Characteristics of FDI in Lao PDR and Its Effect on Growth Enterprise Performance

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“ラオスにおける FDI の特徴と成長及び企業パフォーマンスへの影響”

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Executive Summary

In recent times, there has been increasing growth in Foreign Direct Investment (FDI) globally. Many countries around the world, particularly those in the industrializing economies are engaged in aggressive competition to attract foreign investment. Moreover, as the globalization of the world economy over the past decades has advanced, foreign investors also desire to gain advantages through foreign investment in order to compete with international and local firms. The competition among countries seeking FDI has led to the implementation of incentive policies to attract those potential foreign investors. This is because FDI is a main driver of economic growth and also promotes export and improves industry. Foreign investment is an important source of long term capital inflows for economic expansion, especially in developing nations, such as Lao PDR. Furthermore, FDI performing as an instrument contributes to technological progress, new ideas, skills, equipment and infrastructure development in host economies.

The government of Laos initiated the transition process from a planned economy to a market oriented economy with the implementation of the New Economic Mechanism (NEM) in 1986. These reforms consist of gradual liberalization of trade and investment regimes by offering numerous incentives to foreign investors through import duty and tax exemption on raw materials and capital equipment, tariff reduction, tax holidays and other facilities. The amount of FDI inflow was approximately $US 17 billion during the period 1988-2010, with around 2,000 MNEs operating in Laos. Based on the economic census of 2006, the private sector was at that time dominated by micro, small and medium size enterprises, while there were a few large firms in the economy. There were round 127,000 firms doing business and employing 346,000 workers in Laos (NSC, 2007). Increasing FDI in Laos is widely believed to promote economic growth. However, a better understanding of the relationship between FDI and growth in the context of changes in the FDI structure requires complementary analyses to explore the issue of cointegration as well as the short and long term dimensions of the causal relationship.

To comprehend FDI, first we must understand the basic motivations that motivate firms to invest abroad rather than export or outsource production to national firms. In the literature of economics and international business, numerous studies have been conducted at the macro and firm level to explain the phenomenon of FDI. There is no single accepted theory; all new evidence adds some new elements and criticism to previous ones. The few studies related to these issues have been conducted in Laos but lack the needed scope for effective implementation. Therefore, this study has three main objectives as follow:

First, the purpose of this research is to examine the factors influencing initiating FDI in Laos by empirically investigating its economic, geographic and political factors from a macroeconomic perspective. Unbalanced panel data set is estimated by the Generalized Least Square (GLS) Random Effect method to analyze the empirical results based on the data for approved FDI projects from 16 investing partners over the period 1996-2009. It is assumed that foreign investors make investment decisions after comparing the factors that affect their locational decisions between the home country and the potential host countries. Thus, relative data are used rather than absolute data. This paper differs from other studies because in this empirical analysis, both host and home countries characteristics are taken into account as determinants of FDI location. Secondly, additional explanatory variables are included in this paper to capture more key indicators.

Secondly, this study also examines the causal link between industry-specific FDI and economic growth in Laos from 1988 to 2010 by applying the Engel-Granger Vector Error Correction Model (VECM) and Panel Cointegration technique. This analysis focuses on the sectoral distribution of FDI inflows on GDP in order to estimate whether the growth impact of FDI differs among the primary, secondary and tertiary sectors. This study also investigates the possibility of spillovers across sectors at least tentatively by performing additional Granger causality tests. This analysis differs from other studies in that in this empirical analysis, disaggregated FDI data is used due to the sectoral composition of FDI in Laos which has changed considerably and the growth effects can be expected to differ significantly across

sectors. It is the first comprehensive study of FDI in Laos to analyze the links and the impacts of specific-industry FDI on the economic growth. In this paper, two sets of questions have been posed: (1) whether changes in the structure and type of FDI in Laos are relevant for its growth impacts, and (2) whether the impacts of growth on FDI differ among the primary, secondary and tertiary sectors.

Finally, the objectives of this study are to examine the efficiency performance of Lao firms in the manufacturing and services sectors, to investigate whether spillover from FDI contribute to technical efficiency. To achieve the objectives, this research addresses the three broad set of questions. First, do foreign-owned firms operate more efficiently or perform better than domestic firms? Second, does spillover from FDI contribute to technical efficiency? Finally, what factors impact the technical efficiency of Lao firms? To answer these questions, this study applies a stochastic frontier production function and technical inefficiency effects model to examine the efficiency performance of Lao firms in the manufacturing and services sectors by employing cross-sectional firm level datasets from the Investment Climate Survey (ICS) conducted by the World Bank in 2009. This is the first empirical study using Stochastic Frontier Analysis (SFA) to estimate and analyze the technical efficiency performance of Lao manufacturing and services industries.

The empirical results indicate that the minerals and fuels exports, manufacturing exports, labour productivity, degree of openness and an impact from the Asian financial crisis are the common determinants of FDI inflows into Laos. However, this study fails to support the hypotheses that relative agriculture exports, inflation rate, market size, exchange rate, interest rate, distance, infrastructure, economic freedom and ASEAN variables influence FDI inflows. This finding implies that there is non-market seeking FDI in Laos. Resource-seeking effects are strongly confirmed; labour productivity is an important determinant for FDI inflows and openness to trade and export-oriented policy attract inward FDI flows in Laos. Moreover, the Asian financial crisis negatively affected FDI inflows in Laos.

The findings from this investigation have vital implications for the future development of FDI in Laos. The findings yield some suggestions for policy makers to enhance the attractiveness of a host country, promote and develop programs in order to attract more foreign investors and to sustain economic development. Rapid growth in the natural resource sector and trade expansion are expected to continue according to the World Bank (2010), and labour costs in Laos are relatively low in the region and significantly lower than neighboring countries such as Cambodia and Vietnam (World Bank, 2011). Therefore, Laos should expect to continue experiencing a rapid increase in inward FDI. By doing so, Laos should further harness its natural resources and comparative advantage to promote mining and manufacturing sectors in order to achieve sustainable economic growth and poverty eradication. However, the Lao government has to promote the sustainable use of natural resources and use them effectively to minimize the negative impacts on the environment, society and biodiversity. In addition, it is essential to improve the quality of labour, while keeping comparative advantage of labour cost with other countries in the regions, especially China and Vietnam. Furthermore, the Lao government should further liberalize international trade and open its economy in order to encourage greater confidence in foreign investors to be able to attract more FDI.

In this analysis, Granger causality tests show that there are bidirectional effects between real GDP and FDI inflows in the long term at the aggregated level. FDI inflows appear to have a positive effect on the growth of the Lao economy. However, the effects of inward FDI on economic growth vary across sectors at the sectoral levels. For the three broad sectors identified in this study, the findings illustrate that there is a bidirectional causal link between FDI inflows and output in the long run. In the short run, there is no FDI-led growth in the primary sector, a unidirectional causality running from output to FDI in the manufacturing sector. The services sector has the most favorable growth effects of FDI inflows in Laos.

At the level of industries, the result shows that all nine industries are the main industries contributing to economic growth in the long run and only FDI inflows in the trading sector has a strong impact on growth in the short run. On the other hand, the findings show that the growth promoting FDI is mainly in the manufacturing, trade, transport and communications, banking and other services sector in the long term, and manufacturing and construction sectors in the short term. In addition, for cross-sector spillover, the results show that there is a bidirectional causal link between the two alternative pairs of variables in the long run, meaning that FDI and the output of the manufacturing and services sectors have a causal link through cross-sector spillovers. However, there is no evidence of any cross-sector causality in the short run.

Several policy implications based on the empirical results of this paper can be suggested as follows: firstly, the Lao government should pay more attention to policies and incentives provided to foreign investors in all industries because they are indeed beneficial to enhance economic growth. Thus, it is suggested that the Lao government should continue creating a favorable business and investment environment and deregulating policies related to foreign investment. This could include providing a level playing field for investors, simplifying administrative processes and providing additional incentives and facilities to investors. Secondly, improving local conditions including the infrastructure base, sound institutions, and a reliable and consistent financial sector will have a beneficial effect. Additionally, openness to trade plays an important role in increasing the relationship between foreign and domestic firms particularly in the manufacturing and trade sectors. Finally, developing the ability of local firms and skilled labour to absorb the spillover benefits from foreign investment particularly in the manufacturing sector is important.

Additionally, the results show that the technical efficiency levels in the labour intensive manufacturing and services sectors of Lao firms are low, showing a high level of technology inefficiency in the production process. Moreover, the findings indicate that firm age, firm size and FDI spillover effects are main factors contributing to the technical

efficiency of the manufacturing and services firms. However, the effect of location, firm ownership and capital-labour ratio factors on the firm technical efficiency is not found in this study.

The findings from this study suggest that policies for strengthening the absorptive capacity of domestic firms through investing in knowledge and human capital formation ought to be prioritized. Moreover, business obstacles should be gradually removed and more general policies and incentives should be pursued in order to improve the business environment and attract more foreign investment so that the firms with higher potential, particularly potential foreign-owned firms can improve their efficiency and business operations. In addition, there is also a need for further industrial and trade policy reforms in order to gain the technical advantages from industrialization and trade development.

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Acronyms and Abbreviations

AIA	ASEAN Investment Area
ADB	Asian Development Bank
ASEAN	Association of South East Asian Nations
BLUE	Best Linear Unbiased Estimators
CLMV	Cambodia, Laos, Vietnam and Myanmar
CPI	Consumer Price Index
DEA	Data Envelopment Analysis
DFA	Deterministic Frontier Analysis
EC	Error Components
VECM	Vector Error Correction Model
FDI	Foreign Direct Investment
FE	Fixed Effects
GDP	Gross Domestic Product
GLS	Generalized Least Square
ICS	Investment Climate Survey
IPS	Im, Pesaran and Shin
LLC	Levin, Lin and Chu
Lao PDR	Lao People's Democratic Republic (known as Laos)
LSDV	Least Squared Dummy Variable
LM	Lagrange Multiplier
NEM	New Economic Mechanism (Economic reform launched in Laos)
NSC	National Statistic Centre (Laos)
NTR	Normal Trade Relations
MPI	Ministry of Planning and Investment (Laos)
MNEs	Multinational Enterprises
OLS	Ordinary Least Squared
RE	Random Effects
SME	Small and Medium Enterprise
SOE	State-Owned Enterprise
SFA	Stochastic Frontier Analysis
TE	Technical Efficiency
TFP	Total Factor Productivity
UNCOMTRADE	United Nations Commodity Trade Statistics Database
UNCTAD	United Nations Conference on Trade and Development
VAR	Vector Auto Regression
VIF	Variance Inflation Factor
WB	World Bank
WTO	World Trade Organization

Chapter 1

Introduction

1.1. Background of the Study

Since the late 19th century, there has been global increasing growth in Foreign Direct Investment. Many countries around the world, particularly those in the industrializing economies are engaged in aggressive competition to attract foreign investment. Moreover, as the globalization of the world economy over the past decades has advanced, foreign investors also desire to gain advantages through foreign investment in order to compete with international and local firms. The competition among countries seeking FDI has led to the implementation of incentive policies to attract those potential foreign investors. This is because FDI is a main driver of economic growth and also promotes export and improves industry. Therefore, in order to attract more FDI, host countries need to create sound strategies and a favorable investment environment including macroeconomic stability, infrastructure reliability and labour force development and tax incentive.

Foreign investment is an important source of long term capital inflows for economic expansion, especially in developing nations, such as Lao PDR. Furthermore, FDI performing as an instrument contributes to technological progress, new ideas, skills, equipment and infrastructure development in host economies. However, Laos is still learning how to attract, manage, monitor and then attract more FDI inflows. In spite of several years' promotion, Laos has not received a favorable amount of FDI because of the existing negative business environment, including a weak physical infrastructure network, structural deficiencies within the economy, nontransparent and lengthy documentation procedures, limited access to credit and financing, and a poorly skilled labour force.

Generally, FDI can provide the host country with capital, knowledge and management skill. FDI also has positive effects on economic growth through new technology, which is often large enough to encourage developing countries to provide investment incentives to influence multinational enterprises (MNEs) investment decisions and attract more FDI. A

positive relationship between FDI and economic growth has been supported by many empirical studies. The direction of linkage between FDI and economic growth, however, is not always clear and depends on various factors including factor endowment, geographical location, infrastructure, education and market size or a country's trade regime. In addition, FDI has been found to have a larger effect on growth than domestic investment does due to the effect of FDI on productivity growth.

Moreover, it is believed that FDI inflows create a productivity spillover to domestic firms in the host countries, particularly for developing countries. It is argued that multinational corporations set up subsidiaries abroad and transfer knowledge and technology to their subsidiaries. As characteristic of public goods, the transferred knowledge and technology can spread through non-market mechanisms over the whole economy leading to productivity gains and productivity spillovers in domestic firms (Blomstrom, 1989).

Generally, MNCs contribute technologies and experiences from their affiliates to the local businesses in the recipient countries. Spillovers might occur when the domestic firms improve efficiency by duplicating technologies of foreign affiliates either by employing workforces trained by the affiliates or by observing and implementing new approaches. Moreover, another type of spillover effects could take place if the entrance of foreign firms into the host economy causes higher competition and domestic firms were forced to seek more advanced technology or utilize their existing resources more efficiently (Blomstrom and Kokko, 1998).

Furthermore, MNCs are often assumed to employ more sophisticated technology and superior managerial practices in their operating system resulting in better performance and more efficient as well as more competitive advantage over domestic firms, despite the fact that those firms are likely to be more familiar with the preference of consumers, government policies and business practices (Blomstrom and Sjoholm, 1999). FDI will improve resource allocation of the domestic firms in the sectors that they enter leading to an increase in productivity levels in those sectors. Firms related to MNCs offer learning opportunities to

local firms and decrease the innovation and imitation cost for local businesses, inducing them to accelerate improvement of productivity (Helpman, 1999).

Although FDI policy in Laos has been developed and promoted for two decades, the FDI promotion measures have not been effective, and this seems to be due to a gap between policies and realities of implementation. It is believed these inappropriate policies are from a lack of understanding of the determinants and consequences of FDI. To comprehend FDI, first we must understand the main motivations that motivate foreign firms to invest in Laos rather than export or outsource production to national firms. Hence, there is a need to investigate factors that attract foreign investors to invest in Laos.

According to MPI statistics, the amount of FDI inflow was approximately $US 17 billion during the period 1988-2010, with around 2,000 MNEs operating in Laos. Increasing FDI inflows in Laos is widely believed to promote economic growth. However, a better understanding of the relationship between FDI and growth in the context of changes in the FDI structure requires complementary analyses to explore the issue of cointegration as well as the short and long term dimensions of the causal relationship. An increase of FDI in Laos is widely believed to promote economic growth. Therefore, there is a need to understand the effect of FDI on economic growth and the relationship between FDI and growth in sectoral levels and in the context of changes in the FDI structure.

The number of enterprises in the manufacturing and services sectors has grown rapidly since Laos started economic reforms through the New Economic Mechanism (NEM) in 1986. Based on the economic census of 2006, the private sector is dominated by micro, small and medium size enterprises, with only a few large firms in the economy. There are round 127,000 firms doing business and employing 346,000 workers in Laos. The major source of employment is in the trade sector including retail and wholesale, accounting for around 64 percent of total employment in all sectors. Enterprises in Laos are relatively small in terms of sales and employment (NSC, 2007).

According to World Bank statistics, productivity of Lao workers is low compared to neighboring countries and under the levels proposed by its income per capita. Labour productivity in Laos is relatively lower than Vietnam and Cambodia and far behind the leading countries in the region, for example China, Malaysia and Thailand. Foreign owned firms in Laos on average are more productive than local firms. Foreign firms, firms with international certification and firms employing technologies such as the internet are more productive than firms without access and no certification. There is no evidence that exporting firms and firms with bank credit have higher productivity than non-exporting firms and the firms without bank credit (World Bank, 2009). Therefore, an important motivation for this research is to identify what causes the manufacturing and services sectors of Lao firms to underperform in output and technical efficiency, and determine firm-specific factors affecting performance of the firms.

In the literature on economics and international business, numerous studies have been conducted at the macro and firm level to explain the phenomenon of FDI. There is no single accepted theory; all new evidence adds some new elements and criticisms to previous studies. The few studies related to these issues that have been conducted in Laos lack the needed scope for effective implementation. Therefore, an important question for policy makers is what the Lao government can do to attract, manage and sustain FDI and improve firm performance.

1.2. Objectives of the Study

In order to fill the gap described in the preceding section and analyze FDI phenomenon in Laos, the first part of this study focuses on the main determinants of FDI inflows. This paper aims to examine the factors influencing FDI in Laos by empirically investigating its economic, geographic and political factors from a macroeconomic perspective. To determine what has caused Laos' volatile FDI experience and which factors have determined FDI inflows into Laos, a set of business environmental factors across 16 investing partners, accounting for around 93 percent of total investment values over the period

1996-2009 is analyzed. In order to achieve the objectives, this research addresses the following topics of investigation: (1) Assuming that FDI has positive effects, what causes the inflows of FDI, or in other words, what are the determinants of FDI flows in Laos? (2) Since the country was first opened economically, the Lao economy has undergone a series of structural reforms, including the ongoing reduction of tariffs and trade barriers, a new tax system and macroeconomic frameworks. Do macroeconomic factors matter? Has the combination of a sound macroeconomic policy and ongoing structural reform contributed to Lao's attraction as a FDI destination?

Considering the importance of the contribution of the FDI to the Lao economy, the limited number of studies on this issue for Laos, it is an important question for investigation. Therefore, the purpose of the second part of this research is to examine the causal link between industry-specific FDI and economic growth in Laos from 1988 to 2010 by applying the Engel-Granger Vector Error Correction Model (VECM) and Panel Cointegration technique. This analysis focuses on the sectoral distribution of FDI inflows on GDP. In addition, this paper estimates whether the growth impact of FDI differs among primary, secondary and tertiary sectors. This study also investigates the possibility of spillovers across sectors at least tentatively by performing an additional Granger Causality tests. In this study, two sets of questions have been posed: (1) whether changes in the structure and type of FDI in Laos are relevant for its growth impacts, and (2) whether the impacts of growth on FDI differ among the primary, secondary and tertiary sectors.

The probability of productivity spillovers from knowledge and technology transfers become a main point of interest to policy makers in order to create FDI-friendly policy. Now an important question is whether huge FDI inflows indeed bring about productivity spillovers for recipient countries, particularly for developing economies. For Lao manufacturing and services firms in particular, there are very few researches, especially in terms of their technical efficiency and the main factors affecting a firm's inefficiency. Therefore, the objectives of this study are to examine the efficiency performance of Lao firms in the

manufacturing and services sectors, to investigate whether spillover from FDI contribute to technical efficiency and to propose plausible policy recommendations to develop a sound policy on FDI in order to improve firm technical efficiency. This research addresses the following three broad sets of questions. First, do foreign-owned firms operate more efficiently or perform better than domestic firms? Second, does spillover from FDI contribute to technical efficiency? Finally, what factors impact the technical efficiency of Lao firms?

1.3 Uniqueness, Contribution and Limitation

This dissertation consists of both macro and firm level analyses. In the first part of this study, it is assumed that foreign investors make investment decisions after comparing the factors affecting their locational decisions between the home country and the potential host countries. Thus, relative data are used rather than absolute data. This paper differs from other studies because in the empirical analysis, both host and home country characteristics are taken into account as determinants of FDI location. Secondly, additional explanatory variables are included in this paper compared to previous studies to capture more key indicators such as the share of minerals and fuels, agriculture products and manufacture products in total exports and others.

The second part of this empirical analysis differs from other studies is that in this study, disaggregated FDI data is used. The motivation for disaggregating data according to the sectoral composition of FDI in Laos is due to two reasons. First, the sectoral composition which has undergone several well-known changes since economic reforms were first initiated; for example, foreign investment in resource sectors. Furthermore, it is reasonable to expect that growth effects to differ significantly across sectors. In addition, this is the first empirical study using Stochastic Frontier Analysis (SFA) to estimate and analyze the technical efficiency performance of Lao manufacturing and services industries.

This study makes a contribution to current research in various ways. It is the first comprehensive study of FDI in Laos, linking the analysis of FDI determinants, the impacts of specific-industry FDI on the economic growth, and the technical efficiency performance of

manufacturing and services industries. More importantly, the outcomes of this study will help policymakers evaluate the policies and regulations that affect the performance of the foreign investment directly. Furthermore, the findings can provide some options for policymakers to maximize the benefits of FDI in Laos by improving FDI policies and to target preferred types of FDI in specific industries effectively in order to accelerate economic growth.

This paper applies secondary and descriptive statistical data from various international and national sources. Although the modern empirical methodologies and econometric techniques have high accuracy for the analysis of FDI, this paper faced some limitations in data reliability and availability beyond the control and scope of the research. The small size and short time period of the sample are limitations of this research. Moreover, primary data from the investment climate survey conducted by the World Bank in 2009 may not capture and reflect the entire scenario of FDI inflow in Laos since the random selection method may be biased in selecting the target group for primary data collection.

1.4 Organizational Structure

This paper is structured as follows: Chapter 1 presents the background of the study describing the issue of determinants and effects of FDI inflows, firm performance, the objectives, uniqueness, and structure of this dissertation.

Chapter 2 presents a brief overview of FDI inflows and sectoral FDI effects on economic growth, and firm performance in Laos.

Chapter 3 reviews the relevant literature on the determinants of FDI, the causal link between FDI and growth, and the technical efficiency and spillover of firms in Laos.

Chapter 4 introduces the empirical models of the determinants of FDI inflows, the causal link between inward FDI and economic growth, and technical efficiency and spillover of firms. Data description and methodologies are also explained in this chapter.

Chapter 5 reports the empirical results based on the macro and firm level analyses.

Chapter 6 summarizes the main results of the paper, provides some policy implications and suggestions for further study. The references follow chapter 6.

Chapter 2

Overview of FDI Characteristic, Economic and Firm Development in Laos

2.1 Overview of FDI Inflows into Laos

Laos has pursued different foreign investment policies at different times depending on the development objectives and economic situation in the country. Since Laos started economic reform through the NEM in 1986, Laos put an end to its centrally planned economy and gradually opened its economy. This policy reform ended the promotion of state owned enterprises and turned to promoting private sector involvement in trade and investment in order to attract FDI into Laos. For instance, the privatization campaign peaked in 1996 with the partial divestment of the national telecommunications company, restructured as a joint venture with Shinawatra of Thailand. There were only 32 large state corporations remaining by 1998 out of the 640 state enterprises that existed in Laos a decade earlier (IMF, 1997).

The NEM reforms consist of gradual liberalization of trade and investment regimes by offering numerous incentives to foreign investors through import duties and tax exemption on raw materials and capital equipment, tariff reduction, tax holidays and other facilities. The first investment law as part of the major economic reform program was promulgated in July 1988. At the initial stage, the primary purpose of the FDI policies in Laos was to engage the participation of foreign investors in the restructuring of state-owned enterprises (SOEs). Foreign investors are allowed to invest in all business sectors with 100% ownership permitted in most sectors, except in energy and mining projects in which the Lao government contributes to share capital or preserves the right to purchase a pre-agreed equity share. The participation of foreign equity is required to be at least 30 percent of total invested capital for joint ventures.

In order to strengthen the reforms and improve the business environment, the investment law was revised many times to match the circumstances and conditions of the country in each period. First, it was replaced by the Law on Promotion and Management of

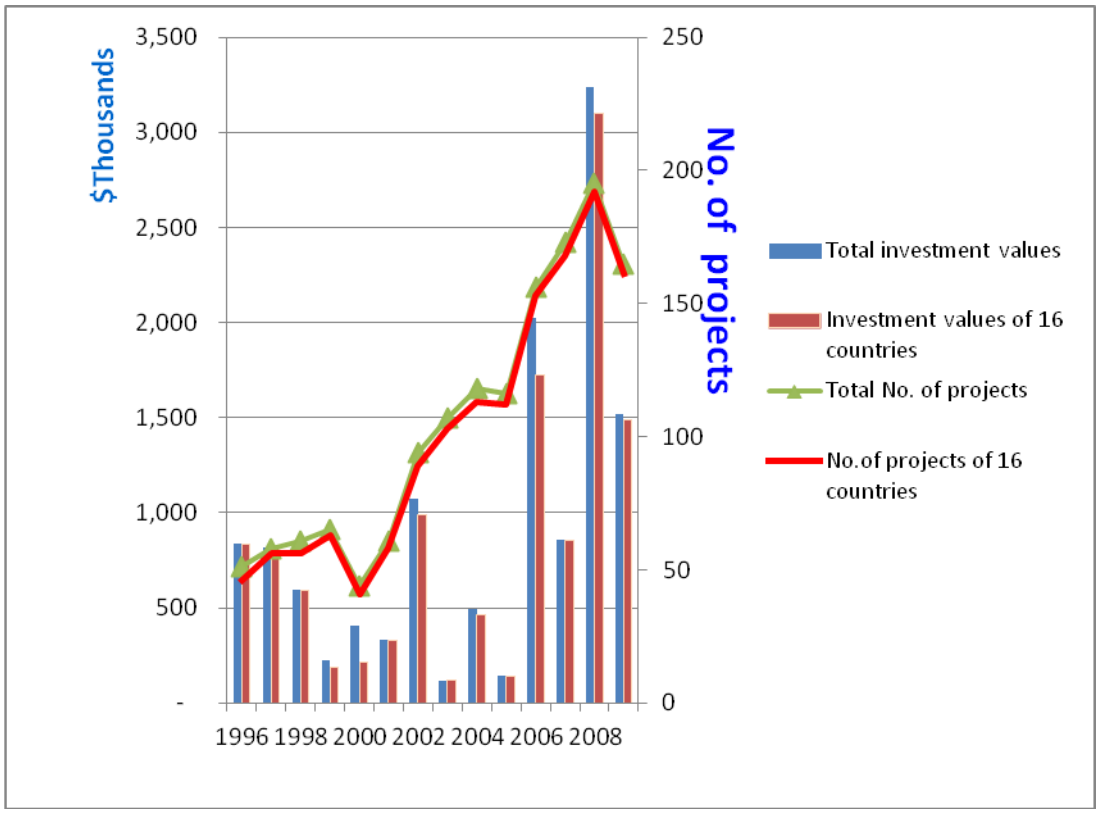
Foreign Investment in July 1994, which was again substantially revised in October 2004 and in March 2009 respectively. Generally, policy regimes of FDI have become more liberal and the industries open to foreign investment have been enlarged over the past two decades. However, in order to create an economy more attractive to foreign investors and to enlarge gains to the national economy, much remains to be done (ADB, 2006).

As a result of the NEM, Laos has now become an FDI destination for two decades. According to the MPI statistics, the majority of inward FDI was from neighboring Asian countries, especially Thailand, China and Vietnam, which accounted for about 62 percent of the total investment. FDI plays an increasingly important role in the economic development of Laos. FDI inflows are a way of boosting economic growth and supporting the transition process of both economic reforms and business liberalization measures. The economic growth averaged six percent per annum during the period 1988-2010, except during the short term fall caused by the Asian financial crisis that occurred in 1997. Economic growth has decreased official poverty rates from 46 percent in 1992 to 26 percent in 2010. The growth is mainly from the high influx of foreign investment in natural resource sectors as Laos is richly-endowed with natural resources such as minerals, water resources and forestry products. For example, FDI has increased rapidly since 2002 as foreign mining companies started to enlarge production due to an increase in the price of minerals during this period. Moreover, the hydroelectricity sector is dominated by foreign investment and accounted for more than 40 percent of total investment in 2004. The estimation of actual inward FDI in 2007 was approximately US$ 950 million, which increased by 60 percent from 2006 and around 90 percent of foreign investment is related to the resource sector. However, in order to sustain its growth it is important for the country to strike a balance between the resource and non-resource sectors (World Bank, 2008).

Since 2001, Laos has received 1,173 FDI projects accounting for roughly $ 7.1 billion from 36 investing partners. Thai and Vietnamese investors are among the biggest foreign investors in Laos. From 2000-2006, the amount of Thai investment was around $1.27 billion,

equivalent to 26.5 percent of the total investment. Over the same period investment inflow from Vietnam was valued at $746 million, accounting for 15.6 percent of total investment inflows. During 2007-2008, Vietnam was the largest investor in Laos with investment values accounting for nearly $1 billion on 32 projects. However, currently, China has become a major investor with investment amounting to $1.1 billion over the period 2001-2007 and their investment has been mainly in mining, electricity generation, rubber plantations, telecommunications and tourism. Moreover, FDI inflow from Korea is expected to rise after the signing of a formal agreement to strengthen cooperation in mining, electricity and renewable energy in May 2009 (UNCTAD, 2010). Laos recorded the highest investment value in FDI inflow in year 2008 as a result of the bounce back of copper prices in the world markets, which led to sharp increases of FDI inflows into Laos. However, in 2009, the value of FDI inflow decreased and many large projects were postponed due to the recession of the global economies.

Figure 1: FDI inflows into Laos (1996-2009)



Source: Investment Promotion Department, MPI

Table 1: FDI by 16 Investing Countries, 1996- 2009

No.	Countries	Projects	Value of Investment
1	Thailand	296	4,162,015,128
2	Vietnam	196	2,149,187,540
3	China	322	2,074,032,177
4	Australia	45	763,415,316
5	France	99	722,832,873
6	Malaysia	55	535,566,219
7	USA	51	489,940,414
8	Korea	159	462,097,975
9	India	9	355,457,600
10	Japan	55	318,057,655
11	Norway	6	242,265,000
12	Germany	11	178,294,667
13	Singapore	41	78,330,258
14	UK	35	47,185,333
15	Canada	17	18,954,583
16	Sweden	6	11,655,430
Total		**1,403**	**12,609,288,168**

Note: Approved Value (US$)

Source: Investment Promotion Department, MPI

Table 2: Total FDI by Sector, 1996- 2009

No.	Sectors	Projects	Value of Investment
1	Electricity	33	5,370,101,000
2	Mining	153	2,304,821,998
3	Services	264	1,310,642,705
4	Agriculture	240	1,288,686,502
5	Industry & Handicraft	288	844,702,680
6	Telecom	9	488,103,681
7	Hotel & Restaurant	101	356,339,740
8	Construction	42	259,730,787
9	Wood Industry	53	171,371,667
10	Banking	18	143,830,000
11	Trading	138	93,987,592
12	Garment	45	30,830,128
13	Consultancies	78	20,091,143
Total		**1,463**	**12,683,239,624**

Note: Approved Value (US$)

Source: Investment Promotion Department, MPI

Laos has abundant natural resources including land, water, forests, and a variety of minerals such as gold, copper, iron and coal. Laos has rich water resources with a high potential for hydropower plants. Figure 1 presents the approved FDI inflows in Laos from 1996-2009. It is clear that inward FDI in Laos fluctuated because most of the proposed investment had been in the hydropower energy sector since 1991. In terms of the capital approved, inward FDI in Laos dramatically declined about 70 percent in year 1998 and 1999 as a result of the Asian financial crisis and continued to be fairly stagnant until 2001, before moderately increasing again the in 2002. The energy sector ranks first followed by mining, service and agriculture respectively. The mining sector started booming from 2000. During the 2000s, FDI inflow in Laos still rose and fell due to the considerable investment in the hydropower and mining sectors; when no hydropower or miming projects were approved the total FDI inflow in Laos tended to be much less (Freeman, 2001).

