ECONOMIC GROWTH IN ASEAN-4 COUNTRIES:

A PANEL DATA ANALYSIS

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ABSTRACT

This research studies the impact of economic variables which are foreign direct investment (FDI), openness and gross fixed capital formation to economic growth which indicates using gross domestic product (GDP). Data is collected from 1981 until 2008 using World Development Indicator CD-ROM. This research estimates using panel data estimation. In order to test the significance of the variable, this research uses panel unit root test. Result of panel data unit root test shows that all variables in panel unit root test are significant and stationary at first difference 5 percent level of significant. In addition, the impact of variables to GDP is estimated using three panel estimation models which are called pooled model (pooled), fixed effects model (FEM) and random effects model (REM). Result of three particular models in panel estimation give the stationary at 5 percent level of significant for all variables involved. Variable of openness for pooled and random effects model indicate negative relation with GDP. Meanwhile, other variables in all models show positive relation with GDP. Goodness to fit in this research for all models demonstrate high value which 0.74 (pooled), 0.87 (FEM) and 0.73 (REM). Furthermore, Hausman test is employed to this research in order to choose the best model. Result for this test suggests rejecting null hypothesis because of the value of p is 0.00 ($p<.05$). On other words, rejecting of null hypothesis may conclude that the FEM will apply. Thus, this research describes that all variables are correlated with each other and also have the positive relationship to GDP. Hence, all variables may lead economic growth boost when they are increase whereas FDI becomes the most efficient variable in order to assist economic growth and followed by openness and gross fixed capital formation. Otherwise, the result in Ordinary Least Squares (OLS) which implies in this study as well test all variables stationary at 5 percent level of significant. These shows only gross fixed capital formation is significant to growth and contributes the positive effect to GDP in each ASEAN-4 countries. However, OLS estimation result for Indonesia shows the other variable has significant to growth which is openness; while it gives the negative affect the GDP. Instead of Indonesia, openness is not significant at other ASEAN-4 countries such as Malaysia, Thailand and Philippines. Besides, other variable is FDI also not significant in the case of all ASEAN-4 countries. It means that, openness does not correlated to growth for Malaysia, Thailand and Philippines countries; while FDI is not correlated to growth for all ASEAN-4 countries in this study.

ABSTRAK

Kajian ini mengkaji kesan pembolehubah ekonomi iaitu pelaburan langsung asing (FDI), keterbukaan dan pembentukan modal tetap kasar terhadap pertumbuhan ekonomi yang diukur menggunakan Keluaran Dalam Negara Kasar (GDP). Data yang dikumpul adalah bermula dari tahun 1981 hingga 2008 daripada *'World Development Indicator'* berbentuk CD-ROM. Penganggaran dalam kajian ini menggunakan panel data. Untuk mengkaji signifikasi pembolehubah, kajian ini menggunakan ujian *'panel unit root'*. Hasil ujian ini menunjukkan bahawa kesemua pembolehubah adalah signifikan dan pegun pada pembezaan pertama 5 peratus aras keertian. Selain itu, kesan pembolehubah terhadap GDP dianggarkan menggunakan tiga *'panel estimation model'* iaitu *'pooled model'* (*pooled*), *'fixed effects model'* (FEM) dan *'random effects model'* (REM). Hasil ketiga-tiga model ini memberikan nilai pegun pada aras keertian 5 peratus bagi semua pembolehubah. Pembolehubah keterbukaan bagi *'pooled'* dan REM menunjukkan hubungan negatif dengan GDP. Manakala pembolehubah-pembolehubah lain dalam semua model menunjukkan hubungan positif dengan GDP. *'Goodness to fit'* bagi semua model memberikan nilai yang tinggi iaitu 0.74 (*pooled*), 0.87 (FEM) dan 0.73 (REM). Untuk memilih model yang terbaik kaedah *'Hausman test'* diaplikasikan. Hasil ujian mendapati hipotesis nul ditolak kerana nilai p=0.00 (p<.05). Penolakan hipotesis nul memberi kesimpulan bahawa FEM dapat diaplikasi. Oleh itu, kajian ini menunjukkan semua pembolehubah mempunyai hubungan yang positif dengan GDP dan dapat membantu dalam mengembangkan pertumbuhan ekonomi di mana FDI menjadi faktor terbesar yang ,menyumbang kepada pertumbuhan ekonomi diikuti oleh faktor keterbukaan dan pembentukan modal tetap kasar. Hasil penganggaran *'Ordinary Least Squares'* (OLS) yang diuji dalam kajian ini menunjukkan hanya pembentukan modal tetap kasar pegun pada aras keertian 5 peratus. Ini menunjukkan pembentukan modal tetap kasar sahaja signifikan kepada pertumbuhan ekonomi juga memberi kesan positif kepada GDP bagi setiap negara ASEAN-4. Namun, hasil penganggaran OLS bagi Indonesia menunjukkan pembolehubah keterbukaan turut signifikan terhadap pertumbuhan ekonomi tetapi memberi kesan negatif kepada GDP. Pembolehubah keterbukaan adalah tidak signifikan bagi negara ASEAN-4. FDI adalah tidak signifikan untuk kesemua negara ASEAN-4. Dalam penganggaran OLS pembolehubah keterbukaan tidak memberi kesan kepada pertumbuhan ekonomi di Malaysia, Thailand dan Filipina sementara FDI tidak mempunyai hubungan dengan pertumbuhan ekonomi di semua negara ASEAN-4.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Economic growth is the expansion in a nation's economy which can be measured using several approaches, most often used is Gross Domestic Product (GDP). Chaudhuri (1989) noted that economic growth refers to the quantitative dimension in national income, output per capita or real total output over time in which national income is best approximated by GDP and per capita income (Hassan, 2004).

Other researchers provide several other definitions for economic growth. For instance, Peterson (1978) defined economic growth as the expansion of a nation's capability to produce the goods and services its people want. He further explained that economic growth involves an increase over time in the actual output of goods and services as well as an increase in the economy's capability to produce goods and services.

Meanwhile, Fuller (1991) defined economic growth as an increase in the productive capacity of an economy relating to the growth in GDP. According to this definition, GDP is the performance in terms of a nation production.

In other words, economic growth can be defined as the expansion of goods and services in a country which can lead to higher consumption. This situation may lead to increase in labor demand followed by a high income of labor. High income of labor subsequently implies an increase in GDP which is defined as economic growth earlier.

1.2 Economic Performance in Malaysia

Investment in the manufacturing sector is one of the main factors that contribute to Malaysia's growth. Shifting its focus from the agriculture sector to manufacturing combined with rapid increase in manufacturing contribute to economic growth. The manufacturing sector later evolves from a labor intensive industry to a capital intensive and high technology industry. Meanwhile, the agriculture sector showed a continuous decline in average growth, 5.7 per cent for the period 1971 – 1975 to 3.2 per cent for 1981 – 1985. Average growth

declined further to 1.5 per cent from 2001 – 2003 (Chamhuri, Surtahman, & Norshamliza, 2005).

Several other policies also play significant role in influencing Malaysia's economic performance. For instance, four decades ago, the government introduced Malaysia's New Economic Policy (NEP) with the objective to alleviate poverty. This policy marks the ending of classification of economic functions by ethnic group. It was later replaced by the National Development Policy (NDP) in 1991. In addition, a new programme called the Economic Transformation Programme (ETP) under Government Malaysian Performance Management and Delivery Unit (PEMANDU) was introduced with the aim to become a high income country in the future (PEMANDU, 2011).

Malaysia's economic performance during the 2002 to 2006 period can be analyzed using the following indicators:

From Table 1.1, five indicators are shown to represent Malaysia's economic performance. The lowest GDP achieved was 4.4 per cent in 2002, compared to the highest at 7.2 percent in 2004. However, this percentage declined in 2005 and rised about 0.07 percent in 2006. The Kuala Lumpur Composite Index

continuously increased starting 2002 (646.32 point) until 2004 (907.43 point) and dropped in 2005 (899.79 point). This point however, rose in 2006 which became 1096.24 point, showed the highest point during this period. Trade surplus in this table showed the increasing trend from 2002 which about RM54.3 billion to RM290.4 billion in 2006. Besides, international reserve demonstrated the increasing value from 2002 until 2005. Despite, it seemed dropped in 2006 which became RM120.6 billion. Federal government revenue suggested the increasing movement in the period from 2002 until 2005. This indicator seemed similar in value for 2005 and 2006. By this table, it showed that Malaysia has the fluctuation trend of economy for certain indicator. However it still showing that economy in Malaysia in the positive trend during this period. The increase indicated that the economy was performed well.

Table 1.1: Malaysia's Economic Indicators, 2002 - 2006

Component	2002	2003	2004	2005	2006
Gross domestic product (%)	4.4	5.5	7.2	5.2	5.9
Kuala Lumpur Composite Index	646.32	793.94	907.43	899.79	1096.24
Trade surplus (RM billion)	54.3	81.3	81.6	99.8	290.4
International Reserve (RM billion)	128.1	167.8	251.6	265.1	120.6
Federal Government Revenue (RM million)	83.5	92.6	99.4	106.3	106.3

Source: *Berita Harian,* 2007

The expansion in Malaysia's growth is supported by external indicators shown in Table 1.2:

Table 1.2 establishes the three external indicators in Malaysia which are total exports, total imports and trade balance for the period of June until December 2010. All the external indicators in this table show the fluctuation trend during this period. Export and import were the indicators that can be used to see the factor of openness in a country. Thus, the growth of export and import is essential in order to ensure the positive trend in openness that can lead to the

economic growth for a country. In this case, these figures show that these three variables had positive growth in Malaysia.

Table 1.2: External Indicators for Malaysia June – December 2010

Variable (RM million)	June	July	Aug	Sept	Oct	Nov	Dec
Total exports	55,426	52,852	50,500	54,961	52,700	57,200	55,426
Total imports	48,413	44,532	43,457	48,137	43,700	47,500	48,413
Trade balance	7,013	8,320	7,043	6,825	9,000	9,700	7,013

Source : www.epu.gov.my

1.2 Economic Growth Performance in Indonesia, Thailand and Philippines

Indonesia is Malaysia's neighbouring country, comprising of several islands, with Jakarta as its center of administrative function. Gray (2002) presents the economic history for seven decades earlier for Indonesia. The economic policy during the Sukarno presidency until 1965 was focus more on fiscal stimulus by money creation. This led to high inflation and stagnation in the economy. Food

shortage contributed to high inflation and unemployment rate was high in 1965. After President Soeharto's takeover of the administration, there was a change in government policies. Fiscal and monetary policies were still important and oil became the important resource in the economy. These policies proved to be very successful. The average growth rate was 8 per cent during the 1970s period. However, in the early 1980s, bureaucracy slowed down growth. The collapse in the oil sector in 1986 subsequently had great effect on government policies.

Next, investment from the private sector became an important factor which boosts the GDP growth rate during the 1986 to 1997 period. The economy became a more open market economy. Foreign Direct Investment (FDI) became an important contributor to Indonesia's economy. This period showed high rates of growth in the economy. However, the Asian economic crisis 1997-1998 caused Indonesia to experience slower growth. In 1998, Indonesia's real GDP had declined to 13 per cent (Gray, 2002).

Table 1.3 shows the economic indicators comprising GDP, FDI and trade balance for Indonesia for 2006 to 2010. The GDP for Indonesia in 2010 was Rp6,422.92 million compared to Rp5,603 million in 2009. As for FDI, there

was a decrease of over Rp40 million from Rp90.27 million in 2009 to Rp50.76 million in 2010. In 2010, trade balance decreased to US$22,160.2 million from US$22,816.8 million in 2009.

Table 1.3: Indonesia's Economic Indicator, 2006 - 2010

Component	2006	2007	2008	2009	2010
Gross Domestic Product (Rupiah Million)	3,339,220,000	3,950,890,000	4,948,690,000	5,603,870,000	6,422,920,000
Foreign Direct Investment (Rupiah Million)	45,026,097.5	63,324,223.6	90,268,567.6	50,762,804.5	120,888,833.5
Trade Balance (US Million)	42,461.5	43,539.6	10,407.7	22,816.8	22,160.2

Source: www.portal.euromonitor.com.eserv.uum.edu.my/Portal/Pages/Search/SearchResultsList.aspx

Thailand is also a Southeast Asian country located near Cambodia and Laos. Before the Asian Financial Crisis, the growth in the manufacturing sector in a decade until 1996 was around 9.4 per cent. This remarkable growth was made possible by factors such as abundant natural resources, number of labor, prudent fiscal policy and open policy with regards to foreign investment. More than 60

per cent of total labor is involved in the agriculture sector. Paddy cultivation is the main agricultural activity for Thailand, which is an important exporter of rice in the world.

Table 1.4 shows the indicators of economic growth for Thailand for 2006 to 2010. These indicators are Gross Domestic Product (GDP), Foreign Direct Investment (FDI) and trade balance which represent the balance of export and import. GDP in 2009 decreased to Baht 9,041,550 million from Baht 9,075,490 million for the previous year, while for the other years, the amount increases annually. FDI in 2008 and 2009 declined from the previous years. In 2008, FDI totaled Baht 281,434.3 million, declining from Baht 391,955.3 million in 2007. This figure further declined in 2009 to Baht 170,603.7 million. Trade balance for Thailand in 2008 experienced the most severe downturn at -US2,783 million. From 2009 to 2010, it fell from US17,159 million to US10,785 million.

Table 1.4: Thailand's Economic Indicator, 2006 - 2010

Component	2006	2007	2008	2009	2010
Gross Domestic Product (Baht Million)	7,850,190	8,529,840	9,075,490	9,041,550	10,104,800
Foreign Direct Investment (Baht Million)	360,522.4	391,955.3	281,434.3	170,603.7	184,188.2
Trade Balance (US Million)	2,080	12,564	-2,783	17,159	10,785

Source: www.portal.euromonitor.com.eserv.uum.edu.my/Portal/Pages/Search/SearchResultsList.aspx

For the Philippines, Cebu, Davao-General Cantos and Subic-Clark are the regional centers that had faster development growth. This is due to expansion in exports and total investment compared to other area such as Metro Manila. The Philippines is a country which has a high rate of urbanization in the 20th century (Pernia & Quising, 2003). The economic structure of the Philippines is focus on the industrial sector such as textile, electronic and food processing. The industrial areas are located in the Manila area. The economy is also highly dependent on agriculture and mining. Its natural resources consist of chromites, copper and nickel. Philippines had recorded a strong economic performance in 2005 with GDP growth at 5.1 per cent. Public sector deficits and debts had also reduced. This was the second time that the Philippines had a growth rate above 5 per cent. The first was in 2004 when the GDP growth was 6 per cent. Income per capita for 2005 had also increased by 2.9 per cent (World Bank, 2011).

