

Bachelor Thesis

# Economic Growth, FDI, and Trade Openness: Causality for the EU and ASEAN.

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## Abstract

This thesis analyzes two causality models, the first model is used to check for causality between FDI and economic growth and the second one analyzes the causality between trade openness and economic growth among fourteen EU (European Union) and five ASEAN (Association of Southeast Asian Nations) countries over the period 1970-2015. In order to check for causality and its directions, Augmented Dickey Fuller (ADF) unit root test, Johansen co-integration test, and Vector Error Correction Model (VECM) are performed. The results show that FDI is motivated by economic growth (Austria, Denmark, Sweden, Indonesia, Malaysia, Thailand, Philippines) and trade openness is motivated by economic growth (Denmark, UK). However, it is also found that economic growth is motivated by FDI (Philippines) and economic growth is motivated by trade openness (Austria, Sweden, Philippines). Bidirectional relationship between economic growth and FDI is found in the case of Philippines, but there is no bi-directional relationship between economic growth and trade openness. Causality among the variables is country-specific.

## **I. Introduction**

Globalization is the process of greater economic interdependence among countries, and it is reflected in the increasing amount of cross-border trade in goods and services as well as increasing flows of labor and the volume of international financial flows (Fischer, 2003). Enhancing trade activities has been one of the main focuses of developing countries' policies, and it is found that the East Asian countries that promoted trade policies, especially export policies, experienced a boost in their economic performances. This could be one of the factors that increase researchers' interest to analyze the relationship between trade openness and economic growth.

International trade has a very important role in a country's development process. Through multinational trade developing countries are able to catch up with developed countries' industrialization and technological advancement. Trade openness is one of the main elements of international trade, and recent report by World Economic Forum (2015) shows that trade openness increases the market for domestic firms in a country, which in turn improves economic opportunities available for them. Trade openness also improves a nation's competitiveness as the firms' productivity is enhanced the more they are exposed to the international market. Barro and Sala-i-Martin (1995) find that when countries are open to international trade, the more they can absorb technological advancement from the leading countries. Trade liberalization therefore also increases foreign direct investment (FDI).

According to the World Bank (2017), FDI plays an important role in many economic aspects and brings benefits to the recipient countries; it enhances economic growth, increases employment, and it also induces technology spillovers. The developing countries can catch up with the international technology frontier as an impact of FDI. Many countries who were not as open to foreign investments have now liberalized their policies regarding FDI to attract more foreign investments. Developed and transition economies also find FDI as a source of economic development and modernization. Previous studies find that FDI would lead to technology spillovers, improvement in the quality of human capital, enhancement in the business environment and also openness in the international trade of a country. All of these benefits from FDI supposedly lead to an increase in economic growth. Besides the advantages on the economic sector, FDI could also lead to an improvement in social and environmental conditions

of the country. This could be achieved through the technology spillovers, which for example could lead to a much better work ethics and result in an improvement in the policies.

Although evidence from previous studies supports that there is indeed a correlation between FDI and economic growth, there has not been many studies which focus on the causality between the two variables. FDI could occur for many different reasons. First, there is growth-driven FDI, in which the investments take place because investors are attracted by the growth potential of the host countries. There is also FDI-led growth, where FDI contributes to the economic growth of the host countries, as we have discussed above. And third, there might be a two-way causality between FDI and economic growth, where FDI and economic growth both affect each other. The same relationship applies to trade openness and economic growth.

Despite the benefits that FDI and trade openness come with, it cannot be helped that there are not only positive consequences it would bring but also drawbacks for the host economies. Some costs come with integration of financial markets, trade openness, and technology development. There have been some cases where the technology development which comes from multinational enterprises investing in developing countries is not suitable with their national standards (World Bank, 2015).

This paper follows the step that Moudatsu and Kyrkilis (2011) undergo in their previous work “FDI and Economic Growth: Causality for the EU and ASEAN” where they check for causality between FDI and the economic growth in the two groups of countries. The variables used in this paper are inspired by Moudatsu and Kyrkilis’ work. Where FDI is constructed by FDI inflows over the gross fixed capital formation of country  $i$  at time  $t$  and economic growth is represented by GDP per capita of country  $i$  at time  $t$ . This paper aims to contribute to the existing literature by also checking for causality between trade openness and economic growth in the EU and ASEAN. Malaysia will also be included among the ASEAN countries, and a more recent data (1980-2015) for both the EU and ASEAN countries will be used in testing for causality between FDI, trade openness, and economic growth. The same methodology to check for the causality between trade openness and economic growth will be applied, which are Augmented Dickey-Fuller (ADF) unit root test, Johansen co-integration test, and lastly to check for causality Vector Error Correction Model (VECM) will be used.