In terms of sectoral distribution of influx FDI in Laos, the largest recipient of foreign investment is the electricity sector due to the vast hydropower potential, which accounts for 47 percent of total approved FDI. The mining sector has become the country's fastest growing and most profitable sector since 2004, contributing 20 percent to the GDP of the country and with an export share of 54 percent to total export (UNCTAD, 2010). In the 1990s, other major recipients of inward FDI consisted of the manufacturing sector including food processing, wood processing, textiles and garments and handicrafts; telecommunications and transport, banking, hotels and tourism. Especially, the garment industry received fairly considerable foreign investment during the first half of the 1990s because the EU granted the GSP (generalized system of preferences) trade privileges for Lao garment imports in 1993, but the agreement on GSP privileges ended in 2001 (Freeman, 2001). However, FDI flows in the 2000s turned out to be more diversified than during the 1990s. Particularly, the minerals sector, for example, gold and copper; the agricultural sector, for example, rubber plantations; and the industry and handicraft sector became more attractive to FDI inflows. Among the top three foreign investors, Thailand was the leading source of investment in the energy sector;

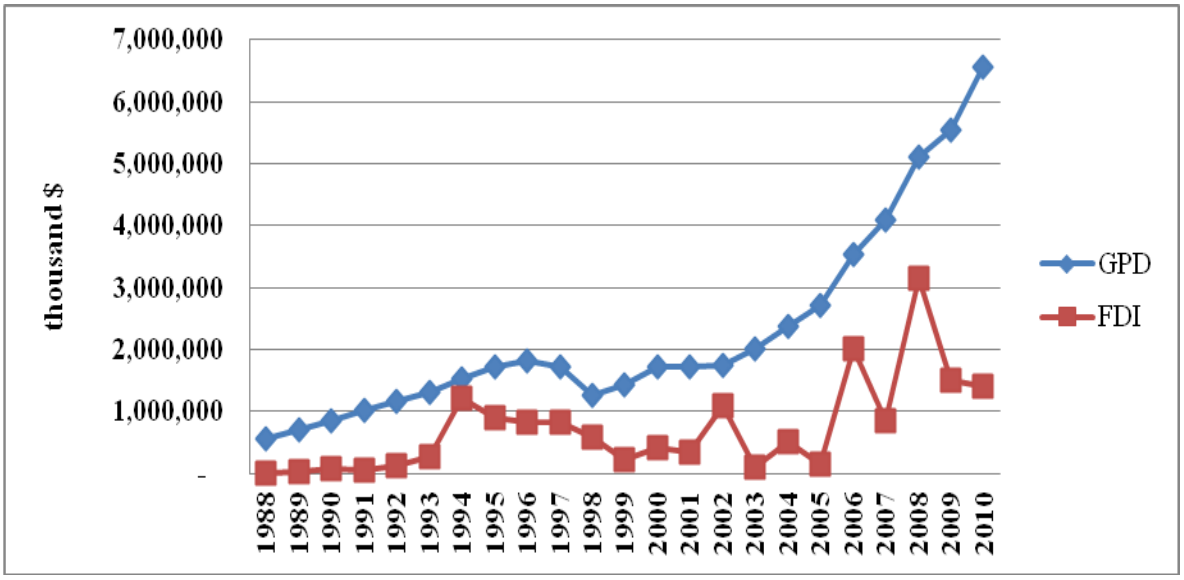
investors from Vietnam were primarily interested in the agriculture sector; and Chinese investors mainly invested in the mining sector (Suruga and Onphanhdala, 2010).

More than 90 percent of total manufactured exports consist of clothing exports produced by foreign owned factories. Although there is no employment figures related to foreign investment companies, a tentative approximation according to the investment approvals suggests that foreign investment companies have hired approximately 60,000 workers (ADB, 2006). Moreover, the World Bank (2008) estimates that the manufacturing industry grew at 15 percent driven by garment, construction materials, and food and beverage production. Interestingly, an increase in the services sector was relatively fast at an average of 7.4 percent during 2000 to 2008. The contribution of these industries to annual GDP growth averaged roughly 3.6 percent from 2003 to 2008 and is expected to increase significantly over the medium term. For example, the main contributors to the growth of the services sector were from hydropower, retail and wholesale trade, financial intermediation, transportation and communications, while other sub-sectors stayed at the same levels throughout the last two decades.

Although there has been some diversification in the services industry in recent years, FDI inflow into Laos has traditionally been concentrated in the natural resource industries. Table 2 indicates the sectoral composition of FDI in Laos during the period 1988-2010. Noticeably, the tertiary sector is the most favorable sector compared to others. The annual FDI inflow over the period of analysis in the tertiary sectors was on average of 63 percent, while the influx of FDI in the primary and secondary sectors on average were 25 and 12 percent respectively. Laos has bilateral investment treaties including investment protection with 27 countries and double taxation treaties with 13 countries. Laos also has promulgated Intellectual Property Rights (IPRs) in order to comply with international requirements, especially those compulsory under the agreement on Trade Related Intellectual Property Rights (TRIPS) of the WTO. Such related trade policy and simplified investment procedures will improve the business environment. The Lao government also has committed to improve

the country's profile among investors in order to attract more foreign investors. The World Bank has stated that Laos will reach the goal of graduating from the list of least developed countries by the year 2020.

Finger 2: FDI Inflows and GDP of Laos (1988-2010)



Source: Ministry of Planning and Investment and ADB.

Table 3: FDI and GDP by Sectors from 1988-2010 (Million $US)

Sectors	FDI inflows	GDP
Electricity	7,529	1,444
Mining	2,883	2,646
Services	2,176	3,208
Agriculture	1,449	21,039
Manufacturing	1,369	5,643
Telecom	548	2,629
Construction	372	2,178
Banking	204	1,157
Trading	159	8,014
Total	**16,689**	**47,958**

Source: Ministry of Planning and Investment.

2.2 Firm Performance in Laos

At firm level, the number of enterprises in manufacturing and services has grown rapidly. Based on the economic census of 2006, the private sector is dominated by micro, small and medium size enterprises, while there are only a few large firms in the economy. There are approximately 127,000 firms doing business and employing 346,000 workers in Laos, of which 92 percent employ fewer than five workers, four percent hire between five and nine employees, two percent employ from 10 to 99 workers and another two percent employ over 99. About 23 percent of the enterprises are located in Vientiane, the capital city, 32 percent in the central part, 30 percent in the north and 16 percent in the south. Moreover, 40 percent of the firms have trade registration certificates and 71 percent have tax registration certificates. The major source of employment is in the trade sector, including retail and wholesale, accounting for around 64 percent of total employment in all sectors. Enterprises in Laos are relatively small in terms of sales and employment (NSC, 2007).

According to the World Bank statistics, productivity of Lao workers is low compared to neighboring countries and under the levels proposed by its income per capita. Labour productivity in Laos is relatively lower than Vietnam and Cambodia and far behind the leading countries in the region, for example, China, Malaysia and Thailand. Foreign owned firms in Laos on average are more productive than local firms. Foreign firms, firms with international certification and firms employing technologies such as the internet are more productive than firms without access and no certification. There is no evidence that exporting firms and firms with bank credit have higher productivity than non-exporting firms and the firms without bank credit (World Bank, 2009).

Although the FDI amount has increased over the past decades, the share of FDI in non resources industries in Laos has continuously dropped from roughly 59 percent in 2000 to around 17 percent in 2010 due to rapid development of the resource sector. The average growth of FDI in the non-resource sector is 38.5 percent from 2004 to 2008 (Brahmbhatt and Vostroknutova, 2010). The manufacturing industry, including food and beverages,

construction materials, textiles, wood products and furniture, had performed well and enjoyed 10 percent growth during the 1990s but the rate has decreased slowly since 2000. The contribution of the manufacturing industry to GDP moderately grew from 7.6 percent in 1995 to 9.9 percent between 2003 and 2008 and is expected to increase around 10.6 by 2015 (World Bank, 2011).

The garment sector is one of the major export sectors and the largest manufacturing employer in Laos, generating over 20,000 jobs, accounting for around one percent of total labour force. The majority of the productions are exported to the international markets with around 75 percent to the EU due to the tariff advantages and duty-free entrance to the EU market under the terms of the "Everything But Arms" agreement. Exports to the US market have increased since the establishment of Normal Trade Relations (NTR) in 2005. However, it is very hard to compete in the US market because of the small size of garment firms and their inability to meet demand from the larger orders. Value added per worker for all firms on average is US$ 1,554, whereas the average for the garment sector is US$ 1,009. The garment industry is a key component of the recent strategy of Lao Government on trade integration and export diversification (World Bank, 2012).

The main products of the construction material sector includes steel bars and cement manufacture. The steel industry produces approximately 24,000 tons and contributes to GDP around US$ 27 million yearly. The cement industry manufactures roughly 830,000 metric tons and contributes about US$ 70 million to GDP per year (UNDP, 2010). Both cement and steel bar are protected in the form of tariff and non-tariff measures such as quantitative restrictions on import and price control. The cement and steel industries will face more competitive pressure from imported products, particularly those from the neighboring countries because some of the protected measures will be phased out as part of commitments under AFTA or WTO accession (World Bank, 2011).

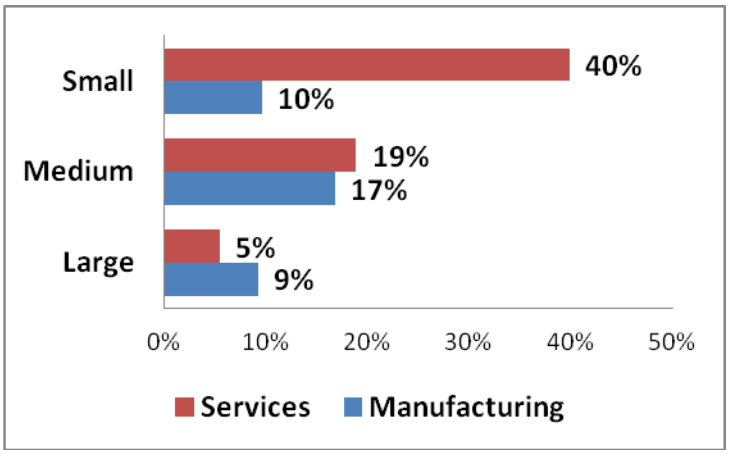
The wood processing industry is one of the key manufacturing sectors in Laos, but it is still in the early stage of development. The value added of the wood products is low; the small

and medium wood products firms are inefficient due to low capacity utilization and non-transparent allocations of logging quotas. There are over 100 sawmills and 2 plywood mills with a full operating capacity (log input) of around 1.2 million cubic meter per year in the primary wood industries. There are over 1,000 family owned and micro furniture manufacturers serving local markets. This sector generates around 22,000 jobs and accounts for roughly 15 percent of total exports. The main exported products are timber, in the form of sawn logs, semi-processed and many types of primary wood processing products, whereas additional small amounts are further processed into strip parquet flooring, furniture and a variety of other secondary wood processing products. Based on statistics, the exports of the wood products account for around US$ 200 million yearly, of which less than US$ 5 million are products of secondary wood processing. Since 2000, this figure has not changed (World Bank, 2011).

From 2000 to 2008, the services industry increased relatively rapidly on an average of 7.4 percent but the contribution from these industries to GDP growth has stagnated with an average 3.6 percentage points from 2003 to 2008 and is expected to decrease in the long term. The key sectors contributing to the services sectors are financial intermediation, wholesale and retail trade, communications, transportation, and storage, while other subsectors remain at the same levels over the last two decades (World Bank, 2011).

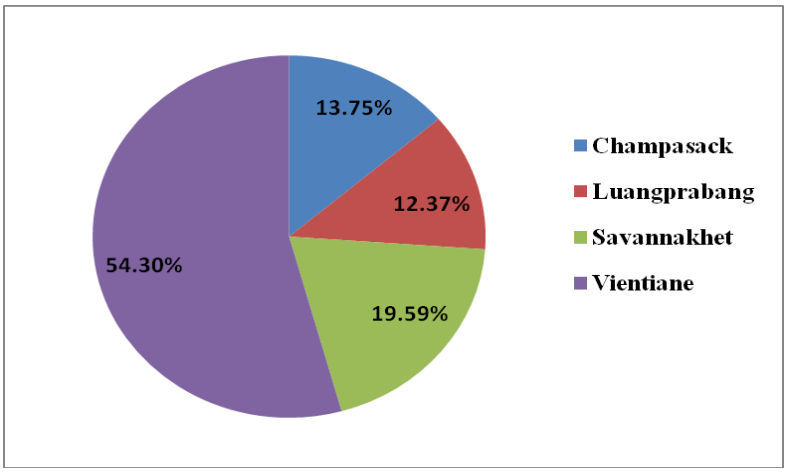
Laos has become a top ecotourism destination in the region due to its unique culture and nature. There were around 87,000 tourists visiting Laos in 1992 and the number of visitors increased to 2 million in 2009. Between 1992 and 2009, there was a steady increase of 20 percent growth rate in the number of visitor arrivals to Laos. Therefore, the income from the tourism sector also rose from US$ 2 million in 1991 to approximately US$ 268 million in 2009. Laos still has enormous potential to develop its tourism industry and enlarge the market segment compared to the number of international arrivals in the region (World Bank, 2009).

Figure 3: Distribution of Firms in the Survey by Size and Industry



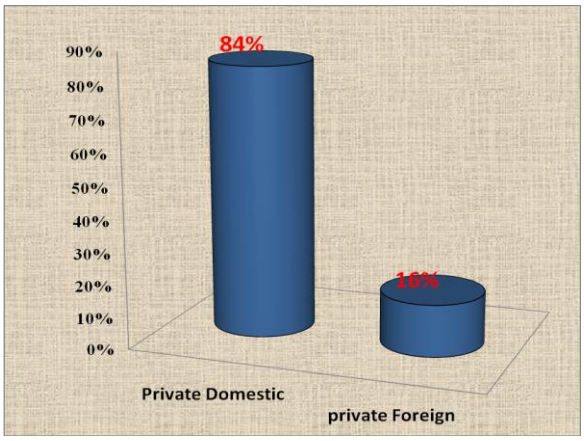
Source: Investment Climate Survey (ICS) conducted by the World Bank in 2009.

Figure 4: Distribution of Firms in the Survey by Region



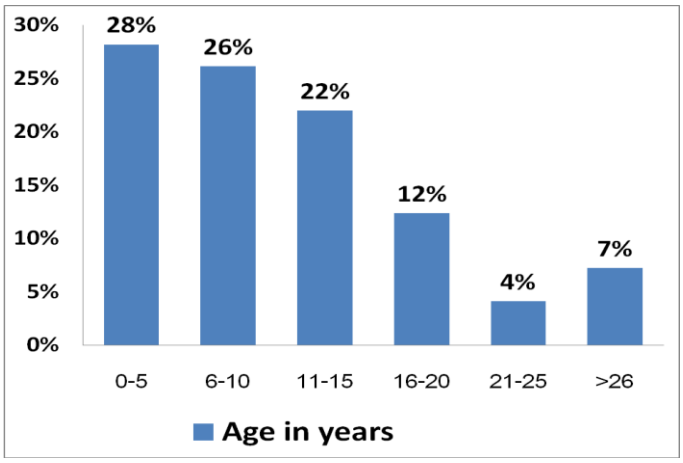
Source: Investment Climate Survey (ICS) conducted by the World Bank in 2009.

Figure 5: Firm's Ownership Structure



Source: Investment Climate Survey (ICS) conducted by the World Bank in 2009.

Figure 6: Distribution of Firms by Age



Source: Investment Climate Survey (ICS) conducted by the World Bank in 2009.

Chapter 3

Review of the Literature

3.1 Literature on the Determinants of FDI Inflows

What specific determinants of a host country attract FDI? Understanding the motives of foreign investors in undertaking investment projects is crucial to answer the question along with the particular characteristic of each firm and determinants governing their decisions. The motivations, characteristics and determinants of FDI inflows can be analyzed by different theoretical frameworks, and numerous theories have been developed to investigate the existence and the growth of the international operations of multinational corporations via FDI. Such theories include international product life-cycle theory by Vernon (1966), substitute theory of FDI for trade by Mundell (1968), industrial organization theory by Hymer (1976), complement theory of FDI for trade by Kojima (1973 & 1985), OLI or eclectic theory of the new investment development (Dunning, 1981), vertical and horizontal investment theory of FDI by Markusen (2000) and so on. These theories attempt to analyze the determinants of inward FDI under different assumptions and frameworks. Dunning (1981) introduces the OLI theory or the Eclectic paradigm, which is a comprehensive framework explaining FDI behavior by integrating the advantages of ownership, location and internalization. It is one of the first rigorous and integrative efforts to identify the determinants that drive firms from a specific source country to invest in foreign countries and had become widely applied.

According to the Eclectic Theory, Dunning (1981, 1988 and 1998) states that production abroad can be explained with reference to ownership, internalization and location advantages. Thus, a firm will engage in FDI subject to the following three conditions: (1) it possesses ownership advantages that mostly comprise the possession of intangible assets specific to the firm. Moreover, such firm-specific advantages must be greater than the offsetting disadvantages that they may face in competition with local firms; (2) there is a location advantage in a foreign country rather than at home and it should be able to utilize its

advantages in conjunction with some factor endowments of the host country and (3) there must be an advantage to internalize FDI activities rather than using the market, for example by selling abroad or by licensing or by contracting to foreign firms. Tahir and Larimo (2004) suggest that the Eclectic Theory is the best framework to examine the effect of location characteristics on the choice of FDI even though the diversities of determinants have been criticized in this approach as tautological.

Itaki (1991) critically argues with the Eclectic Theory on the grounds that the ownership advantage comprises the firm's internal economies of integration, market power, minimized transaction costs and internalized external economies. Therefore, he states that the Eclectic Theory confuses the ownership advantage in engineering terms and ownership advantage is influenced by and inseparable from location factors. He also suggests that the theory should distinguish between real terms and nominal terms. However, Agarwal and Ramaswami (1992) examine the effect of interrelationships among ownership, location and internalization advantages of the firm on its alternative modes of entry, namely exporting, licensing, joint venture, and sole venture in foreign markets. They found that direct investment is a preferable mode for firms to establish a market presence in foreign countries as the effect of those interrelationships. However, the abilities of the firms are limited by their size and multinational experience. So investment modes will be applied only in high potential markets.

Based on the Eclectic paradigm, FDI flows are also classified into three types. First, market-seeking FDI refers to FDI that aims to serve local and regional markets. Second, resource-seeking FDI is the FDI that tries to obtain resources which are not available in the home country. Such resources consist of natural resources, raw materials, or low-cost inputs such as a labour force. Particularly in the manufacturing sector, factor cost is taken into account when multinationals directly invest in order to export. Third, efficiency-seeking FDI is the type of FDI that takes place when foreign investment can benefit from the common governance of geographically dispersed activities, especially in the presence of economies of

scale and scope (UNCTAD, 2006 and Dunning and Lundan, 2008). However, different factors have an influence on the motivations of these categories of FDI. For instance, Loree and Guisinger (1995) state that market-seeking versus export-oriented FDI will be influenced to different degrees by the host country market. Market-oriented FDI may be more concerned with the market size than export-oriented FDI because the former produces for the host country market while the later produces for the foreign market. Additionally, efficiency-seeking and resource-seeking FDI may be encouraged by low-cost developing countries and resource availability respectively while asset-creating FDI is more likely to go to rich developed economies.

Multinational enterprises take into account several different factors while making the decision to set up subsidiaries in foreign countries. A large number of such determinants have been tested in empirical studies (Lui et al., 1997; Wei and Liu, 2001; Zhao, 2003; Pan, 2003). This paper focuses on the following factors determining FDI: market size, resources availability, labour productivity, international trade, inflation rate, exchange rates, borrowing costs, geographical distance, communication infrastructure, regional integration, economic freedom and the Asian financial crisis. These variables have been widely applied and tested in empirical studies for both the developed and developing countries (Jun and Sing, 1996; Liu et al., 1997; Wei and Liu, 2001; Asiedu, 2002; Zhao, 2003; Tahir and Larimo, 2004; Gao, 2005; Quazi, 2007 and Karimi et al., 2010). Hypothesis formulations are described in the following section.

3.1.1. Natural Resources

Dunning (1983) stresses that the most important form of FDI is resource-seeking, which a resource-seeking firm has a motive to invest in the host country in order to exploit natural resources. Therefore, resource endowments are the most important location determinants for resource seeking and export-oriented FDI inflows, which seek to utilize particular and specific resources at a lower real cost such as natural resources, land and labour forces availability. Shiells (2003) suggests that this abundance of oil and gas are important in

attracting FDI inflows. As proposed by the Eclectic paradigm, all else being equal, countries that are endowed with natural resources will receive more FDI. Therefore, this paper employs the share of minerals and fuels in total exports to capture the availability of natural resource endowments. This measure of natural resources has been employed in several studies, including Sachs and Warner (1995), Asiedu and Esfahani (2001) and Aseidu (2002).

Hypothesis 1: *The higher the mineral and fuels exports of Laos are relative to the home country, the more FDI will flow into Laos.*

3.1.2 Market Size

Market size is typically measured by GDP. Different forms of FDI will be influenced to different degrees by the host market. Market-seeking FDI is more related to the market size than export oriented FDI (Bajo-Rubio and Sosvilla-Rivero, 1994 and Loree and Guisinger, 1995). Similarly, the market size hypothesis states that inward FDI is a function of the market size of the host countries. A larger market size has better prospects for market growth. Thus, countries with attractive market opportunities allow MNEs to utilize their ownership advantages and to gain from economies of scale (Wei and Liu, 2001). There are two main reasons for the impact of market size on the locational decisions of MNCs. First, the volume of expected sales has a significant influence on foreign investment decisions. Second, market size can be concerned with economic and strategic motivations behind FDI that occurs primarily in highly concentrated industries. The market size of the host countries is assumed to capture demand and scale effects. For example, there must be adequate domestic demand for final goods in the host country (Davidson, 1980).

Such assumption is supported by various studies, For example, several empirical studies found a positive relationship between FDI and market size of the host country, which supports the hypothesis arguing that inward FDI is positively related to the host country's market size. Among others, Wei and Liu (2001), Bevan and Estrin (2004), and Ho (2004) find a positive relationship between inward FDI and the recipient country's GDP, suggesting that a larger market size can increasingly attract FDI inflows. Since market size can be used as a

proxy for aggregate demand, the size of the home country's market may be negatively related to the amount of FDI in the host country (Wei and Liu, 2001). For instance, the empirical study done by Pitelis (1996), which applies an econometric estimation for testing for relationships between aggregate demand and outward investment, found that effective domestic demand insufficiencies are a driver to outward investment by the home country.

According to this brief summary of the literature in the previous paragraphs, a comparison can be made between the relative change in the market size of the investing partner and the recipient country (Wei and Liu, 2001). If the host country GDP grows faster than the home country's GDP, the host country is expected to be relatively more attractive than the home country and the home country firm is more likely to invest in the host country. However, if the market size of the host country is very small, the MNCs are likely to make more profit through lower marginal costs of production in that country and then export their products to other markets (Markusen, 1998).

Hypothesis 2: *An increasing ratio of GDP of Laos relative to the home country's GDP, results in more FDI flowing into Laos.*

3.1.3 Labour Cost

Lower wage rates or labour costs make countries with plentiful skilled and/or unskilled labour forces more competitive and attractive, and are likely to encourage efficiency-seeking FDI inflows (Jun and Singh, 1996). Labour cost is a large component of the total costs for the firms that use labour intensively in their production process, thus producing overseas in the cheaper labour cost countries offers them significant cost advantage over potential competitors. Additionally, a cheaper cost of workers in the host country relative to the source country makes it more attractive to inward FDI (Dunning, 1998; Navaretti and Venables, 2004; Dunning and Lundan, 2008).

Several studies indicate that there is convincing evidence for the hypothesis that FDI inflows are negatively associated with higher labour costs in the recipient country (Baek and Okawa, 2001; Wei and Liu, 2001; Bevan and Estrin, 2004). For example, Wei and Liu (2001)

apply panel data analysis for the determinants of FDI flows in China and find that wage rates have a strongly negative effect on inward FDI, implying that a cheaper labour force is a determinant of FDI inflows in China. However, some researchers do not find strong support for a negative relationship between inward FDI and labour costs in the host economies (Jun and Singh, 1996; Wezel, 2003).

Biswas (2002) shows that cheap wages are not necessarily as vital for inward FDI as other factors including natural resources and a large market size are, which have a more important influence on FDI inflows. Similar to the previous studies, Merlevede and Schoors (2004) show that relative unit labour cost have the expected negative sign. However, it only becomes significant if labour costs are allowed to rise over time. In addition, according to the results from both survey results and regression estimations, Meyer (1995) argues that low labour costs either in Central and Eastern Europe are not a determinant to attract foreign investors. Similar results are reported by Veugelers (1991), where the coefficient of the labour cost is insignificant, implying that the labour costs are not a significant determinant for inward FDI.

Although theoretical studies propose that labour costs play an important role for multinational enterprises in location choices for FDI, the empirical results of many studies regarding the effect of wages rate on location choices are not clear (Dunning, 1998). There is no clear verification for the link between labour costs and location choice for FDI inflows. Based on this assumption, if the host country has lower labour costs compared to the home country's labour costs, more FDI inflows are likely into the host country. This paper will study the case of Laos by using labour productivity as a proxy for the real wage rate variable since there is insufficient data on labour costs/wage rate in the host and home countries. This choice of proxy is in line with previous studies, including the study by Ioannatos (2001) which shows that labour productivity directly impacts the recipient country's ability to attract FDI flows, based on the cost minimization assumption under perfect competition and Cobb-Douglas production conditions.

Hypothesis 3: *the lower the ratio of the real wage rate in Laos is to the home country's real wage rate, the higher the inward FDI is in Laos.*

3.1.4 Exchange Rate

The cost of production inputs during a firm's production process is commonly measured by the exchange rate between the host and source country. Many research studies have examined this process. One finding is that it is due to the impact of labour costs. Halicioglu (2001) shows that a home country's currency appreciation causes an increase in inward FDI to the host country since it is cheaper to employ a given amount of labour. In contrast, when the exchange rate of the host country appreciates, FDI is deterred. Aristotelous and Foundas (1996) point out that the real depreciation of the host country currency makes investment in the host country cheaper for foreign firms and raises the benefits of the foreign firms, leading to an increase in foreign purchases of domestic assets that enlarge FDI flows into the host country. In addition, a real depreciation of currency of the host country would lead to inward FDI as foreign firms may be interested in gaining benefits and taking advantage of lower local labour costs. Thus, the domestic real exchange rate increase or real currency deprecation leads to hiring more labour and should have a positive impact on inward FDI in the host country (Wei and Liu, 2001).

A second way in which exchange rates affect production cost are in the price of manufactured goods. Dewenter (1995) and Pan (2003) hypothesize that FDI is impacted by the exchange rate in two different ways. First, the home country currency's appreciation means that the price of its products is relatively higher, as a result of less competitive exports to the host country. Thus, firms of the home country are motivated to transfer the manufacturing to the host country which results in an increase in FDI inflows in the host country (Froot and Stein, 1991; Pan, 2003). Secondly, the appreciation of the home country's currency against the currency of the host country leads to a rise in investment value when the investment is denominated into the currency of the host country. In a similar line of argument, the influence of the exchange rate on FDI is often brought up as the "wealth effect". From the

perception of the investors of the home country, investment becomes less expensive in the host country, which in turn provides more profits for the foreign subsidiary. A higher return on investment as a result persuades even more FDI inflows into the host country. Furthermore, the wealth of a foreign firm that is denominated by the currency of the host country also rises due to the depreciation of the host country currency. The inputs of production become cheaper in the currency of the home country for foreign firms, which in turn offers them an incentive to buy more host country assets, as a result of an increase in inward FDI (Xing and Wan, 2006).

Several studies confirm that exchange rate has an influence on inward FDI. A similar result is reported by Kiyota and Urata (2004), who found that host country currency depreciation attracts FDI inflows into Japan by applying a panel data set over the period 1981 to 2002. The findings of Xing and Wan (2006) indicate that the competition among China and ASEAN 4 (Thailand, Malaysia, Indonesia and Philippines) for Japanese investment in Asian manufacturing has significantly been influenced by the relative real currency appreciation of those nations to the Japanese yen. Therefore, the depreciation of the Chinese renminbi, which occurred during the 1980s and the early 1990s, attracted more FDI inflows from Japan.

However, despite the positive conclusions discussed above, many studies find that the exchange rate has a negative impact on FDI inflows (Froot and Stein, 1991; Aristotelous and Foundas, 1996; Grosse and Trevino, 1996; and Baek and Okawa, 2001; Wei and Liu, 2001). Other studies do not find clear evidence of the linkage between inward FDI and the exchange rate in the long run (Halicioglu, 2001 and Pain and Welsum, 2003).

Hypothesis 4: *The higher the currency depreciation of Laos is relative to the home country's currency, the higher the level of FDI flows into Laos is.*

3.1.5 Interest Rate

The interest rate measures the cost of borrowing capital which is considered to be a determining factor affecting investment. If the host country has a higher cost of borrowing than the source country, then foreign firms will have a cost advantage and have greater ability

to compete with domestic firms in the host country, leading to higher inflows into the host country (Aliber, 1993). This hypothesis has been examined in a number of empirical studies. Based on the assumption that foreign investors will raise the desired funds in their home countries and make use of funds to finance their business activities in the recipient country, a lower borrowing cost (lower interest rate) in the home country of investors provides incentive to invest in the potential recipient countries via FDI. This may be correct in the case of the investment projects wholly owned by foreign investors; however, it is not necessarily the case in joint ventures where both foreign and domestic partners have to partially provide funds corresponding to related equity share (Wei and Liu, 2001). Thus, if other factors influencing inward FDI hold constant, the lower the interest rate in the source country is compared to the host country, the higher the FDI inflows into the host country. Many empirical results support the hypothesis that the interest rate has an impact on inward FDI (Barrel and Pain, 1997 and Farrell et al., 2000). However, some findings fail to support this assumption for inward FDI to East and Central European and Africa (Onyeiwu and Shrestha, 2004 and Bevan and Estrin, 2004).

Hypothesis 5: *The higher the difference between the lending interest rate of Laos and home countries is, the more the FDI inflows into Laos.*

3.1.6 Openness

Asiedu (2002) states that the share of trade to GDP is the most widely applied variable to calculate the degree of openness. Trade volumes are assumed to have a positive relationship with FDI. Thus, countries that wish to attract more FDI should increase trade volumes. The effect of openness on FDI can have a positive sign in the case of FDI being export-oriented and have a negative sign in the case of FDI being tariff jumping. Generally, firms have different entering modes into a foreign market including setting up production processes via FDI or extending markets by exporting. UNCTC (1991) and the United Nations (1993) illustrate that there are links between FDI and international trade, especially in the cases of market-seeking and resource-seeking FDI. Additionally, Markusen (1998) develops a

knowledge-capital model, which is based on the Eclectic paradigm. Markusen (2002) also proposes a substitution between trade and horizontal investment. In addition, firms may invest overseas when the international production costs are more than offset by savings coming from avoiding transportation costs, tariff duties and non-tariff impediments (Moore, 1993).

Neary (2009) shows that the influx of FDI is horizontal rather than vertical, with foreign investors seeking to duplicate production facilities in foreign nations in order to access the foreign markets easily rather than breaking down the process of production to benefit from cheaper costs of production. Moreover, the model forecasts that an increase in trade costs such as transport cost and tariff stimulates FDI compared with exports and vice versa. Thus, it is expected that firms are willing to serve their goods to the markets close to their production facilities in the host countries by exporting. This is because they want to escape the fixed costs of setting up production services. In contrast, in order to save the cost of transportation, firms should serve the far away markets by setting up production service units in those host nations. This argument is in accordance with the principle that trade cost and distance between the home and host countries are correlated positively. Based on this statement, it means that international trade and FDI are substitutes since a rise in transaction costs will encourage FDI, whereas a fall in such transaction costs will discourage FDI.

However, international trade and FDI are also complementary. The relationship between trade and FDI complementarities can be explained by the theory of product life cycle (Vernon, 1966). For example, Barrel and Pain (1997) state that the growing demand in high income nations is the initiative for firms to establish production abroad, while retaining the standardization of the product and lowering production costs in the recipient country relative to the original country of the new product. In a later stage, firms will set up their production processes in the low cost developing countries where a maturing product is produced, then exported back to the innovating country. These sorts of FDI are called export oriented. Similarly, firms producing tradable goods are also willing to invest overseas to improve market access and sales services by providing better after-sales services. Wei and Liu (2001)

show that FDI might relate to sales and will become stronger when there are requests for after sales services. When the exports reach a certain threshold level, firms producing tradable commodities might invest in consumer-oriented service facilities in the host country. Therefore, firms involved in vertical FDI are likely to utilize factor prices by moving production facilities to the places where they can produce components or semi-finished products cheaply.

The formal theoretical study of export-platform FDI that incorporates both horizontal and vertical FDI was done by Ekholm, Forslid and Markusen (2007). Their results indicate that vertical or export-platform production activities complement trade, while horizontal affiliate production processes substitute for trade. Vertical FDI happens between parent companies in high-cost countries and partners in low-cost developing countries, whereas horizontal FDI takes place between countries with similar levels of economic development. The empirical results on the linkage between FDI and trade are mixed. Among others, the study by Hejazi and Safarian (2001) and Marchant et al., (2002) support FDI-trade complementarity. In addition, Pantulu and Poon (2003) find that trade creation takes place in East Asian nations and in the advanced industrialized nations such as Germany, France and UK. However, an investigation by Pain and Wakelin (1998) show results supporting FDI-trade substitutability. Thus, in this paper the degree of openness is measured as a percentage of the sum of exports and imports to GDP.

