corruption in FDI-induced growth. The results computed in Table 13 present that the quality of CoC (Control of corruption) can significantly (at the level of 5%) stimulate the economic growth, which is corresponding with the results under SYSTEM-GMM estimation

although the significant results are not observed in upper-middle income countries. The interaction terms between FDI and Control of Corruption are found to has insignificantly positive impact on economic growth but the signs become weakly significant at the level of 10% after the control variables (capital, inflation, trade and population growth) are added into the estimation model. Other control variables see consistent results with those under GMM estimation.

For fixed effects estimation in human capital, major signs of variables are in line with expectations. The noticeable result is that the interaction term of FDI and School (Human Capital) is insignificant but becomes significant at level of 1% after adding control variables. The sign is statistically meaningful and the thesis can conclude that human capital level can have positive impact on FDI-induced Growth in the global dataset. Human Capital is observed to have positive impact on economic growth, which is corresponding with the estimation of Huang (2009), who uses both fixed-effects and dynamic model.

Table 12 Estimates of the direct effect of FDI on growth——Full Samples (Fixed-Effect Model)

Economic Growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FE***	FE***	FE***	FE***	FE***	FE***	FE***
FDI	0.0597***	0.0563***	0.0523***	0.0278*	0.0327**	0.0169	0.00829**
	(3.93)	(3.79)	(3.60)	(1.92)	(2.27)	(1.18)	(2.58)
Initial Income		-3.842***	-3.894***	-4.122***	-4.677***	-5.099***	-4.885***
		(-9.74)	(-10.09)	(-10.86)	(-12.20)	(-13.32)	(-12.84)
Government			-0.412***	-0.383***	-0.418***	-0.401***	-0.426***
			(-9.39)	(-8.86)	(-9.73)	(-9.43)	(-10.08)
Capital				0.160***	0.158***	0.172***	0.182***
				(8.66)	(8.67)	(9.49)	(10.11)
Inflation					-0.109***	-0.120***	-0.115***
					(-6.98)	(-7.76)	(-7.45)
Trade						0.0362***	0.0363***
						(7.29)	(7.38)
Population							-1.220***
							(-6.39)
Constant	2.155***	46.23***	53.26***	51.87***	59.35***	60.62***	59.80***
	(21.56)	(10.21)	(11.86)	(11.76)	(13.23)	(13.68)	(13.63)
N	2040	2040	2040	2040	2040	2040	2040
R-Square	0.0079	0.0543	0.0955	0.1293	0.1507	0.1734	0.1905

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; FE is the Fixed Effect Model; Initial Income are included as ln (Initial Income).

Table 13 Estimates of Institutional Quality Impacting on FDI-Growth Nexus——Corruption (Fixed-Effect Model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
FDI	0.0597***	0.0644**	0.0463**	0.0598**	0.0459**	0.0362*	0.0498**	0.0487**
	(3.93)	(2.43)	(2.05)	(2.39)	(2.04)	(1.84)	(2.16)	(2.15)
Corruption		0.0462**	0.0588**	0.156**	0.0227**	0.0889**	0.0528**	0.0715**
		(2.29)	(2.37)	(2.01)	(2.15)	(2.59)	(2.35)	(2.49)
Corruption*FDI		0.00136	0.00292	0.00218	0.0212*	0.0198*	0.0192*	0.0164*
		(0.11)	(0.24)	(0.18)	(1.78)	(1.69)	(1.65)	(1.83)
Initial Income			-3.850***	-3.901***	-4.164***	-4.724***	-5.138***	-4.922***
			(-9.75)	(-10.10)	(-10.96)	(-12.31)	(-13.41)	(-12.93)
Government				-0.415***	-0.380***	-0.417***	-0.399***	-0.425***
				(-9.43)	(-8.76)	(-9.66)	(-9.35)	(-10.01)
Capital					0.167***	0.165***	0.178***	0.187***
					(8.83)	(8.80)	(9.59)	(10.15)
Inflation						-0.110***	-0.121***	-0.115***
						(-7.02)	(-7.78)	(-7.48)
Trade							0.0359***	0.0360***
							(7.23)	(7.33)
Population								-1.211***
								(-6.34)
_cons	2.155***	2.020***	46.15***	52.92***	52.10***	59.49***	60.80***	59.92***
	(21.56)	(4.22)	(10.14)	(11.74)	(11.78)	(13.24)	(13.70)	(13.63)
Obs.	2040	2040	2040	2040	2040	2040	2040	2040
R-square	0.0079	0.0080	0.0544	0.0960	0.1310	0.1526	0.1750	0.1918