Table 1.5 shows the economic indicators for the Philippines for 2006 to 2010. These indicators are Gross Domestic Product (GDP), Foreign Direct Investment (FDI) and trade balance. GDP for the Philippines keep increasing every year from Ps6,271,160 in 2006 to Ps9,003,480 million in 2010. FDI experienced a decline from 2006 until 2008, it went up in 2009 to Ps93,595.3 million from Ps68,435.2 million in the previous year. Trade balance recorded negative amounts from 2006 until 2010. However, the negative balance gradually reduces in 2009 and 2010 at - US7,426.9 million and -US6,796.8 million, respectively.

Table 1.5: The Philippine's Economic Indicators, 2006 - 2010

Component	2006	2007	2008	2009	2010
Gross Domestic Product (Peso Million)	6,271,160	6,892,720	7,720,900	8,026,140	9,003,480
Foreign Direct Investment (Peso Million)	149,889.1	134,568.7	68,435.2	93,595.3	77,272.9
Trade Balance (US Million)	-6,665.3	-7,437.5	-11,279.8	-7,426.9	-6,796.8

Source: www.portal.euromonitor.com.eserv.uum.edu.my/Portal/Pages/Search/SearchResultsList.aspx

1.4 Problem Statement

Foreign Direct Investment (FDI) is referred as the net inflows of investment to achieve a lasting management interest in a business operating in an economy other than that of the investor. In Malaysia, the investor needs to hold at least 10 per cent of total equity. Since the previous four decades, the Malaysian government had implemented many policies to attract foreign investment. Abundant labor, natural resources and resourceful legal infrastructure are amongst factors attracting FDI to Malaysia. FDI is crucial in expanding new technologies, skills and capital in the domestic economy. FDI flows of ASEAN countries can be determined by source or distribution by sector. In 2000 Malaysia had the lowest FDI inflows during the 1990 to 2009 period. In terms of net FDI, the figures show a declining trend after year 2004. MITI (2011) explains in 2009, Malaysia received only US$1.38 billion FDI into the country compared to 2008 at US$7.2 billion (Hazirah, 2011). The fluctuation in the amount of FDI indicates it as one of the indicators to be examined in detail further.

Statistics on regional FDI pattern shows why FDI needs to be investigated in this research. Table 1.6 shows the FDI patterns by region in the ASEAN-4

countries in terms of the average share over the 1985 to 2004 period. It should be pointed out that FDI definition differs from one country to the next. FDI for Indonesia is measured by inward FDI appovals. The table shows that all countries had positive average share. Thailand had the highest average share from 2000 to 2004. However, the different FDI pattern for each country makes it important for FDI role in economic growth to be examined further. The importance of FDI in GDP expansion in the countries will be answered using the results of the analyses.

Table 1.6: Regional FDI Patterns in ASEAN-4

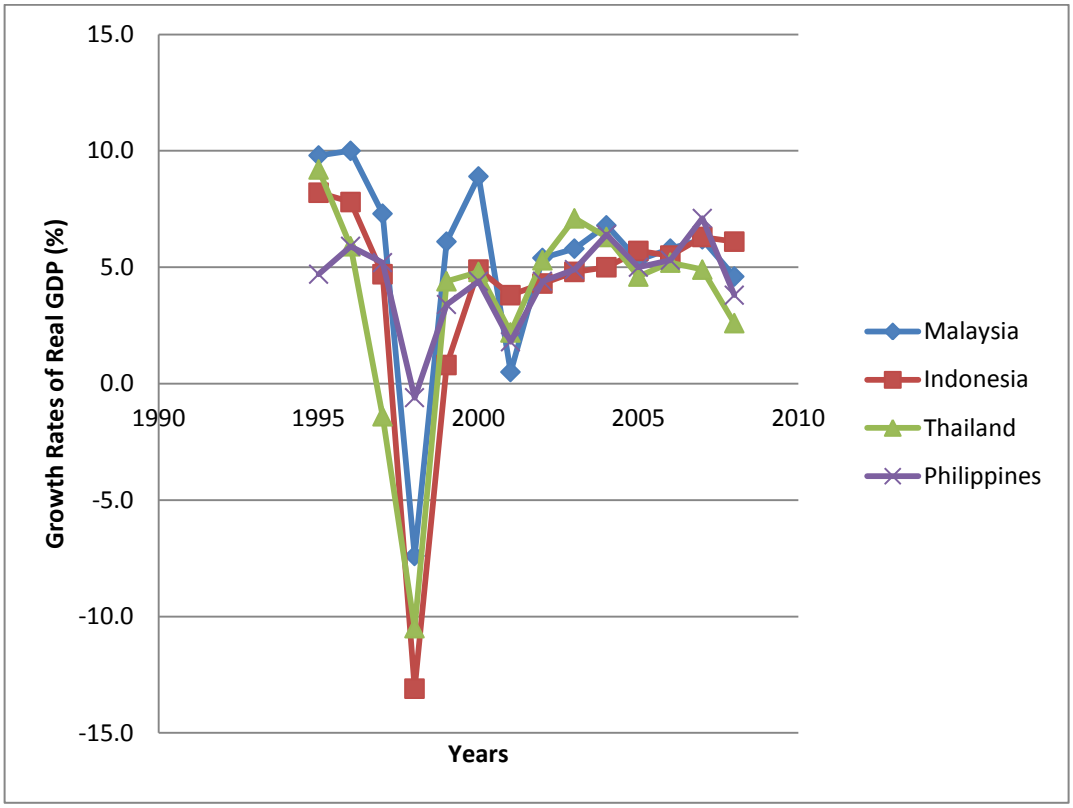
Country	Definition	Average share (%) : 1985-1989	Average share (%) : 1990-1994	Average share (%) : 1995-1999	Average share (%) : 2000-2004
Indonesia	Inward FDI approvals	40.6	47.1	38.0	41.8
Malaysia	Inward FDI flows	-	48.5	28.4	28.6
Philippines	Inward FDI registered at the central bank	25.9	38.9	43.3	41.9
Thailand	Inward FDI flows	71.0	62.3	51.9	94.4

Source: An East Asian Renaissance: Ideas for Economic Growth's Book

Economic performance can be shown by GDP. GDP is defined as the total amount of value in goods and services that had been produced by a country in a year (Weil, 2005).

Next are the growth rates of GDP for the ASEAN-4 countries from 1995 to 2008. Regarding Figure 1.1, in 1995, Malaysia's growth rate was 9.8 per cent. It further increased to 10 per cent in 1996. The Asian financial crisis in 1997 - 1998 was a very challenging period in the global economic environment. All ASEAN countries were affected, the four countries included. The growth rates for these four countries were the lowest in 1997 and 1998. Moreover, they had negative growth rates in 1998. Malaysia experienced -7.4 per cent growth rate in 1998. Indonesia had -13.1 per cent growth rate, Thailand -10.5 per cent and Philippines -0.6 per cent. Clearly Indonesia had the lowest growth rate compared to the other countries in 1998. GDP per capita is also important in determining the individual's standard of living (Malaysian Quality of Life, 1999). It is an indicator used to compare the total income with the total population in a country.

Figure 1.1: Growth Rates of Real GDP (percent) for 4 ASEAN Countries for 1995 - 2008 Period



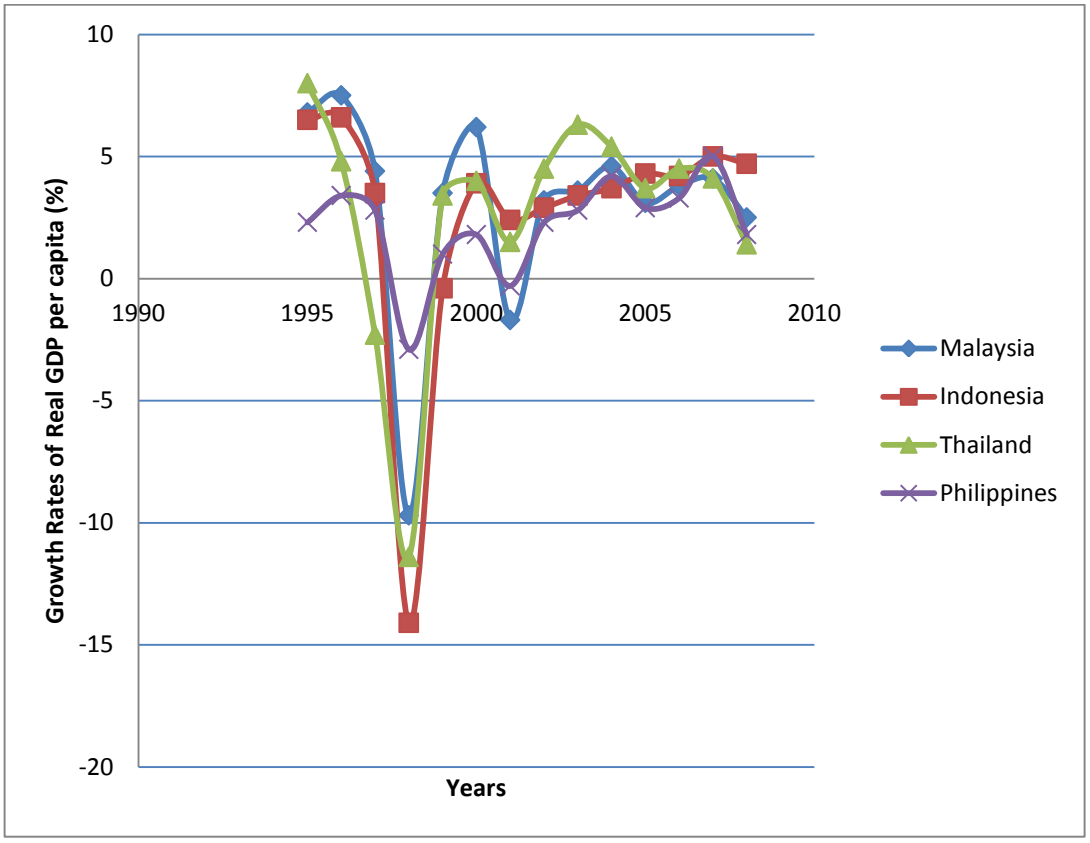
Source: http://www.adb.org/Documents/Books/Key_Indicators/2009/pdf/Key-Indicators-2009.pdf

Next, Figure 1.2 shows the growth rates of real GDP per capita for the four countries from 1995 to 2008. Figure 1.2 shows that Malaysia's growth rate of real GDP per capita was 6.8 per cent in 1995 and 7.5 per cent in 1996. It also shows that in 1998, all countries had negative growth rates of real GDP per capita. Malaysia had -9.7 per cent growth rate, Indonesia -14.1 per cent,

Thailand -11.4 per cent and the Philippines -2.9 per cent. Again, Indonesia had the lowest growth rate of real GDP per capita among the other countries in 1998.

Figure 1.2 Growth Rates of Real GDP Per Capita (percent) for 4 ASEAN Countries,

1995 – 2008



Source:http://www.adb.org/Documents/Books/Key_Indicators/2009/pdf/KeyIndicators-2009.pdf

Economic growth is very important for every country. The two figures above clearly shows that the countries had fluctuations in GDP during the period. Therefore, to achieve a high growth rate in the economy, questions regarding the relationship of growth and its determinants should be answered. The macroeconomic variables that influence growth rate in the ASEAN-4 should be determined. In this study, 3 indicators will be examined, trade openness, capital formation and FDI and their effects on GDP growth and a country's development.

1.5 Objective of the Study

1.5.1 General Objective

The general objective of this study is to examine factors which are important in determining economic growth for the ASEAN-4 countries.

1.5.2 Specific Objective

The specific objectives of this study are:

1) To examine the determinants of economic growth in the ASEAN-4 countries

2) To determine the variables which have large impact on economic growth in the ASEAN-4 countries

1.6 Significance of the Study

Economic growth is the benchmark of a country's economic performance. This study is valuable because the identification of the determinants of economic growth will provide important information to policymakers. Knowing the significant factors, the relationship and causality between growth and the determinants will help the government to design and implement effective policies to achieve high growth rates in the future. In this study, three variables will be investigated. The independent variables are trade openness, capital formation and foreign direct investment (FDI).

Growth is also important to policymakers in Malaysia's quest to become a high income country and to fulfill Malaysia's aim in its Nation 2020 vision. Therefore, it is important to analyze the contribution of each determinant on

Malaysia's economy. Similarly, the effect of the determinants on growth in the other countries provides information on how to boost growth. The results of the study will provide valuable information to policymakers on how to have a continuous positive growth. The significant determinants that affect Malaysia's growth rate will be shown later.

The determinants of growth have been widely debated by previous researchers. The economic literature has examined this topic in depth. Therefore, in the aim to achieve high growth rates, it is important to have a good understanding of this topic. The findings of the study will contribute to the literature on economic growth and its determinants in the ASEAN-4 countries. It is hoped that this research will inspire others about economic growth. The results will also help others to better understand growth and the factors affecting it.

1.7 Scope and Limitation of the Study

The objective of this study is to examine the determinants of economic growth in four ASEAN countries, namely Malaysia, Indonesia, Thailand and the Philippines. This study uses annual data for the period of 1981 to 2008. The data of the study are real GDP per capita and the determinants of economic

growth such as FDI, trade openness and gross fixed capital formation. The researcher faced some obstacles which delayed the process of completing this study. Data collection was time consuming since the data has to be converted to real values so that it will not be distorted by inflation.

1.8 Structure of the Study

This study is divided into five chapters. Chapter 1 is the introduction which explains the background and economic performance in the four ASEAN countries. Next, the problem statement, general and specific objectives of study, significance of the study and the scope of study are discussed in depth. Lastly, the chapter explains the structure of the whole study.

Chapter 2 discusses the literature relevant to this study. The literature review is based on journal articles and is divided into two subtopics namely theoretical and empirical framework. Theoretical framework covers the theory of economic growth while empirical framework discusses several early studies on economic growth and its determinants.

The methodology of this study is explained in Chapter 3. In the chapter, the method and types of data used in this study are explained in detail. In Chapter 4, the results of the regression analysis for each country are presented and discussed. Specifically, the results will show significant determinants of economic growth in these countries. Chapter 5 presents a summary of the results followed by suggestions and conclusions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

There exists a large body of theoretical and empirical literatures which examined economic growth and its determinants. In the previous century, researchers were keen on predicting and estimating future growth. Many studies were seen trying to determine the variables that have significant effect on growth rate. An understanding of the literature on economic growth is helpful in understanding economic growth well.

This chapter is divided into two subtopics namely theoretical and empirical framework. The former explains the theory of growth while the latter discusses early studies about growth and its determinants. Three variables are investigated in the empirical framework namely trade openness, capital formation and FDI.