Hypothesis 6: *The higher the external trade and bilateral trade between Laos and the home country are, the higher the FDI flows into Laos.*

3.1.7 Regional Integration

Regional integration is one of the factors affecting locational choice of MNCs. The economic integration with the rest of the world makes the internal trade costs decrease and influences the volume and pattern of FDI both into and within the integrated region. The consequence of an increase in market size as a result of the integration theoretically is more attractive for firms to invest in the area (Blomström and Kokko, 1997). Additionally,

countries that are integrating in regional integration are expected to gain more benefits and stimulate investment in the short run and also have a larger market size, more efficient resource allocation, stronger competition and numerous positive externalities in the long run. Eventually, this leads to an increase in the economic growth rate of the members countries. According to international theory, this means that inward FDI from outside the region seems to be attracted by regional integration since the combined market size is larger, making it more attractive for foreign investors (Lim, 2001). Bajo-Rubio and Sosvilla-Rivero (1994) claim that an economy of a nation integrating with other nations in the region has an influence on the prospective for foreign investors. Although the lowering of trade barriers might be expected to induce an increase in exports instead of FDI, foreign investors may also make use of the host country as an export platform in order to service other member countries' markets in the region.

In the literature, there are several theoretical approaches seeking to explain the linkage between an inward FDI and a single market. According to the standard Heckscher-Ohlin theorem, which forecasts that a rise in external barriers in the integrated region will lead to an increase in income of import-competing industries that are mostly capital intensive. Since the return on capital in the region is higher than in the investors' countries, FDI flows are also expected to go up. Similarly, the international production theory explains that growth in FDI inflows will occur because of the location advantages that make foreign investors replace their production activities for exports. Firms produce commodities for a larger market so they can enjoy economies of scale and gain more benefit from the dynamic effects to improve their ownership advantages (Blomström and Kokko, 1997).

Hypothesis 7: *The more Laos engages in regional and global economic integration, the higher the level of FDI in Laos will be.*

3.1.8 Communications Infrastructure

Good infrastructure increases the productivity of investment, thus stimulating inward FDI. One of the key indicators of infrastructure as a determinant of FDI inflows in all the

cited studies is communications infrastructure.[1] The number of mobile and fixed line telephone lines per 1,000 populations is an indicator of modern information and communication infrastructure. Development of the host country's communications networks is also crucial for investment as a good and advanced telecommunications system is expected to lower transaction costs and boost productivity of investments (Wei and Liu, 2001). Communication networks in developing countries have increased dramatically during the past 10 years. The finding of Lydon and Williams (2005) supports the hypothesis that a higher rate of communication infrastructure in developing countries is related to higher rates of FDI flows. This link is even stronger when problems of endogeneity are controlled for. In addition, Reynolds et al., (2003) investigated the effect of telephone lines on FDI flows and discovered that having more mainlines than would be expected for the size of the economy is associated with a higher level of FDI flows. For developing countries, including Laos, telecommunications operation have increased dramatically during the past 10 years; therefore, this paper attempts to investigate that impact.

Hypothesis 8: *The more Laos develops its telecommunication system relative to the home country, the more FDI flows into Laos.*

3.1.9 Geographic Distance

Geographic distance plays an important role in determining the locational choice of international production because one of the main motivations for firms to invest abroad is market accessibility (Wei and Liu, 2001). Additionally, distance is also a measure of transaction costs of undertaking investment activities in a foreign country, such as transportation cost, communications and informational costs and cultural and language differences (Bevan and Estrin, 2004). In addition, geographic distance has both direct and indirect effects on the investment climate between the host country and investing partners.

[1] Other measures of infrastructure quality are the frequency of power outages, paved roads, and rail lines. The data are published in World development Indicators, but are not available for most of the countries in this sample.

Distance can also act as an obstacle to dealings among economic institutions through unfamiliarity with local laws and regulations, whereas neighboring countries are more familiar with them (Brenton et al., 1999). The study by Portes and Rey (2005) proposes that distance plays an important role in determining transaction flows in foreign investment. For instance, distance is used as a measurement for information costs rather than transport costs as a determinant of inward FDI and equity flows. And the cost of gathering information is likely to rise with distance since familiarity with the host country's investment opportunities, customs and culture decrease the cost (Guerin, 2006).

Gopinath and Echeverria (2004) state that geographical distance may cause countries to change from exports to investing overseas to reduce the transportation and production cost. Therefore, nations with a huge domestic market or close to the larger markets are more attractive to foreign investors than smaller or more remote markets. However, any country with advances in internal transportation networks and short distances from markets can attract more investors although it is bounded by smaller markets. Moreover, investments in infrastructure can diminish gaps between the capital cities, financial centers and small towns in the countryside (IMF, 2004). Thus, distance is expected to have a negative impact on inward FDI as it is a proxy of all possible investment barriers, which obstruct foreign investment by distance, implying that rises in these investment costs have a negative impact on FDI inflows into the host country.

Hypothesis 9: *The shorter the geographic distance is between Laos and the home country, the more FDI inflows are expected.*

3.1.10 Economic Freedom

The quality of the investment climate in the host country has an impact on attracting or deterring FDI. It is difficult to create a precise indicator to measure the investment climate, which is determined by economic and non-economic factors in the host country. The Heritage Foundation and *The Wall Street Journal* jointly publish the annual index of economic

freedom,[2] which is a reliable proxy for the investment climate. Nations that benefit from higher levels of economic freedom have greater factors efficiency and higher rates of inward FDI. Gwartney et al., (1996) describe two indicators used as a proxy of economic freedom, one from the Fraser Institute and the second from the Heritage Foundation. Both quantify aspects including the degree of openness, government intervention, distortions in the economy and corruption. In practical terms, the indexes provide similar results and in this study the index from the Heritage Foundation is used. Bengoa and Sanchez-Robles (2003) examine the relation between economic freedom, FDI and growth for Latin America. They find that economic freedom in the host country has a positive impact on FDI inflows and conclude that those countries in which the institutional framework is sounder and less regulated are more attractive. Quazi (2007) affirms that economic freedom is a significant and robust determinant of FDI inflows in seven East Asian countries over the period 1995-2000.

Hypothesis 10: *The higher the degree of economic freedom in Laos is relative to the home country's economic freedom, the more attractive Laos will be for inward FDI.*

3.1.11 Other Variables

The Asian financial crisis in mid 1997 had an impact on structural changes of the Thai economy and many countries in the region. The Asian financial crisis of 1997-1999 may also have adversely affected FDI inflows in Laos since the major investment inflows came from ASEAN countries such as Thailand. To analyze the influences of the Asian financial crisis on FDI, dummy variables will be applied. The adverse impact of the Asian financial crisis can be

[2] The Heritage Foundation and *The Wall Street Journal* have published the Index since 1995. There are 10 categories of economic freedom across countries. The categories include business freedom, trade freedom, fiscal freedom, government size, monetary freedom, investment freedom, financial freedom, property rights, freedom from corruption and labour freedom. Each index is between 0 and 100 and a greater index number shows greater freedom of the business sector from government interference.

explained in accordance with the relative costs of investment in Laos and those in the country of origin of the FDI. Hsieh and Hong (2004) found that FDI inflows in the CLMV countries (Cambodia, Laos, Vietnam and Myanmar) were deterred during the Asian financial crisis period. The adverse effect of the Asian financial crisis on inward FDI in these countries indirectly affected by crisis-hit countries clearly demonstrates the significance of attracting appropriate FDI from well diversified sources and destined for diversified industries, to mitigate any possible damage from regional crises.

Inflation rate is a measure of overall economic stability. A high inflation rate is attributed to irresponsible monetary and fiscal policies, which raise the user cost of capital and negatively impact the firms' profitability in the recipient country (Mello, 1997; Onyeiwu and Shrestha, 2004; Asiedu, 2006; Busse and Hefeker, 2007). Foreign investors will choose to invest in a host country which has economic stability and a low degree of uncertainty. Therefore, the inflation rate is expected to have a negative relationship with inward FDI. Many empirical studies support the hypothesis and find that the inflation rate has a negative impact on FDI inflow (Kahai, 2004; Onyeiwu and Shrestha, 2004; Asiedu, 2006). Therefore, to encourage foreign investment, stability of the inflation rate is important.

Hypothesis 11: *The smaller the difference between Laos' and the home country's inflation rate is, the more Laos will be attractive to inward FDI.*

Resource endowments play an important role in determining resource seeking and export-oriented FDI inflows, which seek to utilize particular and specific resources at a lower real cost such as natural resources, land and labour forces availability. Resource-seeking FDI occurs in order to access the host country's cheap labour and raw materials. Yeaple (2003) states that factor endowment differences enhance FDI for industries that intensively use the factor so that the host country has a comparative advantage. The manufacturing industry is a labour intensive industry, thus this paper uses the share of manufacture in total exports as a proxy of availability of labour. In addition, as proposed by the Eclectic paradigm, all else being equal, countries that are endowed with natural resources will receive more FDI.

Therefore, the share of agriculture in total export is applied to measure the availability of natural resource endowments.

Hypothesis 12: *The higher the manufactured exports of Laos are relative to the home country is expected to attract more FDI from the home country.*

Hypothesis 13: *The more the agriculture exports of Laos are relative to the home country, the more inward FDI in Laos.*

3.2 Literature on the Relationship between Inward FDI and Economic Growth

In the middle of the 20th century, the question of the impact of FDI on different sectors of economic growth was raised and Hirschman (1958) was one of the first economists who attempted to investigate and answer the question whether inward FDI has the same impact on all sectors of the economy. He finds that foreign investment influx and technology in all industries do not react in the same way and he claims that for agriculture and mining there is no significant impact of FDI on their economic growth. There are several theories and models that have been applied to investigate the impact of FDI on economic growth. Generally, FDI is considered as a combined bundle of inward FDI capital, knowledge and technology transfers (Balasubramanyam et al., 1996). Modernization theories point out that inward FDI can promote economic growth under the principle that growth requires capital investment (Adams, 2009).

The new growth theories also stress the role of technology transfer through FDI as developing countries lack the necessary infrastructure including education, liberalized financial markets, socio-economic and political stability (Calvo and Sanchez-Robles, 2002). On the other hand, the dependency theories claim that reliance on foreign investment creates negative effects on income distribution and growth as FDI forms monopolies in industrial sectors leading to underutilization of domestic resources (Bornschier and Chase-Dunn, 1985). Thus, the multiplier effect is not strong and induces stagnant growth in developing countries (Adams, 2009).

As noted by De Mello (1997), the effect of FDI on growth is diverse; particularly Greenfield FDI possibly might complement local investment leading to an increase in production capability of the host country. Thus, FDI can promote growth through productivity gains as a consequence of spillovers to local firms. However, the growth rates of the less developed countries depend on the capacity of those countries to adopt and employ high technology used in developed countries in their own countries. Moreover, it might have spillover of managerial expertise and knowledge about the international market for local companies in host countries inducing enlarged growth by relaxing the constraints of human capital and strengthening the export sector competitiveness (Borensztein et al., 1998). Similarly, FDI flow also plays two main roles, contributing to capital accumulation and increasing total factor productivity (Nath, 2005).

According to these mixed theoretical observations, several empirical analyses regarding the linkage between FDI and economic growth have been conducted by many scholars including Borensztein et al., (1998), De Mello (1999), Zhang (2001), Campos and Kinoshita (2002), Makki and Somwaru (2004). Among others, Bulasubramanyam et al., (1996) analyze the causal link between FDI and growth in the context of differing trade policy regimes (i.e. export promotion and import substitution) by applying cross section data to examine 46 developing countries during the period 1970-1985. The result are in line with the hypothesis of Bhagwati that growth enhancing effects of FDI is stronger in countries where the workers are highly educated and in countries that adopt an export promotion policy.

De Mello (1999) affirms that there is a positive impact of FDI on economic growth in both developed and developing countries. He also finds that the spillover of knowledge and technology from the home countries to the host countries is the determinant of the long run growth in the host countries. The study by Zhang (2001) shows that in host countries, where the infrastructure is well developed and policies of FDI and trade are more liberal, inward FDI promotes economic growth. In addition, Bengoa et al., (2003) study the connection between

FDI and economic growth for 18 Latin American countries applying panel data from 1970 to 1999. The study finds that FDI does have an effect on growth in the host countries.

Additionally, using annual data for the ASEAN 5 from 1970-1996 to perform a cross-country study, Bende-Nabende (2001) finds evidence that FDI is positively linked to GDP growth in Malaysia, Indonesia and the Philippines, but has a negative effect in Thailand and Singapore. However, Kohpaiboon (2003) applies annual macroeconomic data of Thailand from 1970-1999 and includes export openness, then his result indicates that FDI has a positive effect on growth. Furthermore, Marwah and Tavakoli (2004) conduct a study for four countries (Indonesia, Malaysia, the Philippines, and Thailand) individually and the finding shows that for all four countries FDI is positively correlated with GDP growth. Choong et al., (2005) also support the hypothesis and conclude that FDI has a strongly positive impact on growth for Malaysia. However, Chowdhury and Mavrotas (2006) and Damooei and Tavakoli (2006) find contradictory results for these South East Asian nations.

Choe (2003) applies a panel VAR model to examine the relationship between FDI and economic growth in 80 countries from 1971 to 1995. The finding indicates that there is evidence of a bidirectional link between FDI and economic growth but the effects running from growth to FDI are stronger rather than the opposite, which is in line with the study by Agosin and Mayer (2000). Khawar (2005) also concludes that FDI has a strongly positive impact on growth across host countries. Blonigen and Wang (2004) find the same results for developing countries. In addition, Li and Liu (2005) examine the endogenous link between FDI and economic growth for 84 countries over the period 1970-1999 by using single equation and simultaneous equation system methods. The result shows that FDI has a positive effect on growth via its relationship with human capital in developing countries, but has a negative impact on economic growth through its relationship with the technology gap.

Vu et al., (2007) investigate industry-specific FDI flows over the period 1985-2002 for China and during the period 1990-2002 for Vietnam by applying an augmented production function measurement and regression methodology. The results show that FDI positively and

directly impacts economic growth and its impacts on labour productivity also affect growth indirectly. In industry specific FDI analysis, they find that the impact varies across sectors and the manufacturing sector appears to have gained more than other sectors. Moreover, the study of the impact of FDI on growth applying sectoral data from 22 OECD countries from 1990 to 2001 for 19 sectors is examined by Alfaro and Charlton (2007). They find that aggregated FDI has an ambiguous effect on growth. FDI in the primary sector has a negative effect on growth, while investment in the manufacturing sector has a positive one. Evidence from the services sector is ambiguous.

Noticeably, in recent studies, the empirical results from the surveys of the cross-country evidence mostly support the hypothesis and theoretical expectations that FDI promotes growth (Lim, 2001; Lipsey, 2002; OECD, 2002). However, some studies have found an insignificant impact of FDI on growth including Akinlo (2004) and Aynwale (2007). Chakraborty and Basu (2002) report that inward FDI does not promote GDP growth in India and the causality is likely running from GDP growth to FDI with trade liberalization weakly attracting the FDI flows. Similarly, Carkovic and Levine (2005) argue that the positive relationship between FDI flow and GDP growth is biased due to the estimation method used. Therefore, they employ the Arellano Bond GMM technique for a large cross-country data set over the period 1960-1995 and find that FDI neither impacts domestic growth directly nor through its effect on human capital.

Moreover, there is evidence that FDI has a significant negative impact on economic growth in the host country (Fry, 1995, Agosin and Mayer, 2000, Hermes and Lensink, 2003 and Sylwester, 2005). The finding obtained from Khaliq and Noy (2007), who examine the influence of inward FDI on the economic growth in Indonesia applying annual data for 12 industries over the period 1997-2006, indicates that FDI has a positive impact on growth at the aggregated level. However, while looking at each sector in particular, very few sectors are positively correlated with growth and FDI in the mining and quarrying sector even turn out to have a negative impact on growth. Furthermore, the study done by Aykut and Sayek (2007)

conclude that an influence of FDI on the primary and manufacturing sectors is analogous, but interestingly FDI in the services sector has a negative effect on growth. The results studied by Vu and Noy (2008) show evidence of a negative linkage between FDI and growth in the primary sector and there is a positive influence in the manufacturing sector and the impact on the services sector is ambiguous, which is in line with the study by Alfaro (2003).

Blonigen and Wang (2005) argue that combining rich and poor countries in empirical FDI analysis is improper because the factors affecting inward FDI seem to be different across them. In addition, they find that only developing countries gain benefits from FDI inflows but not for developed countries, where there is a crowding out effect of FDI on local firms in the higher income countries. Additionally, the direction of a causal link between FDI and economic growth is still debated (Carkovic and Levine, 2005). Chowdhury and Mavrotas (2006) confirm that the causal link between FDI and growth is distinguished by a considerable degree of heterogeneity, which is in line with the previous studies of Nair-Reichert and Weinhold (2001). Therefore, as far as the direction of causality is concerned, there is a need for host country-specific analysis.

Among the authors who examine the industrial differences of the foreign investments' influence, many of them such as Alfaro (2003), Basu et al., (2003) estimate the effect of FDI on economic growth using sectoral data for cross countries. More detailed studies concentrating on the effect of differential sectoral FDI on growth in specific countries include Chakraborty and Basu (2002), Ayanwale (2007), Chakraborty and Nunnenkamp (2008). The findings obtained in the early studies are diverse regarding the influence on the performance by sectors in different countries. Since one of the top priority goals of the Lao government is to attract foreign capital, the sectors to be prioritized need to be selected and then it is necessary to estimate. Importantly, the impact of sectoral FDI on economic growth has not been investigated. Therefore, the available data allows us to analyze the influence of FDI on growth, and this study can also fill the gap and provide some recommendations to policy makers.

Based on the World Investment Report (UNCTAD, 2001), theoretically, the influence of FDI on each sector of the economy varies because it depends on where the sector is directed, and each sector also has its own characteristics. That FDI is positively correlated with economic growth is situated in growth theory, which stresses that FDI plays an important role in improving technology, effectiveness and productivity leading to the promotion of growth (Lim, 2001). Moreover, the potential contribution of FDI to growth depends strictly on the host countries' conditions, which are necessary to facilitate the spillover effects. Although the finding for the relationship between FDI and economic growth is a controversial issue, there seems to be some consensus that FDI is the main determinant of growth. Two main hypotheses on the impact of FDI on economic growth have been identified: the modernization hypothesis and the dependency hypothesis.

The hypothesis of the modernization theory proposes that FDI stimulates economic growth by supplying external capital and spreading the benefits all over the economy leading to the promotion of growth. Recently, for developing countries, FDI seems to be the "engine of growth". On the other hand, the dependency theory argues that there is a harmful effect of FDI inflow on growth in the long run. In the short run, an increase in FDI inflow enables higher investment and consumption activities that lead to economic growth directly and indirectly. However, as foreign capital accumulates and investment projects are established, there will be adverse effects on the rest of the economy leading to reduction of economic growth. This is because of the intervening mechanisms of dependency, especially "decapitalization" and "disarticulation" (O'Hearn, 1990).

The primary sector basically means production of raw materials and foods including agriculture, mining, forestry and fishing. Investment in this sector requires a large amount of capital and effort since the production process in this sector is difficult to divide into parts and takes time. Unlike the primary sector, the secondary or manufacturing sector operates by transforming raw materials into semi-finished and finished products. Moreover, activities associated with the manufacturing sector have a stronger effect and more contribution to

growth as its inputs come from other sectors. Thus, the influence of FDI in the secondary sector generally has a positive impact on growth (UNCTAD, 2001).

The tertiary sector is principally the services industry such as banking, trading, transportation, telecommunications, construction, electricity and other services. The efficiency of the services industry can be increased by foreign investors through bringing new technologies, knowledge and creating services in general more equivalent to the world standards by lowering cost and improving quality. On the other hand, the services industry is usually more capital intensive compared to other sectors and there is the possibility that local firms will be crowded out by foreign firms. Therefore, in order to obtain a positive effect of FDI in the services industry, there is a need for effective and appropriate legislation and regulatory systems. Moreover, the initial conditions in the services industry of the host country also play an important role (UNCTAD, 2001).

The hypotheses for this analysis are based on the assumption that the causal link between FDI and GDP growth can run either direction. On the one hand, based on the "FDI-led growth hypothesis", inward FDI can have an influence on GDP by raising capital stock, job creation and transfer knowledge and technology (De Mello, 1997; Borensztein, 1998 and De Gregorio, 2003). Therefore, this paper hypothesizes that FDI inflows stimulate growth in Laos. On the other hand, rapid economic growth in the host country providing new investment opportunities can also attract a higher amount of FDI inflows according to the "market size hypothesis" (Mah, 2010). Thus, the hypothesis of this analysis is GDP growth has an influence on FDI inflows into Laos. Moreover, some of the previous studies confirm FDI has positive effects on economic growth, but FDI can also has negative impacts on output growth since it crowds out local investment, boosts external dependence and vulnerability (Aitken and Harrison, 1999; Lipsey, 2002). Hence, it is also probable that the causal link between FDI and GDP growth does not occur in Laos, which is in line with the "neutrality hypothesis".

3.3 Literature on the Efficiency Performance of Firms

Spillover effects from FDI can take place through several channels: labour movement, imitation, competition, exports, and backward and forward linkages with local businesses. However, there are three main channels of intra-industry spillover identified in the theoretical literature. The first channel is demonstration impacts, which happen when the presence of foreign firms in local markets causes local firms to imitate directly the new knowledge or improve their own innovations, thus increasing their productivity and efficiency (Das, 1987). The second one is competition, when the entrance of foreign firms' competition in the markets forces local business to make use of their resources in a more efficient way (Wang and Blomstrom, 1992). The last one is labour mobility, which occurs when the labour forces trained by MNCs move to local firms or set up their own companies (Glass and Saggi, 2002).

FDI spillover effects offer direct and indirect advantages for recipient countries. The direct benefits are employment and capital, while externality resulting from foreign presence is indirect benefits (Hymer, 1960). It is argued that the indirect benefits from the presence of the MNCs as FDI may create a non-market impact on local firms and then may experience rising productivity or efficiency (productivity or efficiency spillovers), increasing ability to gain profits (pecuniary spillovers), and obtaining knowledge to access international markets (market-access spillovers) (Blomstrom and Kokko, 1998; Lipsey and Sjoholm, 2005).

The productivity spillover hypotheses of FDI are examined by many researchers in the literature. The study on Australia conducted by Caves (1974) was the pioneering empirical study in this area following by the study on Canada by Globerman (1979), and on Mexico by Blomstrom and Persson (1983). Then the empirical literature has been developed in several directions and examined in many specific countries and across countries. However, the link between FDI spillovers and firms' technical efficiency still remains a controversial topic.

The results of studies on cross-sectional intra-industry show that FDI generates positive spillovers (Dimelis and Lauri, 2002). The studies using panel data firm level find ambiguous results, especially in the evidence from developing countries. A number of panel

data analyses show that there is existence of positive FDI spillovers (Kugler, 2006; Liang, 2007). However, the studies done by Haddad and Harrison (1993) and Kathuria (2000) show that there is no FDI spillovers effect and some studies even find negative FDI spillovers (Djankov and Hoekman, 2000).

Although FDI spillover in recipient countries has been investigated in several empirical studies over the past few decades, the findings are fairly mixed so far. Some empirical studies illustrate positive productivity spillovers from FDI such as the study by Caves, (1974), Javorcik (2004), Gorg and Strobl (2005), Schiff and Wang (2008), but others find negative and no spillovers for example: Haddad and Harrison (1993), Aitken and Harrison (1999), Djankov and Hoekman (2000). The mixed evidence intuitively implies that there is no universal relationship between FDI and domestic firms' productivity. Some studies argue that the mixed findings may be attributed to domestic firms' characteristics or host countries' ability to absorb productivity spillovers (Gorg and Greenaway, 2004 and Smeets, 2008). However, differences in findings depend significantly on research design, methodological approach, types of data used, estimation strategy, and even on the construction of the spillover variable.

In the FDI spillover literature, a key assumption is that foreign-owned firms have higher technology, which spills over through many channels to the domestic firms; thus it is assumed that foreign-owned firms are more productive than firms without foreign partners. The empirical studies generally assume that productivity gains from foreign investment are absolutely obtained from technology transfer since it is reliable with the use of conventional approaches to production function. Smeets (2008) claims that the productivity spillover effects from FDI should be defined broadly because it happens not only from new technology but also from new knowledge. Moreover, he also describes knowledge as consisting of technology, production and managerial skills that may contribute to technical efficiency and the ability to utilize scale efficiency.

Technical efficiency of the firms is a key characteristic of production functions, which assesses whether the existing resources are being utilized efficiently in the post FDI regime. A number of empirical studies have been conducted in order to investigate the presence of spillover effects. The results from FDI spillover studies differ across countries and industries within countries. Hence, a specific disaggregated sector study may illustrate the uniqueness of the sector in response to the presence of the foreign firms. In this study, manufacturing and services sectors are used to test for the following hypothesis: there is a positive spillover effects from FDI to technical efficiency in the manufacturing and services sectors in Laos.

Chapter 4

Empirical Models, Data Description and Methodologies

4.1 Empirical Models, Data Description and Methodologies: Determinants of FDI Inflows

4.1.1 Empirical Models

The hypotheses mentioned above points to an empirical model of the determinants of foreign direct investment as the following relationship:

FDI = *f* (Mineral, Manuf, Agri, GDP, Labour, DInflation, Exchange, DInterest, Openness, Tel, Distance, Ecofreedom, ASEAN, Crisis) (1)

Where:

FDI : Real annual approved FDI inflows into Laos, computed as approved FDI in current million US dollars divided by Lao's GDP deflator (2000 is a base year).

Mineral : Relative real mining and fuels export, defined as the ratio of the share of mining and fuels in total exports of Laos to the home countries.

Manuf : Relative real manufactures export, defined as the ratio of the share of manufactures in total exports of Laos to the home countries.

Agri : Relative real agricultures export, defined as the ratio of the share of agriculture in total exports of Laos to the home countries.

GDP: Relative real GDP, defined as the ratio of GDP of Laos to the real GDP of home countries, measured in Purchasing Power Parity. Real GDP is derived from GDP in current US$ deflated by GDP deflator in base year 2000.

Labour : Ratio of labour productivity (measured by real GDP divided by labour force) in Laos to the home country.

DInflation : Difference between the inflation rate of Laos and the home countries. Inflation rate is the rate of change in GDP deflator.

Exchange : Relative real exchange rate, defined as the ratio of the real Kip/ US$ exchange rate to the currency of home countries/ US$ exchange rate. Real exchange rate is computed as official nominal exchange rate divided by the CPI deflator.

DInterest: Difference between the real interest rate of Laos and the home country's real interest rate. Inflation rate is used to convert the nominal values into real terms.

Openness : Ratio of Laos' total trade to GDP, (the sum of exports plus imports to GDP), to the home country.

Tel: Ratio of the mobile and fixed line telephone subscribers per 100 people of Laos to the home country.

Distance: Geographic distance between Laos and the home country, measured in kilometers between the capital city of Laos (Vientiane) and the capital city of the home country.

Ecofreedom : Ratio of annual economic freedom rating for Laos to Home country's annual economic freedom rating. The rating is scaled from 0 to 100, where 100 represents the maximum freedom.

ASEAN : Dummy variable, equal to 1 for the years 1997 when Laos became a members of the ASEAN to 2009 and 0 for other years.

CRISIS: Dummy variable, equal to 1 for 1997, 1998 and 1999, the years of the Asian financial crisis, and 0 for the other years.

The relationship between the dependent and independent variables is the model choice in equation (2), which is in line with the previous theoretical and empirical literature on the determinants of FDI flows (see i.e. Wei and Liu, 2001; Pan 2003; Zhao 2003; Bevan and Estrin, 2004 and Gao, 2005). The model to be tested is the following:

$$FDI_{it} = \beta_1 Mineral_{it} + \beta_2 Manuf_{it} + \beta_3 Agri_{it} + \beta_4 GDP_{it} + \beta_5 Labour_{it} + \beta_6 DInflation_{it} + \beta_7 Exchange_{it} + \beta_8 DInterest_{it} + \beta_9 Openness_{it} + \beta_{10} Tel_{it} + \beta_{11} Distance_{it} + \beta_{12} Ecofreedom_{it} + \beta_{13} ASEAN_{it\ 1997\text{-}2009} + \beta_{14} Crisis_{it1997\text{-}99} + \varepsilon_{it} \quad (2)$$

Where subscript i denotes home countries (i = 1, 2, …. , 16), and t is time period (t = 1996, 1997,……, 2009). βs are the parameters to be estimated and ε represents a composite term including both intercept and the error term ($\beta_{0i} + u_{it}$). As the impacts of all independent variables in the model are expected to occur either simultaneously with FDI or with a lag of less than one year, hence no lag is considered.

4.1.2 Data Description

This paper uses detailed and unpublished data provided by MPI. According to the approved FDI projects, 39 home countries invested in Laos from 1996 to 2009. In some years, the data for some countries are equal to zero because there is no investment from those countries and some of the host countries account for only a few projects. Therefore, this analysis applies unbalanced panel data for approved FDI projects from 16 investing partners. Although only 16 countries out of the 39 investing partners are included in the analysis, they represent 93 percent of total approved FDI value over the period 1996-2009. The data for explanatory variables are from international institutions such as the IMF, WB, UNCOMTRADE, UNCTAD and the Heritage Foundation *and The Wall Street Journal*. The terminology of the variables and descriptions of the data as well as their sources are shown in Table 14 in the Appendix.

Similarly with the previous studies of the determinants of FDI in developed and developing countries, the variables in this paper are deflated to remove the influence of price changes, except the geographic distance, telecommunication, economic freedom and the set of dummy variables. All of the explanatory variables except geographic distance and the set of dummies are in difference and relative real terms and integrate "push" and "pull" factors in both host and home countries into the analysis. The reasons for using relative terms rather than absolute value in this analysis are based on the general assumption and belief that foreign investors are rational in assessing and selecting host countries for the site of FDI activities. When the investors in the home countries consider setting up production in a particular recipient country, they often compare the economic, political and other factors between home

and host countries. The home country factors also are taken into account as a frame of reference. Therefore, foreign investors will run business in the host countries based on the differences between the home and host countries factors and the attractiveness of business environments in the host countries.

Laos has received FDI since the 1980s. However, this study focuses on the time during 1996-2009 as data on some independent variables become available officially after the 1990s. Because the data covers a short time period, it is not suitable to apply time series estimations. Simple cross-sectional analysis is also inappropriate since a large number of explanatory variables are included in this analysis. As both time series and cross-sectional estimations are not efficient estimation methods, as a result an unbalanced panel data set is applied in this paper.

4.1.3 Methodologies

Panel data have numerous advantages over the usual time series or cross-sectional data. The use of panel data is appropriate to analyze the determinants of FDI inflows into Laos. This is because panel data takes into account the diversity and the specificity of unobservable behavior of different investors. Additionally, it is more efficient with regard to random sampling and simplicity of identification, less multicollinearity, greater degree of freedom as well being better for aggregation since the aggregation might vary over time (Hsiao, 2003; Plasmans, 2006). In general, a panel data set can be estimated in any of three methods, depending on whether the individual cross-sectional effects are considered to be constant, fixed or random. The ordinary least squares (OLS) model, least squared dummy variable (LSDV) or fixed effects (FE) model and error components (EC) or random effects (RE) model. Both the RE and FE estimations accommodate unobservable heterogeneity, thus the unobservable individual country-specific effects are not very different when the assumption holds.

These three models have their own advantages and disadvantages. The use of the OLS model is simple to estimate. However, in most of the cases the assumption, in which the

unobservable individual-specific effects do not differ, is very strong and unlikely to hold. Fixed effects methods allow for unobservable country heterogeneity. However, applying FE estimations will eliminate the time-invariant variable and will make FE estimations less efficient than the RE model because of the loss of degree of freedom. Finally, The RE estimation takes into account the unobservable country heterogeneity effects and incorporates these effects into the error terms that are assumed to be uncorrelated with the explanatory variables, but violation of this assumption may cause the RE model to produce biased and inconsistent estimates. In order to choose the appropriate and efficient model for the panel data set in this analysis, the following tests are usually applied to identify the best statistical model (Plasmans, 2006). The F-test is used to carry out a test for the FE model against the pooled OLS, the Hausman Specification test is applied for testing the appropriateness of FE and RE models (Hausman, 1978) and the Lagrange Multiplier test (LM test) is used to test between RE and pooled OLS (Breusch and Pagan, 1980) and the process for restriction estimation and model selection is discussed in Judge et al (1985), Hsiao (1986), Baltagi (1995) and Greene (2000).