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; FE is the Fixed Effect Model; Initial Income are included as ln (Initial Income).

Table 14 Estimates of Human Capital Impacting on FDI-Growth Nexus in terms of income level (Fixed-Effect Model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***	GMM***
FDI	0.0597***	0.00153	0.0097**	0.0071*	0.0062***	0.0031***	0.0032***	0.0029***
	(3.93)	(0.02)	(2.03)	(1.78)	(3.42)	(3.45)	(3.62)	(3.60)
School		9.213***	18.67***	19.33***	15.77***	15.96***	11.58***	10.07***
		(4.14)	(5.47)	(5.79)	(4.79)	(4.92)	(3.53)	(3.09)
School*FDI		0.0756	0.181	0.144	0.422***	0.426***	0.425***	0.409***
		(0.64)	(1.57)	(1.28)	(3.69)	(3.78)	(3.81)	(3.70)
Initial Income			-6.687***	-6.830***	-6.816***	-7.433***	-7.195***	-6.771***
			(-10.56)	(-11.03)	(-11.24)	(-12.31)	(-12.02)	(-11.35)
Government				-0.415***	-0.381***	-0.418***	-0.401***	-0.425***
				(-9.52)	(-8.89)	(-9.83)	(-9.50)	(-10.12)
Capital					0.179***	0.178***	0.194***	0.205***
					(9.28)	(9.35)	(10.23)	(10.85)
Inflation						-0.113***	-0.123***	-0.118***
						(-7.30)	(-8.00)	(-7.71)
Trade							0.0331***	0.0338***
							(6.59)	(6.79)
Population								-1.170***
								(-6.17)
_cons	2.155***	8.881***	65.24***	72.89***	70.87***	78.95***	76.05***	73.77***
	(21.56)	(5.45)	(11.71)	(13.24)	(13.15)	(14.54)	(14.11)	(13.78)
Obs.	2040	2040	2040	2040	2040	2040	2040	2040
R-square	0.0079	0.0168	0.0706	0.1125	0.1505	0.1734	0.1917	0.2074

*, **, *** represent the significant level at 10%, 5%, 1% level prospectively; t-statistics are included in the parentheses; FE is the Fixed Effect Model; Initial Income are included as ln (Initial Income).

6. Conclusion

This thesis aims at investigating the impact of FDI on economic growth and how institutional quality as well as human capital alter FDI-Growth nexus based on a dynamic procedure using data of countries over the period from 1999 to 2018. Such procedure can address major econometric problems that may arise in the estimation regression, including its dynamic nature, endogenous regressors, and finite samples. The thesis uses institutional quality indicators from World Bank and datasets of 102 countries over the period from 1999 to 2018. System GMM approach is used to estimate the direct impact of FDI on growth and how institutional quality and human capital alter the FDI-Growth nexus.

While previous studies present a pessimistic view on FDI in the perspective of macroeconomic research, this thesis empirically asserts that FDI can promote economic growth. By running the GMM estimation, the results present that FDI can independently promote the economic growth. Through expanding the dataset, the positive relationship from previous macro studies has been confirmed. The thesis also finds that trade openness and physical capital in developing countries (countries in upper-middle and lower-middle income groups) have positive impact on economic growth, but higher inflation and government size can damage the sustainable economic growth in host country.