2.2 Theoretical and Conceptual Framework

Chen and Feng (2000) examine factors of cross-provincial variations of economic growth in China. In their study, the determinants include private enterprise, education and openness. According to their views, there are three policy implications important for economic growth in China. The first view states that less developed provinces in China are lacking in human capital. In order to build up human capital in these provinces, China must set up a labour system which can keep on the brightest people in these provinces. The second view is related to international trade. In order to develop a region, its international trade relation must be conducive. Conduciveness in international trade allows for comparative advantage by shifting resources to the relevant sectors. In addition, trade restrictions between provinces are detrimental to economic growth. According to the third view, fatality rate is also essential in increasing economic growth. A reduction in fatality rate can help boost economic growth.

Economic globalization exposes a country to international trade, allowing the migration of productive and unproductive labor, and also transferring new technologies and attracting capital flows into the domestic country. According

to Weil (2005), there exists a link between openness and technology. Economic openness can contribute to an advanced level of technology by importing new technologies from other foreign countries. One way is through FDI, where technology can be transferred with foreign capital simultaneously. Another way by buying inputs and capital goods embodied with the technology. Expansion incentives also help in increasing new technologies in the domestic country. Investing in research and development (R&D) will create better quality goods and services. Later, higher profits will encourage the firm to expand production by exporting it to other countries.

Weil (2005) also relates economic openness with efficiency. Economic openness contributes to efficiency in production. The main effect of trade is it will increase efficiency level. In addition, economies of scale can be achieved in a larger market. However, economic openness means that the domestic firms have to compete with foreign firms and imports.

As a conclusion, economic openness affects growth in two ways, through factor accumulation and increase in productivity. By factor accumulation, the focus is on physical capital. Physical capital flows can be obtained from FDI and portfolio investment. Portfolio investment means that foreign investors are

buying bonds or stocks in the domestic country. The capital mobility of growth can be seen using the Solow model.

Ownership, Locational and Internalization (OLI) framework is used in the study by Ramasamy (2008). This framework can be used in understanding FDI in detail. How FDI contributes to the economy will be discussed in this comprehensive framework. Firm needs to have their own advantages such as their own patents, marketing system or technologies. These are examples of intangible assets which are called O advantages. These assets will help in competing with domestic firms. The higher the O advantages the better the firm is in competing with other firms in the market. Location also plays an important role in expanding FDI. This is classified as the L advantages. The advantage can be in resource endowments. Non-tariff barriers and high import duties are important reasons for FDI. The government plays an important role in implementing policies to attract foreign investments. Ramasamy (2008) suggests two other factors in determining FDI. Using data from the Malaysian Investment Development Authority (MIDA), the result shows the link between delayability and reversibility in FDI. Delayability is one of the determinants in uncertainty. It gives the government ideas to attract more foreign investment in Malaysia by using policies that manage by government in order to growth the FDI.

Vidyattama (2007) investigates factors influencing provincial growth in Indonesia from 1993 to 2003. Cobb-Douglas production function and the Solow-Swan model were used in this research. The Cobb-Douglas function is written as:

$$Y = AK^{\alpha}L^{1-\alpha}$$

Where:

Y = output

K = physical capital

L = labor

A = total factor productivity

α = share coefficient

The purpose of α is to show the share of input on output. If the value is less than 1, the share contribution of input is higher than the growth of output. Meanwhile A means that output is increased to an increase in input. According to Durlauf and Quah (1999) (as cited in Vidyattama (2007) the indicators of growth are in the explanatory variables or A which is called TFP. However,

there are some variables that could not be used in sub-national studies but commonly used in cross country research. Meanwhile, investment is the indicator used in the Solow-Swan growth theory model. This physical investment will enhance the income level of the steady-state and also enhance the speed in growth. This model can be applied to any economy. Investment according to their research is regarded as gross fixed capital formation. However, previous studies argued that physical capital alone cannot explain the difference in income growth in the Solow-Swan growth model.

2.3 Empirical Framework

According to Gray (2002), FDI is defined as a source of technologies and skills valuable in the long term. FDI is one of the important factors in economic development process. After the financial crisis, FDI became an important factor contributing to Indonesia's growth. Gray examined FDI and how FDI inflows recovered in Indonesia. Development projects in Indonesia hold uncertainty for investors. Factors such as restrictions in the projects, high taxes and charges are some of the issues of FDI in Indonesia. Furthermore, there are also problems between the national and local governments in Indonesia. The impact of FDI in

Indonesia can be seen through three agencies namely Semen Gresik, Caltex and Kaltim Prima Coal (KPC).

The effect of scale economies and total export on factor productivity was examined by Thangavelu and Owyong (2003). Their study focused on the manufacturing sector in Singapore. Using a panel data from 1974 to 1995, their study shows that these two independent variables are significant. Panel data has its own advantages compared to other methods. Most important, it can reduce problems often present in time series data such as multicollinearity and endogeneity effects among the variables. Blunded and Bond (1998) GMM estimator approach was used to establish the robustness of the results in a dynamic panel framework which allowed for fixed effect (Thangavelu and Owyong, 2003). Export affects the productivity of the whole manufacturing industries. Further, these variables had been separated into two independent variables namely FDI-intensive and non-FDI intensive industries. The study showed that FDI was the main contributor that supported productivity growth in ten industries in the manufacturing sector in Singapore compared to non-FDI intensive industries. Growth in productivity was also not affected by any changes in export growth or scale economies in non-FDI intensive industries.

Financial development was the independent variable examined in Seetanah, Ramessur, and Rojid (2008). The objective was to test the link between financial development and economic growth in island economies. The study used a sample of 20 island economies for a 22 year period. The islands were The Bahamas, Antigua and Barbuda, Belize, Dominican Republic, Guinea Bissau, Mauritania, Seychelles, Singapore, Trinidad and Tobago, Bahrain, Barbados, Cyprus, Fiji, Grenada, Guyana, Haiti, Jamaica, Malta, Mauritius, and Papua New Guinea. Using the fixed effect method, the study shows that financial developments have positive impact on islands' output. Furthermore, using the dynamic panel data method, namely the Generalised Methods of Moments (GMM) panel, the study also shows that estimation had a positive link with the level of output in island economies. According to Rajan and Zingales (2000), industries which are heavy-users of external finance make countries growth faster rather than other industries whereas the countries have the well-developed financial systems (Seetanah, Ramessur, and Rojid, 2008).

Theoretical framework of the endogeneity of financial openness and trade openness is the objective of research by Aizenman and Noy (2009). Their study examines two-way causality between trade openness and financial openness in developing countries. By letting FDI fragment the optimal productivity, countries may get the benefits from cost advantage associated with

labour intensive production stage in the abundant labour country. Their model is characterized by political uncertainty and limited tax. Fiscal tools ware financed by implicit tax and direct income tax. Using Geweke's (1982) causality technique, the findings revealed that an increase of 1 per cent in trade openness leads to an increase of 9.5 per cent in the international financial flows in the domestic country. There exists a bi-directional causality where financial openness leads to an expansion in trade openness. However, there was still a restriction in the current accounts that will have a negative effect on trade openness in the developing countries.

Inward FDI and economic growth have a bi-directional causal link in Portugal. This finding is based on a research by Andraz and Rodrigues (2009). Their study uses a three-stage technique while the data are from 1977 to 2004. The purpose was to investigate Granger-causality between growth, FDI and export. FDI was significant in short run and FDI also Granger-caused total real exports. The finding shows that FDI is one of the indicators that influence GDP growth in Portugal. However, export does not affect GDP growth rates. Expansion in FDI affects total capital formation in the economy. Subsequently, the increase in total production capacity and external competitiveness will increase growth rates.

Mandilaras and Popper (2009) investigate international capital flows in seven East Asian countries. The purpose was to determine the indicators of net outflows. The study also evaluates the effect of openness in financial markets on international capital flows, including the link between domestic capital flows and international capital flows in the East Asian countries. The findings show that domestic capital markets is a good indicator in explaining the changes in total capital flows in the seven East Asian countries. Furthermore, openness in capital markets is also important in influencing total capital flows in the economy. The US macroeconomic variables are significant in determining the growth of GDP.

Adhikary (2011) reports that based on theoretical linkage, the relationship between economic growth, trade openness, foreign direct investment (FDI) and capital formation tends to be positive. First, FDI expands economic growth in a capital scarce economy through the efficiency of physical investment. Thus, FDI widens the scope of international competition, increases technological spillover benefits and strengthens the supply side capabilities to produce and sell goods and services in order to achieve high economic growth. Second, risk-return relationship is an effect of the flows of international capital which is influenced by the degree of trade openness. Besides, trade openness shows the comparative advantage of a country's investment according to the transaction cost theory.

The theory explains that a low transaction cost environment provides financial incentives for foreign and domestic players who have a large supply of irreversible investment like FDI. Moreover, an economy with a higher economic openness can grow faster by absorbing new technologies. Third, economic growth and FDI are also influenced by the level of capital formation. By using time series data from 1986 to 2008, the study shows that capital formation and FDI have positive effect on growth rates in Bangladesh.

Causality between trade openness and per capita real GDP and the impact of openness in eight Union Economique et Monetaire Ouest-Aafricaine (UEMOA) countries were investigated by Agbetsiafa (2010). The study uses three measurement of trade openness. By using the Johansen cointegration test, trade openness and growth rate are shown to have a long run equilibrium relationship. There exist a bidirectional causality between total trade and per capita real GDP in Ivory Coast, Niger and Burkina Faso. However, in Benin, Mali, Guinea Bissau, Togo and Senegal, causality is unidirectional. The researcher also suggests increasing exports in intermediate goods, improving facilities and human capital in order to increase per capita real GDP, and avoiding deficits in the country.

Asid (2010) uses real GDP of workers as a proxy for economic growth. Human capital and FDI are the independent variables that have significant effect on growth. Meanwhile openness is weakly significant in a certain model of growth. Grossman and Helpman (1991) & Romer (1992) (as cited in Asid, 2010) also support this findings because economic openness will increase the opportunity for the domestic country to absorb technologies from foreign countries.

Azam (2010) examined four South Asian countries, namely India, Bangladesh, Sri Lanka and Pakistan. The objective is to examine the impact of FDI on these four countries. The data are from 1980 to 2009. Using the least squares technique, the result shows that FDI has a significant effect on growth. Therefore, the governments of these South Asian countries should increase the total FDI inflows into the country since FDI has ae high potential to increase GDP in the countries.

Chimobi (2010) analysed the relationship and causality between economic growth and trade openness and financial development in Nigeria. The financial variable is separated into three sub-variables which are private credit, money supply and direct credit. The time series data are from 1970 to 2005. First,

testing for stationarity using the Augmented Dickey Fuller (ADF) test, the result shows that all the variables are stationary at first difference. However, the long run relationship shows that all the independent variables are not co-integrated. The Granger causality test also shows that the two independent variables do not have causal effect on growth. On the other hand, growth affects financial development and trade openness in Nigeria. Money supply is the only financial development variable seen to have an effect on the level of trade openness in the country.

The importance of the U.S. trade on North African countries' growth is the objective of Ekanayake & Sussan (2010) study. Their study analyzes the flow and effect of US trade on North African countries. The independent variables are FDI and US trade. FDI is a source of new technologies and human capital in the domestic country. The study uses quarterly data from 1989 to 2008. The finding shows that FDI had a positive effect on growth rate in the North African countries. The coefficient was significant at 5 per cent. Meanwhile the openness variable statistically was insignificant and share of trade with U.S. variable showed a negative sign. Therefore, it can be concluded that U.S. trade was not important in determining the per capita GDP growth in the countries. This was because the total export of North African countries to the US was only 12 per cent of the whole trade.

Hoang, Wiboonchutikula, and Tubtimtong (2010) examine the impact of FDI on growth rates in Vietnam. They use panel data over a period of 1995 to 2006. The finding shows that FDI had a significant effect on growth rates in Vietnam. The increase of 1 per cent in FDI will expand economic growth to 0.012 per cent. Further, the study also examines whether human capital has significant effect on growth. Gregorio, Borenstzein, & Lee (as cited in Hoang et al. (2010)) suggest that FDI only has a positive effect when the stock of human capital reached a certain threshold. Only at this threshold can a country exploit the technology absorbed from FDI.

The determinants of FDI in Canada had been examined by Leitao (2010). The study examines the determinants of FDI in Brazil, Japan and the EU-15. Using GMM system estimator and Fixed Effects estimators, the findings show that trade openness and market size were the significant factors that influence the total inflows of FDI in Canada. North American Free Trade Agreement (NAFTA) and Free Trade Agreements (FTA) are the policies that attracted inward FDI to Canada. Tax and wages also had significant influences in determining total FDI in Canada. The stability of macroeconomic policies attracts foreign investors to invest in the country.

Shabri and Said (2010) use time series data to examine the empirical link between growth and finance-growth nexus in the short and the long run. Their study examines the relationship during the financial crisis post-1997. They use the Autoregressive Distributed Lag (ARDL) model and apply Granger causality test. The finding shows that a causality relationship does not exist between finance and growth rates in Indonesia. This is similar to the "independent hypothesis" by Lucas (1988) (as cited by Shabri and Said (2010)). Finance does not have a significant influence on growth because of the volatility and arbitrariness in stock prices, which make investment allocation inefficient. Consequently, this may decrease growth rates in the long run.

Hermes and Lensink (2003) examine the empirical relationship between FDI and economic growth. They investigate the role of the development in the financial system in enhancing the relationship between foreign direct investment, financial development and economic growth. Their sample was countries in Latin America and Asia. Their empirical investigation shows that 37 of the 67 countries examined were clearly developed in their financial system, enhancing the positive relationship between FDI and economic growth. On the other hand, financial system may contribute to economic growth via two channels. First, by mobilizing savings; this increases the volume of resources available to direct investment. Second, by supervising investment projects; this

increases the projects efficiency. The capability to mobilize savings and supervise investment projects is due to a developed domestic financial system. Consequently, developed domestic financial system may lead to increase in economic growth.

Yu (1998) reports two important determinants for economic growth in China from the 1980's to 1990s. The study uses the augmented Dickey-Fuller (ADF) procedure to test each variable for a unit root in the first difference and its level form. The important determinants are fixed capital investment and merchandise export. However, the expansion in foreign trade and fixed-capital investment are because of changes in the economic system. Based on the empirical evidence, economic growth in China needs massive accumulation of physical capital stock.

Hu and Khan (1997), demonstrate why China is growing so fast. They examine the contributions of capital and labour inputs, and particularly productivity to China's economic growth based on the standard neoclassical growth framework. The study uses time series data. The study shows that during 1979 to 1994 which was the reform period, physical investment had played a dominant role in economic growth in China. Capital formation as a dominant factor influencing

economic growth in China contributed 65.2 percent of output growth in the central planning era from 1952 to 1978.

Anthony and Peter (2011) use the two-stage least squares (2SLS) in the study of the relationship between foreign private investment, capital formation and economic growth in Nigeria. The study reports that there exist a long run relationship between foreign private investment, capital formation and economic growth. The relationship among the variables as the error correction term in the long-run equilibrium is significant. Estimations of two-stage least squares are very close to estimations using OLS. This suggests that estimations of OLS are unbiased and consistent. Therefore, endogeneity was not a problem in the model estimation. Thus, there has no simultaneity between GDP growth and the model of capital formation.