The F-test is applied for selecting between fixed effects and pooled OLS estimations. The pooled OLS is the restricted model and if H_0 is rejected leading to fixed effects are chosen. The F-test has following form:

$$F_{N-1,NT-N-K+1} = \frac{(R^2_{FE} - R^2_{pooled})(N-1)}{(1-R^2_{FE})/(NT-N-K+1)}$$

N is the number of FDI-investing countries, K is the number of explanatory variables. The null hypothesis will be rejected if the value of F is small, meaning that the FE model is preferable.

The Hausman specification estimation is a very general test and relatively easy to compute as it is included as a routine in some econometrics packages. The null hypothesis tells us more or less the same while the alternative is that only the fixed effect model is

consistent. If the null hypothesis is rejected, meaning cannot use the random effects model. The problem is that the Hausman test rejects the random effects model very often and does not work very well in small samples (Baum, 2006).

In this analysis, the regression equation (2) consists of both time variant and time invariant variables, so it is not suitable to apply the FE estimation since it will eliminate the time invariant variable such as geographic distance. Thus, this paper will consider an alternative statistical model between the OLS and RE estimations by the LM test. The OLS estimators are the best linear unbiased estimators (BLUE) and GLS estimators are inefficient if individual effects do not exist and vice versa.

Breusch and Pagan (1980) have derived the following Lagrange Multiplier test (LM) to identify the existence of heterogeneity with the null hypothesis $\sigma^2_\alpha = 0$. If the null hypothesis is rejected, random effects are present. The RE model assumes that the individual specific effect α_i is random, while the OLS model assumes that α_i is a constant. α_i is identically and independently distributed $\alpha_i \sim IID(0,\sigma^2_\alpha)$. u_{it} is assumed to be normally distributed with zero mean and constant variance $u_{it} \sim IID(0,\sigma^2)$. It indicates that, under the null hypothesis H_0: $\sigma^2_\alpha = 0$ against the alternative hypothesis H_1: $\sigma^2_\alpha > 0$, the LM test statistic is as follows:

$$LM = \frac{NT}{2(T-1)}\left[\frac{\sum_N\left(\sum_T \varepsilon_{it}\right)^2}{\sum_N\sum_T \varepsilon_{it}^2} - 1\right]^2 \sim \chi_1^2$$

Which is asymptotically χ^2 -distributed with one degree of freedom; ε_{it} denotes OLS residuals obtained under H_0. A large value for the LM test statistic will reject the null hypothesis in favor of the RE model.

In addition, multicollinearity, heteroskedasticity and autocorrelation estimations are needed in order to obtain stable and unbiased estimated slope parameters. Applying the variance inflation factor (VIF) to test for the multicollinearity. VIF is equal to $1/(1- R^2_i)$, where R^2_i is the coefficient of determination of a regression of explanator i on all the other explanators. When a VIF >10 indicates a multicollinearity problem (O'Brien, 2007)

Wooldridge (2002) derives a simple test for autocorrelation in panel-data models.[3] The null hypothesis is no serial correlation. Rejecting the null hypothesis indicates the presence of autocorrelation in the panel data set. The Wald test statistic is available for testing heteroskedasticity. The null hypothesis is homoskedasticity (or constant variance). Rejecting the null hyphothesis implying that there is heteroskedasticity. The Wald test statistic has a form as following:

$$W = \sum_{i=1}^{n} \frac{(\hat{\theta} - \theta_0)^2}{\mathrm{var}(\hat{\theta})}$$

Where W is χ^2 distributed with n degrees of freedom. Under the Wald statistical test, the maximum likelihood estimate $\hat{\theta}$ of the parameters of interest θ is compared with the proposed value θ_0, with the assumption that the difference between the two will be approximately normal. Typically the square of the difference is compared to a chi-squared distribution.

4.2 Empirical Models, Data Description and Methodologies: Causal Links between Industry-Specific FDI and Economic Growth

4.2.1 Empirical Models

The causal links between industry-specific FDI and economic growth in Laos over the period 1988-2010 is estimated by using Engel-Granger Vector Error Correction Model (VECM). This paper applies a panel cointegration framework that allows for heterogeneity across nine industries in the primary, secondary and tertiary sectors. This paper takes the lead from the work of Basu et al., (2003) and Chakraborty and Nannenkamp (2008) to identify the following two variables model.

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3 The Wooldridge (2002) test is widely used in the recent literature, see for example, Winner (2005) and Houston and Richardson (2006).

$$\ln GDP_{it} = \alpha_i + \delta_t + \beta_i \ln FDI_{it} + \varepsilon_{it} \quad (3)$$

Where α_i (1, 2,.....,9) refers to the industry specific effects, δ_t refers to the time effect and ε_{it} is the estimated residuals indicating deviations from the long run steady state relationship.

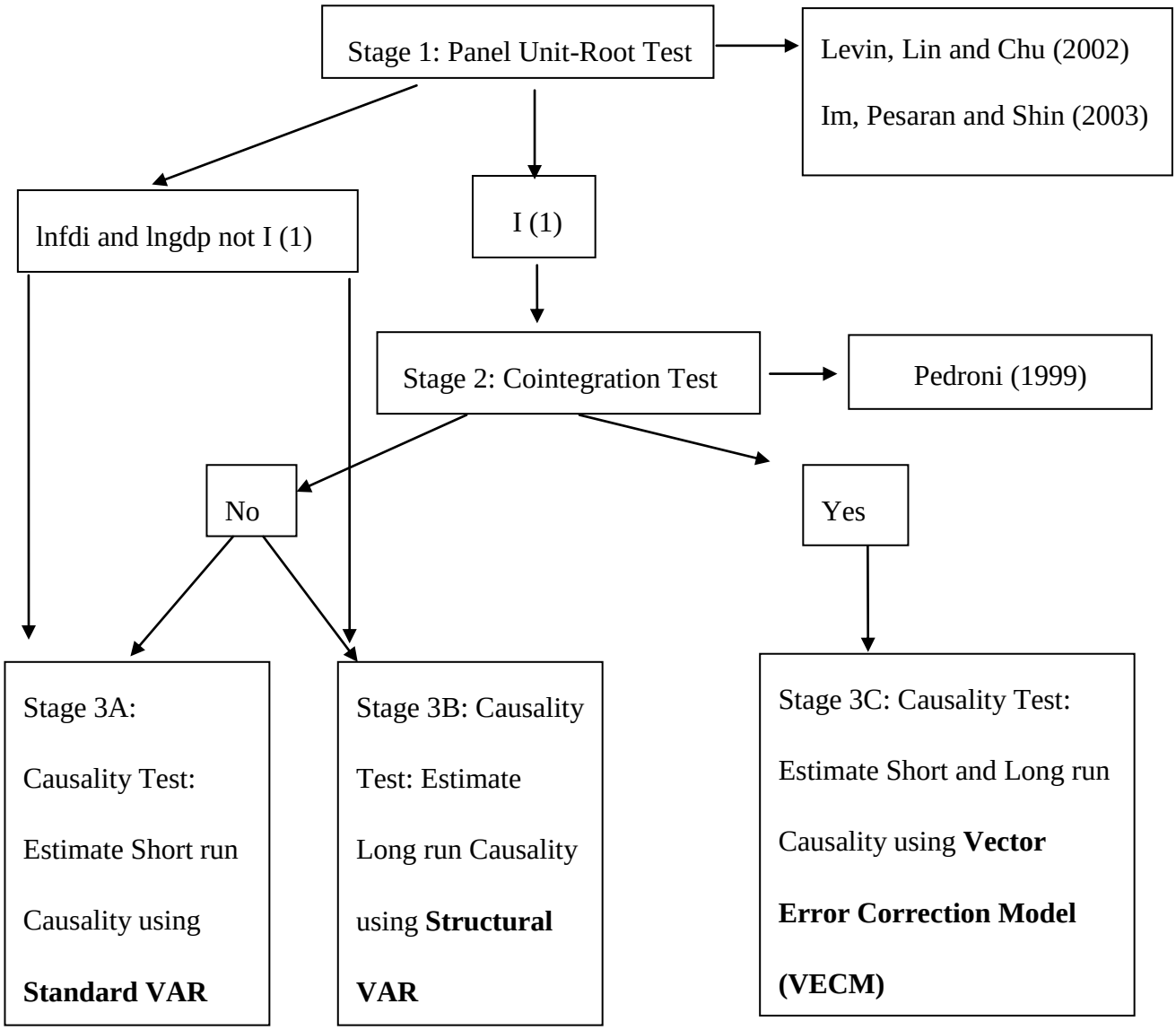
4.2.2 Data Description

To evaluate the relationship between inward FDI and economic growth, this paper uses detailed and unpublished FDI data provided by the Investment Promotion Department, Ministry of Planning and Investment (MPI). According to the approved FDI projects from 39 home countries, this analysis includes FDI inflows into 9 industries in the panel data sets over the period 1988-2010. GDP and GDP deflator data are collected from ADB. Real FDI and GDP data are computed in million US$ (GDP deflator 2000 is a base year). The broad sectoral breakdown of the nine sectors is given in Table 19 in the Appendix.

4.2.3 Methodologies

The econometric methodology in this study proceeds in three steps. Firstly, the unit root tests suggested by Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) are applied to verify the integration order of the individual series FDI and GDP. Secondly, panel cointegration test by Pedroni (1999) is employed to ensure that all variables are integrated of order I(1). Thirdly, after finding that two variables FDI and GDP are cointegrated, then this paper applies Granger causality using VECM to estimate the long run relationship.

Figure 7: Panel Causality Testing Framework



4.2.3.1. Panel Unit Root Tests

The time series properties of the data need to be verified before continuing to investigate the long run relationship. Thus, Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) panel unit root tests, which are commonly recognized as LLC and IPS panel unit root tests, are employed to check the stationarity of the variables. LLC and IPS tests are more relevant for panels of moderate size and the null hypothesis is H_0: $\rho_i = 0$ (varaibles are non-stationary) against H_1: $\rho_i < 0$ for i=1, 2....., N.

Recently, the unit root test for the panel data is commonly applied in the empirical literature due to its weak restrictions. This test captures the member-specific effects and allows for residual serial correlation and heterogeneity of the dynamics and error variances across groups. Thus, it provides a great degree of flexibility in terms of model selection. The alternatives for model choices are taken from the model with heterogeneous intercepts and heterogeneous trends to the model with no intercepts and no trends. Following the methodology employed in previous studies, both mean stationarity and trend stationarity in the two variables of FDI inflows and GDP are tested. Therefore, the models of interest of this paper include M1: model with heterogeneous intercepts and M2 model with heterogeneous intercepts and trends.

4.2.3.2. Panel Cointegration Test

The next step is to test for the existence of cointegration in the long run relationship between variables of interest, FDI inflows and GDP, by employing the panel cointegration technique based on Pedroni (1999), which is commonly applied in panel data analysis. The Pedroni suggests seven residual-based cointegration tests according to the null hypothesis of no cointegration. Pedroni cointegration test allows for heterogeneous variance across categories in the panel. Thus, following the work of Basu et al., (2003) and Chakraborty and Nannenkamp (2008), a panel cointegration technique based on Pedroni (1999) specifies the two variables model as follows:

$$\ln FDI_{it} = \beta_i + \Phi_t + \eta_i \ln GDP_{it} + e_{it} \qquad (4)$$

Equation (4) does not make any assumptions about the direction of causality between FDI and output. Where β_i (1, 2,....., 9) refers to the industry specific effects, Φ_t refers to the time effect and e_{it} is the estimated residuals indicating deviations from the long run steady state relationship. If e_{it} is found to be stationary, there is an existence of cointegration between FDI and GDP variables.

4.2.3.3. Causality Tests

As FDI and GDP are cointegrated, this paper estimates Granger causality using Vector Error Correction Model (VECM) to account for the short and long term relationship using the two step procedures introduced by Engle and Granger (1987) and demonstrated by Granger et al., (2000). Firstly, this study estimates the long run model from Equation (4) to obtain the estimated residuals, e_{it}. Secondly, this paper estimates the Granger causality model with dynamic error correction. The form of the dynamic error correction models is as follows:

$$\Delta \ln FDI_{it} = \alpha_{1i} + \lambda_{1i} e_{it-1} + \Sigma_k \varphi_{1ik} \Delta \ln FDI_{i,\, t-k} + \Sigma_k \varphi_{2ik} \Delta \ln GDP_{i,\, t-k} + u_{1it} \quad (5)$$

$$\Delta \ln GDP_{it} = \alpha_{2i} + \lambda_{2i} e_{it-1} + \Sigma_k \theta_{1ik} \Delta \ln GDP_{i,\, t-k} + \Sigma_k \theta_{2ik} \Delta \ln FDI_{i,\, t-k} + u_{2it} \quad (6)$$

Where λ_{1i} : long run effect of innovation in GDP on FDI

λ_{2i} : long run effect of innovation in FDI on GDP

φ_{2ik}: Short run Granger causality from GDP to FDI

θ_{2ik} : Short run Granger causality from FDI to GDP

K is the optimal lag length for individual sectors in the panel.

Based on Engle and Granger (1987), for the i^{th} sector in the panel, if the cointegration between variables GDP and FDI exists, there is a causal link between referred variables as subject to the null hypotheses. For the long run causality, null hypothesis H_0: $\lambda_{1i} = 0$ for all i, i=1,2……9 again H_1: $\lambda_{1i} \neq 0$ for at least 1i. Accepting the null hypothesis implies that GDP doesn't Granger cause FDI for any sectors in the panel for the long run. On the other hand, accepting null H_0: $\lambda_{2i} = 0$ for all i, i=1,2……9 means that for any sectors in the panel, FDI inflows do not Granger cause GDP in the long run. For the short run Granger causality, the interim effects and the adjustment process between variables GDP and FDI in reaction to a random shock are captured by the set of coefficients φ_{2ik} and θ_{2ik}. The null hypothesis H_0: $\varphi_{2ik}=0$ for all i and k, (i = 1, 2,….., 9, k = 1,2,….., k), means that in the short term GDP does not Granger cause FDI inflows for any sectors contained in the panel. Conversely, if we fail to

reject H_0: θ_{2ik} =0 for all i and k, (i = 1,2,…., 9, k = 1,2,….., k), it implies that in the short term FDI does not Granger cause output for any sectors in the panel. According to the conventional procedure, this paper employs a standard F-test to test the referred sets of the short and long run hypotheses.

4.3 Data Description and Stochastic Frontier Method: Firm Performance

4.3.1. Data Description

This paper uses firm level datasets from the Investment Climate Survey (ICS) conducted by the World Bank in 2009. This study applies data covering the manufacturing and services sectors of Lao firms in 2008. This paper estimates 291 firms across four major provinces namely: Vientiane (the capital city), Luangprabang, Champasack and Savannakhet provinces.

4.3.2 Stochastic Frontier Method

Technical efficiency can be estimated by either the deterministic or the stochastic production frontier. The stochastic frontier model consists of the effect of random shocks to the production frontier, while the entire shortfall of observed output from maximum possible output is attributed to technical inefficiency in the case of the deterministic frontier estimation (Ondrich and Ruggiero, 2001). Several techniques have been developed for estimating efficiency as the production frontier cannot be estimated directly. Del Hoyo et al., (2004) and Kortelainen (2008) define two main models to estimate production frontiers and efficiency namely non-parametric models, for instance Data Envelopment Analysis or DEA, developed by Farrell (1957) and Charnes et al., (1978) and parametric models such as Deterministic Frontier Analysis or DFA and Stochastic Frontier Analysis or SFA, developed by Aigner et al., (1977) and Meeusen and van den Broeck (1977).

When considering the alternative approaches to measure the efficiency and productivity at the firm level, for instance conventional production or cost functions, data envelopment analysis (DEA), stochastic frontier production or cost function, researchers must

consider their choices carefully because each of these approaches has its advantages and disadvantage and based on data availability (Coelli, Rao, O'Donnell, and Battese, 2005). The characteristic of the non-parametric approach, (also call DEA) is that there is no need to impose any assumptions about functional form and it does not take into account random error, thus extremely sensitive to outlying observations. Furthermore, there is no scope for statistical inference, thus it is impossible to construct confidence intervals and standard errors (Aigner and Chu, 1968 and Timmer, 1971).

The advantage of SFA over DEA is that error measurement can be estimated in SFA, which produces individual producers' efficiency estimations or efficiency scores, allows the possibility of making inference about the contribution of inputs and is less sensitive to the presence of outliers. Therefore, in this paper, the cross-sectional firms are estimated by the stochastic frontier method to determine the effect of FDI spillovers and other factors affecting the technical inefficiency for manufacturing and services sectors of Lao firms in 2008. Following Battese and Coelli (1995), the frontier production function is as following:

$$Y_{ij} = f(X_{ij}, \beta)\, e^{V_{ij}-u_{ij}} \qquad (7)$$

Where Y_i denotes value added and X_i is the vector of inputs for firm *i*, sector *j*. β is the vector of unknown parameters to be estimated.

The two-component error terms v_{ij}-u_{ij} makes stochastic frontier approaches in estimating a production frontier differ from the OLS. v_{ij} is a random error term having an independently identical distribution $N(0,\sigma_v^2)$ that is assumed to be independently distributed of u_{ij}. A one-sided error term u_{ij} is assumed to be non-negative and represents technical inefficiency effects. If u_{ij} =0, a firm is fully technically efficient. If u_{ij} >0, a firm is technically inefficient (Kumbhakar and Lovell, 2000).

u_i is assumed to be a function of explanatory variables in order to analyze the determinants of technical inefficiency (Coelli et al., 1998) as follows:

$$u_{ij} = \delta_0 + Z_{ij}\,\delta + \omega_{ij} \qquad (8)$$

where Z_{ij} is a vector of explanatory variables determining the technical inefficiency of production, δ is a vector of unknown coefficients to be estimated and ω_{ij} is defined by the truncation of the normal distribution $N(0,\sigma_v^2)$ such that the point of truncation is $-(\delta_0 + Z_{ij}\ \delta)$ (Battese and Coelli, 1995).

Cobb-Douglas and Translog production functions are the common functional forms that employed for SFA (Coelli et al., 2005). Use a generalized likelihood ratio test[4] to select the appropriate model specification between the Cobb-Douglas production function equation (9) and Translog specifications of production function equation (10). The results reported in Table 4 show that the Cobb-Douglas function is a preferable form.

$$\ln Y_{ij} = \beta_0 + \beta_1 \ln L_{ij} + \beta_2 \ln K_{ij} + v_{ij} - u_{ij} \quad (9)$$

$$\ln Y_{ij} = \beta_0 + \beta_1 \ln L_{ij} + \beta_2 \ln K_{ij} + \beta_3 \ln K_{ij} \ln L_{ij} + \beta_4 (\ln L_{ij})^2 + \beta_5 (\ln K_{ij})^2 + v_{ij} - u_{ij} \quad (10)$$

Where: i, and j are firms and sectors respectively.

Y: Value added deflated by CPI base year 2002 (million kip)

L: labour (number of employees)

K: fixed asset[5] deflated by CPI base year 2002 (million kip)

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[4] The likelihood ratio (LR) test is the different between the log-likelihood value obtained from the unrestricted and restricted models and multiply by 2 as following:

$LR = 2(L_u - L_r)$

The LR has approximately χ^2 distribution with the degree of freedom equal to the number of parameters, which assumed to be equal to 0 in the null hypothesis. The critical value of LR is dragged from table 1 of Kodde and Palm (1986).

[5] The total fixed asset (K) is used as a proxy for capital input, which is calculated from the value of fixed assets after depreciation.

Table 4: Generalized Likelihood Ratio Test for Functional Form

Null hypothesis	Production function is Cobb-Douglas ($\beta_3 = \beta_4 = \beta_5 = 0$)
$\chi^2_{0.99}$ - value	10.501
χ^2 - statistic	1.78
Decision	Accept H_0

Source: All critical values of the statistic test are at 1 % significant level, which is obtained from Table 1 of Kodde and Palm (1986).

Following the methodology of Coelli et al., (1998), the maximum likelihood method under the assumption of normal distribution for v_{ij} and the truncated normal distribution for u_{ij} is applied to estimate the coefficients of the frontier and inefficiency functions. Battese and Corra (1977) introduce the calculation of the parameter gamma γ, which has a value 0-1 and depends upon the two-variance parameters of the frontier function, to check on the appropriateness of the stochastic frontier approach as following:

$$\gamma = \sigma^2_u / \sigma^2 \qquad \text{where} \qquad \sigma^2 = \sigma^2_v + \sigma^2_u$$

σ^2_v is variance of noise and σ^2_u is the inefficiency effect. The deviations from the frontier function are attributed to noise if the value of γ is near 0, while a value close to unity implies that deviations are due to technical inefficiency in the production function (Battese and Corra, 1977; Coelli et al., 2005 and Tran et al., 2008).

In order to investigate the impacts of the possible factors on the technical efficiency of the firms, an inefficiency function are formed as follows:

$$u_{ij} = \delta_0 + \delta_1 \ln Age_{ij} + \delta_2 Location_{ij} + \delta_3 Size_{ij} + \delta_4 Foreign_{ij} + \delta_5 \ln Spill_j + \delta_6 \ln K/L + \omega_{ij} \qquad (11)$$

Where:

Size = 1 for small firms employing up to 19 workers and 0 for medium and large firms employing over 20 workers.

Location =1 for firms located in capital city Vientiane and 0 otherwise.

Foreign = 1 if firms has foreign investment and 0 otherwise.

Spill = Spillover variable measured by the share of foreign firm's output over total output in industry.

K/L= capital-labour ratio measured by capital (K) over number of workers (L)

This paper follows Coelli et al., (2005) and Tran et al., (2008) to conduct three null hypotheses test by using the generalized likelihood-ratio test as reported in Table 5 to verify whether stochastic frontier production function and technical inefficiency effects model estimation can be employed. The results reported in Table 5 show that the null hypothesis for no technical inefficiency effects is rejected at 1 % significant level meaning that there are technical inefficiency effects for Lao firms in 2008. In addition, the hypothesis of non stochastic inefficiency is also rejected at 1 % level of significance. It indicates that the estimated parameters can be identified in technical inefficiency effects model. The last hypothesis is also rejected implying that the efficiency effects in the model are not a linear.

Table 5: Statistic Tests for Stochastic Frontier and Technical Inefficiency Effects Models

(1) Null hypothesis	No technical inefficiency effects ($\delta_0 = \delta_1 = \ldots = \delta_6 = 0$)
$\chi^2_{0.99}$ - value	17.755
χ^2 - statistic	273.4
Decision	Reject H_0
(2) Null hypothesis	Non stochastic Inefficiency ($\gamma = 0$)
$\chi^2_{0.99}$ - value	5.41
χ^2 - statistic	36.36
Decision	Reject H_0
(3) Null hypothesis	No joint Inefficiency Variables ($\delta_1 = \ldots = \delta_6 = 0$)
$\chi^2_{0.99}$ - value	16.074
χ^2 - statistic	23.64
Decision	Reject H_0

Source: All critical values of the statistic test are at 1 % significant level, which is obtained from Table 1 of Kodde and Palm (1986).

Chapter 5

Empirical Results

5.1 Empirical Results of the Determinants of FDI Inflows in Laos

The three step estimations as mentioned in previous section are carried out to select an appropriate statistical model. Both the generalized least square (GLS) random effect (RE) model and OLS model were tested by the Breusch and Pagan LM test for random effects. In this test, either the GLS or OLS can be applied under the null hypothesis whereas only the GLS is applicable under the alternative hypothesis (i.e. the null hypothesis is rejected). By doing so, this paper fails to reject the null hypothesis, indicating that either the GLS or OLS can be a good estimator for our empirical model.

The Wald test statistic for groupwise heteroskedasticity indicates that the null hypothesis is strongly rejected at less than the 1% conventional significant level. It means that there is heteroskedasticity across the countries in all the regressions. The Wooldridge test or autocorrelation test shows that the first-order autocorrelation is present in the models due to the null hypothesis being rejected. Therefore, both heteroskedasticity and autocorrelation are taken into consideration when estimates the model.

As is evident from Table 16 in the Appendix, there is a large correlation between some explanatory variables such as between inflation rate and interest rate; interest rate and crisis; inflation and crisis; and telephone and economic freedom. Including highly correlated variables as independent regressors in the model might cause multicollinearity. To evaluate the severity of multicollinearity, the diagnostic of VIF was applied. Baum (2006) gives a rule of thumb for interpreting VIF values in that there is evidence of collinearity if mean VIF is greater than 10. The result from Table 17 in the Appendix expresses that the VIF statistic is $4.58 < 10$ (no VIF valued exceeding 10) for the approved FDI data sets, indicating no serious problems of multicollinearity (Gujarati, 1995; Neter, Wasserman and Kutner, 1985). Thus, this paper proceeds with the panel estimation.

The empirical models are estimated by using the generalized least square (GLS) random effect (RE) technique to achieve efficient results. The GLS estimator is a weighted average of between and within effects, which corrects for time-invariant, heteroskedasticity and autocorrelation problems. Table 4 presents the results of multiple regression analyses applied to the panel data set from the 16 investing partners over the periods 1996-2009. The descriptive statistics and panel data correlation test results are show in appendix. In this study two specifications of equation (2) are estimated. Specification (I) is estimated by OLS and specification (II) is regressed by GLS. Table 6 reports the estimation results estimated by OLS and GLS. Since the panel data model usually has composite errors which exhibit autocorrelation, the GLS estimator can provide more efficient results than the OLS estimator. As a result, the GLS is applied to estimate the model.

The results of specification (II) show that the coefficient of the minerals and fuels exports variable has the expected positive sign and is significant at less than the 1% level of significance. It means that the natural resource availability of Laos is an important determinant of inward FDI. The outcome also supports the hypothesis that countries with natural resources endowment receive more FDI as well as confirming the results of Aseidu (2002) for African case. In addition, the outcome indicates the presence of resource-seeking FDI, which is in line with previous empirical evidence by Sachs and Warner (1995) and Asiedu and Esfahani (2001).

The coefficient of manufacturing export has the expected positive sign and is statistically significant at less than the 5% significant level. The outcome provides some evidence that manufacturing export is positively associated with FDI flows into Laos. The result is in line with the resource-seeking hypothesis as well as confirming the stated hypothesis and previous findings by Harinder and Kwang (1995), which reveal that manufacturing exports are an important determinant of inward FDI. They also found that some countries including Thailand, Singapore, Ecuador, Portugal and Greece have a

significant feedback from manufacturing exports to FDI inflows. Therefore, the result supports the general notion that exports precede FDI inflows.

The result illustrates that the agriculture export variable turns out to have a positive sign, but is statistically insignificant in any conventional level of significance. It demonstrates that exporting agriculture products does not have an influence on the inflow of FDI into Laos. The result is similar to the study by Harinder and Kwang (1995). They conclude that the relationship between the agriculture export sector and inward FDI is statistically insignificant in both the high and low FDI countries. It means that agriculture export does not play an important role in attracting FDI inflow. However, a possible explanation is that exporting in the agriculture sector of Laos is improving but is not satisfactory compared to other sectors such as mining and manufacturing. Since the government introduced industrialization and modernization strategies as a result of the dramatic changes in the structure of exports, there has been a gradual decrease in primary exports share, especially crude materials. On the other hand, there is a rapid increasing value of exports of manufactures products.

The coefficients of relative GDP are negative and statistically insignificant at any conventional significance level. This outcome suggests that the market size of Laos does not impact FDI inflows and confirms the previous study by Loree and Guisinger (1995). As Laos has a small market, the MNCs are likely to make profit through lower marginal costs of products in Laos and then export their products to other markets. This result is consistent with the pervious finding (Markusen, 1998). Additionally, Lucas (1993) examines the FDI inflows in Southeast Asian countries and he finds some evidence of the virtual importance of outward-oriented policies. Particularly, FDI is relatively more elastic concerning demand for exports than regarding aggregate domestic demand. If outward-oriented economies are relatively successful in attracting more FDI, the size of the domestic market need not be a constraint. Even small host countries could pressure global corporate decisions by encouraging export-oriented policies.

Labour cost is also considered an important factor. Foreign investors generally aim to take advantage of cheaper labour (Andresosso-O'callagham and Wei, 2003). The coefficient on labour productivity has an expected negative sign and is significant at the 5% level of significance. It means that labour productivity affects FDI inflows into Laos, which confirms the hypothesis that foreign investors are cost sensitive and in line with the result of Wheeler and Mody (1992) and Shaukat and Wie (2005). This result also supports Bevan and Estrin's (2004) work that an increase in labour cost is associated with less FDI inflows. Foreign investors evaluate alternative production locations in Laos to ensure that the wage rate will be lower than in their countries. Therefore, foreign investors establish factories in Laos to benefit from the lower labour cost of production.

The inflation rate variable has a negative sign and is insignificant at any conventional significance level. A higher inflation rate may lead to a reduction in FDI in the host country, because investors will not risk profits expected from investment. As long as there is uncertainty, foreign investors will demand a high price to cover their exposure to inflation risks, hence will decrease the volume of investment. In order to encourage investment, the stability of the inflation rate is important. However, this study shows that the inflation rate in Laos does not affect FDI flows and in line with the analysis by Asiedu (2002).

The estimated coefficient of the exchange rate has a negative sign and is statistically insignificant at any level of significance. This may suggest that an appreciation in the exchange rate of the investing partners against the Lao Kip will increase investment in Laos. As the currency of investing partners appreciate, the cost of capital investment in Laos becomes cheaper as a result of an increase in investment. However, the result indicates that the exchange rate does not affect FDI inflows into Laos and confirms the previous result of Hsieh and Hong (2004). This finding is also in line with the study by Pan (2003) that exchange rate is not found to be a significant determinant for aggregate FDI inflow in China.

The sign of estimated coefficients of interest rate is negative and statistically insignificant at any level of significance. The result implies that the higher interest rate in

Laos is, the lower inward FDI in Laos will be. One possible explanation is that the dominant form of FDI in Laos is joint venture. Given the relative high borrowing cost in Laos, potential foreign partners can have a borrowing cost advantage if they borrow from the home country, but local partners may have trouble in raising funds. Thus, it would be difficult to form a joint venture. However, the cost of borrowing does not impact FDI inflow in this analysis. The finding of the current study is consistent with those of Liu et al., (1997) who found that interest rate variable does not contribute significantly to attracting inward FDI in China.

The coefficient for the openness variable comes out with the estimated positive sign and is strongly significant at less than the 1% level of significance. This implies that an increase in trade is associated with an increase in the inflows of FDI into Laos. This result suggests that FDI and trade are complementary rather than supplementary. The positive relationship between trade and FDI supports the hypothesis that high levels of trade have a positive effect on the inflows of FDI into Laos and also supports the previous research of Yamagata (2006) and Cuyvers et al., (2006, 2008). Additionally, Edwards (1990), Asiedu (2000) and Lydon and Williams (2005) also found that openness had a positive impact on FDI and suggest the countries more open to trade are likely to attract more FDI inflows.

The coefficient of telecommunications has a negative sign but is not significant at any levels of significance. It means that telecommunications has no significant impact on FDI inflows into Laos, which confirms the findings of Tsai (1994), Lorree and Guisinger (1995), Lipsey (1999) and Morrisset (2000). It can be explained by two facts. First, FDI flows to Laos tend to be natural resource based, mainly in extractive industries. For instance, in 2007, the actual FDI inflows were estimated at about $950 million and around 90 percent of FDI value is related to the resource industry, particularly mining alone accounted for approximately 64 percent of FDI (World Bank, 2008). Second, infrastructure development, especially the availability of telephones, is not very relevant for natural resources-based investments. Indeed, foreign firms in hydropower and mining sectors are often located in remote areas, which typically lack access to basic amenities such as electricity and water.

The result shows that the coefficient of geographic distance has a positive sign but is not significant at any significant levels. Geographic distance can be argued to be relatively insignificant for resource-based investment. For resource-seeking, MNEs are attracted to a limited number of geographical locations where the needed resource is available, diminishing the importance of distance for the investment decision. Consequently, a significant negative effect from distance would indicate market-seeking investment while an insignificant effect would provide support for resource-seeking FDI. The geographic distance is a proxy for transportation and information costs. However, as trade cost also increases with distance, MNCs may prefer to invest rather than trade. Therefore, the sign on the distance variable can be ambiguous (Guerin, 2006). However, this finding indicates that geographic distance has no important impacts on FDI inflows into Laos and this is consistent with the findings of (Liu et al., 1997).