## **Problem Setting**

This paper will focus on two issues, the first one being the causality between FDI and economic growth and the second one is the causality between trade openness and economic growth. It has been found that there are many determinants that could attract FDI and enhance trade activities, and while previous literature has focused on both FDI and trade openness' effects on economic growth, there have not been many that aim to check for the causality among them. This paper will study the causality between FDI, trade openness, and economic growth and check whether it is the promised growth of recipient countries that attract FDI and trade openness, whether growth arises as a result of FDI and trade openness, or if there is a two-way causality between the analyzed variables. The European Union (EU) and Association of Southeast Asian Nations (ASEAN) countries are specifically chosen to see whether there is an inter-correlation between FDI and economic growth in two different groups of countries who belong to a regional economic integration. Developed and developing countries are also distinguished among the two groups; where EU comprises developed countries and ASEAN comprises developing countries.

To analyze the causality between FDI, trade openness, and economic growth the structure of this research is constructed as follows; following this introduction in chapter II a literature review will be presented in order to compare the contributions made by various authors regarding FDI, trade openness, and economic growth. Due to the fact that there have not been many studies that focus on the causality among the variables in question in this research, some of the literature reviewed are in the case of correlation among the variables. Chapter III will discuss in depth about the data and methodology which includes the econometric models used to check for causality, and a descriptive statistics of the variables in EU and ASEAN countries are also presented. An interpretation of the empirical findings follows in chapter IV, and lastly chapter V comes with a brief conclusion of this research.

## **II. Literature Review**

### **II.1 Theoretical Framework**

Various methods have been implemented in previous studies to check for causality between FDI and economic growth as well as between trade openness and economic growth. Li, Woodard, & Leatham (2013) use directed acyclic graph approach in order to eliminate prior causal assumptions, and find that among the developed countries FDI leads to economic growth whereas among developing countries economic growth induces FDI inflows. Both in developing and developed countries, trade plays a major role in determining the effect of FDI where it serves as the main intermediary between FDI and the explanatory variables. GDP, which represents economic growth in this paper, has different roles in developed and developing countries. In developed countries, GDP is an effect variable where in developing countries it is a causal variable. Michie (2011) comes with an argument that in developing economies, governments are more concerned to implement policies that would attract FDI inflows, on the other hand, the governments in developed countries would not go to that extent since FDI is treated as a component that contributes to economic activity.

Previous literature has confirmed that there is indeed a strong relationship between FDI and economic growth as well as trade openness and economic growth. Yanikkaya (2003) conducts research using two different measures of trade openness to see whether there is causality between trade openness with economic growth in the long-run. The empirical findings show that the relationship between trade openness and economic growth is not that simple and straightforward. Analyzed using a panel data of more than 100 developed and developing countries from the year 1970-1997, it can be concluded from the findings of this research that trade barriers are positively and significantly associated with economic growth, especially among the developing economies. Almfraji and Almsafir (2013) reviewed studies that examine the relationship between FDI and economic growth. Qualitative research is conducted, and it is found that the previous studies focusing on FDI and economic growth have proved that there is indeed a positive effect of FDI on host country's economic growth. And only in some cases that there is no and even negative effect found between the two variables. There are several factors that significantly contribute to the positive effect that FDI has on economic growth. These factors include an open trade regime, adequate level of human capital, and a well-developed financial market.

In order to see whether there is causality between inward FDI and economic growth in countries that belong to a regional economic association, Moudatsou and Kyrkilis (2011) use sets of countries that are members of the European Union (EU) and Association of Southeast Asian Nations (ASEAN). Panel data containing FDI and GDP per capita from the period 1970-2003 is used in the research. The measure of FDI that is used is a ratio of FDI inflows to global fixed capital formation. To check if the data are stationary an Augmented Dickey-Fuller (ADF) unit root test is conducted; and to see whether the two variables have co-integrating equations in the long run, Johansen test for co-integration is run. Lastly vector error correction test is used to check for causality. The empirical findings show that the EU countries exhibit a growth-driven FDI where FDI is motivated by economic growth. Among the ASEAN countries there is an indication of a bidirectional relationship between inward FDI and economic growth (Indonesia and Thailand) but the remaining countries show that FDI is motivated by economic growth. Thereby the causality between FDI and economic growth is country specific and path dependent since the results differ from country to country.