Akpokodje (1998) shows that Nigeria's domestic investment as a ratio of gross domestic product (GDP) declined in average from 24.4 percent in 1973 - 1981 to 13.57 percent in 1982 - 1996. Private investment rate also decreased 4.4 percent between the two time periods. Based on the fact that investment influences the rate of capital formation, domestic investment becomes an important factor in contributing to economic growth (Anthony and Peter, 2011).

Using panel data, Seetanah & Rojid (2011) investigate the determinants of growth rates of COMESA countries. The COMESA countries are Burundi, Congo DR, Egypt, Ethiophia, Kenya and Madagascar. The variables that have high significant effect on growth are capital accumulation, education, and openness. Political stability and financial development also lead to the expansion of growth rates in these countries.

2.4 Conclusion

Several theoretical frameworks have been discussed in this chapter. The formula of production function has also been explained in depth. Several empirical frameworks have also been explained. From the discussion of the empirical frameworks, FDI appears to be one of the indicators that greatly influence growth rates. A study undertaken by Andraz and Rodrigues (2009) demonstrates that FDI is significant in the short run and its increase may affect the total capital formation in the economy, resulting in higher economic growth. A study by Hoang, Wiboonchutikula, and Tubtimtong (2010) found that FDI has a significant effect on growth rates as well. Azam (2010) studies the impact of export and FDI on growth in South Asia and concludes that FDI has a significant effect on growth.

There are studies which show that openness determine growth. Aizenman and Noy (2009) shows that increase in trade openness will increase the international financial flows in the domestic country. This subsequently helps to enhance growth. Moreover, Weil (2005) demonstrates openness may contribute to advanced technology and may facilitate an innovation in production. Agbetsiafa (2010) discovers that there is a long run relationship between openness and growth. On the contrary, Ekanayake and Susan (2010) in their study about the role of U.S trade and its impact on economic growth in North African Nations found that trade openness is insignificant to growth.

Gross fixed capital formation provides positive impact on growth as well according to several studies. Seetanah, Ramessur, and Rojid (2008) in their study on financial development and economic growth notice that financial development has positive impact on economic growth. In a study about capital investment, international trade and economic growth in China in the period of 1980s - 1990s, Yu (1998) concludes that fixed capital investment is an important determinant in economic growth. Hu and Khan (1997) in their study about China's growth uncover that capital formation is the major factor to improve growth.

Next is Chapter 3 that will discuss the methodology of this research. In this chapter, the source of data, the dependent and independent variables, together with the method of analysis will be explained in detail.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discusses the methodology employed in the study. This study uses panel data method and also applies the Ordinary Least Square (OLS) method. Annual data for Malaysia, Indonesia, Thailand and the Philippines from 1981 to 2008 were collected. The data were deflated a constant price at year 2000. Deflated data take inflation into account to ensure that the data are appropriate (Fuller, 1991). To determine the determinants of economic growth for these four ASEAN countries, this study uses three variables namely FDI, openness and gross fixed capital formation. These three variables are used as the independent variables. GDP is used as the dependent variable to represent economic growth.

3.2 Model Specification

The model can be described as follows:

(3.1)

Where:

gdp	:	Growth Domestic Product (GDP)
fdi	:	Foreign Direct Investment (FDI)
open	:	Openness
		[(export + import) / GDP)]
capfor	:	Gross Fixed Capital Formation
μ	:	error term
β_1, β_2, and β_3	:	coefficient for explanatory variables
i	:	cross-sectional unit
t	:	time period (1981 - 2008)

3.3 Measurement of Variables

The dependent variable in this study is GDP. It has been shown that GDP can describe the economic growth in the ASEAN–4 countries. The explanatory variables consist of three independent variables namely FDI, trade openness and gross fixed capital formation. All the dependent and independent variables are stated in constant price (2000 - 100) to ensure that there are no inflation effects.

3.3.1 Gross Domestic Product (GDP)

Gross Domestic Product (GDP) is a measure of aggregate output produced in an economy. This particular output can be classified into 3 categories: the total value of output produced, the total value of incomes yielded in producing the output, or the total expenditures on the output (Artis, 1984). Economic growth is defined as the growth rate of GDP for each ASEAN-4 country. The GDP growth rate is derived by taking difference between the current year GDP and the previous year GDP divided by the previous year GDP and multiplied by hundred.

As an example, the economic growth in 2010 can be seen by comparing the growth rate of GDP in 2010 can be seen by comparing the growth rate of GDP in 2010 with the growth rate of GDP in 2009. Thus, while the growth rate of GDP for 2010 is larger than the growth rate of GDP 2009, it means that there has an economic growth in 2010 and vice versa. The growth rate of GDP can be obtained as follows:

$$\text{Growth rate of GDP} = [\text{GDP (2010)} - \text{GDP (2009)}] / \text{GDP (2009)} \times 100$$

An increase in n in economic growth will help a country to increase its per capita income. In addition, economic growth will increase demand for labour, subsequently decreasing the unemployment rate. Economic growth also helps a country reduce its poverty rate and also achieve a higher standard of living for its citizens.

GDP is used as the dependent variable in this study since it can represent economic growth for a country. Meanwhile, the independent variable such as FDI, openness and gross fixed capital formation are the determinants of GDP since they can influence economic growth.

3.3.2 Foreign Direct Investment (FDI)

Foreign Direct Investment (FDI) or Foreign Investment is defined as the net inflows of investment to achieve a lasting management interest in a business operating in an economy other than that of the investor. FDI is the sum of equity capital, other long-term capital and short-term capital as shown in the balance of payments, and reinvestment of earnings. FDI is divided into two types: inward foreign direct investment and outward foreign direct investment. Both types will result in a net FDI inflow that can be positive or negative in values. The formula to find FDI net inflow is:

FDI net inflow = FDI inflow – FDI outflow

Inflow of FDI results in an additional increase in the transfer of skills, technologies and job opportunities for a country. ASEAN countries such as the Philippines and Singapore obtain significant benefits from FDI. For that reason, this study examines the importance of FDI in increasing the economic growth.

3.3.3 Openness

Openness is defined as an economy which trades with the rest of the world. In other words, there exist economic activities such as import and export for a country. Countries like the ASEAN members who practice foreign trade are known open economies. Openness can be measured as follows:

Openness = (total export + total import) / total GDP

Economic openness brings many advantages such as consumers have plenty of choices since there are variety of goods and services in the economy. Moreover, the country's citizens have the opportunity to invest their savings abroad. Furthermore, open economy appears to be beneficial for regional development, at the same time indirectly reducing poverty among citizens, (Pernia and Quising, 2003).

3.3.4 Gross Fixed Capital Formation

European System of Accounts (ESA) defines gross fixed capital formation as resident producers' acquisitions of fixed assets during a given period, less disposals, plus certain additions to the value of non-produced assets that are realized by the productive activity of producer or institution. The importance of gross fixed capital formation is in quantifying the value of the acquisitions less disposals of fixed assets which is future replacement for obsolescence of existing assets because of normal wear.

Uremadu (2006) defines gross fixed capital formation as an addition in stock of capital assets set. It is a part of the stock of capital assets set that is used for future productive endeavours in the real sector. It will conduct to increase physical capital assets of a country. It gains from savings accumulation which gives positive effect to private savings accumulation, in other word contributes more savings. Increase in savings accumulation leads to increase in gross domestic investment (GDI), next more investment projects will made. Investment projects will generate income and this will increase GDP growth (Anthony and Peter, 2011).

From the above discussion, it is clear that gross fixed capital formation is not a measure of total investment since only the value of net additions to fixed assets is counted and all kinds of financial assets like other operating costs and stocks of inventories are excluded. As an example, it is easy to find fixed assets when we examine a company's balance sheet. This is because fixed assets are the only component of the total annual capital outlay.

3.4 Source of Data

This study is an empirical study using secondary data. Annual data from 1981 to 2008 of four ASEAN countries namely Malaysia, Indonesia, Thailand and the Phillipines were collected from World Development Indicator (WDI) published by the World Bank. Data for total GDP, FDI, export, import and gross fixed capital formation for 1981 to 2005 were obtained from the World Development Indicator (WDI) 2007 CD-ROM. For years 2006 to 2008, data were extracted from the World Development Indicator (WDI) website.

3.5 Estimation Procedure

This section explains the econometric procedure in testing time series data and panel data which are used in the study. The most appropriate estimation procedure to be used based on various conditions are discussed in order to achieve the objective of the study.

3.5.1 Panel Unit Root Test

The possibility of panel cointegration will be examined using the panel unit root test. Panel unit root test is used to test whether the data is stationary or non-stationary. Im, Pesaran and Shin (2003) (IPS) explain that the Dickey-Fuller (DF) unit root test which applies in panel is used to allow for heterogeneous deterministic intercept terms (Harris, Harvey, Leybourne and Sakkas, 2008). In the case of the limiting fraction of a stationary series is non-zero as $N \rightarrow \infty$ the *LM*-bar test is consistent as proposed by IPS (Harris *et al.* ,2008). In addition, (IPS, 2003) denoted a general setting in a standardized *t*-bar test statistic where the DF statistics is depicted to converge in probability to a standard normal variate consecutively with $T \rightarrow \infty$ for time series dimension and $N \rightarrow \infty$ for cross section dimension. Panel unit root test involves two types, at level and first

difference. By using panel unit root test, the data can be ensured to be stationary in level or first difference. The IPS model for this study is shown as follows:

Model 1: Malaysia

(3.2)

Model 2: Indonesia

(3.3)

Model 3: Thailand

(3.4)

Model 4: Philippines

(3.5)

3.6 Panel Data

Panel data are sets of data on the same individual over respective periods of time (Maddala (1994). However, data sets are sometimes incomplete. In other words, there are missing data for a certain period of time. In addition, data sets are sometimes available for a short of period of time such as two to seven years. This kind of data sets is denoted as ‘short panels’ (Maddala, 1987).

Panel data is used in empirical analysis where two types of data, cross-sectional and time series data are combined. Baltagi (1995) discusses that there are three advantages of panel data. First, estimator technique of data panel heterogeneity is explicit for every micro unit. Second, such combination of data gives much more information, which means it more quality as a variable and there are less colinearity problem among the variables. Third, panel data provide advantage in studying complex behaviour.

In addition, Hsiao (1985, 1986), Klevmarken (1989) and Solon (1989) (cited in Baltagi, 1995) suggest that the use of panel data is advantageous in studying the dynamics of adjustment. It is also well suited in studying economic duration, useful in order to adjust to economic policy changes. Panel data are also simple in identifying and measuring effects instead of pure time series data or pure cross-sections data.

3.6.1 Hausman Test

Verbeek (2008) explains that in general, the Hausman test is a comparison of two estimators. The first estimator is consistent and typically efficient under the null hypothesis. The second estimator is consistent under both the null and

alternative hypothesis. In other words, the Hausman test is used to vary the consistency and efficiency of the estimator between the fixed effects and random effects model. In addition, the Hausman test functions to compare the significance of the fixed effects model estimator to the random effects model estimator. It also tests whether the estimator of the random effects model produce consistent and efficient result.

3.6.2 Fixed-Effects vs. Random-Effects

In Maddala (1994), several arguments are put forward with regard to using random effects models rather than fixed effects models. If the of number of cross-section units are large compared to estimating N of the α_i, only the mean and variance will be estimated in the random effects models. Hence, a lot of degrees of freedom will be saved. Maddala (1971) says that we ignore μ_{it} measure effects for the *i*-th cross section unit in the *t*-th period as somehow we ignore α_i measure firm specific effects. Therefore, if we addressed μ_{it} as a random variable, there is no reason that α_i should be otherwise (Maddala, 1994). In addition, if the inferences to be made are only about a set of cross-section units, α_i should be treated as fixed. In contrast, if the inferences to be made are about the population from which these cross-section data came from, α_i should

be treated as random. Some time-invariant variables like years of schooling and family background in studies of wages (Lillard and Willis, 1978) are used as examples as shown in this model:

(3.6)

Based on this case, one model has been employed called the random effects model. If the fixed effects model were used, the parameters cannot be estimated. This is because captures the effect of all the time-invariant variables (Maddala, 1994).

In choosing the most suitable model, it should depend on the statistical properties of the implied estimator. Neyman and Scott from the classical problem of incidental parameters in Chamberlain, 1980; the fixed effects model results in inconsistent parameters in dynamic models applying small values of *T* and large values of *N* (Maddala, 1994). On the contrary, Mundlak (1978) argues that the duality of fixed effects and random effects models will disappear if the assumption of depends on the mean value of . This assumption is sensible in many problems. As an example:

$_i$ (3.7)

.

Hoch (1962) and Mundlak (1961, 1963) allowed for unobserved effects specific to each production unit in the early stage of using panel data. The model given is referred to as the fixed effects model:

i (3.8)

t

Substituting (3.3) in (3.4), produces:

$_i$ (3.9)

By using the ordinary least squares for the equation noted by Fuller and Battese (1973) argument, the estimator β from the random effects model can be obtained.

$$- \quad _i \quad _i \quad _i \quad _i \tag{3.10}$$

$$_i \quad _i$$

Where: – and –

As $_i$ is orthogonal to $_i$. Also as Cov $_i$ – $_i$

the result produces as the within group estimator. The random effects model gives the same estimator as the fixed effects model for this particular case.

$$_i \quad _i \quad _i \quad _i \quad -$$

Will produce:

$$_i \quad _i \quad _i \quad _i$$

Mundlak arguments are true in the case of all the elements in π are nonzero. Based on the earlier discussion in (3.3), the argument is reasonable and we will get:

$$_{i} \tag{3.11}$$

due to this case, (3.6) will become

$$- \quad _{i} \qquad _{i} \qquad _{i} \quad -$$

since $-$ $_{i}$; again the estimator of as the within group estimator will be obtained.

On the other hand, if not all of the elements in π are nonzero, clearly the argument is no longer reasonable. Let say we separate the variables x_{it} into two sets x_{1it} and x_{2it}. Similar to x_{it}, β is also separated into β_1 and β_2. Suppose (3.7) is changed to:

$_1$ $_i$

corresponding to (3.6)

$_i$ $_1$ $_i$ $_2$ $_i$ $_1$ $_i$

Where – . In this case the least square estimation does not produce the within group estimator even for the subvector β_1. Exception is for the case of the variables and are orthogonal.

3.7 Ordinary Least Squares (OLS)

Ordinary Least Squares (OLS) is also known as least squared errors regressions or least squares (ClockBackward, 2009). OLS is a method of linear regression in estimating data to achieve the best fit of data. Gujarati (2006) argues that in

OLS, and should be chosen in the case of the residual sum of squares (RSS) value is very small.