The coefficient of economic freedom has a negative sign but is insignificant at any conventional significance level. This finding implies that economic freedom does not have a significant influence on FDI inflows into Laos. Since economic freedom is a broad concept that involves various forms. Thus, its impact on FDI is difficult to generalize. The literature on the link between economic freedom and FDI flows is very limited and undeveloped. It is plausible to believe that foreign firms, when making their investment decisions, will choose those locations in which the economic environment is favorable and enjoy a higher degree of economic freedom. Economic freedom has become a more important factor for determining FDI inflows (Loree and Guisinger, 1995; Addison and Heshmati, 2003). However, economic freedom does not play an important role in attracting inward FDI in the case of Laos.

Based on my estimation results, the ASEAN variable has a negative sign but is not statistically significant at any significant level. Therefore, being a membership of ASEAN does not significantly affect FDI flows into Laos. This finding is in line with the research of Hoang (2006). It means that even though not clearly supported by evidence, the joining in ASEAN also may not yet help increasing FDI invested in Laos. As a member of ASEAN,

Laos signed the Protocol for the Accession to AFTA, a regional trade arrangement among the ASEAN member states. Under the terms and conditions of its accession to AFTA, Laos is committed to reduce its tariff rates to 0-5% of several goods and remove non-tariff barriers by 2008. In addition, under the ASEAN Investment Area (AIA) initiative, Laos has to offer 'national treatment' and access to most business sectors to ASEAN investors by 2010, and 'national treatment' and access to most business sectors for all foreign investors by 2020 (Menon, 1999). So the benefit of lower tariff rates when investing in Laos did not have much effect on foreign investors in Laos over the period 1996-2009, then not yet attracting FDI inflows.

The dummy variable crisis turns out to have a negative sign and is statistically significant at the 10% level of significance. It means that during the end of 1997 and 1999, as is well known, the Asian financial crisis, which spread from Thailand to other countries in the region. The countries most strongly affected by the Asian crisis were Korea, Indonesia, Hong Kong, Singapore, Taiwan, Malaysia and Thailand. Investors from affected countries reduced or suspended their investment in Laos and the number of proposed projects was postponed due to the financial crisis. After the financial crisis originated in Thailand, the macroeconomic conditions of Laos deteriorated significantly (Okomjo-Iweala et al., 1999). Particularly, the local currency (Kip) went into a virtual free-fall over the period 1998-1999, falling from approximately 1$=1,000 kip in 1997 to 1$= 8,000 kip by mid-2000 and a triple digit inflation rate (Freeman, 1999). Therefore, the estimate result illustrates that the financial crisis has a significant negative impact on FDI inflows into Laos.

Table 6: Estimate Results on the Determinants of FDI in Laos (1996-2009)

Variables	OLS	GLS
Minerals	.3132361*	.0504093 ***
	(.1703886)	(.0111785)
Manuf	.1304404	.0316083**
	(.1736954)	(.0164105)
Agri	-.0608623**	.0008277
	(.0270216)	(.003071)
GDP	-4.204266	-.0257486
	(5.385238)	(.2025798)
Labour	-.3748299	-.1305828**
	(.3444136)	(.056639)
Dinflation	.0029592	-.000129
	(.0156723)	(.0002845)
Exchange	-.0000135	-2.13e-06
	(.0000206)	(2.35e-06)
Dinterest	-.043376	-.0007729
	(.0325715)	(.0006829)
Openness	27.64186 ***	26.28298***
	(13.22862)	(4.158871)
Tel	-.2036416	-.0366709
	(.8585585)	(.0315956)
Distance	-.0001*	2.59e-06
	(.0000541)	(2.95e-06)
Ecofreedom	-1.902438	-.0780665
	(2.780116)	(.0730648)
ASEAN	-2.625111	-.0165787
	(1.727457)	(.0153382)
Crisis	-.3173348	-.0209851 *
	(.5298448)	(.0127512)
Constant	5.398268	.0129362
	(3.301816)	(.0567522)
No. of Obs.	224	224
R-squared	0.2304	
Wald $chi^2(14)$		111.01
VIF		4.58
Hausman Test		27.01 [0.0046]

Standard errors are in parentheses. *, **, and *** denote that the slope parameter estimates are statistically significant at the levels of 10%, 5% and 1% respectively. Hausman test is asymptotically χ^2 distributed with p-value in bracket.

5.2 Empirical Results of the Causal Links between Inward FDI and Economic Growth

The empirical results are reported in three steps. Firstly, the property of time series data are tested by means of the panel unit root test by Levin et al., (2002) and Im et al., (2003).

In the next step, this paper applies panel cointegration using the residual based test proposed by Pedroni (1999). Thirdly, the short and long run causality between variables of interest GDP and FDI are estimated by Granger causality using an Error Correction Model (ECM). The findings are reported in the following section.

5.2.1 Unit Root Test Results

Before estimating Equation (3), this paper first checks the order of integration of variables GDP and FDI inflows using LLC (2002) and IPS (2003) panel unit root tests. These tests are residual-based tests, which estimate two different statistics for two referred variables at their levels and at first differences. The results reported in Table 7 show the sets of two statistics for the models of interest M1 and M2 with two lags.[6] The first two rows under each model are the results of the panel unit root statistics on the GDP and FDI series in levels. The results show that the null hypothesis of non-stationarity is rejected by the left tail of the normal distribution and this paper fails to reject the null hypotheses across different models since these rows have positive and small negative values. The last two rows under models M1 and M2 indicate the results of the panel unit root statistics on GDP and FDI in the first differences. The null hypothesis of non-stationarity is rejected at the 1% level for all models as a result of the large negative values for the statistics. Therefore, it concludes that both GDP and FDI inflows are non-stationary at their levels and stationary at their first differences. This implies that both GDP and FDI are integrated of order one or I(1) variables for short. The results of the LLC and IPS tests are reported in Table 7.

[6] The lag length for variable GDP and FDI is chosen endogenously by using the standard step-down procedure and allowed to differ in all ADF tests.

Table 7: Unit Root Test Results

H_0: Variables are non-stationary

Variables	LLC	IPS	Decision
M1: Heterogeneous intercepts:			
Lngdp	-0.88677 (0.1876)	0.00890 (0.5036)	Accept
Lnfdi	1.80350 (0.9643)	-1.05576 (0.1455)	Accept
Dlngdp	-3.02017*** (0.0013)	-2.99477*** (0.0014)	Reject
Dlnfdi	-7.27737*** (0.0000)	-11.0909*** (0.0000)	Reject
M2: Heterogeneous intercepts and trend:			
Lngdp	1.47449 (0.9298)	1.57726 (0.9426)	Accept
Lnfdi	4.43546 (1.0000)	-0.17473 (0.4306)	Accept
Dlngdp	-1.96558** (0.0247)	-2.19080** (0.0142)	Reject
Dlnfdi	-4.35152*** (0.0000)	-8.91667*** (0.0000)	Reject

Note: P-values are in the parentheses. *, ** and *** indicates rejection of the null hypothesis of no-cointegration at the 10, 5 and 1 percent levels of significance respectively.

5.2.2 Cointegration Test Results

Following the unit root test results, this paper then applies a panel cointegration technique based on Pedroni (1999) residual-based cointegration tests. This method allows for cointegrating vectors of differencing magnitudes between sectors as well as time fixed effects (Basu et al., 2003). The first four are referred to as panel cointegration statistics and the last three are recognized as group mean panel cointegration statistics. The findings of the cointegration tests in Table 8 show that the null hypothesis of no cointegration is rejected by panel Rho, panel PP and panel ADF tests. However, the panel V-test fails to reject the null hypothesis of no cointegration. Maeso-ernandez et al., (2006) propose that panel Rho and panel PP are more reliable tests of cointegration. Thus, this study has enough statistical support to conclude that GDP and FDI are cointegrated.

Table 8: Panel Cointegration Test Results

H_0 : No cointegration vector between GDP and FDI		
Statistics	**M1**	**M2**
Panel v-Statistic	2.032771 [0.3884]	-0.521691 [0.9783]
Panel rho-Statistic	-6.402254 [0.0000] ***	-3.912043 [0.0000] ***
Panel PP-Statistic	-8.222021 [0.0000] ***	-9.453489 [0.0000] ***
Panel ADF-Statistic	-5.019660 [0.0000] ***	-5.437359 [0.0000] ***
Group rho-Statistic	-5.094155 [0.0000] ***	-3.208743 [0.0000] ***
Group PP-Statistic	-9.305286 [0.0000] ***	-12.11212 [0.0000] ***
Group ADF-Statistic	-5.462065 [0.0000] ***	-6.687397 [0.0000] ***
Decision	**Reject H_0**	**Reject H_0**

Note: V-statistic test is right-sided, while the others are left-sided. p-values are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1% respectively.

5.2.3. Panel Causality Test Results

As GDP and FDI inflows are cointegrated, in the next step in this study estimates Granger causality applying an Error Correction Model to investigate the relationship of referred variables in the short run and long run. Following the two-stage estimated process for the causality test, the two coefficients λ_{1i} and λ_{2i} in Equations (5) and (6) refer to the adjustment speeds along the long run equilibrium path. λ_{1i} can be interpreted as indicating the effect of GDP on FDI inflows in the long run, while λ_{2i} implies the effect of inward FDI on GDP in the long term. The optimal lag length for this model is chosen two lags dependent on the comparison of regression results with alternative lag structures. Since there are no noticeable changes in significance or magnitude of the estimated results when using the step-down procedure for each sector allowing for up to four lags. However, an increase in lags leads to the reduction of the time horizon of the results, thus this paper allows the lag length up to two lags of the annual data. As all variables enter the model in stationary form, a standard F-test is applied to test the null hypothesis. This study investigates the possibility of the causal links between FDI and GDP in both aggregated and sectoral level FDI. The findings of these tests are reported in the following section.

5.2.3.1 Causality Tests for All Sectors

The results from Table 9 show that both the hypotheses of no causality from GDP to FDI and from FDI to GDP are rejected at the 1% in the long run, indicating strong bidirectional causality between the two variables. This result is consistent with the previous finding by Basu et al., (2003) and Chakraborty and Nunnenkamp (2008). However, this research fails to reject the null hypothesis of no causality running from FDI to GDP and that of no causality from GDP to FDI in the short run. This result implies that there are no causal link between FDI and GDP in the short run, which is in line with the previous studies by Liangshu (2007) and James (2009). The bidirectional causality between FDI and GDP in the long term could exit since there are infusions of FDI into Laos, where capital accumulation forms new production ability and then increases output in the long run growth path, while an increase in output enables more savings, which is the source of capital investment.

Table 9: Causality Test Results for All Sectors

Null hypothesis	Long- run	Short-run
LnGDP does not Granger cause LnFDI	1.173518*** [-3.10537]	0.584778 [0.76726]
LnFDI does not Granger cause LnGDP	0.852865*** [-7.59355]	0.003544 [0.55810]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

5.2.3.2 Causality Tests for Three Board Sectors

The Granger causality tests are repeated to investigate the direction and magnitude of the causal relationship between FDI and output for the primary, manufacturing and services sectors (see Table 23 in the Appendix for more details on each three broad categories). The finding reported in Table 10 indicates that the nature of causal links between FDI and output varies across sectors. For the primary sector, the hypothesis of no causality from GDP to FDI

is rejected at 5% level, while the hypothesis of no causality from FDI to GDP is rejected at 1% level in the long term. This means there are bidirectional causal links, but causality running from FDI to output is relatively stronger than from output to FDI. This result confirms the finding by Khan and Khan (2011). This is because FDI inflows into the primary sector, especially in the mining sector as a resource-seeking FDI, generate economic growth and an increase in real output also attracts FDI inflows in the long run. However, this paper fails to reject the null hypothesis of no causality running from GDP to FDI and from FDI to output in the short run. This indicates that there is no causal link between FDI and the output in the primary sector, which is in line with a previous studies by Chandana and Nunnenkamp (2008) and Khan and Khan (2011).

For the manufacturing sector, there is evidence of bidirectional causality links between FDI and real GDP in the long term. This means that an increase in real output attracts FDI inflow into Laos and the influx of FDI also contributes to an increase in Lao economic growth in the long run. This result is in line with previous findings by Alfaro (2003) and Chandana and Nunnenkamp (2008). The null hypothesis of no causality running from real output to FDI inflow is rejected at the 5% in the short term, indicating there is evidence of unidirectional causality from GDP to FDI. This result shows that the influx of FDI may be the resource-seeking types.

The results from the causality tests confirm that there is evidence of bidirectional links between FDI and output in the long term for the services sector. In addition, evidence of causality running from FDI to real output is observed in the short term, which is in line with the study by Khan and Khan (2011). This result is also consistent with the fact that in recent years there has been a substantial inflow of FDI in the services sector, especially in electricity, trade, telecom and banking sectors, which play an important role in growing the economy. Noticeably, only service sector has the growth-promoting effect both in the short and long run. One possible reason is that the spillover effects of FDI might be stronger in the services sector.

Table 10: Causality Test Results for Three Board Sector Levels

Null hypothesis	Long run	Short run
Agriculture and mining:		
LnGDP does not Granger cause LnFDI	0.873454**	1.334185
	[-2.49098]	[0.90197]
LnFDI does not Granger cause LnGDP	1.144880***	0.044887
	[-3.43610]	[-1.48486]
Manufacturing:		
LnGDP does not Granger cause LnFDI	0.991000***	1.377480**
	[-5.33244]	[2.26460]
LnFDI does not Granger cause LnGDP	1.009082***	0.037448
	[-6.32750]	[0.53942]
Services:		
LnGDP does not Granger cause LnFDI	2.027493***	1.195651
	[-3.84359]	[0.68360]
LnFDI does not Granger cause LnGDP	0.493220***	0.065841**
	[-4.03207]	[2.14094]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

5.2.3.3 Causality Tests for Individual Sectors

The Granger causality tests are repeated to analyze the direction of the relationship between real FDI and output for each individual industry, which is expected to differ across sectors. As evident from Table 11, this paper fails to reject the null hypothesis of no causality from real output to FDI, meaning that there is no causality from real output to FDI in the agriculture sector both in the short and long term. The finding shows that FDI inflows exert a unidirectional causal effect on growth in the long run. Since there are enormous FDI flows into the agriculture sector as the Lao economy is largely agriculture based and the agriculture sector also contributes to economic growth.

For the mining sector, the null hypothesis of no causality between real output and FDI cannot be rejected in the short term. This means there is no evidence of causal links between the two variables. In the long term, this paper can reject the null hypothesis of no causality running from real FDI to output, but it fails to reject the null hypothesis of no causality from output to FDI. This implies that there is evidence of a unidirectional causal link running from FDI to output in the long term. The influx of FDI appears to be the resource seeking type as

Laos has abundant natural resources and the mining sector has become the country's fastest growing and most profitable sector, and generates huge revenue.

In the trading sector, the null hypothesis of no causality between the two variables output and FDI is rejected, indicating a bidirectional causal link between real output and FDI existing in the long run. However, this study fails to reject the null of no causal links running from real GDP to FDI in the short run. This means that causality for the trading sector is unidirectional and running from FDI to output of the trading sector. FDI flows into the trading sector have contributed to the economy of Laos since Laos declared itself open to international trade and liberalization. Therefore, there is no doubt that there is strong evidence of a causal link running from FDI to output both in the short and long term.

The transport and communication sectors indicate that there is no causal link between the two variables of interest output and FDI in the short run because the null hypothesis of no causality between the two variables cannot be rejected. However, the result for the long run shows there is bidirectional causality running from real output to FDI as the null hypothesis of no causality link between output and FDI is rejected. The demand for good infrastructure and high technology in the communication sector is increasing as a result of ongoing economic growth, which provides FDI opportunities in the these sectors in Laos. An increase in the transport and communication sectors also generates economic growth.

The finding indicates that the null hypothesis of no causality from real output to FDI inflows in the construction sector is rejected in the short run. Therefore, causality seems to be unidirectional and running from real output to FDI. However, the null hypothesis of no causal link from FDI to output is rejected in the long run, implying that there is a unidirectional causal link running from FDI to GDP. As the Lao economy is growing, it leads to more demand in construction projects including commercial buildings, hotels and resorts, recreational facilities, city and provincial level infrastructures. Moreover, the construction sector not only creates jobs but also contribute to economic growth.

For the banking sector, this study finds that the null hypothesis of no causality between real output and FDI inflows cannot be rejected in the short run, indicating that there is no evidence of a causal link between two variables. On the other hand, a bidirectional causal link between FDI and output is found in the long run as this paper can reject the null hypothesis of no causality between the two variables output and FDI is rejected. Therefore, an increase in FDI inflows in the banking sector in Laos helps to boost the growth and expansion of the sector.

The result illustrates that in the electricity generation sector, the null hypothesis of no causality between real output and FDI cannot be rejected. It implies that there is no evidence of a causal like between two variables in the short run. However, in the long run, this analysis can reject the null hypothesis of no causality from FDI to real output, meaning that there is a unidirectional link running from FDI to output in the electricity sector in the long run. It is noticeable that there are huge opportunities for FDI in the hydropower sector in Laos due to the availability and abundance of water resources. Thus, the largest recipient of foreign investment in Laos is the electricity sector, which plays an important role in contributing to economic growth and expansion of the hydropower sector.

For other services sectors, this study fails to reject the null hypothesis of no causality between two variables output and FDI in the short run. It implies that there is no causal link between real output and FDI. However, the finding shows that in the long run, causality seems to be bidirectional, given that the null hypothesis of no causal link between output and FDI is rejected. As an increase in the demand for other services including insurance, tourism, hotel and restaurant and other services is powered by the increase in the levels of disposable income and economic growth in Laos. Other services sector also play an important role in contributing to economic growth.

Table 11: Causality Test Results for Individual Sectors

Null hypothesis	Long- run	Short-run
Agriculture:		
LnGDP does not Granger cause LnFDI	0.116027	1.301083
	[-0.41603]	[1.25416]
LnFDI does not Granger cause lnGDP	8.618670***	0.012133
	[-9.97689]	[0.67278]
Mining:		
LnGDP does not Granger cause LnFDI	0.843542	0.871597
	[-1.45358]	[1.47400]
LnFDI does not Granger cause lnGDP	1.185478***	0.009759
	[-2.87469]	[0.11107]
Manufacturing:		
LnGDP does not Granger cause LnFDI	0.991000***	1.377480**
	[-5.33244]	[2.26460]
LnFDI does not Granger cause lnGDP	1.009082***	0.037448
	[-6.32750]	[0.53942]
Trade:		
LnGDP does not Granger cause LnFDI	1.645243***	1.434355
	[-5.11784]	[1.46278]
LnFDI does not Granger cause lnGDP	0.607813***	0.276951***
	[-5.47515]	[-4.69591]
Transport and communications:		
LnGDP does not Granger cause LnFDI	2.809691***	4.431125
	[-2.93414]	[-0.90755]
LnFDI does not Granger cause lnGDP	0.355911***	0.002624
	[-4.64324]	[-0.33583]
Construction:		
LnGDP does not Granger cause LnFDI	1.027167	6.680238**
	[0.94880]	[2.06180]
LnFDI does not Granger cause lnGDP	0.973552***	0.006075
	[4.67308]	[0.36457]
Banking:		
LnGDP does not Granger cause LnFDI	3.800080***	1.070530
	[-3.31937]	[-0.51808]
LnFDI does not Granger cause lnGDP	0.263152***	0.005522
	[-4.11579]	[-0.20176]
Electricity:		
LnGDP does not Granger cause LnFDI	3.05000	8.697590
	[0.77563]	[-1.45061]
LnFDI does not Granger cause lnGDP	0.327869***	0.002831
	[3.35781]	[0.34631]
Other services:		
LnGDP does not Granger cause LnFDI	1.105721***	1.627902
	[-3.79659]	[1.41142]
LnFDI does not Granger cause lnGDP	0.90438***	0.041220
	[-5.56854]	[1.27673]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

The complementary calculation of elasticity coefficients derived from logarithmic transformation of FDI and real output at the level of nine specific sectors is reported in Table 22 in the Appendix. The results from the elasticity coefficients indicate that the economic impact of inward FDI in the manufacturing sector on output is particularly high compared to other industries. The tertiary sector also illustrates high elasticity of output regarding FDI inflows, especially in the trading and services industries. For the primary sector, the mining industry has a slightly high elasticity of real output with regard to inward FDI. However, there are constrained growth effects in the agriculture sector.

5.2.3.4 Causality Tests for Cross Sector Spillover

Additional Granger causality tests are examined for cross-sector spillover as an increase of FDI in some sectors may affect other sectors of the Lao economy and could promote growth of output in other sectors, especially in the manufacturing sector. The cross sector of two pairs (1) services output and FDI inflow in the manufacturing sector and (2) manufacturing output and FDI inflow in the services sector are tested. The findings in Table 12 show that the null hypotheses of no causality between the two alternative pairs of variables are rejected at the 1% level in the long run. The findings for the first group of paired variables show that there is a bidirectional causal link between output growth in the services sector and FDI inflows in the manufacturing sector. This indicates that the output growth in both manufacturing and services sectors has not only been promoted by FDI in their sectors but also by FDI in other sectors through cross-sector spillovers in the long run. For the second group of paired variables, the results also indicate that a bidirectional causal link between output of the manufacturing sector and inward FDI in the services sector are observed in the long run. One possible explanation is the spillover effects of FDI inflows in both manufacturing and services sectors might be stronger than other sectors because they consist of both capital and labour intensive industries, while other sectors do not. However, the study fails to reject the null hypothesis of no causality between the alternative pairs of variables, meaning that there is no evidence of any cross-sector causality in the short run.

Additionally, this research also employs exchange rate (data obtained from ADB) as a control variable in the model. After controlling the FDI and GDP variables by exchange rate, the empirical results from testing the two main variables and the results obtained from the model including exchange rate remain the same. The findings are reported in Table 28 - Table 33 in the Appendix.

Table 12: Causality Test Results for Cross Sector Spillover

Null hypothesis	Long- run	Short-run
LNGDPSERVICES does not Granger Cause LNFDIMANUF	1.237819*** [-5.96411]	0.308449 [0.23362]
LNFDIMANUF does not Granger Cause LNGDPSERVICES	0.807873*** [-6.86338]	0.043001 [0.66631]
LNGDPMANUF does not Granger Cause LNFDISERVICES	0.775854*** [-3.35534]	1.682810 [1.45289]
LNFDISERVICES does not Granger Cause LNGDPMANUF	1.288903*** [-5.39253]	0.020385 [0.54955]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

5.3 Empirical Results of Firm Performance

The maximum likelihood estimation for the stochastic frontier and technical inefficiency effects model's parameters were calculated simultaneously by the econometric package Frontier Version 4.1 developed by Coelli (1996). The estimated results in Table 13 illustrate that labour and capital in Lao firms' manufacturing and services industries have positive signs and are strongly significant at the 1% level. However, the coefficient of labour is bigger than capital in the production function indicating that the manufacturing and services sectors of Lao firms are labour intensive as many firms still heavily depend on labour input with low skilled workers and value added activities.

All negative signs of technical inefficiency effects model are obtained from the estimation of equation (9) and (11) are simultaneously equal to positive signs of technical efficiency. The results illustrate that the coefficient of firm age measured by the number of operating years has a negative sign and is significant at the 5% level. This implies that firm age is a factor affecting the technical efficiency of the manufacturing and services firms. In

other words, firms with longer operating time and more experience are more technically efficient. This result is in line with a number of empirical studies, which find that firm age has a positive relationship with technical efficiency based on the principle of learning by doing and knowledge accumulation (Tran et al., 2008, Park et al., 2009 and Amornkitvikai and Harvie, 2011).

The results from this study show that coefficient of location has a positive sign but it is not statistically insignificant. It means that location does not affect on benefits for the technical efficiency of the manufacturing and services sectors in Laos. This paper finds that firm size has a positive sign and significance at the 5% level, showing that small firms are less technically efficient than medium and large firms. The advantages of medium and large firms are that they are likely to take more advantages of economies of scale, scope in research and development and specialist expertise, and have greater financial and technological resources and management skills. Moreover, they also contribute to other business activities. An effect of firm size on the technical efficiency of firms has been found in many studies including Haddad and Harrison (1993), Lundvall and Battese (2000), Tran et al., (2008) and Park et al., (2009).

The coefficient of ownership has a positive sign but it is not statistically significant at any significant level. It is surprising that foreign-owned firms do not produce technical efficiency. This could be explained by there are only 16 percent foreign owned firms out of the total surveyed firms. There are more foreign-owned firms and mixed-ownership firms of medium and large size. Therefore, a bigger investment project will take more time to start operating and produce efficiency gains than smaller firms.

The negative and significant at the 1% level estimated coefficient of spillover implies that FDI spillover has a significantly positive impact on technical efficient of domestic firms in both manufacturing and services sectors. This result suggests that Lao firms in the manufacturing and services industries with higher foreign share make use of their resources in

a more efficient way leading to more technical efficiency and productivity gain. This finding is consistent with the results of the studies by Sjoholm (1999) and Takii (2005).

Table 13: Empirical results from SFA

Variables	Parameters	2009
Production function:		
Constant	β_0	10.98***
		(0.747)
LnL	β_1	0.80***
		(0.09)
LnK	β_2	0.166***
		(0.05)
Inefficiency function:		
Constant	δ_0	19.41***
		(0.998)
Age	δ_1	-0.178**
		(0.093)
Location	δ_2	0.241
		(0.179)
Size	δ_3	0.536**
		(0.22)
Foreign	δ_4	0.034
		(0.217)
Spillover	δ_5	-0.684***
		(0.225)
K/L	δ_6	-0.105
		(0.144)
Variance Parameter:		
Sigma-Squared		0.591***
		(0.678)
Gamma		0.700***
Log-likelihood		-372.2
Mean technical efficiency		0.30

Standard errors are in parentheses, *, ** and *** are significant levels at the 10, 5 and 1% respectively.

This paper finds that the capital-labour ratio coefficient has a negative sign and is insignificant. It means that technical efficiency of the firms would not be higher with an increase in capital investment. Some possible explanations are that the existing technology level may not be suitable for the workers' skill level. Based on NSC (2007), the low skill of workers is one cause of lower productivity in firms; thus, education development is needed to increase the efficiency. Moreover, a huge investment in equipment that is not broadly

employed for production may induce a higher capital intensity and lower efficiency. This finding is consistent with the study by Alvarez and Crespi (2003).

The variance parameter estimation gamma (γ) is 0.7, indicating that deviations are due to technical inefficiency in the production function.

Additional estimations are conducted in order to investigate the determinants of Total Factor Productivity (TFP). After obtaining the indices of TFP from residual, this paper follows the work of Liu (2008) to identify the following models:

$$\ln TFP_{ij} = \delta_0+\delta_1 \ln Age_{ij}+\delta_2 Location_{ij}+\delta_3 Size_{ij}+\delta_4 Foreign_{ij}+\delta_5 \ln Spill_j+\delta_6 \ln K/L+\varepsilon_{ij} \quad (23)$$

The estimated results and explanation are reported in the Appendix.

Chapter 6

Conclusions and Policy Implications

6.1 Conclusions and Policy Implications for the Determinants of FDI inflows in Laos

This paper investigates the factors that might affect inward FDI into Laos based on unbalanced panel data for approved FDI projects from 16 investing partners, which accounts for about 93 percent of total investment value over the period 1996-2009. A key feature of this paper is that the explanatory variables are estimated in relative terms rather than absolute terms. This is because this paper assumes that foreign investors make investment decisions after comparing factors such as economic, political and geographic factors, which affect their locational decisions between the home country and the potential host countries. In addition, this study applies several diagnostic tests for selecting the best econometric estimation technique. The empirical model is estimated by using the generalized least square (GLS) random effect (RE) technique in order to achieve efficient results. The GLS estimator is a weighted average of between and within effects, which corrects for time-invariant, heteroskedasticity and autocorrelation problems.

The empirical results indicate that the abundance of natural resources is strongly positive and significant, which supports the presence of resource seeking FDI and similar to the findings of Aseidu (2002) and Kinoshita and Campos (2004). Manufacturing export is also positively associated with FDI flows into Laos. The finding provides some evidence that confirms the resource seeking hypothesis as well as is in line with the previous research of Harinder and Kwang (1995). Additionally, labour productivity plays an important role in attracting FDI inflows into Laos, which confirms the hypothesis that foreign investors are cost sensitive and in line with the results of Wheeler and Mody (1992), Estrin (2004) and Shaukat and Wie (2005). In addition, openness has a strongly positive impact on FDI inflows and supports the fact that an efficient environment that comes with more openness to trade is likely to attract more foreign firms (Yamagata, 2006 and Cuyvers et al., 2006 & 2008).

Furthermore, the estimate result illustrates that the Asian financial crisis had a negative impact on FDI inflow into Laos during the period 1997-1999.

Therefore, the estimated result can be concluded that the minerals and fuels exports, manufacture exports, labour productivity, degree of openness and an impact from the Asian financial crisis are the common determinants of FDI inflows into Laos. However, this study fails to support the hypotheses that relative agriculture exports, inflation rate, market size, exchange rate, interest rate, geographic distance, infrastructure, economic freedom and ASEAN variables influence FDI inflows. This finding implies that there is non-market seeking FDI in Laos. However, resource-seeking effects are strongly confirmed, labour productivity is an important determinant for FDI inflows and openness to trade and export-oriented policy attract inward FDI flows in Laos. Moreover, Asian financial crisis negatively affected FDI inflows in Laos.

The results from this investigation have vital implications for the future development of FDI in Laos. The findings yield some suggestions for policy makers to enhance the attractiveness of a host country, promote and develop programs in order to attract more foreign investors and to sustain economic development. Rapid growth in natural resource sectors and trade expansion are expected to continue according to the World Bank (2010), and labour costs in Laos are relatively low in the region and significantly lower than neighboring countries such as Cambodia and Vietnam (World bank, 2011). Therefore, Laos should expect to continue experiencing a rapid increase in inward FDI. By doing so, Laos should further harness its natural resources and comparative advantage to promote mining and manufacturing sectors in order to achieve sustainable economic growth and poverty eradication. However, the Lao government has to promote the sustainable use of natural resources and use them effectively to minimize the negative impacts on the environment, society and biodiversity. In addition, it is essential to improve the quality of labour, while keeping comparative advantage of labour cost with other countries in the regions, especially China and Vietnam. Furthermore, the Lao government should further liberalize international

trade and open economies in order to encourage greater confidence in foreign investors to be able to attract more FDI.

6.2 Conclusions and Policy Implications for the Relationship between FDI and Economic Growth

In this analysis, Granger causality tests show that there are bidirectional effects between real GDP and FDI inflows in the long term at the aggregated level. However, the effects of inward FDI on economic growth vary across sectors at the sectoral levels. For the three broad sectors, the findings illustrate that there is a bidirectional causal link between FDI inflows and output in the long run. In the short run, there is no FDI-led growth in the primary sector, a unidirectional causality running from output to FDI in the manufacturing sector. The services sector has the most favorable growth effects of FDI inflows in Laos.

At the level of industries, the result shows that all nine industries except the other services sector are the main industries contributing to economic growth in the long run and only the trading sector has a strong impact on growth in the short run. On the other hand, the finding shows that the growth promoting FDI is mainly on the manufacturing, trade, transport and communications, banking and other services sector in the long term, and manufacturing and construction sectors in the short term. In addition, for cross sector spillover, the results show that there is a bidirectional causal link between the two alternative pairs of variables in the long run, meaning that FDI and output of the manufacturing and services sectors have a causal link through cross sector spillovers. However, there is no evidence of any cross-sector causality in the short run.

Several policy implications based on the empirical results of this paper can be suggested as follows: firstly, the Lao government should pay more attention to policies and incentives provided to foreign investors in all industries because they are indeed beneficial to enhance economic growth. According to the findings of this paper, these policies should reflect the fact that FDI inflows in the primary sector have very little contribution and no

effect on growth because the products based exports of primary sectors are inelastic demand. However, FDI inflows in secondary and tertiary sectors should be encouraged as growth effective sectors, as results show that FDI inflows at the aggregated level have a positive impact on output growth, thus it is suggested that the Lao government should continue creating a favorable business and investment environment and deregulating policies related to foreign investment. This could include providing a level playing field for investors, simplifying administrative processes and providing additional incentives and facilities to investors. Secondly, the results from the examination of decomposition recommend that more incentives should be offered to foreign investment, which contributes to growth, especially in services and manufacturing sectors. Thirdly, at the level of industries, the findings suggest that improving local conditions including the infrastructure base, sound institutions, and a reliable and consistent financial sector will have a beneficial effect. Additionally, openness to trade plays an important role in increasing the relationship between foreign and domestic firms particularly in the manufacturing and trade sectors. Finally, developing the ability of local firms and skilled labour to absorb the spillover benefits from foreign investment particularly in the manufacturing sector is important.