In later analysis, this thesis run the heterogeneity test based on the income level of countries and obtain three groups (High-Income group, Upper-Middle Income group and Lower-Middle-&Low-Income group). FDI can positively promote economic growth in developed and high-income developing countries while it has negative impact on host countries whose income level is lower-middle and low. Therefore, absorptive capacity can affect the spill over effects of FDI in host country. The role of institutional quality and human capital is considered in FDI-Growth relationship.

The thesis also employs World Governance Indicator (WGI) to estimate the role of institutional quality in FDI-Growth nexus. The four institutional quality indicators selected by this thesis are control of corruption, rule of law, government effectiveness and regulatory environment. The thesis suggests that institutional quality can directly boost economic growth in host country. By interacting the institutional quality variables with FDI, the thesis finds that institutional quality factor can have positive impact on FDI-Growth nexus and enhance the spill over effects from FDI on economic development. Regulatory stability quality has the largest impact on economic growth and government effectiveness is the most important factor in enhancing FDI-induced economic growth.

Considering the income level of samples, the results in full samples are in line with the results of high-income countries. As for upper-middle income, control of corruption and government effectiveness are found to be insignificant for economic growth, but all interactions terms have significantly positive impact, implying that better institutional quality can promote FDI-Growth nexus. For lower-middle- and low-income countries, only control of corruption and government effectiveness are significant and have positive impact on FDI-Growth nexus. The thesis does not observe significant impact of rule-of-law and regulatory-environment on FDI-induced economic growth in lower-middle- and low-income countries. The inconsistent results are also seen in developed countries because the coefficients of interaction term of rule of law and regulatory environment are insignificant. The thesis also observes that rule of law can have negative impact on the economic growth in higher income countries.

Furthermore, the thesis investigates the role of human capital in FDI-Growth nexus and concludes that the level of human capital threshold can determine growth effects of FDI. When the thesis divides the samples into three groups considering the income level, the notable results are that the coefficient of interactive term of human capital and FDI for lower-middle- and low-income countries is positive while the coefficient of FDI is negative. This result indicates that a minimum level of human capital plays

an essential role in absorbing the spill over effects from FDI and FDI-induced growth. The results in high income and upper-middle income countries are totally opposite. The coefficients of FDI is positive but the interaction term between FDI and human capital is insignificantly negative. The insignificant coefficients of interaction term indicate that human capital is less likely to act as a threshold in maintaining economic growth in higher-income groups. The coefficients of human capital are significant in upper-middle countries but see insignificant results in high income groups, indicating that economic growth has few impacts on developed countries.

Based on the empirical results, this thesis suggests that host country should consider the proper FDI in line with its development stage and absorptive capacity. The aim of FDI attractiveness is to obtain the spill over benefits from better technology and institutions from developed countries. Through the upgrade of domestic institutions and accumulation of human capital, host country can improve absorptive capacity of spill over effects from FDI, thereby enhancing the economic growth. For instance, developing countries policy makers can consider emphasizing more on education. Through strong education curriculum and vocational training, lower-income-developing countries can maximize the potential of the domestic labour force and strengthen the absorptive capacity. For developing countries, it can be wise choice for policy makers to reduce the economic rent or factor costs to accelerate domestic growth. Apart from institutional quality and human capital, host country also requires reforming the trade openness because it can accelerate the economic growth and benefit the FDI attractiveness.

Through expanding the dataset, the thesis does not reject that FDI can exert the economic growth independently. For future possible research, short or long-run effects can be considered. Future studies can introduce Granger causality test and autoregressive distributed lag model. The thesis also suggests that other institutional quality including political stability can be considered in investigating the impact of institutional quality in FDI-Growth nexus. Further studies can also research on the

causality issue. More determinants that can affect the FDI-induced economic growth can be considered.