In OLS, model transformation can be used to change the parameters from nonlinear parameters to linear parameters. This is achieved via transformed equations. The stochastic term in OLS linked to the dependent variable has dissimilar variability. The nonlinear models can be intrinsically linear regression models in parameter and can be intrinsically nonlinear in parameters; depending on the variability of the stochastic term.

The least square criterion of minimisation can be applied to the original variables in the case of the linear models and nonlinear models in variables. However, in models nonlinear in parameters, the least squares criterion of minimisation can be achieved via transformed variables. (Even the estimation of parameters in OLS transformed models is biased. Hence, researchers need to be aware of the properties of the stochastic residual term used in these models when the process of transforming model in done.

Next, Chapter 4 provides explanation about the analyses using panel unit root test and pooled estimation. The chapter also explains in detail the results produced by the tests. This study applies the OLS estimation analysis as well in order to ascertain the effect of the independent variables on growth in each country.

CHAPTER 4

RESULTS AND ANALYSIS

4.1 Introduction

This chapter explains the data results of the analyses carried out in this study. The analyses use fixed effects model in panel data. The study employs data for four variables which are gross domestic (GDP), foreign direct investment (FDI), openness and gross fixed capital formation from 1981 to 2008. The analysis applies to four ASEAN countries, Malaysia, Indonesia, Thailand and the Philippines. This chapter establishes the results of panel unit root tests for each country. In addition, this chapter also discusses the results using pooled regression called the fixed effect model.

4.2 Results of Panel Unit Root Tests

Im, Pesaran, and Shin (1995) as mentioned in Seetanah and Rojid (2011), built a panel unit root test. A unit root could be rejected at 5 percent significance level when the null hypothesis is non stationary. Thus, it is safe to further the panel data estimations in econometric specifications. On the other hand, this may assume:

H_0 : y = non stationary

H_1 : y ≠ non stationary

4.2.1 Augmented Dickey-Fuller Panel Unit Root Test Results

Panel unit root test is used to test stationarity with various degree of heterogeneity. Karlsson and Lothgren (2000) point out that the power of panel unit root test increase when there is an increase in the number of panel series. In addition, the null hypothesis in this panel test has a unit root for each series and hence it is difference stationary. Quah (1994) and Levin and Lin (1992) (LL) explain that the alternative hypothesis is that each individual series are

stationary (Karlsson and Lothgren, 2000). Im, Pesaran and Shin (1997) suggest that at least one of the individual series is stationary (Karlsson and Lothgren (2000)).

Table 4.1 shows the Unit Root Test results for the four variables in the four ASEAN countries. This method is used to test the stationary of the four variables in these countries. It is used to reject the null hypothesis which says that all variables have unit roots. The result shows that all variables included in the study do have unit roots at level which means it is not stationary. However, only one variable which is GDP for the Philippines and Malaysia do not have unit root and stationary in level.

Hence, unit root test for the variables at first difference are carried out to determine whether the series are stationary at first difference. The results of unit root test at first difference indicate that all variables are stationary at first difference. Thus the null hypothesis can be rejected. This shows that all variables in ASEAN-4 countries do not have unit root and stationary at first difference.

Table 4.1: Unit Root Test for ASEAN-4 Countries

Country	Variables	Level (At 5%)	First Difference (5%)
Malaysia	gdp	0.050748** [0] (2.757171)	-0.676478** [0] (-3.516307)
	fdi	-0.283285 [0] (-2.001180)	-1.404970** [0] (-7.256098)
	open	-0.049230 [0] (-1.225020)	-0.895611** [0] (-4.315241)
	capfor	-0.077958 [0] (-0.966117)	-0.891341** [0] (-4.390315)
Indonesia	gdp	0.027788 [0] (1.034639)	-0.701115** [0] (-3.574805)
	fdi	-0.230418 [2] (-1.164710)	-1.554369** [1] (-6.668985)
	open	-0.439482 [0] (-2.493874)	-1.345335** [0] (-7.044197)
	capfor	-0.015207 [0] (-0.211603)	-0.719886** [0] (-3.595117)
Thailand	gdp	-0.004056 [1] (-0.181213)	-0.556342** [0] (-3.070990)
	fdi	-0.213656 [0] (-1.656715)	-6.566838** [6] (-5.267938)

	open	-0.010581 [0] (-0.260210)	-1.179399** [0] (-6.111229)
	capfor	-0.164320 [1] (-2.341801)	-0.672345** [1] (-3.479097)
Philippines	gdp	0.312957** [6] (4.374140)	0.323957** [6] (1.154678)
	fdi	-0.627819** [0] (-3.451954)	-1.611559** [0] (-9.396044)
	open	-0.055502 [0] (-1.025082)	-0.836787** [0] (-4.101686)
	capfor	-0.067235 [2] (-0.585094)	-1.149097** [1] (-4.092962)

Note: ** indicates the rejection of null hypothesis of non-stationary at 5% significant level ( ) indicates the t-statistic value [ ] indicates lag length

Table 4.2 shows the result of pooled estimation for the four countries. The estimation involves the three independent variables. The second column of the table shows the results of the pooled model. The coefficient value for FDI is 1.52 with a t-statistic of 4.56. The coefficient value indicates a correlation between FDI and GDP as the dependent variable; and the sign shows a positive relationship between both variables. An increase in FDI of 1 percent will increase GDP by about 1.5 percent, while other variables remain constant. The

t-statistic value for this variable indicates that it is significant at 5 percent level of significance.

The coefficient value for openness is -1.32. This value shows that there is a negative correlation between openness and GDP. The results mean that an increase in openness by 1 percent decreases GDP by 1.32 percent. The value of the t-statistic at -2.24 means that it is statistically significant at 5 percent significance level.

The coefficient value for gross fixed capital formation is 2.77. This result means that there is a positive correlation between gross fixed capital formation and GDP. A 1 percent increase in gross fixed capital formation will lead to an increase of 2.8 percent in GDP. Furthermore, the t-statistic value at 12.85 shows the result is highly significant at 5 percent level of significance.

The goodness of fit can be determined by the value of R square from this result. Since the R square value is 0.74, there is a high relationship between all the independent variables and GDP. Thus, about 74 percent of the variation in GDP can be explained by all these independent variables (FDI, open, capfor); while

about 26 percent of the variation in GDP can be explained by other explanatory variables not included in this study.

The third column of Table 4.2 presents the result of pooled estimation using fixed effect model. The coefficient value for FDI is 5.67, indicating that it has a positive relationship with the dependent variable, GDP. Furthermore, the t-statistic value for FDI at 4.08 shows that the result is significant at 5 percent level of significance. The result indicates a positive relationship between FDI and GDP, assuming other independent variables are constant. An increase in FDI by 1 percent will increase GDP by about 5.7 percent.

The next independent variable in the study is openness. In the fixed effect model, the coefficient value for openness is 2.47. This result shows a positive relationship between openness and GDP. Meanwhile, the t-statistic value for openness is 3.27, indicating that the result is significant at 5 percent level of significance. The result shows that there is a positive relationship between openness and GDP. Assuming other variables are constant, an increase in openness of 1 percent will increase GDP by about 2.5 percent.

The last independent variable is gross fixed capital formation. From the table, the coefficient value for gross fixed capital formation is 2.21, which shows that this variable has a positive effect on GDP. In addition, the t-statistic value is 10.02 which shows that the result is significant at 5 percent level of significance. Assuming other variables are constant, an increase in gross fixed capital formation of 1 percent will increase GDP by about 2.2 percent.

Based on the discussion above, the result shows that FDI has the largest effect on GDP compared to the other independent variables. We arrive at this conclusion by comparing the coefficient values of the three variables. FDI shows the highest coefficient value (5.67) compared to openness (2.47) and gross fixed capital formation (2.21). However, openness and gross fixed capital formation also affect economic growth.

Furthermore, the value of R-square is 0.87, which explains that the relationship between the dependent variable (GDP) and all the independent variables (FDI, open, capfor) is high. The value means that about 87 percent of variation that occurs in GDP can be explained by FDI, openness and gross fixed capital formation. Meanwhile, about 13 percent of the variation can be explained by other exogenous variables not included in this study.

Fixed effects model is used to identify the different impact of the independent variables on the dependent variable. In our case, the fixed effects model is used to determine whether FDI, openness and gross fixed capital formation have different impact on GDP. According to Fauzi (2009), fixed effects model incorporates the differences between cross-sectional entities allowing a different intercept for each entity. The intercept for each entity is constant through time and the coefficient slopes are assumed similar.

The fourth column of Table 4.2 presents the results of pooled estimation based on random effects model. The coefficient value of FDI is 3.38, which shows that there is a positive relationship between the dependent variable (GDP) and the independent variable (FDI). When FDI increase by 1 percent, GDP will increase by about 3.4 percent, assuming other variables are constant. The value of of the t-statistic for FDI is 3.76, indicating that the coefficient for FDI is significant at 5 percent level of significance.

On the other hand, the coefficient value for openness is -1.35. We conclude that there is a negative relationship between openness and GDP. When openness increase by 1 percent, GDP will decrease by about 1.4 percent, assuming other variables are constant.

Meanwhile, the coefficient value for gross fixed capital formation is 2.79. There is a positive relationship between this variable and GDP. Assuming other variables are constant, an increase of 1 percent in gross fixed capital formation leads to a GDP increase by about 2.8 percent. Moreover, the value of t-statistic for this variable is high at 17.88. Therefore, the coefficient of gross fixed capital formation is significant at 5 percent level of significance.

In Table 4.3, the coefficient value for Malaysia is -0.002 which explains that there is a correlation between all the independent variables (FDI, open, capfor) and Malaysia. However, the negative figure indicates that the relationship of these variables and Malaysia is negative. The figure also shows that these variables do not have high impact on Malaysia. The result is quite similar to Thailand where the coefficient value for this country is -0.007. Therefore, similar to Malaysia, Thailand appears not to have high advantage from those variables by looking at the negative relationship.

In contrast to Malaysia and Thailand, Indonesia and Philippines show positive relationship with these variables. This is shown by the value of coefficient for Indonesia at 0.007 and the Philippines at 0.002. These figures demonstrate that these variables produce positive impact for both countries.

Furthermore, the value of R square is high at 0.73 which suggests that there is a high relationship between the dependent variable (GDP) and the independent variables (FDI, open, capfor). Hence, about 73 percent of variation that occurs in GDP can be explained by FDI, openness and gross fixed capital formation while another 27 percent of the variation can be explained by other exogenous variables not included in the study.

Hausman Test is used to choose the best model between the fixed effects and random effects model. The test is done to compare the fixed effects and the random effects models under the null hypothesis (Hausman (1978). Comparison between fixed effects and random effects models occur while the effects of individual regressor are uncorrelated to the other regressors in the model (Wahid, Sawkut and Seetanah, 2009). Greene (2003) states that if the individual effects are correlated, the null hypothesis can be rejected, and the random effects model creates biased estimators. This violates one of the assumptions of Gauss-Markov and the fixed effects model is preferred (Wahid, Sawkut and Seetanah (2009)).

All the variables are seen to be significant at 5 percent level of significance. This shows that these variables are correlated to GDP in the ASEAN-4 countries. Moreover, there are positive impact between all the explanatory variables and GDP. The null hypothesis is rejected since the p-value is 0.00 ($p <$

.05), Thus, this test suggests that the fixed effects model is efficient compared to the random effects model.

Table 4.2: Pooled Estimation Results for Three Independent Variables in ASEAN-4 Countries

	Pooled Model	Fixed Effects Model	Random Effects Model
Constant	3.42** (4.56)	5.23 (0.78)	3.38** (6.27)
Fdi	1.52** (2.91)	5.67** (4.08)	5.20** (3.755378)
Open	-1.32** (-2.24)	2.47** (3.27)	-1.35** (-3.09)
Capfor	2.77** (12.85)	2.21** (10.02)	2.79** (17.88)
R^2	0.74	0.87	0.73
Hausman Test		p = 0.00	

Note: ** indicates the rejection of null hypothesis of non-stationary at 5% significant level ( ) indicates the t-statistic value

The panel data model particularly applies when *T* is small and the differences in β estimation appear to be large. In Maddala (1994), several arguments are identified in terms of using random effects models rather than fixed effects models. These arguments are about in case the number of cross-section units are large compared to estimating N of the α_i, only the mean and variance will be

estimated in the random effects models. Hence, a lot of degrees of freedom will be saved.

Maddala (1971) states that we ignore μ_{it} effects on the *i*-th cross section unit in the *t*-th period similar like we ignore the α_i for firm specific effects. Therefore, if we regard μ_{it} as a random variable, there is no reason that α_i should be vice versa (Maddala, 1994). In addition, if the inferences to be made are only about a set of cross-section units α_i should be treated as fixed. In contrast, if the inferences to be made are about the population from which these cross-section data came from α_i should be treated as random.

Table 4.3 shows the OLS estimation for Malaysia involving three independent variables which are Foreign Direct Investment (fdi), openness (open) and gross fixed capital formation (capfor). It can be seen that the t-statistic for FDI is 0.68; while for openness and gross fixed capital formation, they are 0.05 and 4.71, respectively. This result shows that only gross fixed capital formation is significant at first difference. In contrast, FDI and openness are not significant at first difference. In this particular case, gross fixed capital formation establishes a relation with GDP. This relation seems positive which means that

an increase in gross fixed capital formation will increase GDP. The other variables which are FDI and openness do not have correlation with GDP.

Table 4.3: OLS Estimation for Malaysia

Variables	Coefficient	T-statistic
Fdi	0.28	0.68
Open	2.40	0.05
Capfor	0.67	4.71**

Note: ** indicates the rejection of null hypothesis of non-stationary at first difference

Table 4.4 presents the results of the OLS estimation for Indonesia. From this table, openness (-3.10) and gross fixed capital formation (7.89) are significant at first difference. However, FDI (0.06) is not significant at first difference. For the case of Indonesia, openness (-2.30) plays the dominant role in influencing the GDP. In addition, gross fixed capital formation (1.13) also influences GDP; while FDI do not influence GDP. Openness shows a negative relationship with GDP. In other words, an increase in openness will decrease GDP. In contrast, gross fixed capital formation has a positive relationship to GDP where an increase in openness will lead to an increase in GDP.

Table 4.4: OLS Estimation for Indonesia

Variables	Coefficient	T-statistic
Fdi	0.03	0.06
Open	-2.30	-3.10**
Capfor	1.13	7.89**

Note: ** indicates the rejection of null hypothesis of non-stationary at 5% significant level

Table 4.5 presents the OLS estimation for Thailand using the three variables, FDI (fdi), openness (open), gross fixed capital formation (capfor). Based on the results, only gross fixed capital formation (10.46) is significant at first difference. The other variables, FDI (0.51) and openness (0.68) are not significant at first difference. The result also show that only gross fixed capital formation (0.78) has a relationship with GDP where an increase in gross fixed capital formation will help in increasing GDP. On the contrary, FDI and openness do not have any relationship with GDP. In other words, an increase in both factors will not increase GDP.