6.3 Conclusion and Policy Implications for Firm Performance

In this paper, cross-sectional firm datasets from the Investment Climate Survey (ICS) were estimated by the stochastic frontier method to determine the effect of FDI spillovers and other factors affecting the technical efficiency for manufacturing and services sectors of Lao firms in 2008. The results show that the technical efficiency levels in the labour intensive manufacturing and services sectors of Lao firms are low, showing a high level of technology inefficiency in the production process. Moreover, the findings indicate that firm age, firm size and FDI spillover effects are main factors contributing to the technical efficiency of the manufacturing and services firms. However, the effect of location, firm ownership and capital-labour ratio factors on the firm technical efficiency is not found in this study.

The findings from this study suggest that policies for strengthening the absorptive capacity of domestic firms through investing in knowledge and human capital formation ought to be prioritized. Moreover, business obstacles should be gradually removed and more general policies and incentives should be pursued in order to improve business environment and attract more foreign investment so that the firms with higher potential, particularly potential foreign-owned firms can improve their efficiency and business operations. In addition, there is also a need for further industrial and trade policies reforms in order to gain the technical advantages from industrialization and trade development.

6.4 Scope for Further Research

In this section some suggestions are offered for future research concerning FDI in Laos. Even though this paper provides a major contribution in terms of understanding characteristics of FDI in Laos and its effects on economic growth and enterprise performance, the study is only as good as the data on which it is based due to the constraint of data availability. Therefore, there is a need for the longer time period and better data for further research. Moreover, more information on foreign firms in Laos is also needed. The further research can be extended in the following ways: first, the determinants of FDI also rely on the FDI forms such as horizontal and vertical FDI, export-platform FDI, market-oriented FDI and others. Thus, a more detailed analysis should be conducted in each case individually. Second, for the impact of FDI on economic growth, the research on more specific types of industry and FDI forms should be conducted in order to introduce appropriate investment attraction strategies. Finally, the study on technical efficiency of firms should cover longer time period and include environmental variables beyond the control of the management of the firms, for example, business environment, investment incentives and government support and policies, skill level of workers, and technological level of firms.

References:

Addison T. and Heshmati A., (2003). The New Global Determinants of FDI Flows to Developing Countries. *United Nations University, WIDER,* Discussion Papers No. 2003/45.

Agarwal, S. and Ramaswami, (1992). Choice of Market Entry Mode: Impact of Ownership, Location, and Internalization Factors, *Journal of International Business Studies*, 23 (1), 1-27. Received the "Decade Award" in June 2002.

Agosin, M., and Mayer, R., (2000). Foreign direct investment: Does it crowd in domestic investment? United Nations Conference on Trade and Development Working Paper No. 146. Geneva, Switzerland.

Ajami, R.A and BarNiv, R., (1984). Utilizing Economic Indicators in explaining foreign investment in the US, *Management International Review,* 24(4), 16-26.

Akinolo, A. (2004). Foreign Direct Investment and Growth in Nigeria: An Empirical Investigation. *Journal of Policy Modeling*, 26, 627-39.

Aliber, R.Z., (1993). *A Theory of Direct Foreign Investment, in Dunning, J.H. (ed): The Theory of Transnational Corporations*. London and New York: Routledge.

Alfaro, L., (2003). *Foreign direct investment and growth: Does the sector matter?* Boston, MA: Harvard Business School, Mimeo.

Alfaro, L., and Charlton, A., (2007). Growth and the Quality of Foreign Direct Investment: Is All Foreign Direct Investment Equal? Working Paper, Harvard University.

Andresosso-O'Callagham, B., and Wei, X., (2003). EU FDI in China: Locational Determinants and its Role in China's Hinterland. Proceedings of the 15th Annual Conference of the Association for Chinese Economics Studies, Austria (ACESA).

Aristotelous, K. and Fountas, S., (1996). An Empirical Analysis of Inward Foreign Direct Investment Flows in the EU with Emphasis on the Market Enlargement Hypothesis, *Journal of Common Market Studies*, 34(4), 571-83.

Asiedu, E., (2002), On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?, *World Development*, 30(1), 107-18.

_____, (2006), Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability, *World Economy*, 29(1), 63-77.

Asiedu, E., and Esfahani, H., (2001). Ownership Structure in Foreign Direct Investment Projects. *Review of Economics and Statistics*, 83 (4), 647-62.

Aykut, D., and Sayek, S., (2007). The Role of the Sectoral Composition of Foreign Direct Investment on Growth. *A book chapter in International Workshop: Innovation, Multinationals and Local Development.* New York: Palgrave Macmillan.

Ayanwale, A.B., (2007). FDI and Economic Growth: Evidence from Nigeria. *African Economic Research Consortium*, AERC Research Paper, 165, Nairobi

Baek, I. M. and Okawa, T., (2001). Foreign Exchange Rate and Japanese Foreign Direct Investment in Asia, *Journal of Economics and Business*, 53, 69-84.

Bajo-Rubio, O. and Sosvila-Rivero, S., (1994). An Econometric Analysis of Foreign Direct Investment in Spain, 1964-1989, *Southern Economic Journal*, 61(1), 104-20.

Balasubramanyam, V. N., Salisu, M. A., and Sapsford, D., (1996). Foreign direct investment and growth in EP and IS countries. *Economic Journal*, 106(434), 92-105.

Baltagi, B.H., (1995). *Econometric Analysis of Panel Data*. New York: Wiley.

Barrell, R. and Pain, N., (1997). Foreign Direct Investment, Technological Change, and Economic Growth within Europe, *Economic Journal*, 107, 1770-86.

Basu, P., Chakraborty, C., and Reagle, D., (2003). Liberalization, FDI, and growth in developing countries: A panel cointegration approach. *Economic Inquiry*, 41(3), 510-16.

Baum, C. F., (2006). *An introduction to modern econometrics using stat.* College Station, Texas, USA: Stata Press.

Bende-Nabebde, A., (2001). FDI, Regional Economic Integration and Endogenous Growth, Some evidence from Southeast Asia, *Pacific Economic Review*, 6(3), 383-99.

Bengoa, M., and Sanchez-Robles, (2003). FDI, Economic Freedom, and Growth: New Evidence from Latin America. *European Journal of Political Economy*, 19(3), 529-45.

Bevan, A.A, and Estrin, S., (2004). The determinants of foreign direct investment into European transition economies, *Journal of Comparative Economics*, 32, 775-87.

Biswas, R., (2002). Determinants of Foreign Direct Investment, Review of Development Economics, 6(3), 492-504.

Blomstrom, M. and Kokko, A., (1997), Regional Integration and Foreign Direct Investment: A Conceptual Framework and Three Cases, Policy Research Working Paper, World Bank.

_____, (1998). Multinational Corporations and Spillovers. *Journal of Economic Surveys*, 12(2), 1-31.

Blomstrom., M and Sjoholm, F., (1999). Technology transfer and spillovers: Does local participation with multinationals matter? *European Economic Review*, 43, 915-23.

Blonigen, B. A., and Wang, M., (2004). Inappropriate pooling of wealthy and poor countries in empirical FDI studies. NBER Working Paper 10378. National Bureau of Economic Research, Cambridge, MA.

_____, (2005). Inappropriate pooling of wealthy and poor countries in empirical FDI studies. In:Moran, T.H., Graham, E.M., Blomstrőm, M. (Eds.), *Does Foreign Direct Investment Promote Development*? Institute of International Economics Press, Washington, DC.

Borensztein, E., De Gregorio, J., and Lee, J.W., (1998). How does foreign investment affect growth?. *Journal of International Economics*, 45, 115-35.

Bornschier, V. and Chase-Dunn, C., (1985). *Transnational Corporations and Underdevelopment*, Now York: Praeger.

Brenton, P., Mauro, F. D., and Lucke, M., (1999). Economic integration and FDI: An Empirical Analysis of Foreign Investment in the EU and in Central and Eastern Europe. *Empirical*, 26(2), 95-121.

Breusch, T. and Pagan, A., (1980). The LM test and its applications to model specification in econometrics, *Review of Econometric Studies*, 47, 239-54.

Busse, M. and Hefeker, C., (2007). Political risk, Institutions and Foreign Direct Investment, *European Journal of Political Economy*, 23, 397 - 415.

Calvo, M. B. and Sanchez-Robles, B., (2002). Foreign Direct Investment, Economic Freedom, and Economic Growth: New Evidence from Latin America. Universidad de Cantabria (Economics Working Paper No. 4/03).

Campos, N. and Kinoshita Y., (2002). Foreign Direct Investment as Technology Transferred: Some Panel Evidence from the Transition Economies. *The Manchester School*, 70, 398-419.

Carkovic, M., and Levine, R., (2005). *Does foreign direct investment accelerate economic growth?* In: Moran, T.H., Graham, E.M., Blomstrőm, M. (Eds.), Does Foreign Direct Investment Promote Development? Institute of International Economics Press, Washington, DC.

Chakraborty, C., and Basu, P., (2002). Foreign Direct Investment and Growth in India: A Cointegration Approach. *Applied Economics*, 34(9), 1061-73.

Chakraborty, C., and Nunnenkamp, P., (2008). Economic reforms, FDI, and economic growth in India: A sector level analysis. *World Development*, 36(7), 1192-1212.

Choe, J.I., (2003). Do foreign direct investment and gross domestic investment promote economic growth?, *Review of Development Economics*, 7(1), 44-57.

Chowdhury, A., and Mavrotas, G., (2006). FDI and growth: What causes what?. *The World Economy*, 29(1), 9-19.

Coelli, T. J., Rao, P., O'Donnell, C. J., & Battese, G. E., (2005). *An introduction to efficiency and productivity analysis (2nd ed.)*, Springer.

Coelli, T.J., (1996), A Guide to FRONTIER Version 4.1: a Computer Program for Stochastic Frontier Production and Cost Function Estimation, Working paper 96/07, Centre for Efficiency and Productivity Analysis, Armidale, University of New England.

Cuyvers, L., Soeng, R. and Van Den Bulcke, D., (2006). Foreign Direct Investment and the Development of Less Developed Economies: The Case of Cambodia's garment, textiles, tourism, furniture and tourism, CAS Discussion Paper No. 49, Centre for ASEAN Studies, University of Antwerp.

_____, (2008). The Contribution of MNEs to Economic Success of Small Open Economies: The Case of Cambodia..

Damooei., J and Tavakoli, A., (2006). The effects of Foreign Direct Investment and Import on Economic Growth: A Comparative Analysis of Thailand and the Philippines (1970-1998). *The Journal of Developing Areas,* 39(2), 79-100.

Davidson, W.H., (1980). The location of Foreign Direct Investment Activity: Country characteristics and experience effects, *Journal of International Economic,* 22, 178-82.

De Mello, L.R., (1997). Foreign direct investment in developing countries and growth: A selective survey. *Journal of Development Studies*, 34 (1)**,** 1-34.

_____, (1999). *FDI-led growth: evidence from time series and panel data*. Oxford Economic Papers 51, 133-51.

_____, (2003). The role of foreign direct investment and natural resources in economic development, Working Paper No. 196, Central Bank of Chile, Santiago.

Dewenter, K. L., (1995). Do Exchange Rate Changes Drive Foreign Direct Investment?, *Journal of Business*, 68(3), 405-33.

Dunning, J. H., (1981). *International production and the multinational enterprise*. London, UK: Allen and Unwin.

_____, (1988). *Explaining International Production*. London: Unwin Hyman.

_____, (1998). *Multinational Enterprises and the Global Economy* (Reprinted). Singapore: Addison-Wesley.

Dunning, J. H., and Lundan (2008). *Multinational Enterprises and the Global Economy*. 2nd edition, Cheltenham: Edward Elgar.

Dunning, J. H, Norman, G., (1983). The theory of the multinational enterprise: an application to multinational office location, *Environment and Planning*, 15(5), 675-92.

Edwards, S., (1990). Capital flows, foreign direct investment and debt-equity swaps in developing countries, NBER working paper no. 3497, Cambridge, MA: NBER.

Ekholm, K., Forslid, R. and Markusen, J.R., (2007). Export-platform foreign direct investment, *Journal of the European Economic Association,* 5, 776-95.

Engle, R. F., and Granger, C.W.J., (1987). Cointegration and error correction: Representation, estimation and testing. *Econometrics*, 55(2), 277-304.

Freeman, N., (1999). Greater Mekong Sub-Region and the Asian Crisis: Between Scylla and Charybdis, *Southeast Asian Affairs* (Singapore, Institute of Southeast Asian Studies, 32-51.

_____, (2001). The rise and fall of foreign direct investment in Laos, 1988-2000, *Post Communist Economies*, 13(1), 101-19.

Froot, K.A., and Stein J. C., (1991). Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach, *Quarterly Journal of Economics*, 1192-1217.

Fry, M., (1995). *Money, Interest and Banking in Economic Development*, Johns Hopkins, Baltimore, MD.

Gao, T., (2005). Foreign Direct Investment from Developing Asia: Some Distinctive Features, *Economics Letters*, 86(3), 29-35.

Gastanga, V., Nugent, J.B. and Pashamovab (1998). Host country reforms and FDI inflows: How much difference do they make ?', *World Development*, 26(7), 1299-1314.

Gopinath, M. and Echeverria, R., (2004). Does Economic Development Impact the Foreign Direct Investment-Trade Relationship? A Gravity-Model Approach. *American Journal of Agricultural Economics*, 86(3), 782-87.

Gorg, H., and Greenaway, D., (2004). Much ado about nothing? Do domestic firms really benefit from foreign direct investment?. The World Bank Research Observer,19(2), 171-97.

Gorg, H., and Strobl, E., (2005). Spillovers from foreign firms through worker mobility: An empirical investigation. *Scandinavian Journal of Economics*, 107(4), 693-739.

Green, W., (2000). *Econometrics Analysis*. 3rd, NJ: Prentice Hall.

Gross, R and Trevino, L.J., 1996. Foreign direct investment in the United States: an analysis by country of origin, *Journal of international Business Studies,* 27(1), 139-55.

Grossman, G., and Helpman, E., (1991). *Innovation and growth in the world economy*, MIT press, Cambridge.

Guerin, S. S., (2006). The Role of Geography in Financial and Economic Integration: A Comparative Analysis of Foreign Direct Investment, Trade and Portfolio Investment Flows. *The World Economy*, 29(2), 189-209.

Gujarati, D.N, (1995). *Basic Econometrics*, New York: McGraw-Hill International Edition.

Gwartney, J., Robert, L, and Walter, B., (1996). Economic Freedom of the World: 1975–1995. Fraser Institute.

Haddad, M. and Harrison, A., (1993). Are there Positive Spillovers from Direct Foreign Investment? Evidence from Panel Data for Morocco, *Journal of Development Economics*, 42(1), 51-74.

Halicioglu, F., (2001). An Econometric Analysis of Foreign Direct Investment Flows into Turkey from the Major Global Regions, paper presented at International Conference in Economics V, Economic Research Center, Middle East Technical University, Ankara.

Hansen, H., and Rand, J., (2006). On the causal links between FDI and growth in developing countries. *The World Economy*, 29(1), 21-41.

Harinder, S., and Kwang, W.J., (1995). Some new evidence on determinants of foreign direct investment in developing countries, Policy Research Working Paper, 1531, International Economic Department, World Bank.

Hausman, J.A., (1978). Specification Tests in Econometrics, *Econometrics*, 46, 1251-71.

Hausmann, R. and Fernandex-Arias, E. (2000). The new wave of capital inflows: Sea change or just another title? Inter-American Development Bank working paper no. 417.

Hejazi, W. and Safarian, A.E, (2001). The Complementarities between U.S. Foreign Direct Investment Stocks and Trade, AEJ, 29(4), 420-37.

Helpman, E., (1999). The structure of Foreign Trade, *Journal of Economic Perspectives*, 13(2), 121-44.

Heritage Foundation & Wall Street Journal, (2011). Index of Economic Freedom, The Heritage Foundation, Washington, DC.

Hermes, N., and Lensink, R. (2003). Foreign direct investment, financial development and economic growth. *Journal of Development Studies*, 40(1), 142-63.

Hirschman, A., (1958). *The Strategy of Economic Development*. New Haven: Yale University Press.

Ho, O.C.H., (2004). Determinants of Foreign Direct Investment in China: A Sectoral Analysis. Paper presented at 16th Annual Conference of the Association for Chinese Economic Studies, Australia.

Hoang, T.T., (2006). The Determinants of Foreign Direct Investment in Vietnam**,** 958-75. www.thailandnce.eco.ku.ac.th/document/paper/7.6.pdf

Houston, D.J. and Richardson, L.E., (2006). Reducing Traffic Fatalities in the American States by Upgrading Seat Belt Use Laws to Primary Enforcement, *Journal of Policy Analysis and Management*, 25(3), 645-59.

Hsiao, C., (1986). *Analysis of panel data*. Cambridge: Cambridge University Press.

_____, (2003). *Analysis of Panel Data*. Cambridge: Cambridge University Press (Econometric Society monograph No. 34).

Hsieh, W.J. and Hong. M.C., (2004). The Determinants of Foreign Direct Investment in Southeast Asian Transition Economies, Paper presented at the International

Symposium on Foreign Trade, FDI and Industrial Development at National Chung Cheng University, Chia-YA, Taiwan, on March 27, 2004.

Hymer, S., (1976). *The international Operations of National Firms: A Study of Direct Investment*. MA: MIT Press.

Im, K., Pesaran, M. H., and Shin, Y., (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53-74.

International Monetary Fund (2004). *International Financial Statistics Yearbook* (English ed. August 2004). Washington, D.C, International Monetary Fund.

Ioannatos, P. E., (2001). *The Demand Determinants of Foreign Direct Investment: Evidence From Non-nested Hypotheses*, in Paraskevopoulos, C. C., Georgakopoulos, T. and Michelis, L. (eds), The Asymmetric Global Economy: Growth, Investment and Public Policy, Toronto: APF Press.

Itaka, M., (1991). A Critical Assessment of the Eclectic Theory of the Multinational Enterprise, *Journal of International Business Studies*, 22(3), 445-60.

James, B. Ang. (2009). Financial development and the FDI-growth nexus: the Malaysian experience, *Applied Economics*, 41(13), 1595-1601.

Judge, G.G., Giffiths, W.E., Hill, R.C., Lutkepohl, H., and Lee, T.C., (1995). *The theory and practice of Econometrics*, 2nd, New York: John Wiley and Sons.

Jun, K.W., and Singh, H., (1996). The Determinants of Foreign Direct Investment in Developing Countries, *Transnational Corporations*, 5(2), 64-104

Kahai, S. K., (2004). Traditional and Non-Traditional Determinants of Foreign Direct Investment in Developing Countries, *Journal of Applied Business Research*, 20(1), 43-50.

Karimi, M. S., & Yusop, Z., (2009). FDI and Economic Growth in Malaysia, Forthcoming in: *Asian-African Journal of Economics and Econometrics*, [Online] Available: http://mpra.ub.uni-muenchen.de/14999/

Karimi, M.S., Yusop, Z., and Law, S.H., (2010). Location Decision for FDI in ASEAN Countries: A TOPSIS Approach, *International Research Journal of Finance and Economics*, 36, 197-207.

Kathuria, V., (2000). Productivity spillovers from technology transfer to Indian manufacturing firms. *Journal of International Development*, 12(2), 343-69.

Khaliq, A., Noy, I., (2007). Foreign Direct Investment and Economic Growth: Empirical Evidence from Sectoral Data in Indonesia, Working paper, University of Hawaii.

Khan, M. A. (2007). Foreign Direct Investment and Economic Growth: The Role of Domestic Financial Sector, PIDE Working Papers 2007:18.

Khan, M.A and Khan, S.A., (2011). Foreign Direct Investment and Economic Growth in Pakistan: A Sectoral Analysis. In: PIDE-Working Papers. *RePEc:2011:67*.

Khawar, M. (2005). Foreign Direct Investment and Economic Growth: A Cross Country Analysis. *Global Economic Journal*, 5(1), 1-11.

Kiyota and Urata, (2004). Exchange Rate, Exchange Rate Volatility and Foreign Direct Investment, *World Economy*, 27(10), 1501-35.

Kohpaiboon, A., (2003). Foreign Trade Regimes and the FDI-Growth Nexus: A case Study of Thailand. *The Journal of Development Studies*, 40(2), 55-69.

Kojima, K., (1973). A Macroeconomic Approach to Foreign Direct Investment, *Hitotsubashi Journal of Economics*, 14, 1-70.

Kojima, K., (1985). Japanese and American Direct Investment in Asia: A comparative analysis, *Hitotsubashi Journal of Economics*, 26, 1-35.

Kumar, N., (1994). Determinants of export-orientation of foreign production by US multinationals: an inter-country analysis, *Journal of International Business*, 25(1), 141-56.

Kyophilavong, P., (2010). Integrating Lao SMEs into a More Integrated East Asia Region', in Vo, T. T., D. Narjoko and S. Oum (eds.), Integrating Small and Medium Enterprises

(SMEs) into the More Integrate East Asia. ERIA Research Project Report 2009-8, Jakarta: ERIA. 165-95.

Levin, A., Lin, C., Chu, J., and Shang, C. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, 108(1), 1-24.

Li, X., and Liu, X., (2005). Foreign direct investment and economic growth: an increasingly endogenous relationship. *World Development*, 33, 393-407.

Liangshu. Qi., (2007). The Relationship between Growth, Total Investment and Inward FDI: Evidence from Time Series Data, *International Review of Applied Economics*, 21(1), 119-33.

Lim, E.G., (2001). Determinants of, and the Relation Between, Foreign Direct Investment and Growth: A Summary of the Recent Literature, IMF Working Paper, No. 175.

Lipsey,R.E., (1999). The location and characteristics of US affiliates in Asia, NBER working paper no. 6876.

_____, (2000). Inward Foreign Direct Investment and Economic Growth in Developing Countries. *Transitional Corporations*, 9, 67-95.

_____, (2002). Home and host country effects of FDI, NBER Working Paper No. 9293.

Liu, X, Song, H, Wei, Y., and Romilly, P., (1997). Country Characteristics and Foreign Direct Investment in China: A Panel Data Analysis, *Weltwirtschaftliches Archiv*, 133(2), 313-29.

Loree, D.W. and Guisinger, S.E., (1995). Policy and Non policy Determinants of US Equity Foreign Direct Investment, *Journal of International Business Studies*, 26(2), 281-300.

Lucas,R., (1988). On the mechanics of economic development, *Journal of Monetary Economics*, 22, 3-42.

_____, (1993). On the Determinants of Direct Foreign Investment: Evidence from East and Southeast Asia. *World Development*, 21 (3), 391-406.

Lundvall, K., and Battese, G.E., (2000). Firm Size, Age and Efficiency: Evidence from Kenyan Manufacturing Firms, *Journal of Development Studies*, 36(3), 146-63.

Lydon, R. and Williams, M., (2005). Communications Networks and Foreign Direct Investment in Developing Countries. Munich Personal REPEC Archive Paper No. 2492.

Maeso-Fernandez, Osbat, F.C., and Schntz, B., (2005). Pitfalls in Estimating Equilibrium Exchange Rates for CEE Acceding Countries: Methodological Issues and a Panel Cointegration Perspective, European Central Bank, Working Paper No. 353.

Mah, J., (2010). Foreign direct investment inflows and economic growth of China. *Journal of policy Modeling*, 32,155-58.

Makki, S.S., and Somwaru, A., (2004). Impact of Foreign Investment and Trade on Economic Growth: Evidence from Developing Countries, *American Journal of Agricultural Economics*, 86, 795-801.

Marchant, M.A., Cornell, D.N. and Koo, W., (2002). International Trade and Foreign Direct Investment: Substitutes or Complements?, *Journal of Agricultural and Applied Economics*, 34(2), 289-302.

Markusen, J. R., (1998). Multinational Firms, Location and Trade, *World Economy*, 21(6), 733-56.

_____, (2002). *Multinational Firms and the Theory of International Trade*. Cambridge: MIT Press.

Marwah, K., and Tavakoli, A., (2004), The Effects of Foreign Capital and Imports on Economic Growth. *Journal of Asian Economics*, 15, 399-413.

Mello, L.R., (1997). Foreign Direct Investment in Developing Countries and Growth: A Selective Survey, *Journal of Development Studies*, 34(1), 1-34.

Menon, J., (1999). Lao PDR in the ASEAN Free Trade Area, *Journal of the Asia Pacific Economy*, 340-64.

Merlevede, B. and Schoors, K., (2004). Determinants of Foreign Direct Investment in Transition Economies. Accessed on 20 May 2006 at http://www.iue.it/ECO/Conferences/accession_countries/papers/EUIconference .

Meyer, K.E., (1995). Direct Foreign Investment in Eastern Europe: The Role of Labour Costs, *Comparative Economic Studies*, 37(4), 69-88.

Moore, M.O., (1993). Determinants of German Manufacturing Direct Investment: 1980-1988, *Review of World Economics*, 129(1), 120-38.

Morisset, J., (2000). Foreign Direct Investment in Africa Policies Also Matter, *Transnational Corporations*, UN, 9(2), 107-27.

Mundell, R.A., (1968). *International Economics*, Macmillan. New York.

Nair-Reichert, U., and Weinhold, D., (2001). Causality tests for cross-country panels: A new look at FDI and economic growth in developing countries. *Oxford Bulletin of Economics and Statistics*, 63(2), 153-71.

Nath, H. (2005). Trade, Foreign Direct Investment and Growth: Evidence from Transition Economies. SHSU Economics and International Business Working paper No. SHSU Eco WP05 04. Huntsville, TX: Sam Houston State University.

Navaretti, G.B. and Venables A.J., (2004). *Multinational Firms in the World Economy*. New Jersey: Princeton University Press.

Neary, J. P., (2009). Trade Costs and Foreign Direct Investment, *International Review of Economics and Finance*, 18(2), 207-218.

Neter, J., Wasserman, W., and Kutner, M.H., (1985). *Applied linear statistical models*. Homewood, IL:Irwin.

Ngozi, O.I, Kwakwa, V. Beckwith, A. and Ahmed, Z., (1999). Impact of Asia's Financial Crisis on Cambodia and the Lao PDR, *Finance & Development*, 36(3), www.imf.org/external/pubs/ft/fandd/1999/09/okonjo.htm

NSC (2007). *Report of Economic Census in 2006*. National Statistics Center, Vientiane,

O'Hearn, D., (1990). TNCs, Intervening Mechanisms and Economic Growth in Ireland: A Longitudinal Test and Extension of Bomschier Model. *World Development*, 18(3), 417-29.

O'Brien, R.M., (2007). A Caution Regarding Rules of Thumb for Variance Inflation Factors, *Quality and Quantity*, 41(5), 673-90.

OECD (2002). *Foreign Direct Investment for Development - Maximising Benefits, Minimising Costs*. OECD, Paris.

Ondrich, J., and Ruggiero,J., (2001). Theory and Methodology Efficiency measurement in the stochastic frontier model, *European Journal of Operational Research*, 129, 434-42.

Onyeiwu, S. and Shrestha, H., (2004). Determinants of Foreign Direct Investment in Africa, *Journal of Developing Societies*, 20(1-2), 89-106.

Pain, N. and Wakelin, K., (1998). Export Performance and the Role of Foreign Direct Investment, *Manchester School Supplement*, 66, 62-88.

Pain, N. and Welsum, D.V., (2003). Untying the Gordian Knot: The Multiple Links Between Exchange Rates and Foreign Direct Investment, *Journal of Common Market Studies*, 41(5), 823-46.

Pan, Y., (2003). The inflow of foreign direct investment to China: the impact of country-specific factors. *Journal of Business Research*, 56, 829-33.

Pantulu, J. and Poon, J.P.H., (2003). Foreign Direct Investment and International Trade: Evidence from the US and Japan, *Journal of Economic Geography*, 3, 241-59.

Park, Y, Shin, J and Kim, T., (2009). Firm Size, Age, Industrial Networking and Growth: a Case of the Korean Manufacturing Industry, *Small Business Economics*, 1-16.

Pedroni, P., (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61(1), 653-70.

Pitelis, C., (1996). Effective Demand, Outward Investment and the Theory of the Transnational Corporation: An Empirical Investment, *Scottish Journal of Political Economy*, 43(2), 192-206.

Plasmans, J., (2006). *Modern Linear and Nonlinear Econometrics*. New York: Springer Verlag.

Portes, R., and Rey, H., (2005). The Determinants of Cross-Border Equity Flows. *Journal of International Economics*, 65(2), 269-96.

Pradhan, R.P., (2009). The FDI-Led-Growth Hypothesis in ASEAN-5 Countries: Evidence from Cointegrated Panel Analysis. *International Journal of Business and Management*, 4(12), 153-64.

Quazi, R., (2007). Economic Freedom and Foreign Direct Investment in East Asia. *Journal of the Asia Pacific Economy*, 12(3), 329-44.

Romer,P., (1990). Endogenous technological change. *Journal of Political Economy*, 98, 71-102.

Sachs and Warner, (1995). Natural Resource Abundance and Economic Growth, NBER Working Paper No. 5398.

Scheider, F and Frey, B.S., (1985). Economic and political determinants of foreign direct investment, *World Development*, 13(2), 161-75.

Schiff, M., and Wang, Y., (2008). North-South and South-South trade related technology diffusion: How important are they in improving TFP growth?. *Journal of Development Studies*, 44(1), 49-59.

Shaukat, A., and Wie. G., (2005). Determinants of FDI in China, *Journal of Global Business and Technology*, 1(2), 21-33.

Shiells, C.R., (2003). Imperfect Competition and the Design of VAT Regimes: The Case of Energy Trade between Russia and Ukraine, IMF Woking Papers 02/235, International Monetary Fund.

Sjoholm, F., (1999). Technology gap, competition, and spillovers from foreign direct investment: Evidence from establishment data. *Journal of Development Studies*, 36(1), 53-73.

Smeets, R. A., (2008). Collecting the pieces of the FDI knowledge spillovers puzzle. The World Bank Research Observer, 23(2), 107-38.

Suruga, T., and Onphanhdala, P., (2010). FDI and the Investment Climate in Lao PDR, *Lao Trade Research Digest*, 1(1), 31-57.

Sylwester, K., (2005). Foreign Direct Investment, Growth, and Income Inequality in Less Developing Countries. *International Review of Applied Economics*, 19(3), 289-300.

Tahir, R., and Larimo, J., (2004). Understanding the location strategies of the European firms in Asian countries. *Journal of American Academy of Business*, 5 (12), 102-9.

Takii, S. (2005). Productivity spillovers and characteristics of foreign multinational plants in Indonesian manufacturing 1990-95. *Journal of Development Economics*, 76(2), 521-42.

Timmer, C., (1971). Using a probabilistic frontier production function to measure technical efficiency, Journal of Political Economy 79, 776-94.

Tran, T.B, Grafton, R.Q and Kompas, T., (2008). Firm Efficiency in a Transitional Economy: Evidence from Vietnam, *Asian Economic Journal*, 22(1), 47-66.

Tsai, P.L., (1994). Determinants of foreign direct investment and its impact on economic growth, *Journal of Economic Development*, 19, 137-63.

UNCTAD, (1991). *World Investment Report: The Triad in Foreign Direct Investment*. New York: United Nations.

_____, (2001). *World Investment Report*, United Nations, New York.

_____, (2006). *World Development Report: FDI from Developing and Transition Economies: Implications for Development*. New York and Geneva: United Nations.

_____, (2010). *An investment guide to the Lao People's Democratic Republic, UNCTAD/DIAE/PCB/ 2010/02*. New York and Geneva: United Nations.

United Nations, (1993). *Foreign Direct Investment and Trade Linkages in Developing Countries*. New York: The United Nation.

Vadlamannati, K.C., Tamazian, A., and Irala, L.R., (2009). Determinants of Foreign Direct Investment and Volatility in South East Asian Economies. *Journal of the Asia Pacific Economy*, 14, 246-61.

Van Den Broeck, J., Koop, G., Osiewalski, J. and Steel, M., (1994). Stochastic frontier models: A Bayesian perspective, *Journal of Econometrics*, 61, 243-303.

Vernon, R., (1966). International Investment and International Trade in the product cycle, *Quarterly Journal of Economics*, 2(1), 190-708.

Veugelers, R., (1991). Locational Determinants and Ranking of Host Countries: An Empirical Assessment, KYKLOS, 44, 363-82.

Vu, T. B., and Noy, I., (2009). Sectoral Analysis of Foreign Direct Investment and Growth in the Developed Countries. *Journal of International Financial Markets, Institutions and Money*, 19, 402-13.