Appendix

Table A1: Territories in the sample in terms of countries' income levels[2]

High Income			
Australia	Austria	Bahamas	Bahrain
Canada	Cyprus	Czech Republic	Denmark
Finland	France	Germany	Luxembourg
Iceland	Ireland	Israel	Italy
Japan	South Korea	Malta	Netherlands
New Zealand	Norway	Portugal	Saudi Arabia
Singapore	Spain	Sweden	Switzerland
United Kingdom	United States		
Upper-Middle Income Countries			
Albania	Armenia	Azerbaijan	Belarus
Belgium	Brazil	Bulgaria	Chile
China	Colombia	Costa Rica	Côte d'Ivoire
Croatia	Dominican Republic	Ecuador	Estonia
Gabon	Greece	Hungary	Indonesia
Iran	Jamaica	Jordan	Latvia
Lithuania	Malaysia	Mexico	Panama
Paraguay	Peru	Poland	Romania
Russian Federation	Slovakia	Slovenia	South Africa
Thailand	Turkey	Uruguay	
Lower-Middle Income Countries			
Algeria	Bangladesh	Bolivia	Botswana
Cameroon	Congo	Egypt	El Salvador
Ghana	India	Kenya	Moldova Republic
Mongolia	Morocco	Nigeria	Pakistan
Philippines	Senegal	Sri Lanka	Tunisia
Ukraine	Vietnam		
Low Income Countries			
Burkina Faso	Gambia	Guatemala	Guinea-Bissau
Madagascar	Malawi	Mali	Niger
Sudan	Togo	Uganda	

Table A2: Details of all Variables——Equation (5)

Variables	Description[3]
Dependent Variable	
Growth	The growth rate of real GDP per capita in each period
Explanatory Variables	

[2] The classification is derived from World Bank.
[3] These definitions are from the World Bank.

FDI	FDI, net inflow (% of GDP)
Control Variables	
Initial income	Real GDP per capita at the beginning of each five-year period
Trade openness	Sum of import and export (% of GDP)
Government size	Government final consumption expenditure (% of GDP)
Inflation	Annual inflation rate by consumer price (%)
Capital	Gross capital formation (% of GDP)
Population growth	Annual Population Growth Rate

Table A3: Details of all Variables——Equation (6)

Variables	Description[4]
Dependent Variable	
Growth	The growth rate of real GDP per capita in each period
Explanatory Variables	
FDI	FDI, net inflow (% of GDP)
Control of Corruption	Index that measures perceived levels of public sector corruption
Gov. Effectiveness	Index that measures the quality of public services
Rule of Law	Index that measures authority and influence of law in society
Regulatory Quality	Index that measures perceptions of the ability of the government to implement policy
Institutional*FDI	Interaction term between FDI and each institutional factor
Control Variables	
Initial income	Real per-capita GDP at the beginning of each five-year period
Trade openness	Sum of import and export (% of GDP)
Government size	Government final consumption expenditure (% of GDP)
Inflation	Annual inflation rate by consumer price (%)
Capital	Gross capital formation (% of GDP)
Population growth	Annual Population Growth Rate

Table A4: Details of all Variables——Equation (7)

Variables	Description[5]
Dependent Variable	
Growth	The growth rate of real GDP per capita in each period
Explanatory Variables	
FDI	FDI, net inflow (% of GDP)
School	Calculating the average year of education[6]
School*FDI	Interaction term between FDI and School
Control Variables	
Initial income	Real per-capita GDP at the beginning of each five-year period
Trade openness	Sum of import and export (% of GDP)

[4] These definitions are extracted from the World Bank.
[5] These definitions are extracted from the World Bank.
[6] Human Capital Index in PWT 9.0. https://www.rug.nl/ggdc/docs/human_capital_in_pwt_90.pdf.

Government size	Government final consumption expenditure (% of GDP)
Inflation	Annual inflation rate by consumer price (%)
Capital	Gross capital formation (% of GDP)
Population growth	Annual Population Growth Rate

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