Table 4.5: OLS Estimation for Thailand

Variables	Coefficient	T-statistic
Fdi	0.14	0.51
Open	4.63	0.68
Capfor	0.78	10.46**

Note: ** indicates the rejection of null hypothesis of non-stationary at 5% significant level

Table 4.6 shows the OLS estimation for the Philippines using three independent variables (fdi, open and capfor). The results show that only gross fixed capital formation is significant at first difference. This result means that only gross fixed capital formation has a correlation with GDP. When gross fixed capital formation increase, it will cause GDP to rise. On the other hand, FDI and openness are not significant at first difference. Therefore, both variables have no correlation with GDP. Any increase in FDI and openness will not affect GDP.

Table 4.6: OLS Estimation for Philippines

Variables	Coefficient	T-statistic
Fdi	-0.23	-0.51
Open	-3.78	-0.59
Capfor	1.29	4.39**

Note: ** indicates the rejection of null hypothesis of non-stationary at 5% significant level

Chapter 5 presents the summary, conclusion and suggestions of this study. The results discussed in Chapter 4 will be summarized in the first section. The next section explains the conclusion of the study. The last section provides some suggestions for future research.

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 Introduction

This chapter is divided into two sections. The first section summarizes the research work while the second section presents the conclusion of the study.

5.2 Summary

Economic growth in the ASEAN-4 countries has a unique trend where most countries experienced an increasing trend in their GDP growth from 2006 until 2010. However, certain countries experienced a plunge in their GDP in 2008 to 2009. This is because of the world economic downturn occurring in that particular period. However, these countries managed to recover from the recession and improved their GDP growth.

Three variables were employed in the study to determine their relationships with GDP. These variables are FDI, openness and gross fixed capital formation. GDP is used to indicate economic growth and becomes the dependent variable. The appropriate estimation method to analyse this type of data is panel data. Panel data is the best method since it has several advantages such as it can control the individual heterogeneity, give less collinearity among the variables and more degrees of freedom, and also identify and measure effects. Using panel unit root test, the result shows that all variables are stationary and significant at first difference at a 5 percent level of significance. In contrast, at level value, most of the variables are not stationary at a 5 percent level of significance. The results of panel unit root test are summarized in Table 5.1:

Table 5.1: Summary of the Stationarity of Panel Unit Root Test at 5 Percent Level of Significance

	Malaysia		Indonesia		Thailand		Philippines	
	Level	First difference	Level	First difference	Level	First difference	Level	First difference
gdp	(s)	(s)	(ns)	(s)	(ns)	(s)	(s)	(s)
fdi	(s)	(s)	(ns)	(s)	(ns)	(s)	(s)	(s)
open	(ns)	(s)	(s)	(s)	(ns)	(s)	(ns)	(s)
capfor	(ns)	(s)	(ns)	(s)	(s)	(s)	(ns)	(s)

Note: (s) indicates significant; (ns) indicates not significant

Furthermore, in looking for the impact of all the independent variables on GDP, pooled estimation is employed. In pooled estimation, three particular tests were used. First, the pooled model, where all variables are stationary and significant at 5 percent level of significance. In addition, the result shows that only one variables or openness has a negative relationship with GDP. Other variables have positive relationships with GDP. The goodness to fit of the model is also high with R square value of about 0.74.

The second model estimated is the fixed effects model. All variables tested were shown to be stationary and significant at 5 percent level of significance. The model also shows that all the variables have positive relationship with GDP. In addition, the value of R square in this model is also high at 0.87 which indicates a good fit.

The third model is called the random effects model. In this model, all variables seem stationary and significant at 5 percent level of significance. However, the relationships between the independent variables and GDP differ. All independent variables show positive relationship with GDP except for openness. The value of R square at 0.73 indicates that the goodness of fit is high. The signs of each variable in these models are summarized in Table 5.2:

Table 5.2: Summary of the Sign of Impact for Pooled Estimation Model

	Pooled Model	Fixed Effects Model	Random Effects Model
fdi	+ (s)	+ (s)	+ (s)
open	- (s)	+ (s)	- (s)
capfor	+ (s)	+ (s)	+ (s)

Note: (s) indicates significant; (ns) indicates not significant

In choosing the best model, the Hausman test was employed. Based on this test, the best model to be used is the fixed effects model. The rejection of the null hypothesis since the p-value is less than 0.05 indicates that the fixed effects model is applicable.

In addition, the OLS estimation is used in this study to determine the correlation between the dependent variable (GDP) and the independent variables (FDI, openness and gross fixed capital formation). The results of the OLS estimation show the relationship between the dependent variable and the independent variables by country for the ASEAN-4 countries (Malaysia, Indonesia, Thailand and Philippines). The results are summarised in Table 5.3.

As discussed in Chapter 4, only one variable which is gross fixed capital formation is significant at first difference for Malaysia. Other variables (FDI and openness) are not significant at first difference. This shows that in Malaysia, only gross fixed capital formation has a correlation with GDP and the relationship between them (GDP and gross fixed capital formation) is positive. This means that when gross fixed capital formation increase, it will cause GDP to increase. However, other variables do not have any relationship with GDP and do not influence GDP in the case of Malaysia. For Indonesia, there are two variables (openness and gross fixed capital formation) significant at first difference. FDI is not significant at first difference which indicates that it has no correlation with GDP in this country. On the other hand, openness shows a negative correlation with GDP. In this case, an increase in openness causes GDP to decline. However, gross fixed capital formation indicates a positive sign in its relationship with GDP. This shows that an increase in gross fixed capital formation will increase GDP.

In Thailand, gross fixed capital formation as an independent variable seems significant at first difference. This means that this variable has a correlation with GDP and the correlation is positive. Therefore, increase in gross fixed capital formation will increase GDP. In contrast, the other two independent variables (FDI and openness) are not significant at first difference. This means

that there are no correlation between FDI and openness with GDP. Any changes in both independent variables will not influence GDP.

The results of the OLS estimation for the Philippines demonstrate that only gross fixed capital formation is significant at first difference. In contrast, the other two variables, FDI and openness are not significant at first difference. Therefore, gross fixed capital formation is identified as having a correlation with GDP and the correlation is positive. This relationship means that GDP will increase when there is an increase in gross fixed capital formation. The results of the OLS estimation for the ASEAN -4 countries are summarised in Table 5.3.

Table 5.3: Summary of Signs and Stationarity at 5 Percent Significance Level of

OLS Estimation for ASEAN-4 Countries

Countries	Variables	Sign	Stationary
Malaysia	fdi		(ns)
	open		(ns)
	capfor	+	(s)
Indonesia	fdi		(ns)
	open	-	(s)
	capfor	+	(s)
Thailand	fdi		(ns)
	open		(ns)
	capfor	+	(s)
Philippines	fdi		(ns)
	open		(ns)
	capfor	+	(s)

Note: (s) indicates significant; (ns) indicates not significant at first difference

5.3 Conclusion

To see the impact of certain variable as determinant of economic growth, three variables were used as determinants. These are foreign direct investment (FDI), openness (open) and gross fixed capital formation (capfor). Meanwhile, the dependent variable is gross domestic product (GDP) which is used as an indicator of economic growth.

In panel unit root test, not all variables are significant at level at a 5 percent significance level. The significant variables at level are only GDP and FDI for Malaysia and the Philippines, openness for Indonesia, and gross fixed capital formation for Thailand. For this reason, first difference at 5 percent significance level is employed. The subsequent result shows that all the variables are significant at 5 percent level of significance. The result shows that there are correlations between the variables.

Moreover, by applying pooled estimation, the impact of the variables on GDP can be observed. From pooled model estimation, the result shows that there are correlations between the independent variables and GDP. In the model, FDI and openness show positive relationship with GDP. This means that an increase in

FDI and openness will increase GDP. In contrast, the model shows negative relationship between openness and GDP. Hence, an increase in openness will decrease GDP. This result is similar to Ekanayake and Susan (2010) who studied the role of U.S trade with North African countries and its impact on economic growth. Openness shows a negative correlation with GDP growth in North African countries. They conclude that is not important in determining economic growth in these nations.

In the fixed effects model, all variables (FDI, openness and gross fixed capital formation) have correlations with GDP. More important, all of the variables have positive relationship with GDP. Thus, by increasing FDI, openness and gross fixed capital formation, GDP will also increase. This finding is supported by a study on FDI, trade openness, capital formation, and economic growth in Bangladesh by Adhikary (2011). This study found that FDI, openness and capital formation have positive impact on economic growth. Azam (2010) in his study about the impact of FDI in South Asian countries namely India, Bangladesh, Sri Lanka and Pakistan confirms that FDI has a significant effect on growth. Furthermore, an increase in trade openness will expand the international financial flows in the domestic country; thus giving positive impact on growth (Aizenman and Noy, 2009). In a study about the contributions of labour inputs, capital and particularly productivity on China's economic growth,

Hu and Khan (1997) points out that capital formation is the major factor in influencing economic growth.

The random effects model produces significant values for all independent variables, showing correlation exist between all the independent variables GDP. In this model, FDI and gross fixed capital formation produce positive impact on GDP; where GDP will increase due to an increase in FDI and gross fixed capital formation. On the other hand, openness shows a negative relation with GDP. Therefore, an increase in openness will adversely affect GDP. This situation possibly occurs because of other sub-factors such an political instability which can distort import and export and consequently affect openness.

In conclusion, the best model can be chosen that best represent the real situation. Employing the Hausman test, the random effects model can be rejected and the fixed effects model is considered the best model. The result from the fixed effects model shows that all the variables have positive relationship with GDP. Therefore, by increasing FDI, openness and gross fixed capital formation will lead to an increase in GDP. In other words, FDI, openness and gross fixed capital formation can help in boosting economic growth.

In all, FDI seems to be the most influential determinant in increasing economic followed by openness and gross fixed capital formation. The government therefore should take the initiative to put in place policies and regulations which can attract foreign investors to invest in the domestic country. These policies can encourage more foreign investments; hence increasing FDI and boosting the domestic economy.

An additional method, the OLS, is used to determine the relationship between the dependent variable (GDP) and the independent variables (FDI, openness and gross fixed capital formation) by country in the ASEAN-4. From the results presented and discussed in Chapter 4, in Malaysia, the variable that can determine GDP or economic growth is gross fixed capital formation which has a positive relationship with GDP.

However, in Indonesia, the situation is different where in addition gross fixed capital formation, GDP is also correlated with openness. This means that both gross fixed capital formation and openness have an impact on GDP. However, both have opposite impact on GDP. For openness, it has a negative relationship with GDP which means that GDP will decline when openness is increase. On the contrary, gross fixed capital formation shows a positive relationship with

GDP which means that an increase in gross fixed capital formation will lead to an increase in GDP.

For Thailand, the estimates show that only gross fixed capital formation has a correlation with GDP. This variable shows a positive relationship with GDP, meaning that GDP will increase when there is an increase in gross fixed capital formation. Similar to Thailand, the result for the Philippines also shows that only gross fixed capital formation has any relation with GDP. Moreover, the relationship between gross fixed capital formation and GDP indicates a positive relation. An increase in gross fixed capital formation leads to an increase in GDP. The overall results for all countries show that gross fixed capital formation determines growth in GDP.

From the OLS estimation for Malaysia, Indonesia, Thailand and Philippine, the results indicate that economic growth in the ASEAN-4 countries are determined by gross fixed capital formation. This situation is similar to the study by Hu and Khan (1997) about why China grows so fast. Their study found that capital formation is the major factor in influencing economic growth. Other variables do not appear to affect growth. However, in Indonesia; openness gives a negative impact to growth. Asid's (2010) study on economic growth analyses

under the TRIPS transitions says that evidence from selected cross-country samples found that openness is weakly significant in certain models of economic growth. In other words, openness is also related to other factors that affect growth. In the case of Indonesia, in terms of geography, country is frequently exposed to natural disasters. Therefore, this factor also affects the attraction of international trade in the country. Consequently, this factor can distort the effect of openness; Weil (2005) found that openness relates to efficiency in an economy where economic efficiency may help in maximising production.

5.4 Suggestion

Economic growth is important to a country because it can ensure the future of a nation. This is the main reason for many studies on the determinants of economic growth. There are many determinants of economic growth suggested by these studies. However, the determinants of growth differ by regions or countries. They are also determined by other sub-factors that can indirectly affect economic growth.

In this study, three variables were employed to determine their relationship to economic growth. Using panel estimation in fixed effects model, the result

confirms that all variables play a role as determinant of economic growth in the ASEAN-4 countries. Governments play important roles in promoting economic growth since they have the power to shape policies. Governments in the ASEAN-4 countries should create policies that encourage FDI, openness and gross fixed capital formation. For example, the government can reduce tax on imports of goods and services within the ASEAN-4 countries. This move will reduce the prices of imports; thus will help in increasing trade openness between these countries. Agbetsiafa (2010) in a study of causality evidence between regional integration, trade openness and economic growth proposed that an increase in the number of exports in intermediate goods will improve facilities and human capital, subsequently leading to higher per capita real GDP and avoid deficits in the country.

FDI plays the most important role in determining growth as indicated by the fixed effect model in panel estimation. Via FDI, advanced technologies can be absorbed by the ASEAN-4 countries. These technologies can lead to product innovations in the countries. In order to achieve this, the governments in these countries have to assure economic, social, and political stability in the countries. These three aspects can attract foreign investors to invest in the domestic economy. The resulting increase in FDI will spur economic growth. Besides FDI and openness, gross fixed capital formation cannot be excluded in

determining growth. Investment in the domestic countries will add to gross fixed capital formation and lead to more growth in the economy. Azam (2010) in a study about the impact of export and FDI on economic growth in South Asia, suggests that the governments of South Asia countries should increase total FDI inflows into the countries.

However, in the OLS estimation, only gross fixed capital formation plays a role as determinant of economic growth for each ASEAN-4 country. High saving rates may lead to higher gross fixed capital formation. The governments in the ASEAN-4 countries have to design and implement policies that can improve saving rates so that gross fixed capital formation will be enlarged.

As a conclusion, besides the variables discussed in this study, economic growth also depends on other factors such as the economic and political environment in the country. This means, economic growth also depends on the domestic countries' policies. This refers to the role of the government as a policy maker to ensure the best environment for growth is present. This means that social and economic stability must prevail in the domestic countries. Besides, economic growth also depends on political stability. Political stability creates investors confidence in the domestic countries which subsequently promotes

growth. A country free from natural disaster may also attract foreign investors to invest in the economy.

For future research, the role of government to ensure economic, social, and political stability may be included as determinant of growth. In addition, geographical factor may also be included since it plays important role in influencing the economic growth of a country.