Vu, T.B., Gangnes, B., and Noy, I., (2008). Is Foreign Direct Investment Good for Growth? Evidence from Sectoral Analysis of China and Vietnam, Journal of the Asia Pacific Economic, 13(4), 542-562.

Wei, Y., and Liu, X., (2001). *Foreign direct investment in China: Determinants and impact*. UK: Edward Elgar.

Wezel, T., (2003). Determinants of German Foreign Direct Investment in Latin American and Asian Emerging Markets in the 1990s, Discussion Paper 11/03, Economic Research Centre, Deutsche Bundesbank.

Wheeler, D. and Mody, A., (1992). International Investment Locational Decision: the case of US firms, *Journal of International Economics*, 33, 57-76.

Winner, H., (2005). Has Tax Competition Emerged in OECD Countries? Evidence from Panel Data, *International Tax and Public Finance*, 12, 667-87.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

World Bank, (2008). *Lao PDR Economic Monitor*. World Bank, Vientiane Office.

_____, (2009). Enterprise Surveys: Lao PDR 2009, The World Bank, Washington, D.C.

_____, (2010). *Lao PDR Economic Monitor,* issue 15, The World Bank Office, Vientiane Capital, Lao PDR.

_____, (2011). Lao PDR Investment Climate Assessment - Policies to Promote Growth in the Non Resource Sectors, the World Bank, Washington, D.C.

_____, (2012). Lao PDR Labour standards and productivity in the garments export sector: A survey of managers and workers, Poverty Reduction and Economic Management Sector Department, East Asia and Pacific Region, Report No. 70809-LA. 1-52.

Xing, Y. and Wan, G., (2006). Exchange Rates and Competition for FDI in Asia, *World Economy*, 29(4), 419-34.

Yeaple, S.R., (2003). The Role of Skill Endowments in the Structure of U.S. Outward Foreign Direct Investment, *Review of Economics and Statistics*, 85(3), 726-34.

Zaidi, H.H., (2004). Snags in the Inflow of FDI, DOWN-Business 09 August, 2004. Available at http://archives.dawn.com/2004/08/09/ebr7.htm

Zhang, K. H., (2001). Does Foreign Direct Investment Promote Economic Growth? Evidence from East Asia and Latin America. *Contemporary Economic Policy*, 19(2), 175-85.

Zhao, H., (2003). Country Factor Differentials as Determinants of FDI Flow to China, *Thunderbird International Business Review*, 45(2), 149-69.

Appendix

Table 14: Variable Name, Terminology and Data Sources

Variable Name	Terminology and Data Sources
FDI	Real annual approved FDI inflows into Laos from 1996 to 2009. Real approved FDI is computed as approved FDI in current million US dollars divided by Lao's GDP deflator (2000 is a base year). Data on approved FDI is from Investment Promotion Department, *Ministry of Planning and Investment*, and GDP deflator from the IMF's *World Economic Outlook's databases.*
Minerals	Relative real mining and fuels export: ratio of the share of mining and fuels in total exports of Laos to the home countries. Source: WTO statistics database and data on Laos are from UNCTAD statistics.
Manuf	Relative real manufactures export: ratio of the share of manufactures in total exports of Laos to the home countries. Source: WTO statistics database and data on Laos are from UNCTAD statistics.
Agri	Relative real agricultures export: ratio of the share of agriculture in total exports of Laos to the home countries. Source: WTO statistics database and data on Laos are from UNCTAD statistics.
GDP	Relative real GDP: the ratio of GDP of Laos to the real GDP of home countries, measured in Purchasing Power Parity. Real GDP is derived from GDP in current US$ deflated by GDP deflator in base year 2000. Sources: IMF's *World Economic Outlook's databases.*
Labour	Relative labour productivity, computed as the ratio of real GDP to the labour force of the country. Sources: *World Bank, World Development Indicator*.
DInflation	Difference between the inflation rate of Laos and the home countries. Inflation rate is the rate of change in GDP deflator. Source: IMF's *World Economic Outlook's databases.*
Exchange	Relative real exchange rate: the ratio of the real Kip/ US$ exchange rate to the currency of home countries/ US$ exchange rate. Real exchange rate is computed as official nominal exchange rate divided by the CPI deflator. Source: *IMF's International Financial Statistics.*
Dinterest	The difference between the real interest rate of Laos and the home country's real interest rate. Inflation rate is used to convert the nominal values into real terms. Source: *IMF's International Financial Statistics*
Openness	Ratio of Laos' total trade to GDP, (the sum of exports plus imports to GDP), to the home country. Sources: *UN Comtrade and ADB.*

Tel	Ratio of the mobile and fixed line telephone subscribers per 100 people of Laos to home country. Source: *World Bank, World Development Indicators and UN data (*http://data.un.org).
Distance	Geographic distance between Laos and the home country, measured in kilometers between the capital city of Laos (Vientiane) and the capital city of the home country. Source: *World atlas.*
Ecofreedom	The ratio of annual economic freedom rating for Laos to Home country's annual economic freedom rating. The rating is scaled from 0 to 100, where 100 represents the maximum freedom. Source: *The Wall Street Journal and The Heritage Foundation*.
ASEAN	Dummy variable, equal to 1 for the years 1997 when Laos became a member of the Association of Southeast Asian Nations (ASEAN) to 2009 and 0 for previous years.
CRISIS	Dummy variable, equal to 1 for 1997, 1998 and 1999, the years of the Asian financial crisis, and 0 for the other years.

Table 15: Statistical Summary on the Determinants of FDI Inflows

Variable		Mean	Std. Dev.	Min	Max	Observations	
fdi	overall	.8059123	2.839431	0	29.33271	N =	224
	between		1.254662	.008142	5.100263	n =	16
	within		2.565143	-4.263893	25.03836	T =	14
minerals	overall	.5159368	.7614025	.0051969	4.770009	N =	224
	between		.3863261	.0596951	1.429639	n =	16
	within		.6627114	-.7392697	3.856307	T =	14
manuf	overall	1.005672	.6771086	.5145281	3.939286	N =	224
	between		.6562653	.6319682	2.714888	n =	16
	within		.229998	.3405188	2.230069	T =	14
agri	overall	5.417666	6.872716	.557128	40.42557	N =	224
	between		6.391328	1.035744	26.33527	n =	16
	within		2.960827	-13.23524	19.50796	T =	14
gdp	overall	.0252211	.0422033	.0005	.2790479	N =	224
	between		.0271483	.0010218	.0861345	n =	16
	within		.0329704	-.0228092	.2288538	T =	14
labour	overall	.2904734	.6228908	.0224246	4.333741	N =	224
	between		.4100923	.0505841	1.344857	n =	16
	within		.4791881	-.4318964	3.415988	T =	14
dinfla~n	overall	20.17544	34.08524	-16.17993	128.2182	N =	224
	between		2.07819	15.08661	23.89944	n =	16
	within		34.02553	-11.0911	127.6637	T =	14
exchange	overall	2406.967	3452.172	.0725833	13415.75	N =	224
	between		2917.09	.3474329	8932.489	n =	16
	within		1975.889	-5175.142	6890.227	T =	14
dinter~t	overall	7.591761	17.00159	-48.45854	33.49993	N =	224
	between		1.289216	5.032203	9.75926	n =	16
	within		16.9555	-47.32005	33.60925	T =	14
openness	overall	.0104738	.02698	.0000609	.1884843	N =	224
	between		.0256851	.0004242	.1041471	n =	16
	within		.0103274	-.0231448	.094811	T =	14
tel	overall	.1402368	.1917859	.0048923	1.135225	N =	224
	between		.1389523	.0656834	.6011937	n =	16
	within		.1363805	-.1813429	.6742682	T =	14
distance	overall	5994.668	4217.494	500.54	13899.26	N =	224
	between		4346.075	500.54	13899.26	n =	16
	within		0	5994.668	5994.668	T =	14
ecofre~m	overall	.6278099	.1394294	.381549	1.01004	N =	224
	between		.1143935	.4706811	.9018916	n =	16
	within		.0843655	.482126	.8183035	T =	14
asean	overall	.9285714	.2581162	0	1	N =	224
	between		0	.9285714	.9285714	n =	16
	within		.2581162	0	1	T =	14
crisis	overall	.2142857	.4112449	0	1	N =	224
	between		0	.2142857	.2142857	n =	16
	within		.4112449	0	1	T =	14

Table 16: Correlation Results for the Determinants of FDI Inflows

	fdi	minerals	manuf	agri	gdp	labour	dinflation	exchange	dinterest	openness	tel	distance	ecofreedomm	asean	crisis
fdi	1														
minerals	-0.0120	1													
manuf	-0.0067	-0.2648	1												
agri	-0.1259	0.1791	-0.2499	1											
gdp	0.1602	-0.2292	0.1495	-0.1262	1										
labour	0.1133	-0.1249	-0.0229	-0.1654	0.3977	1									
dinflation	0.2167	-0.1959	-0.0134	-0.0444	0.2843	0.2237	1								
exchange	-0.1505	0.0067	-0.0286	-0.0677	-0.2283	-0.2628	-0.2328	1							
dinterest	-0.2618	0.2350	-0.0128	0.1049	-0.3664	-0.3261	-0.9569	0.2836	1						
openness	0.3131	0.1436	-0.0807	-0.1539	0.0784	0.1074	-0.0498	-0.1685	0.0282	1					
tel	-0.0496	0.2475	-0.0116	-0.2270	-0.0903	0.1853	-0.2860	-0.1562	0.2220	0.1171	1				
distance	-0.1469	-0.0560	0.1461	-0.1803	-0.2857	-0.3565	0.0186	0.3195	0.0259	-0.3836	-0.2935	1			
ecofreedom	-0.0537	0.3428	-0.0253	-0.2191	-0.0051	0.3696	-0.3235	-0.1895	0.2989	0.1874	0.7431	-0.3862	1		
asean	-0.2159	0.1560	0.0253	-0.0197	-0.3716	-0.3163	0.0266	0.1643	0.1088	0.0031	0.1293	0.0000	0.0600	1	
crisis	0.1535	-0.1906	0.0391	-0.1233	0.2401	0.2020	0.7965	-0.2910	-0.7900	-0.0257	-0.2401	-0.0000	-0.2944	0.1448	1

Table 17: Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
fdi	1.30	1.14	0.7696	0.2304
minerals	1.52	1.23	0.6599	0.3401
manufacturing	1.22	1.11	0.8172	0.1828
agri	1.79	1.34	0.5598	0.4402
gdp	1.67	1.29	0.6004	0.3996
labour	2.11	1.45	0.4741	0.5259
dinflation	19.39	4.40	0.0516	0.9484
exchange	1.47	1.21	0.6789	0.3211
dinterest	22.28	4.72	0.0449	0.9551
openness	1.45	1.21	0.6884	0.3116
Tel	2.76	1.66	0.3626	0.6374
distance	2.12	1.46	0.4714	0.5286
ecofreedom	4.13	2.03	0.2423	0.7577
asean	2.02	1.42	0.4947	0.5053
crisis	3.54	1.88	0.2824	0.7176
Mean VIF	4.58			

Table 18: Summary of the Key Determinants of Inward FDI in the Literatures.

Authors	Title	Countries and Time Period	Methods	Results of the study
Liu, X, Song, H, Wei, Y., & Romilly, P., (1997)	Country Characteristics and Foreign Direct Investment in China: A Panel Data Analysis	Studies 22 home countries investing in China from 1983-1994	GLS	In the case of realized FDI, inward FDI is determined by relative real wage rates, exchange rate, economic integration represent by real exports and imports. For pledged FDI, market size and cultural differences are determinants of FDI. The study fails to support the hypotheses that relative borrowing costs, country risk and geographic distance influence inward FDI.
Wei, Y., and Liu, X., (2001)	Foreign direct investment in China: Determinants and Impact	Applies data from 22 investing partners over the period 1983-1998 for contracted FDI and 19 home countries from 1984-1998 for realized FDI.	OLS and Random Effects	The results indicate that both contracted and realized FDI inflows are positively affected by market size, economic integration (export and import), but negatively associated with wage rates, country risk and cultural differences. Geographic distance is not a significant determinant of inward FDI.
Zhao, H., (2003)	Country Factor Differentials as Determinants of FDI Flow to China	Analyzes data from 21 source countries over a period 1983-1999	OLS	The statistical result shows that, while the market condition variables and high values of source country currencies positively influenced the flow of FDI to China, the relatively high costs of capital borrowing and political and operational risks inhibit the flow of FDI in China.
Yeaple, S.R., (2003)	The Role of Skill Endowments in the Structure of U.S. Outward Foreign Direct Investment	Investigates U.S. FDI by country and industry. The data, which are aggregated to the industry level from the level of the affiliate, are taken from the Benchmark Survey of 1994 and covers 39 countries and 50 BEA manufacturing industries.	OLS	The results show that scale economy and market size (GDP) variables are motives for FDI. The one result not consistent with this motive is transport cost (freight and insurance cost and tariff), the negative coefficient on freight and insurance, which suggests that shipping costs deter the replication of productive activities across countries. The positive coefficient on tariff, however, is consistent with a tariff-jumping motive for FDI.

Tahir, R., and Larimo, J., (2004).	Understanding the location strategies of the European firms in Asian countries	Studies 10 South and Southeast Asian countries from 1980 to 2000		The results indicate market size, cultural distance and wage rates in the host country increase the probability of undertaking market-seeking and efficiency-seeking FDIs. Also, inflation rate, risks and exchange rate in the target country increase the probability of undertaking risk-reduction seeking.
Gao, T. (2005)	Foreign Direct Investment from Developing Asia: Some Distinctive Features	Studies 24 OECD countries (including South Korea) to 63 host countries for 1994-1997	OLS and Tobit model	The study finds that GDP, GDP per capital, GDP growth, distance and language variables are determinants of bilateral FDI inflows but that a common border, a colonial tie, and the same free trade agreement are not.
Asiedu,E (2006)	Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability	Analyzes the analysis covers 22 countries in Sub-Saharan Africa over the period 1984-2000	Fixed Effects	The results indicate that large local markets, natural resource endowments, good infrastructure, low inflation, an efficient legal system and a good investment framework promote FDI. In contrast, corruption and political instability have the opposite effect.
Karimi, M.S, Yusop, Z & Law, S.H., (2010)	Location Decision for FDI in ASEAN Countries: A TOPSIS Approach	Examines ASEAN countries for period 2000-2005	TOPSIS	Results indicate that Singapore remains the most attractive for investment among ASEAN countries while the ranking of other countries has changed during these years

Table 19: Hausman Test

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 27.01

Prob>chi2 = 0.0046

(V_b-V_B is not positive definite)

Table 20: Breusch and Pagan Lagrangian Multiplier Test for Random Effects

fdi[idcode,t] = Xb + u[idcode] + e[idcode,t]

Estimated results:

| Var sd = sqrt(Var)

---------+----------

fdi | 8.006363 2.829552

e | 6.477885 2.545169

u | 0 0

Test: Var(u) = 0

chi2(1) = 2.21

Prob > chi2 = 0.1374

Table 21: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variable	chi2	df	p
minerals	9.45	1	0.0021 #
manufacturing	1.01	1	0.3155 #
agri	22.65	1	0.0000 #
gdp	101.08	1	0.0000 #
labour	67.61	1	0.0000 #
inflation	1.67	1	0.1958 #
exchange	40.04	1	0.0000 #
interest	7.38	1	0.0066 #
openness	260.59	1	0.0000 #
tel	15.76	1	0.0001 #
distance	64.86	1	0.0000 #
ecofreedom	21.41	1	0.0000 #
asean	299.90	1	0.0000 #
crisis	17.97	1	0.0000 #
simultaneous	691.24	14	0.0000

unadjusted p-values.

Table 22: Wooldridge test for autocorrelation in panel data

H0: no first order autocorrelation

F(1, 15) = 7.008

Prob > F = 0.0183

Table 23: List of Selected Industries

Broad Sectors	Included Industries
Primary Sector	Agriculture, Forestry, Mining and Quarrying.
Secondary Sector	Manufacturing: Large-scale and small-scale; Food, Beverages, Tobacco, Textiles, Clothing, Chemical and Chemical Products, Basic Metals and Metal Products, Machinery equipment and Electrical machinery, Motor vehicles and other transport equipment.
Tertiary Sector	Banking, Telecommunication, Hotel and Restaurant, Consultancy, Construction, Electricity and Gas Distribution, Wholesale and Retail Trade, Transport, and other Services.

Table 24: Summary Statistics of the Causal Links between FDI and GDP

	FDI	GDP
Mean	2.408978	7.527746
Median	0.200893	2.099808
Maximum	86.56343	102.4928
Minimum	1.00E-06	0.044846
Std. Dev.	9.214822	16.30376
Skewness	6.551389	3.927961
Kurtosis	50.53842	18.17599
Jarque-Bera	20972.41	2518.726
Probability	0.000000	0.000000
Sum	498.6583	1558.243
Sum Sq. Dev.	17492.07	54757.42
Observations	207	207

Table 25: Correlation Results for the Causal Links between FDI and GDP

	LNFDI	LNGDP
LNFDI	1.000000	0.157421
LNGDP	0.157421	1.000000

Table 26: FDI Elasticity of GDP by Sectors (1988-2010)

	Elasticity	t-Statistic
Primary Sector :		
Agriculture	-0.101182	-1.772381
Mining and Quarrying	0.294260	2.733465
Secondary Sector :		
Manufacturing	0.481616	3.618500
Tertiary Sector :		
Trade	0.350113	4.717969
Telecom	0.019956	0.623199
Construction	0.001151	0.035807
Banking	0.057515	1.608964
Electricity	-0.004836	-0.341748
Other Services	0.154455	1.730997

Figure 8: FDI Inflow and GDP in the Agriculture Sector (Thousand $)

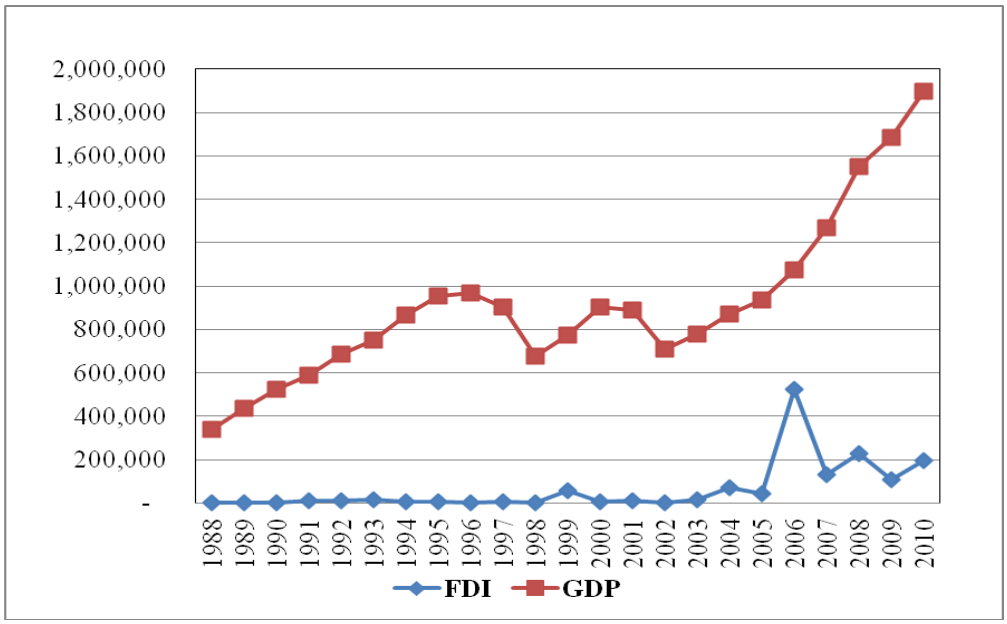

Figure 9: FDI Inflow and GDP in the Mining Sector (Thousand $)

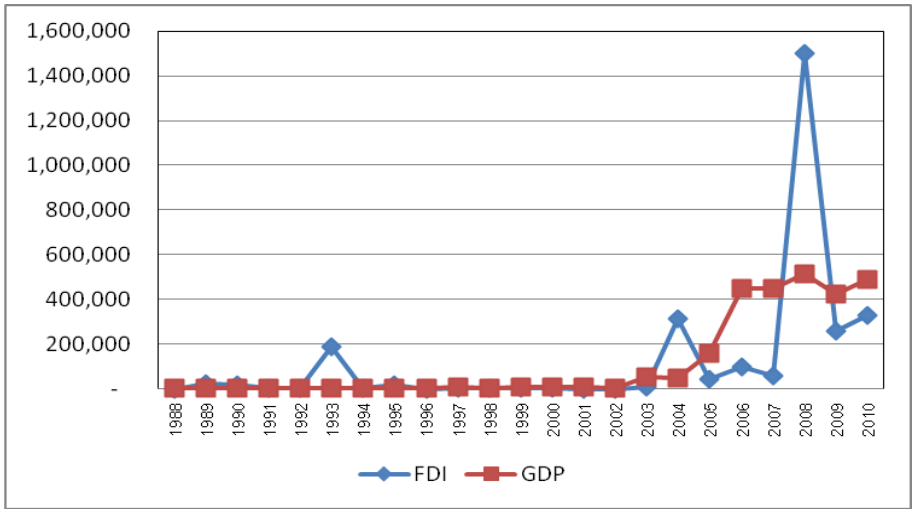

Figure 10: FDI Inflow and GDP in the Manufacturing Sector (Thousand $)

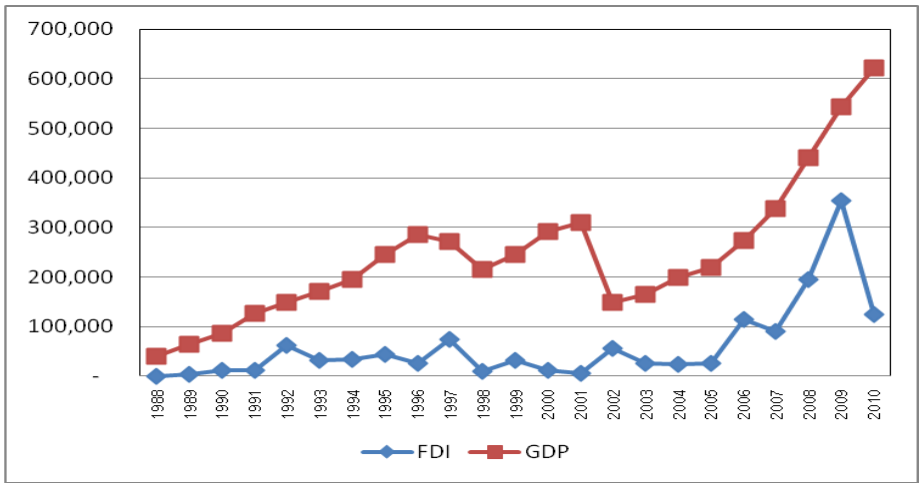

Figure 11: FDI Inflow and GDP in the Trade Sector (Thousand $)

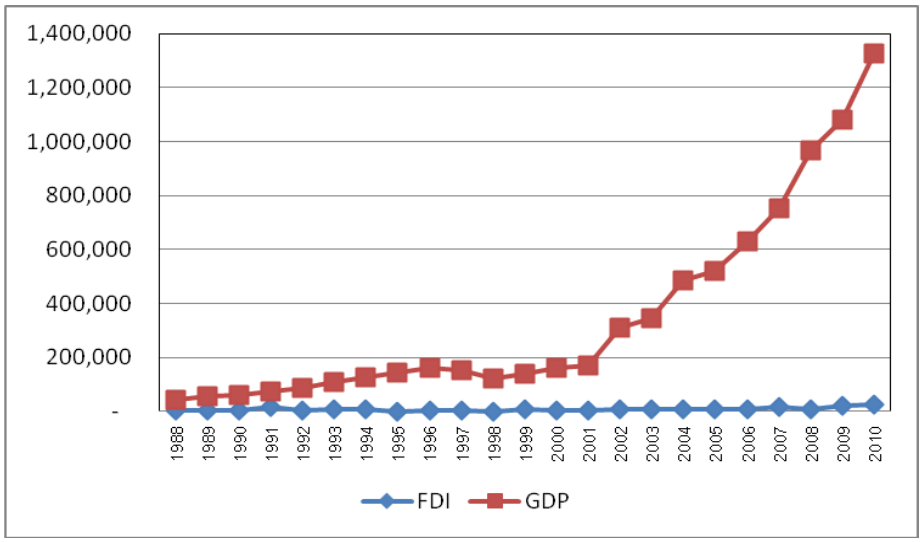

Figure 12: FDI Inflow and GDP in the Banking sector (Thousand $)

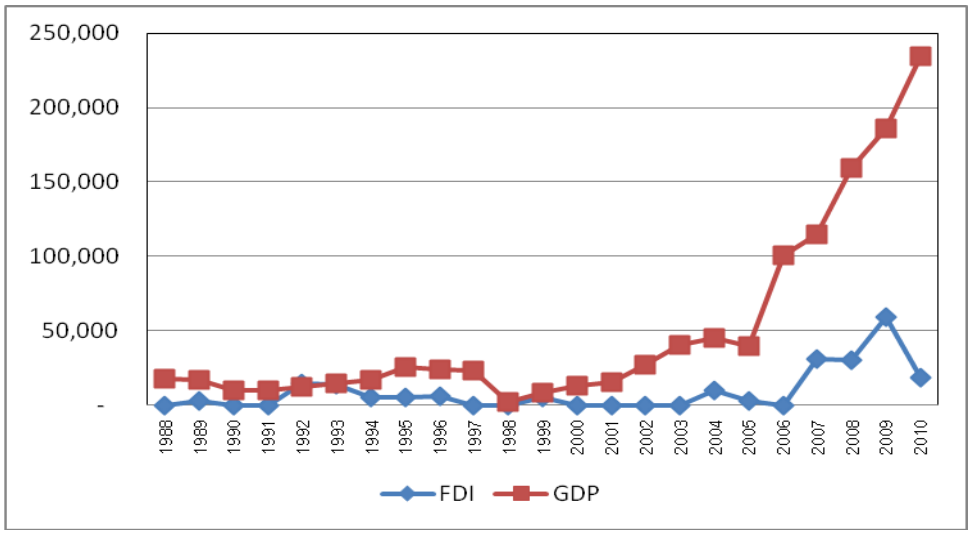

Figure 13: FDI Inflow and GDP in the Services Sector (Thousand $)

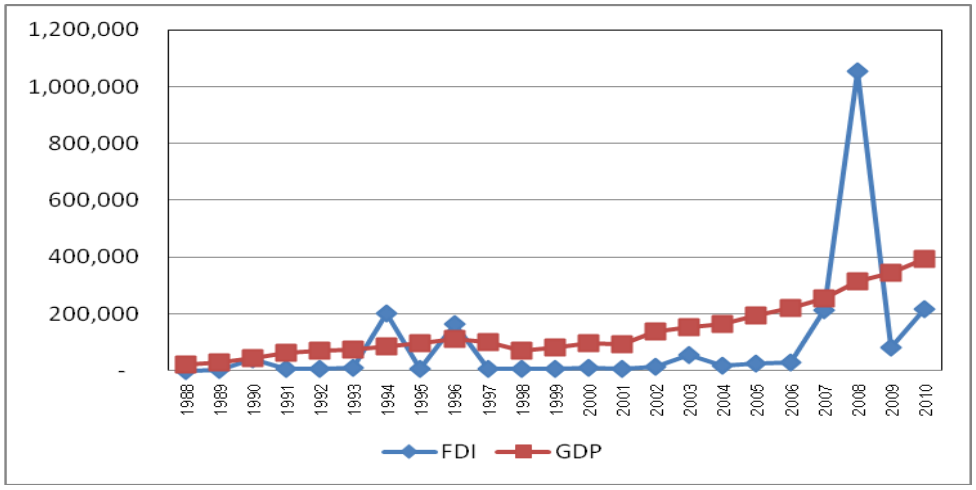

Figure 14: FDI Inflow and GDP in the Construction Sector (Thousand $)

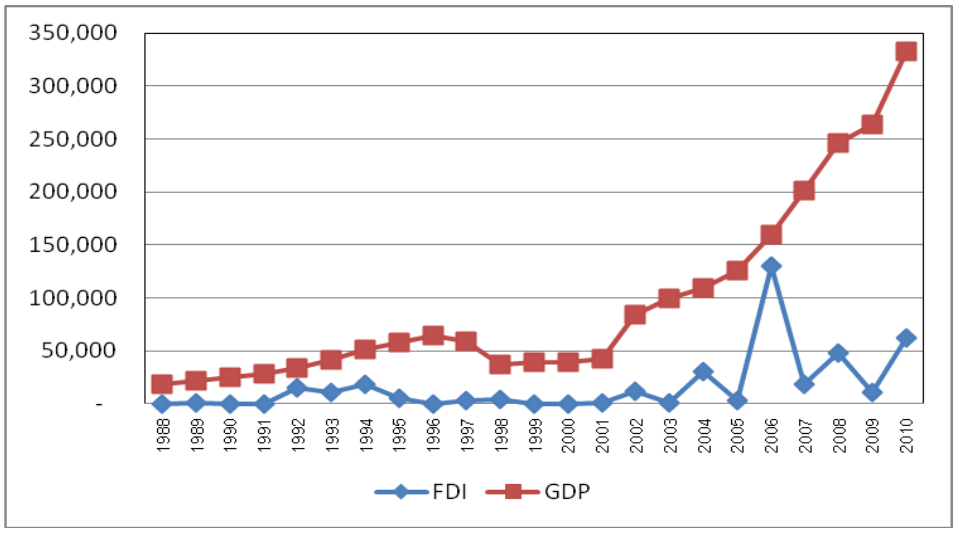

Figure 15: FDI Inflow and GDP in the Telecom Sector (Thousand $)

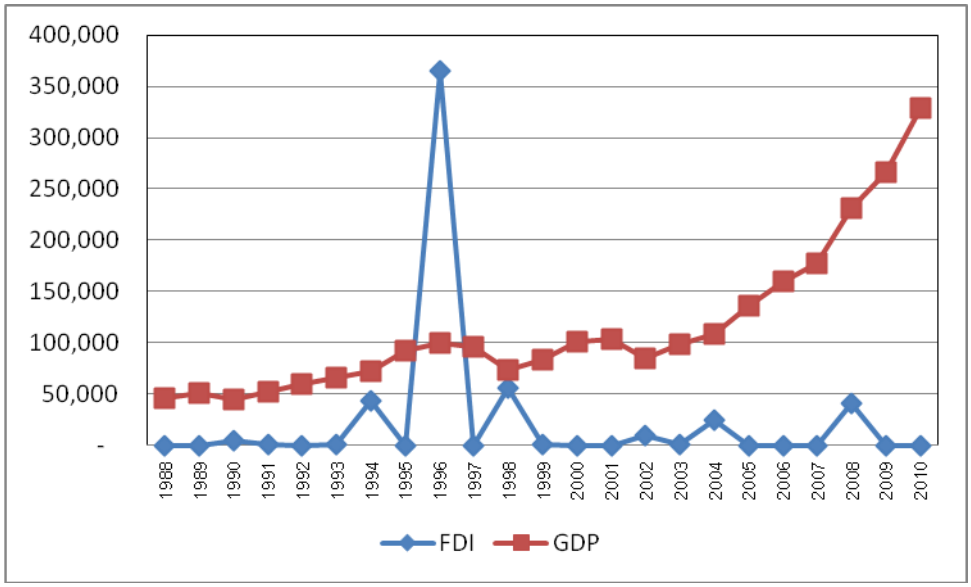

Figure 16: FDI Inflow and GDP in the Electricity Sector (Thousand $)

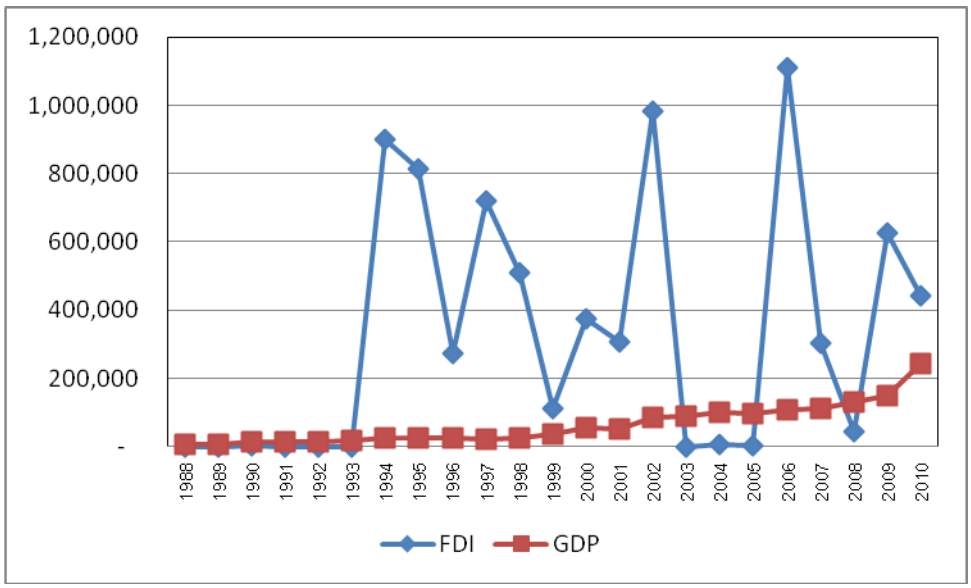

Table 27: Summary of the Key Literature on Causal Link between FDI and GDP

Authors	Title	Countries and Time Period	Methods	Results of the studies
Alfaro, L., (2003)	Foreign direct investment and growth: Does the sector matter?	Uses cross country data for 47 countries for the period 1981-1999.	OLS with White's correction of heteroskedasticity	Aggregate FDI has an ambiguous effect on growth. FDI in the primary sector has a negative effect on growth, while investment in manufacturing a positive one. Evidence from the service sector is ambiguous.
Basu, P., Chakraborty, C., and Reagle, D. (2003)	Liberalization, FDI, and growth in developing countries: A panel cointegration approach	Studies 23 developing countries from 1978 to 1996.	A panel cointegration framework, a vector error correction model	In both the long run and short run, there is evidence of bidirectional causality. The cointegrating vectors show bidirectional causality between GDP and FDI for more open countries. For closed economies, long run causality occurs unidirectional and runs from GDP to FDI.
Vu, T.B., Gangnes, B and Noy, I., (2006)	Is Foreign Direct Investment Good for Growth? Evidence from Sectoral Analysis of China and Vietnam	Studies FDI projects implemented for eleven economic sectors from 1988 to 2002	Feasible generalized least squares (FGLS) estimator	FDI has positive impacts on economic growth operating directly and through labour productivity. The effect varies across economic sectors, with almost all the beneficial impact limited to manufacturing. Other sectors appear to gain very little growth benefit from sector-specific FDI.
Khaliq., A and Noy., I (2007)	Foreign Direct Investment and Economic Growth: Empirical Evidence from Sectoral Data in Indonesia.	Analyzes detailed sectoral data for FDI inflows to Indonesia over the period 1997-2006.	Fixed effect estimation	Aggregate FDI has a positive effect on economic growth. The estimate result of the impacts across sectors show that very few FDI sectors have a positive effect on economic growth and one sector even showing a robust negative impact (mining and quarrying).

Chandana, C. and Nunnenkamp, P., (2008)	Economic Reforms, FDI, and Economic Growth in India: A Sector Level Analysis	Analyzes data from 15 industries in the primary, secondary and tertiary sectors, during the period 1987–2000.	A panel cointegration framework, a vector error correction model.	At the aggregate level, there are feedback effects between FDI and output both in the short and the long run. At the sector level, it turns out that FDI and output are mutually reinforcing in the manufacturing sector, whereas no causal relationship exists in the primary sector. There are transitory effects of FDI on output in the services sector since FDI in the services sector promotes growth in the manufacturing sector through cross-sector spillovers.
Vu, T. B., and Noy, I., (2009)	Sectoral Analysis of Foreign Direct Investment and Growth in the Developed Countries	Studies six country members of the OECD from 1980-2003.	OLS and fixed effect estimations	FDI has a positive impact on economic growth both directly or through its interaction with labour. However, the effect is not equally distributed across countries and sectors. In some sectors, there is no evidence that FDI enhances economic growth.
Akulava., M (2011)	The impact of foreign direct investment on industrial economic growth in Belarus	Analyzes the Belarusian industrial aggregated panel data over the 2002-2009 period	fixed and random effect panel estimators	FDI impacts economic performance across sectors. The results show both positive impact of FDI on the construction industry, IT, real estate, machinery, food and fuel industries, and negative effects on black metallurgy, construction materials, forestry, culture and communications industries.
Khan, M.A and Khan, S.A, (2011)	Foreign Direct Investment and Economic Growth in Pakistan A Sectoral Analysis	Studies 23 industries in the panel for a period of 1981-2008.	Panel Dynamic Least Squares (PDOLS) technique and Error-correction model using seemingly unrelated regression (SUR) method	In the long run, there is evidence of unidirectional causality between FDI and real GDP. However, there exists bidirectional causality in the short run. At the sectoral level, unidirectional causality runs from FDI to real GDP in the primary sector. For manufacturing sector, unidirectional causality runs from GDP to FDI is found. Evidence of unidirectional causality running from FDI to output is also found for the services sector.

In the Case of Using Exchange Rate as a Control Variable in the Model for Causal link between Industry-Specific FDI and Economic Growth

Several studies examine the relationship between exchange rate and FDI and its relation with GDP. The impact of exchange rate on FDI and GDP differs among countries. Therefore, this paper applies exchange rate as a control variable in the model since all payments for foreign investment activities are made in terms of US$. After obtaining the empirical results from the two main variables FDI and GDP, this paper also estimates the Granger causality model with dynamic error correction by adding exchange rate as a control variable. The results show that after controlling the FDI and GDP by exchange rate, the result of Granger Causality remains the same. The form of the dynamic error correction models are as follows:

$$\Delta \ln FDI_{it} = \alpha_{1i} + \lambda_{1i} e_{it-1} + \Sigma_k \varphi_{1ik} \Delta \ln FDI_{i,\, t-k} + \Sigma_k \varphi_{2ik} \Delta \ln GDP_{i,\, t-k} + \Sigma_k \varphi_{3ik} \Delta \ln EX_{i,\, t-k} + u_{1it} \quad (12)$$

$$\Delta \ln GDP_{it} = \alpha_{2i} + \lambda_{2i} e_{it-1} + \Sigma_k \theta_{1ik} \Delta \ln GDP_{i,\, t-k} + \Sigma_k \theta_{2ik} \Delta \ln FDI_{i,\, t-k} + \Sigma_k \theta_{3ik} \Delta \ln EX_{i,\, t-k} + u_{2it} \quad (13)$$

The results of the LLC and IPS tests reported in Table 28 show that the null hypothesis of non-stationarity is rejected by the left tail of the normal distribution and this paper fails to reject the null hypotheses across different models since the first three rows of M1 and M2 have positive and small negative values. The last three rows under models M1 and M2 indicate the results of the panel unit root statistics on GDP, FDI and exchange rate in the first differences. The null hypothesis of non-stationarity is rejected for all models as a result of the large negative values for the statistics. Therefore, it can be concluded that GDP, FDI inflows and exchange rate are non-stationary at their levels and stationary at their first differences. This implies that GDP, FDI and exchange rate are integrated of order one I(1).

Table 28: Unit Root Test Results with Exchange Rate

H_0: Variables are non-stationary

Variables	LLC	IPS	Decision
M1: Heterogeneous intercepts:			
Lngdp	-0.88677	0.00890	Accept
	(0.1876)	(0.5036)	
Lnfdi	1.80350	-1.05576	Accept
	(0.9643)	(0.1455)	
lnEx	2.264	0.849	Accept
	(0.9882)	(0.8023)	
Dlngdp	-3.02017***	-2.99477***	Reject
	(0.0013)	(0.0014)	
Dlnfdi	-7.27737***	-11.0909***	Reject
	(0.0000)	(0.0000)	
DlnEx	-3.608***	-1.693**	Reject
	(0.0002)	(0.0452)	
M2: Heterogeneous intercepts and trend:			
Lngdp	1.47449	1.57726	Accept
	(0.9298)	(0.9426)	
Lnfdi	4.43546	-0.17473	Accept
	(1.0000)	(0.4306)	
lnEx	2.772	1.624	Accept
	(0.9972)	(0.9479)	
Dlngdp	-1.96558**	-2.19080**	Reject
	(0.0247)	(0.0142)	
Dlnfdi	-4.35152***	-8.91667***	Reject
	(0.0000)	(0.0000)	
DlnEx	-3.623***	-2.87285***	Reject
	(0.0001)	(0.0074)	

Note: P-values are in the parentheses. *, ** and *** indicates rejection of the null hypothesis of no-cointegration at the 10, 5 and 1 percent levels of significance respectively.

Following the unit root test results, this paper then applies a panel cointegration technique based on Pedroni (1999) residual-based cointegration tests. This method allows for cointegrating vectors of different magnitudes between sectors as well as time fixed effects (Basu et al., 2003). The first four are referred to as panel cointegration statistics and the last three are recognized as group mean panel cointegration statistics. The findings of the cointegration tests in Table 29 show that the null hypothesis of no cointegration is rejected by panel Rho, panel PP and panel ADF tests. However, the panel V test fails to reject the null of no cointegration. Maeso-ernandez et al., (2006) propose that panel Rho and panel PP are more

reliable tests of cointegration, thus we have enough statistical support to conclude that GDP and FDI are cointegrated.

Table 29: Panel Cointegration Test Results with Exchange Rate

Statistics	**M1**	**M2**
Panel v-Statistic	1.165646 [0.1219]	-0.948136 [0.8285]
Panel rho-Statistic	-3.332854 [0.0004] ***	-1.381357 [0.0836] *
Panel PP-Statistic	-8.316722 [0.0000] ***	-9.314964 [0.0000] ***
Panel ADF-Statistic	-1.892975 [0.0292] **	-1.447194 [0.0739] *
Group rho-Statistic	-2.984058 [0.0014] **	-1.152823 [0.1245]
Group PP-Statistic	-12.84268 [0.0000] ***	-14.46627 [0.0000] ***
Group ADF-Statistic	-2.187716 [0.0143] ***	-2.267475 [0.0117] ***
Decision	**Reject H_0**	**Reject H_0**

Note: V-statistic test is right-sided, while the others are left-sided. p-values are in bracket. Null hypothesis: no cointegration; *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

Table 30: Causality Test Results for all Sectors with Exchange Rate

Null hypothesis	**Long- run**	**Short-run**
LnGDP does not Granger cause LnFDI	1.393107***	0.378278
	[-3.77723]	[0.42397]
LnFDI does not Granger cause lnGDP	0.717820***	0.00473
	[-7.54505]	[-0.08183]
LnEX does not Granger Cause LnGDP	0.523952	1.709742***
	[-0.27362]	[-6.31060]
LnGDP does not Granger Cause LnEX	1.908570***	0.041762*
	-1.908570	[1.90250]
LnEX does not Granger Cause LnFDI	0.729922	0.647920
	[0.28003]	[-0.20438]
LnFDI does not Granger Cause LnEX	1.370010***	0.001303
	[7.58847]	[-0.78351]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

The results from Table 30 show that both the hypotheses of no causality from GDP to FDI and exchange rate, and from FDI to GDP and exchange rate are rejected at the 1% in the long run, indicating strong bidirectional causality between GDP and FDI, and unidirectional causal runs from GDP and FDI to exchange rate. In the short run, there is bidirectional causality

between GDP and exchange rate. It means that exchange rate is affected by the GDP and FDI inflows in the short run.

Table 31: Causality Test Results for Three Board Sector Levels with Exchange Rate

Null hypothesis	Long run	Short run
Agriculture and Mining:		
LnGDP does not Granger cause LnFDI	0.788205*** [-4.57052]	1.691723 [-0.63342]
LnFDI does not Granger cause lnGDP	1.268706*** [-5.99665]	0.012045 [0.36612]
LnEX does not Granger Cause LnGDP	4.449323*** [-2.89651]	1.321333*** [-3.18729]
LnGDP does not Granger Cause LnEX	0.224753*** [-3.96883]	0.063907 [0.56546]
LnEX does not Granger Cause LnFDI	3.506978*** [3.35834]	3.667588 [0.77847]
LnFDI does not Granger Cause LnEX	0.285146*** [6.03748]	0.046525*** [3.19256]
Manufacturing:		
LnGDP does not Granger cause LnFDI	0.856408*** [-8.33980]	2.495907** [2.01349]
LnFDI does not Granger cause lnGDP	1.167668*** [-10.7868]	0.055396 [0.89975]
LnEX does not Granger Cause LnGDP	0.481872 [-0.72118]	0.464725 [-0.42057]
LnGDP does not Granger Cause LnEX	2.075239*** [-5.07812]	0.099536 [-0.52239]
LnEX does not Granger Cause LnFDI	0.412679 [0.73756]	1.260695 [0.24780]
LnFDI does not Granger Cause LnEX	2.423191*** [6.71735]	0.024522 [-0.56279]
Services:		
LnGDP does not Granger cause LnFDI	1.813496*** [-4.67495]	0.038641 [-0.02689]
LnFDI does not Granger cause lnGDP	0.551421*** [-4.61736]	0.042111* [-1.73663]
LnEX does not Granger Cause LnGDP	0.788978 [-0.89381]	1.159699*** [-2.24884]
LnGDP does not Granger Cause LnEX	1.267463*** [-3.85689]	0.139079 [1.08663]
LnEX does not Granger Cause LnFDI	1.430808 [1.01938]	2.114678 [0.62790]
LnFDI does not Granger Cause LnEX	0.698906*** [4.34453]	0.014544 [-0.85302]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

The Granger causality tests are repeated to investigate the direction and magnitude of the causal relationship among output, FDI inflows and exchange rate for the primary, manufacturing and services sectors. The finding reported in Table 31 indicates that the nature of causal links among FDI, output and exchange rate varies across sectors. For the primary sector, the hypotheses of no causality among the three variables GDP, FDI and exchange rate are rejected at the 1% level in the long run. It implies that there are bidirectional causal links between GDP and FDI; GDP and exchange rate, and FDI and exchange rate. In the short run, there is a unidirectional link running from exchange rate to GDP and from FDI to exchange rate, meaning that exchange rate has an impact on GDP, and FDI also affect exchange rate. A possible explanation is that Lao kip depreciation may cause an increase in export and FDI inflows leading to GDP growth.

For the manufacturing sector, there is evidence of a bidirectional causality link between FDI and real GDP in the long term. It means that an increase in real output attracts FDI inflow into Laos and the influx of FDI also contributes to an increase in Lao economic growth in the long run. There is unidirectional causality running from GDP to exchange rate and from FDI to exchange rate in the long run. In the short run, evidence of unidirectional causality from GDP to FDI is observed. This result shows that the influx of FDI may be the resource-seeking types.

For the services sector, there is evidence of bidirectional causality links between FDI and real GDP and evidence of unidirectional causality from GDP to exchange rate, and from FDI to exchange rate in the long run. In addition, evidence of causality running from FDI to output and from exchange rate to output are seen in the short term. This result is also consistent with the fact that in recent years there has been a substantial inflow of FDI in the services sector, especially in the electricity, trade, telecom and banking sectors, which play an important role in growing the economy. Noticeably, only FDI inflows in the services sector

have a growth-promoting effect both in the short and long run. Moreover, currency depreciation causes an increase in export and FDI leading to GDP growth in the short run.

Table 32: Causality Test Results for Individual Sectors

Null hypothesis	Long- run	Short-run
Agriculture:		
LnGDP does not Granger cause LnFDI	0.154494	1.662471
	[-0.75721]	[1.06613]
LnFDI does not Granger cause lnGDP	6.472756***	0.009954
	[-12.0112]	[-0.71072]
LnEX does not Granger Cause LnGDP	1.2037663	1.870322***
	7.791666	[-4.12060]
LnGDP does not Granger Cause LnEX	[-0.81748]	0.147477
	0.128342	[0.89860]
LnEX does not Granger Cause LnFDI	[-0.72763]	2.592106
	[0.90553]	[0.78662]
LnFDI does not Granger Cause LnEX	0.830728***	0.00986
	[12.7852]	[-0.09209]
Mining:		
LnGDP does not Granger cause LnFDI	1.4061777	0.090200
	[1.68582]	[0.11069]
LnFDI does not Granger cause lnGDP	0.638373***	0.043673
	[3.11224]	[0.50851]
LnEX does not Granger Cause LnGDP	8.612051***	1.539964
	[5.33130]	[-1.08577]
LnGDP does not Granger Cause LnEX	0.116116***	0.001885
	[2.90757]	[-0.05445]
LnEX does not Granger Cause LnFDI	10.99671***	2.287297
	[2.50358]	[0.59830]
LnFDI does not Granger Cause LnEX	0.074126***	0.022779*
	[2.95613]	[1.89511]
Manufacturing:		
LnGDP does not Granger cause LnFDI	0.856408***	2.495907**
	[-8.33980]	[2.01349]
LnFDI does not Granger cause lnGDP	1.167668***	0.055396
	[-10.7868]	[0.89975]
LnEX does not Granger Cause LnGDP	0.481872	0.464725
	[-0.72118]	[-0.42057]
LnGDP does not Granger Cause LnEX	2.075239***	0.099536
	[-5.07812]	[-0.52239]
LnEX does not Granger Cause LnFDI	0.412679	1.260695
	[0.73756]	[0.24780]
LnFDI does not Granger Cause LnEX	2.423191***	0.024522
	[6.71735]	[-0.56279]
Trade:		
LnGDP does not Granger cause LnFDI	1.851355***	0.352046

	[-9.24113]	[0.32225]
LnFDI does not Granger cause lnGDP	0.540145***	0.306415***
	[-9.37485]	[-5.72594]
LnEX does not Granger Cause LnGDP	0.850619***	1.050844*
	[2.86614]	[-1.78010]
LnGDP does not Granger Cause LnEX	1.175614***	0.025293
	[5.26042]	[0.23094]
LnEX does not Granger Cause LnFDI	1.574799***	1.749933
	[-2.62687]	[-0.61963]
LnFDI does not Granger Cause LnEX	0.635002***	0.050513
	[-4.89103]	[1.48966]
Transport and communications:		
LnGDP does not Granger cause LnFDI	3.491525***	8.504059
	[-5.36920]	[0.53329]
LnFDI does not Granger cause lnGDP	0.286408***	0.006831
	[-6.92606]	[-1.28144]
LnEX does not Granger Cause LnGDP	3.799453***	1.550164***
	[3.51087]	[-4.46214]
LnGDP does not Granger Cause LnEX	0.263196***	0.121673
	[5.17919]	[0.87823]
LnEX does not Granger Cause LnFDI	11.98602***	5.696978
	[-3.61828]	[0.33103]
LnFDI does not Granger Cause LnEX	0.075381***	0.001197
	[-6.57156]	[-0.28652]
Construction:		
LnGDP does not Granger cause LnFDI	0.747186	8.962259***
	[1.11143]	[2.69964]
LnFDI does not Granger cause lnGDP	1.338355***	0.002599
	[6.78118]	[-0.22116]
LnEX does not Granger Cause LnGDP	14.100102***	1.30950**
	[3.67358]	[-1.99413]
LnGDP does not Granger Cause LnEX	0.071423	0.065448
	[1.16719]	[0.77241]
LnEX does not Granger Cause LnFDI	7.146267***	11.12255
	[2.21085]	[1.15187]
LnFDI does not Granger Cause LnEX	0.095590***	0.010950**
	[7.50031]	[2.48261]
Banking:		
LnGDP does not Granger cause LnFDI	1.838736**	2.042158
	[-2.15522]	[-0.80300]
LnFDI does not Granger cause lnGDP	0.543852***	0.001809
	[-5.21052]	[0.05395]
LnEX does not Granger Cause LnGDP	6.402342***	1.817390
	[-2.77458]	[-0.86667]
LnGDP does not Granger Cause LnEX	0.156193**	0.083891
	[-2.06944]	[1.85261]
LnEX does not Granger Cause LnFDI	9.465770***	0.342703
	[2.14695]	[-0.02178]
LnFDI does not Granger Cause LnEX	0.084946***	0.003695

	[5.73124]	[-0.82472]
Electricity:		
LnGDP does not Granger cause LnFDI	3.194811	8.357787
	[1.32932]	[-0.88819]
LnFDI does not Granger cause lnGDP	0.313008***	0.008031
	[4.64210]	[0.59786]
LnEX does not Granger Cause LnGDP	12.09238***	6.410444
	[3.71769]	[0.37763]
LnGDP does not Granger Cause LnEX	0.065716***	0.004620
	[5.08510]	[-0.96389]
LnEX does not Granger Cause LnFDI	4.763067***	0.455204
	[2.85370]	[-0.98993]
LnFDI does not Granger Cause LnEX	0.209949	0.028147
	[1.32063]	[0.24292]
Other services:		
LnGDP does not Granger cause LnFDI	1.013689***	0.562769
	[-7.97235]	[-0.47308]
LnFDI does not Granger cause lnGDP	0.986487***	0.016180
	[-9.75408]	[0.44813]
LnEX does not Granger Cause LnGDP	2.918257***	1.571154***
	[-4.46992]	[-2.76575]
LnGDP does not Granger Cause LnEX	0.342670***	0.048674
	[-6.14301]	[0.38691]
LnEX does not Granger Cause LnFDI	2.958321***	2.098586
	[5.77582]	[-0.71725]
LnFDI does not Granger Cause LnEX	0.338340***	0.020354
	[9.71171]	[-1.03129]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

The Granger causality tests are repeated to analyze the direction of the relationship between real FDI and output for each individual industry, which is expected to differ across sectors. The results from Table 32 show that for the agriculture sector, this paper rejects the null hypotheses of no causality from FDI to output and from output to exchange rate, meaning that there are unidirectional causal links running from FDI to output, and from output to exchange rate in the long term. FDI flows into the agriculture sector, as the Lao economy is largely agriculture based, causes GDP growth in the long run. In the short run, the finding shows that exchange rate exerts a unidirectional causal effect on FDI.

For the mining sector, the hypotheses of no causality among three variables GDP, FDI and exchange rate are rejected at the 1% level, implying that there are bidirectional causal

links between GDP and FDI, GDP and exchange rate, and FDI and exchange rate in the long run. The influx of FDI appears to be the resource-seeking type as Laos has abundant natural resources and the mining sector has become the country's fastest growing and most profitable sector, and generates huge revenue. In the short run, there is evidence of a unidirectional causal link running from output to exchange rate.

In the trading sector, the hypotheses of no causality among three variables GDP, FDI and exchange rate are rejected at the 1% level, implying that there are bidirectional causal links between GDP and FDI, GDP and exchange rate, and FDI and exchange rate in the long run. There is strong evidence of a causal link running from FDI to output both in the short and long term. This reflects the fact that FDI flows into the trading sector have contributed to the economy of Laos since Laos declared itself open to international trade and liberalization. In the short run, the null of no causal links running from exchange rate to FDI is rejected. This means that causality for the trading sector is unidirectional and running from exchange rate to FDI.

The transport and communication sectors indicate that the hypotheses of no causality among three variables GDP, FDI and exchange rate are rejected at the 1% level, implying that there are bidirectional causal links between GDP and FDI, GDP and exchange rate, and FDI and exchange rate in the long run. The demand for good infrastructure and high technology in the communication sector is increasing as a result of ongoing economic growth, which provides FDI opportunities in these sectors in Laos. In the short run, the null of no causal links running from exchange rate to FDI is rejected. This means that there is unidirectional causality running from exchange rate to FDI.

For the construction sector, the finding indicates that there are unidirectional causal links running from FDI to GDP, from exchange rate to GDP in the long run. In the short run, causality seems to be unidirectional and running from real output to FDI. As the Lao economy is growing, it leads to more demand for construction projects including commercial buildings,

hotels and resorts, recreational facilities, city and provincial level infrastructures. Moreover, the construction sector not only creates jobs but also contributes to economic growth. There are unidirectional casual links from GDP to exchange rate both in the short and long run, meaning that GDP has an impact on exchange rate. The results show that there is a unidirectional casual link running from exchange rate to FDI. It implies that exchange rate affect FDI inflows in Laos.

For the banking sector, the hypotheses of no causality among the three variables GDP, FDI and exchange rate are rejected at the 1% level, implying that there are bidirectional causal links between GDP and FDI, GDP and exchange rate, and FDI and exchange rate in the long run. Therefore, an increase in FDI inflows in the banking sector in Laos helps to boost the growth and expansion of the sector. As the Lao economy is growing, it leads to more demand in the banking sector. However, this study finds that the null hypotheses of no causality among the three variables output, FDI inflows and exchange rate cannot be rejected in the short run, indicating that there is no evidence of a causal link among them.

The results illustrate that in the electricity generation sector, the null hypotheses of no causality among the three variables output, FDI inflows and exchange rate cannot be rejected in the short run, indicating that there is no evidence of a causal link among them. However, in the long run, this analysis rejects the null hypothesis of no causality from FDI to real output and from exchange rate to FDI, meaning that there are unidirectional links running from FDI to output and from exchange rate to FDI. It is noticeable that there are huge opportunities for FDI in the hydropower sector in Laos due to the availability and abundance of water resources. Thus, the largest recipient of foreign investment in Laos is the electricity sector, which plays an important role in contributing to economic growth and the expansion of the hydropower sector. Moreover, there is a bidirectional casual link between output and exchange rate in the long run.

For other services sectors, the hypotheses of no causality among the three variables GDP, FDI and exchange rate are rejected at the 1% level, implying that there are bidirectional causal links between GDP and FDI; GDP and exchange rate, and FDI and exchange rate in the long run. As an increase in the demand for other services, including insurance, tourism, hotel and restaurant and other services, is powered by the increase in the levels of disposable income and economic growth in Laos. The other services sector also plays an important role in contributing to economic growth. However, the null hypotheses of no causality among the three variables output, FDI inflows and exchange rate cannot be rejected in the short run, indicating that there is no evidence of a causal link among them.

Table 33: Causality Test Results for Cross Sector Spillover

Null hypothesis	**Long- run**	**Short-run**
LnGDPManuf does not Granger Cause LnFDIService	0.732675*** [-6.16374]	0.776639 [-0.69186]
LnFDIService does not Granger Cause LnGDPManuf	1.364861*** [-8.73740]	0.024772 [-0.72883]
LnEX does not Granger Cause LnFDIService	2.854981*** [4.48027]	4.679522 [-1.53476]
LnFDIService does not Granger Cause LnEX	0.350265*** [9.20538]	0.017560 [-0.90956]
LnEX does not Granger Cause LnGDPManuf	3.896652*** [-3.68819]	2.185699*** [-4.24473]
LnGDPManuf does not Granger Cause LnEX	0.256631*** [-5.34580]	0.082687 [0.76790]
Null hypothesis		
LnGDPService does not Granger Cause LnFDIManuf	1.214019*** [-14.5870]	0.356246 [-0.44754]
LnFDIManuf does not Granger Cause LnGDPService	0.823711*** [-14.6288]	0.020756 [-0.30748]
LnEX does not Granger Cause LnFDIManuf	1.918986*** [5.88908]	0.587408 [-0.31001]
LnFDIManuf does not Granger Cause LnEX	0.521109*** [8.85482]	0.023460 [0.61722]
LnEX does not Granger Cause LnFDIManuf	1.580689*** [-5.09928]	1.725364*** [-2.96527]
LnFDIManuf does not Granger Cause LnEX	0.632636*** [-7.64540]	0.036637 [0.26619]

Note: *t*-statistics are in brackets. *, ** and *** indicate significant levels at the 10, 5 and 1 percent respectively.

Additional Granger causality tests are examined for cross-sector spillover as an increase of FDI in some sectors may affect other sectors of the Lao economy and could promote growth of output in other sectors, especially in the manufacturing sector. The cross-sector of two pairs (1) services output and FDI inflow in the manufacturing sector with exchange rate; and (2) manufacturing output and FDI inflow in the services sector with exchange rate are tested. The findings in Table 33 show that the null hypotheses of no causality between the two pairs of variables are rejected at the 1% level in the long run. The findings for the first group of paired variables show that there are bidirectional causal links among output growth in the services sector, FDI inflows in the manufacturing sector and exchange rate. This indicates that the output growth in both manufacturing and services sectors has not only been promoted by FDI in their sectors but also by FDI in other sectors through cross-sector spillovers in the long run. Moreover, there is a unidirectional causal link running from exchange rate to growth in the services sector in the short run. For the second group of paired variables, the results also indicate that bidirectional causal links among output of the manufacturing sector, inward FDI in the services sector and exchange rate are observed in the long run. One possible explanation is the spillover effects of FDI inflows in both manufacturing and services sectors might be stronger than other sectors because they consist of both capital and labour intensive industries, while other sectors do not. In the short run, there is a unidirectional causal link running from exchange rate to growth in the services sector.

Table 34: Summary Statistics of Firm Performance

Variable	Obs	Mean	Std. Dev	Min	Max
VA	291	2.81e+07	1.33e+08	11304.76	1.81e+09
L	291	73.53952	194.3254	5	1360
K	291	9.37e+07	4.95e+08	65944.42	4.80e+09
Age	291	11.43643	8.242776	1	51
Location	291	0.5463918	0.4987008	0	1
Size	291	0.4948454	0.5008347	0	1
Foreign	291	0.161512	0.3686365	0	1
Spillover	291	.3702514	.2324477	.1972006	.6814101
K/L	291	3508880	4.15e+07	6969.604	7.08e+08

Table 35: Correlation Results for Firm Performance

	VA	L	K	Age	Location	Size	Foreign	Spillover	K/L
VA	1.0000								
L	0.4117	1.0000							
K	0.5370	0.2709	1.0000						
Age	-0.0373	0.0152	0.0256	1.0000					
Location	0.0518	0.2050	0.0998	-0.0481	1.0000				
Size	-0.1363	-0.3242	-0.1065	0.0244	-0.3269	1.0000			
Foreign	0.2397	0.3132	0.1471	-0.1118	0.1748	-0.2850	1.0000		
Spillover	0.1119	0.2912	-0.0013	0.0258	0.0889	-0.3222	0.1598	1.0000	
K/L	-0.0044	-0.0204	0.5282	0.1309	0.0611	0.0507	-0.0258	-0.0483	1.0000

Additional estimations are conducted in order to investigate the determinants of total factor productivity (TFP). In order to examine the contribution of FDI spillover and other factors on TFP, a general Cobb-Douglas production function equation (9) is estimated with value added as output and capital and labour as input. The results reported in Table 36 show that both labour and capital have positive signs and are strongly significant at the 1 percent level. It means that the Lao manufacturing and services sectors are labour intensive.

Table 36: Estimated Results from Equation (9) by OLS

Variables	OLS
C	7.50***
	(.746)
L	.779***
	(.0783)
K	.313***
	(.054)
R-squared	0.535
Obs	291

Standard errors are in parentheses, *, ** and *** are significant levels at 10, 5 and 1% respectively.

TFP is then calculated as the exponential of the following:

$$\ln TFP = \ln Y_{ijt} - \hat{\beta}_0 - \hat{\beta}_1 \ln L_{ijt} - \hat{\beta}_2 \ln K_{ijt} \qquad (14)$$

After obtaining the indices of TFP from residual, this paper follows the work of Liu (2008) to identify the following models:

$$\ln TFP_{ij} = \delta_0 + \delta_1 \ln Age_{ij} + \delta_2 Location_{ij} + \delta_3 Size_{ij} + \delta_4 Foreign_{ij} + \delta_5 \ln Spill_j + \delta_6 \ln K/L + \varepsilon_{ij} \qquad (15)$$

The estimated results from Table 37 illustrate the firm age coefficient has a positive sign but is insignificant. It means that an increase in firm age does not increase the productivity of the firms. The coefficient of location is positive and statistically significant at 1% level implying that firms located in Vientiane, the capital, have higher productivity than firms located in other provinces. Vientiane is recognized as the business centre with the highest density of firms, accounting for about 54 percent of the total number in 2008 (World Bank, 2009).

This paper finds that firm size has a negative sign and significance at the 1% level, showing that firm size has an impact on firm productivity and medium and large firms are more productive than small firms. The coefficient of the dummy foreign ownership is positive and statistically significant at the 1% level. It indicates that foreign firms are more productive than domestic firms. Moreover, a positive and significant coefficient of spillover means that a rise in spillover increases TFP of firms and suggests that firms with foreign invested capital are more productive than domestic firms. Additionally, the capital-labour ratio is significantly positive. It indicates that an increase in capital-labour ratio enlarges the TFP of firms.

Table 37: Estimated Results for TFP

Variables	**OLS**
C	2.543***
	(.028)
Age	.004
	(.004)
Location	.013***
	(.006)
Size	-.138***
	(.007)
Foreign	.049***
	(.009)
Spillover	.020***
	(.005)
K/L	.016***
	(.002)
R-squared	0.7324
Obs	291

Standard errors are in parentheses, *, ** and *** are significant levels at the 10, 5 and 1% respectively.