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APPENDICES

Unit Root Test Results

Null Hypothesis: YMSIA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.757171	1.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YMSIA)
Method: Least Squares
Date: 06/21/11 Time: 13:12
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YMSIA(-1)	0.050748	0.018406	2.757171	0.0107
C	7.23E+08	1.38E+09	0.525753	0.6037

R-squared	0.233176	Mean dependent var	4.16E+09
Adjusted R-squared	0.202503	S.D. dependent var	3.39E+09
S.E. of regression	3.03E+09	Akaike info criterion	46.57192
Sum squared resid	2.29E+20	Schwarz criterion	46.66790
Log likelihood	-626.7209	Hannan-Quinn criter.	46.60046
F-statistic	7.601993	Durbin-Watson stat	1.819465
Prob(F-statistic)	0.010733		

Null Hypothesis: D(YMSIA) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.516307	0.0156
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YMSIA,2)
Method: Least Squares
Date: 06/21/11 Time: 13:10
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YMSIA(-1))	-0.676478	0.192383	-3.516307	0.0018
C	2.94E+09	1.02E+09	2.888379	0.0081

R-squared	0.340014	Mean dependent var	1.79E+08
Adjusted R-squared	0.312515	S.D. dependent var	3.98E+09
S.E. of regression	3.30E+09	Akaike info criterion	46.74674
Sum squared resid	2.62E+20	Schwarz criterion	46.84351
Log likelihood	-605.7076	Hannan-Quinn criter.	46.77461
F-statistic	12.36442	Durbin-Watson stat	2.018581

Null Hypothesis: FDIMAL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.001180	0.2846
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDIMAL)
Method: Least Squares
Date: 06/21/11 Time: 22:35
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIMAL(-1)	-0.283285	0.141559	-2.001180	0.0563
C	9.10E+08	4.54E+08	2.004407	0.0560

S.E. of regression	1.17E+09	Akaike info criterion	44.67464
Sum squared resid	3.44E+19	Schwarz criterion	44.77062
Log likelihood	-601.1076	Hannan-Quinn criter.	44.70318
Durbin-Watson stat	2.353563		

Null Hypothesis: D(FDIMAL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.256098	0.0000
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDIMAL,2)
Method: Least Squares
Date: 06/21/11 Time: 22:39
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDIMAL(-1))	-1.404970	0.193626	-7.256098	0.0000
C	1.95E+08	2.35E+08	0.827601	0.4161

R-squared	0.686892	Mean dependent var	-58488233
Adjusted R-squared	0.673846	S.D. dependent var	2.08E+09
S.E. of regression	1.19E+09	Akaike info criterion	44.69922
Sum squared resid	3.38E+19	Schwarz criterion	44.79600
Log likelihood	-579.0899	Hannan-Quinn criter.	44.72709
F-statistic	52.65096	Durbin-Watson stat	2.054313
Prob(F-statistic)	0.000000		

Null Hypothesis: OPMAL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.225020	0.6485
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPMAL)
Method: Least Squares
Date: 06/21/11 Time: 22:48
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPMAL(-1)	-0.049230	0.040187	-1.225020	0.2320
C	0.131081	0.071884	1.823517	0.0802

R-squared	0.056628	Mean dependent var	0.046296
Adjusted R-squared	0.018893	S.D. dependent var	0.101873
S.E. of regression	0.100906	Akaike info criterion	-1.678071
Sum squared resid	0.254550	Schwarz criterion	-1.582083
Log likelihood	24.65395	Hannan-Quinn criter.	-1.649528
F-statistic	1.500674	Durbin-Watson stat	1.775020
Prob(F-statistic)	0.231985		

Null Hypothesis: D(DOPMAL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.315241	0.0024
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DOPMAL,2)
Method: Least Squares
Date: 06/21/11 Time: 22:50
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DOPMAL(-1))	-0.895611	0.207546	-4.315241	0.0002
C	0.040510	0.023172	1.748200	0.0932

R-squared	0.436901	Mean dependent var	-0.004615
Adjusted R-squared	0.413439	S.D. dependent var	0.137673
S.E. of regression	0.105440	Akaike info criterion	-1.587546
Sum squared resid	0.266822	Schwarz criterion	-1.490770
Log likelihood	22.63810	Hannan-Quinn criter.	-1.559678
F-statistic	18.62130	Durbin-Watson stat	1.912936
Prob(F-statistic)	0.000237		

Null Hypothesis: D(CFMAL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.390315	0.0020
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFMAL,2)
Method: Least Squares
Date: 06/21/11 Time: 23:02
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CFMAL(-1))	-0.891341	0.203024	-4.390315	0.0002
C	7.83E+08	7.49E+08	1.044626	0.3066

			-
R-squared	0.445406	Mean dependent var	14321624
Adjusted R-squared	0.422298	S.D. dependent var	4.88E+09
S.E. of regression	3.71E+09	Akaike info criterion	46.97854
Sum squared resid	3.30E+20	Schwarz criterion	47.07532
Log likelihood	-608.7210	Hannan-Quinn criter.	47.00641
F-statistic	19.27487	Durbin-Watson stat	1.959256
Prob(F-statistic)	0.000196		

Null Hypothesis: YIND has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.034639	0.9957
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YIND)
Method: Least Squares
Date: 06/21/11 Time: 22:15
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YIND(-1)	0.027788	0.026858	1.034639	0.3107
C	2.96E+09	3.95E+09	0.749194	0.4607

R-squared	0.041061	Mean dependent var	6.80E+09
Adjusted R-squared	0.002703	S.D. dependent var	7.02E+09
S.E. of regression	7.01E+09	Akaike info criterion	48.24905
Sum squared resid	1.23E+21	Schwarz criterion	48.34504
Log likelihood	-649.3622	Hannan-Quinn criter.	48.27759
F-statistic	1.070478	Durbin-Watson stat	1.455106
Prob(F-statistic)	0.310743		

Null Hypothesis: D(YIND) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.574805	0.0137
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YIND,2)
Method: Least Squares
Date: 06/21/11 Time: 22:16
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YIND(-1))	-0.701115	0.196127	-3.574805	0.0015
C	5.09E+09	1.86E+09	2.738048	0.0115

R-squared	0.347458	Mean dependent var	5.12E+08
Adjusted R-squared	0.320269	S.D. dependent var	8.33E+09
S.E. of regression	6.87E+09	Akaike info criterion	48.21139
Sum squared resid	1.13E+21	Schwarz criterion	48.30817
Log likelihood	-624.7481	Hannan-Quinn criter.	48.23926
F-statistic	12.77923	Durbin-Watson stat	1.919570
Prob(F-statistic)	0.001531		

Null Hypothesis: FDIND has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.164710	0.6730
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDIND)
Method: Least Squares
Date: 06/21/11 Time: 22:40
Sample (adjusted): 1984 2008
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIND(-1)	-0.230418	0.197833	-1.164710	0.2572
D(FDIND(-1))	0.186743	0.193330	0.965928	0.3451
D(FDIND(-2))	-0.507755	0.195779	-2.593514	0.0170
C	6.16E+08	3.99E+08	1.544870	0.1373

R-squared	0.424357	Mean dependent var	1.71E+08
Adjusted R-squared	0.342123	S.D. dependent var	1.37E+09
S.E. of regression	1.11E+09	Akaike info criterion	44.64557
Sum squared resid	2.61E+19	Schwarz criterion	44.84059
Log likelihood	-554.0697	Hannan-Quinn criter.	44.69966
F-statistic	5.160321	Durbin-Watson stat	2.190206
Prob(F-statistic)	0.007894		

Null Hypothesis: D(FDIND) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.668985	0.0000
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDIND,2)
Method: Least Squares
Date: 06/21/11 Time: 22:41
Sample (adjusted): 1984 2008
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDIND(-1))	-1.554369	0.233074	-6.668985	0.0000
D(FDIND(-1),2)	0.626436	0.168521	3.717264	0.0012
C	2.32E+08	2.27E+08	1.025820	0.3161

R-squared	0.676959	Mean dependent var	27502860
Adjusted R-squared	0.647591	S.D. dependent var	1.89E+09
S.E. of regression	1.12E+09	Akaike info criterion	44.62817
Sum squared resid	2.77E+19	Schwarz criterion	44.77443
Log likelihood	-554.8521	Hannan-Quinn criter.	44.66874
F-statistic	23.05137	Durbin-Watson stat	2.333926

Null Hypothesis: OPIND has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.493874	0.1280
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPIND)
Method: Least Squares
Date: 06/21/11 Time: 22:51
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPIND(-1)	-0.439482	0.176225	-2.493874	0.0196
C	0.316533	0.126959	2.493188	0.0196

R-squared	0.199216	Mean dependent var	0.002222
Adjusted R-squared	0.167185	S.D. dependent var	0.087149
S.E. of regression	0.079531	Akaike info criterion	-2.154161
Sum squared resid	0.158128	Schwarz criterion	-2.058173
Log likelihood	31.08118	Hannan-Quinn criter.	-2.125619
F-statistic	6.219407	Durbin-Watson stat	2.110981
Prob(F-statistic)	0.019611		

Null Hypothesis: D(OPIND) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.044197	0.0000
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPIND,2)
Method: Least Squares
Date: 06/21/11 Time: 22:52
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPIND(-1))	-1.345335	0.190985	-7.044197	0.0000
C	0.004245	0.016612	0.255520	0.8005

R-squared	0.674005	Mean dependent var	0.002692
Adjusted R-squared	0.660422	S.D. dependent var	0.145343
S.E. of regression	0.084696	Akaike info criterion	-2.025694
Sum squared resid	0.172162	Schwarz criterion	-1.928917
Log likelihood	28.33402	Hannan-Quinn criter.	-1.997825
F-statistic	49.62071	Durbin-Watson stat	2.070902
Prob(F-statistic)	0.000000		

Null Hypothesis: CFIND has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.211603	0.9256
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFIND)
Method: Least Squares
Date: 06/21/11 Time: 23:03
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CFIND(-1)	-0.015207	0.071867	-0.211603	0.8341
C	2.14E+09	2.38E+09	0.901407	0.3760

R-squared	0.001788	Mean dependent var	1.68E+09
Adjusted R-squared	-0.038141	S.D. dependent var	4.51E+09
S.E. of regression	4.59E+09	Akaike info criterion	47.40405
Sum squared resid	5.27E+20	Schwarz criterion	47.50003
Log likelihood	-637.9546	Hannan-Quinn criter.	47.43259
F-statistic	0.044776	Durbin-Watson stat	1.404836
Prob(F-statistic)	0.834132		

Null Hypothesis: D(CFIND) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.595117	0.0131
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFIND,2)
Method: Least Squares
Date: 06/21/11 Time: 23:03
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CFIND(-1))	-0.719886	0.200240	-3.595117	0.0015
C	1.29E+09	9.34E+08	1.379715	0.1804

R-squared	0.350032	Mean dependent var	2.08E+08
Adjusted R-squared	0.322949	S.D. dependent var	5.48E+09
S.E. of regression	4.51E+09	Akaike info criterion	47.36945
Sum squared resid	4.88E+20	Schwarz criterion	47.46623
Log likelihood	-613.8028	Hannan-Quinn criter.	47.39732
F-statistic	12.92487	Durbin-Watson stat	1.781240
Prob(F-statistic)	0.001455		

Null Hypothesis: YTHA has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.181213	0.9294
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YTHA)
Method: Least Squares
Date: 06/21/11 Time: 22:26
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YTHA(-1)	-0.004056	0.022380	-0.181213	0.8578
D(YTHA(-1))	0.452244	0.190899	2.369027	0.0266
C	3.33E+09	2.42E+09	1.376219	0.1820

R-squared	0.201074	Mean dependent var	5.24E+09
Adjusted R-squared	0.131602	S.D. dependent var	4.70E+09
S.E. of regression	4.38E+09	Akaike info criterion	47.34492
Sum squared resid	4.40E+20	Schwarz criterion	47.49008
Log likelihood	-612.4840	Hannan-Quinn criter.	47.38672
F-statistic	2.894321	Durbin-Watson stat	1.804545
Prob(F-statistic)	0.075653		

Null Hypothesis: D(YTHA) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.070990	0.0415
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YTHA,2)
Method: Least Squares
Date: 06/21/11 Time: 22:29
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YTHA(-1))	-0.556342	0.181160	-3.070990	0.0052
C	2.95E+09	1.26E+09	2.349543	0.0274

R-squared	0.282103	Mean dependent var	83215283
Adjusted R-squared	0.252191	S.D. dependent var	4.96E+09
S.E. of regression	4.29E+09	Akaike info criterion	47.26942
Sum squared resid	4.41E+20	Schwarz criterion	47.36620
Log likelihood	-612.5025	Hannan-Quinn criter.	47.29729
F-statistic	9.430982	Durbin-Watson stat	1.797115
Prob(F-statistic)	0.005239		

Null Hypothesis: FDITHA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.656715	0.4410
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDITHA)
Method: Least Squares
Date: 06/21/11 Time: 22:42
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDITHA(-1)	-0.213656	0.128963	-1.656715	0.1101
C	7.06E+08	4.27E+08	1.652677	0.1109

R-squared	0.098927	Mean dependent var	1.94E+08
Adjusted R-squared	0.062884	S.D. dependent var	1.58E+09
S.E. of regression	1.53E+09	Akaike info criterion	45.20935
Sum squared resid	5.87E+19	Schwarz criterion	45.30534
Log likelihood	-608.3262	Hannan-Quinn criter.	45.23789
F-statistic	2.744706	Durbin-Watson stat	1.631865
Prob(F-statistic)	0.110076		

Null Hypothesis: D(DFDITHA) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.267938	0.0004
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DFDITHA,2)
Method: Least Squares
Date: 06/21/11 Time: 22:45
Sample (adjusted): 1989 2008
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DFDITHA(-1))	-6.566838	1.246567	-5.267938	0.0002
D(DFDITHA(-1),2)	4.865250	1.055052	4.611382	0.0006
D(DFDITHA(-2),2)	4.183865	0.922246	4.536605	0.0007
D(DFDITHA(-3),2)	3.531522	0.782899	4.510825	0.0007
D(DFDITHA(-4),2)	2.710590	0.708889	3.823715	0.0024
D(DFDITHA(-5),2)	1.771745	0.511068	3.466748	0.0047
D(DFDITHA(-6),2)	0.912587	0.331953	2.749145	0.0176
C	1.19E+09	3.75E+08	3.169552	0.0081

R-squared	0.828625	Mean dependent var	-1.57E+08
Adjusted R-squared	0.728657	S.D. dependent var	2.47E+09
S.E. of regression	1.28E+09	Akaike info criterion	45.07440
Sum squared resid	1.98E+19	Schwarz criterion	45.47269
Log likelihood	-442.7440	Hannan-Quinn criter.	45.15215
F-statistic	8.288865	Durbin-Watson stat	1.930130
Prob(F-statistic)	0.000850		

Null Hypothesis: OPTHA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.260210	0.9186
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPTHA)
Method: Least Squares
Date: 06/21/11 Time: 22:53
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPTHA(-1)	-0.010581	0.040663	-0.260210	0.7968
C	0.041888	0.040253	1.040627	0.3080

R-squared	0.002701	Mean dependent var	0.031852
Adjusted R-squared	-0.037191	S.D. dependent var	0.058772
S.E. of regression	0.059855	Akaike info criterion	-2.722604
Sum squared resid	0.089565	Schwarz criterion	-2.626616
Log likelihood	38.75516	Hannan-Quinn criter.	-2.694062
F-statistic	0.067709	Durbin-Watson stat	2.262561

Null Hypothesis: D(OPTHA) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.111229	0.0000
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPTHA,2)
Method: Least Squares
Date: 06/21/11 Time: 22:53
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPTHA(-1))	-1.179399	0.192989	-6.111229	0.0000
C	0.040589	0.012818	3.166510	0.0042

R-squared	0.608784	Mean dependent var	0.003846
Adjusted R-squared	0.592483	S.D. dependent var	0.090425
S.E. of regression	0.057724	Akaike info criterion	-2.792469
Sum squared resid	0.079971	Schwarz criterion	-2.695692
Log likelihood	38.30210	Hannan-Quinn criter.	-2.764601
F-statistic	37.34713	Durbin-Watson stat	2.018123
Prob(F-statistic)	0.000003		

Null Hypothesis: CFTHA has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.341801	0.1673
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFTHA)
Method: Least Squares
Date: 06/21/11 Time: 23:04
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CFTHA(-1)	-0.164320	0.070168	-2.341801	0.0282
D(CFTHA(-1))	0.573481	0.162561	3.527791	0.0018
C	5.84E+09	2.43E+09	2.402266	0.0248

R-squared	0.406224	Mean dependent var	1.17E+09
Adjusted R-squared	0.354591	S.D. dependent var	5.80E+09
S.E. of regression	4.66E+09	Akaike info criterion	47.46940
Sum squared resid	4.99E+20	Schwarz criterion	47.61457
Log likelihood	-614.1022	Hannan-Quinn criter.	47.51121
F-statistic	7.867565	Durbin-Watson stat	1.693001
Prob(F-statistic)	0.002493		

Null Hypothesis: D(CFTHA) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.479097	0.0174
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFTHA,2)
Method: Least Squares
Date: 06/21/11 Time: 23:05
Sample (adjusted): 1984 2008
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CFTHA(-1))	-0.672345	0.193253	-3.479097	0.0021
D(CFTHA(-1),2)	0.388245	0.195991	1.980938	0.0602
C	7.42E+08	1.00E+09	0.740983	0.4665

R-squared	0.356709	Mean dependent var	-54591588
Adjusted R-squared	0.298228	S.D. dependent var	5.82E+09
S.E. of regression	4.87E+09	Akaike info criterion	47.56459
Sum squared resid	5.23E+20	Schwarz criterion	47.71086
Log likelihood	-591.5574	Hannan-Quinn criter.	47.60516
F-statistic	6.099560	Durbin-Watson stat	1.852447
Prob(F-statistic)	0.007807		

Null Hypothesis: YPHI has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.374140	1.0000
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YPHI)
Method: Least Squares
Date: 06/21/11 Time: 22:31
Sample (adjusted): 1988 2008
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YPHI(-1)	0.312957	0.071547	4.374140	0.0008
D(YPHI(-1))	-0.600668	0.309846	-1.938602	0.0746
D(YPHI(-2))	-0.900716	0.302568	-2.976908	0.0107
D(YPHI(-3))	-0.332408	0.228188	-1.456730	0.1689
D(YPHI(-4))	-0.689545	0.212572	-3.243822	0.0064
D(YPHI(-5))	-0.338220	0.204610	-1.652995	0.1223
D(YPHI(-6))	-0.425056	0.217653	-1.952905	0.0727
C	-1.18E+10	2.95E+09	-3.999668	0.0015

R-squared	0.777890	Mean dependent var	2.99E+09
Adjusted R-squared	0.658292	S.D. dependent var	1.92E+09
S.E. of regression	1.12E+09	Akaike info criterion	44.79583
Sum squared resid	1.63E+19	Schwarz criterion	45.19374
Log likelihood	-462.3562	Hannan-Quinn criter.	44.88218
F-statistic	6.504225	Durbin-Watson stat	1.677262
Prob(F-statistic)	0.001938		

Null Hypothesis: D(YPHI) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.154678	0.9965
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(YPHI,2)
Method: Least Squares
Date: 06/21/11 Time: 22:32
Sample (adjusted): 1989 2008
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YPHI(-1))	0.323957	0.280561	1.154678	0.2707
D(YPHI(-1),2)	-1.059822	0.364800	-2.905217	0.0132
D(YPHI(-2),2)	-1.166968	0.322434	-3.619252	0.0035
D(YPHI(-3),2)	-0.546502	0.244397	-2.236128	0.0451
D(YPHI(-4),2)	-0.838371	0.222992	-3.759647	0.0027
D(YPHI(-5),2)	-0.534825	0.192327	-2.780809	0.0166
D(YPHI(-6),2)	-0.648643	0.184575	-3.514247	0.0043
C	3.07E+08	6.70E+08	0.458639	0.6547

S.E. of regression	1.27E+09	Akaike info criterion	45.05421
Sum squared resid	1.94E+19	Schwarz criterion	45.45251
Log likelihood	-442.5421	Hannan-Quinn criter.	45.13197
Durbin-Watson stat	1.978984		

Null Hypothesis: FDIPHI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.451954	0.0177
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDIPHI)
Method: Least Squares
Date: 06/21/11 Time: 22:46
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIPHI(-1)	-0.627819	0.181874	-3.451954	0.0020
C	6.20E+08	2.18E+08	2.844684	0.0087

R-squared	0.322787	Mean dependent var	29217817
Adjusted R-squared	0.295698	S.D. dependent var	8.36E+08
S.E. of regression	7.01E+08	Akaike info criterion	43.64571
Sum squared resid	1.23E+19	Schwarz criterion	43.74170
Log likelihood	-587.2171	Hannan-Quinn criter.	43.67426
F-statistic	11.91598	Durbin-Watson stat	2.280936
Prob(F-statistic)	0.001991		

Null Hypothesis: D(FDIPHI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.396044	0.0000
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDIPHI,2)
Method: Least Squares
Date: 06/21/11 Time: 22:46
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDIPHI(-1))	-1.611559	0.171515	-9.396044	0.0000
C	83768107	1.38E+08	0.605932	0.5502

			-
R-squared	0.786259	Mean dependent var	35330771
Adjusted R-squared	0.777354	S.D. dependent var	1.49E+09
S.E. of regression	7.02E+08	Akaike info criterion	43.65043
Sum squared resid	1.18E+19	Schwarz criterion	43.74721
Log likelihood	-565.4556	Hannan-Quinn criter.	43.67830
F-statistic	88.28564	Durbin-Watson stat	1.895177
Prob(F-statistic)	0.000000		

Null Hypothesis: OPPHI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.025082	0.7295
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPPHI)
Method: Least Squares
Date: 06/21/11 Time: 22:54
Sample (adjusted): 1982 2008
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPPHI(-1)	-0.055502	0.054144	-1.025082	0.3151
C	0.067482	0.050508	1.336062	0.1936

R-squared	0.040336	Mean dependent var	0.017407
Adjusted R-squared	0.001950	S.D. dependent var	0.066771
S.E. of regression	0.066706	Akaike info criterion	-2.505852
Sum squared resid	0.111243	Schwarz criterion	-2.409864
Log likelihood	35.82900	Hannan-Quinn criter.	-2.477310
F-statistic	1.050793	Durbin-Watson stat	1.586949
Prob(F-statistic)	0.315142		

Null Hypothesis: D(DOPPHI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.101686	0.0040
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DOPPHI,2)
Method: Least Squares
Date: 06/21/11 Time: 22:56
Sample (adjusted): 1983 2008
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DOPPHI(-1))	-0.836787	0.204010	-4.101686	0.0004
C	0.016288	0.013889	1.172783	0.2524

R-squared	0.412108	Mean dependent var	-0.000769
Adjusted R-squared	0.387613	S.D. dependent var	0.086345
S.E. of regression	0.067569	Akaike info criterion	-2.477528
Sum squared resid	0.109574	Schwarz criterion	-2.380752
Log likelihood	34.20787	Hannan-Quinn criter.	-2.449660
F-statistic	16.82383	Durbin-Watson stat	1.932403
Prob(F-statistic)	0.000407		

Null Hypothesis: CFPHI has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.585094	0.8571
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFPHI)
Method: Least Squares
Date: 06/21/11 Time: 23:07
Sample (adjusted): 1984 2008
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CFPHI(-1)	-0.067235	0.114913	-0.585094	0.5647
D(CFPHI(-1))	0.143257	0.220267	0.650382	0.5225
D(CFPHI(-2))	-0.210109	0.223326	-0.940819	0.3575
C	9.58E+08	1.39E+09	0.690490	0.4974

R-squared	0.082711	Mean dependent var	1.51E+08
Adjusted R-squared	-0.048330	S.D. dependent var	1.51E+09
S.E. of regression	1.55E+09	Akaike info criterion	45.30102
Sum squared resid	5.02E+19	Schwarz criterion	45.49604
Log likelihood	-562.2627	Hannan-Quinn criter.	45.35511
F-statistic	0.631186	Durbin-Watson stat	1.533797
Prob(F-statistic)	0.603037		

Null Hypothesis: D(CFPHI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.092962	0.0042
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CFPHI,2)
Method: Least Squares
Date: 06/21/11 Time: 23:08
Sample (adjusted): 1984 2008
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CFPHI(-1))	-1.149097	0.280750	-4.092962	0.0005
D(CFPHI(-1),2)	0.250841	0.209003	1.200181	0.2428
C	1.67E+08	3.08E+08	0.543339	0.5924

R-squared	0.495121	Mean dependent var	-22305146
Adjusted R-squared	0.449223	S.D. dependent var	2.05E+09
S.E. of regression	1.52E+09	Akaike info criterion	45.23719
Sum squared resid	5.10E+19	Schwarz criterion	45.38345
Log likelihood	-562.4649	Hannan-Quinn criter.	45.27776
F-statistic	10.78739	Durbin-Watson stat	1.545453
Prob(F-statistic)	0.000543		

Pooled Estimation Results

Dependent Variable: Y?
Method: Pooled Least Squares
Date: 06/21/11 Time: 12:30
Sample: 1981 2008
Included observations: 28
Cross-sections included: 4
Total pool (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.42E+10	7.51E+09	4.556885	0.0000
FDI?	1.52E+08	52229585	2.907431	0.0044
OPEN?	-1.32E+10	5.89E+09	-2.244285	0.0269
CAPFOR?	2.770256	0.215629	12.84733	0.0000

R-squared	0.735454	Mean dependent var	9.56E+10
Adjusted R-squared	0.728105	S.D. dependent var	4.97E+10
S.E. of regression	2.59E+10	Akaike info criterion	50.83099
Sum squared resid	7.27E+22	Schwarz criterion	50.92808
Log likelihood	-2842.535	Hannan-Quinn criter.	50.87038
F-statistic	100.0820	Durbin-Watson stat	0.150281
Prob(F-statistic)	0.000000		

Dependent Variable: Y?
Method: Pooled Least Squares
Date: 06/21/11 Time: 12:40
Sample: 1981 2008
Included observations: 28
Cross-sections included: 4
Total pool (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.23E+09	6.74E+09	0.775735	0.4396
FDI?	5.674802	1.391010	4.079626	0.0001
OPEN?	2.47E+10	7.56E+09	3.265129	0.0015
CAPFOR?	2.205241	0.220117	10.01851	0.0000
Fixed Effects (Cross)				
_MAL--C	-3.53E+10			
_IND--C	3.91E+10			
_THA--C	-1.13E+10			
_PHI--C	7.43E+09			

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.868079	Mean dependent var	9.56E+10
Adjusted R-squared	0.860540	S.D. dependent var	4.97E+10
S.E. of regression	1.86E+10	Akaike info criterion	50.18875
Sum squared resid	3.62E+22	Schwarz criterion	50.35865
Log likelihood	-2803.570	Hannan-Quinn criter.	50.25768
F-statistic	115.1549	Durbin-Watson stat	0.269146
Prob(F-statistic)	0.000000		

Dependent Variable: Y?
Method: Pooled EGLS (Cross-section random effects)
Date: 06/21/11 Time: 12:33
Sample: 1981 2008
Included observations: 28
Cross-sections included: 4
Total pool (balanced) observations: 112
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.42E+10	5.33E+09	6.430179	0.0000
FDI?	1.52E+08	37013621	4.102650	0.0001
OPEN?	-1.32E+10	4.17E+09	-3.166891	0.0020
CAPFOR?	2.770256	0.152810	18.12875	0.0000
Random Effects (Cross)				
_MAL--C	0.000000			
_IND--C	0.000000			
_THA--C	0.000000			
_PHI--C	0.000000			

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	1.84E+10	1.0000

Weighted Statistics			
R-squared	0.735454	Mean dependent var	9.56E+10
Adjusted R-squared	0.728105	S.D. dependent var	4.97E+10
S.E. of regression	2.59E+10	Sum squared resid	7.27E+22
F-statistic	100.0820	Durbin-Watson stat	0.150281
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.735454	Mean dependent var	9.56E+10
Sum squared resid	7.27E+22	Durbin-Watson stat	0.150281

Correlated Random Effects - Hausman Test
Pool: HAUSMAN
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	107.926604	3	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
FDI?	5.674802	5.196321	0.020281	0.0008
			- 3.82301492	
	246947119	134607019	779875190	
OPEN?	04.914284	04.557659	00	0.0000
CAPFOR?	2.205241	2.786080	0.024175	0.0002

Cross-section random effects test equation:
Dependent Variable: Y?
Method: Panel Least Squares
Date: 01/09/12 Time: 15:44
Sample: 1981 2008
Included observations: 28
Cross-sections included: 4
Total pool (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.23E+09	6.74E+09	0.775735	0.4396
FDI?	5.674802	1.391010	4.079626	0.0001
OPEN?	2.47E+10	7.56E+09	3.265129	0.0015
CAPFOR?	2.205241	0.220117	10.01851	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.868079	Mean dependent var	9.56E+10
Adjusted R-squared	0.860540	S.D. dependent var	4.97E+10
S.E. of regression	1.86E+10	Akaike info criterion	50.18875
Sum squared resid	3.62E+22	Schwarz criterion	50.35865

Log likelihood	-2803.570	Hannan-Quinn criter.	50.25768
F-statistic	115.1549	Durbin-Watson stat	0.269146
Prob(F-statistic)	0.000000		