Makki and Somwaru (2004) did a research on how FDI and trade affect economic growth in developing countries. It is found that apart from FDI variables that affect economic growth the most are trade, domestic investment, and human capital. However, FDI has the strongest influence on advancing economic growth in developing countries. This is due to the fact that FDI induces institutional stability, sound macroeconomics policies, and it increases human capital thereby producing a much higher-skilled labor. There is a positive and strong correlation between FDI and trade openness, and a big portion of advanced technology that is transferred to developing countries come from FDI. But the benefits that the technology brings would only be beneficial if accompanied by an improvement in host country's stock of human capital.

Hansen and Rand (2006) analyze the causal relationship between the two variables using a sample of 31 developing countries and data obtained from 1970-2000. Knowledge transfers and technology development are seen as the most prominent features that contribute to the increase in FDI inflows. Hence, in order to eliminate the effects that knowledge transfers and technology development have on FDI inflows, the variable FDI is reformulated. In this paper, the ratio of FDI to gross fixed capital formation (GFCF) is used to estimate FDI, and after running simple regression and graphical analyses it is found that there is no long run relation between

FDI/GFCF to economic development indicators (GDP per capita, education, and trade). After specifying for a vector autoregression of FDI and the log of GDP, they test for granger causality. The results show that there is a strong causal link from FDI ratio to GDP, which indicates that FDI does influence economic growth. The result of the causality is that changes in FDI would lead to changes in GDP, and it works the other way around as well. In the long run it is found that there is no impact of GDP on FDI ratio, however, we must also take into account that GDP granger-causes FDI in the long run.

Barro (1991) examines different determinants of economic growth and its convergence. Basing the research on existing growth theories, the empirical findings from this research support the general idea of conditional convergence which believes that countries would 'converge' to have the same economic growth rate when they are in the same level in terms of population growth rates and technological possibilities. However, they would not end up with the same capital-labor ratio because they differ in terms of initial capital-labor ratio and savings propensities. Barro uses data from the year 1960-1990 which includes 100 countries, the findings support conditional convergence, where there is a positive relationship between economic growth and determinants like initial schooling, life expectancy, maintenance of the rule of law, and terms of trade. Where on the other hand economic growth is enhanced when there is a lower fertility, government consumption, and inflation.

Harrison (1998) tests the association between trade openness and economic growth by comparing different measures of trade openness. The approach is to find as many trade openness measures as possible and run a cross-sectional regression among the developing countries, to see whether they yield the same results. It is found that the association between trade openness and economic growth is not always strong even though the variables are estimated using different measures of openness. There are two issues that this paper highlights, the first one being the causality between trade openness in the existing literature have not been resolved. After running vector autoregressions, it can be concluded that there is a two-way causality between trade openness and economic growth. When there are fewer barriers of trade then economic growth will be enhanced, and higher growth rates lead to an increase in trade openness. The second concern is the previous literature's analysis tends to not take into account the annual data in the attempt to distinguish between short-run and

long-run effects. It is suggested to use a time series data in order to distinguish the short-run from the long-run effects of trade openness on economic growth.

Naveed and Shabbir (2006) did a research on the effect of FDI and trade openness on GDP per capita growth. The data included in the research is from 23 developed countries from the year 1971-2000. To see the relationship between the three variables, fixed effects with control variables is used. The results show that there is causality between trade openness and GDP per capita where openness positively affects GDP per capita and is significant. On the other hand, FDI is insignificant and has no effect on GDP per capita. After testing for reverse causality it is found that only trade openness affects GDP per capita and there are no indications of reverse causality.

Sarkar (2008) examines the relationship between trade openness as measured by the ratio of trade to GDP and economic growth by using a cross-country panel data which includes 51 less developed countries. The empirical results show that there is no positive long-run correlation between trade openness and economic growth among the developing East Asian countries during the year 1961-2002, and positive long-term correlation between trade openness and economic growth is only found among the middle-income countries. Higher economic growth would lead to higher trade activities only in 11 countries which are rich and highly dependent on trade.

The main message that should be noted from this selective literature review is that there seems to be a strong relationship between trade openness and economic growth as well as FDI and economic growth. However, the direction of the causality between those variables differ from one case to another, it is country specific because of the distinct conditions of each country. On average, all literature agrees that to some extent FDI and trade openness has some impact on a country's economic growth in a causal way.



## II.2 Hypotheses

This section has focused on reviewing the existing literature regarding the causality of FDI, trade openness, and economic growth. Hence, a set of hypotheses regarding the variables of interest can be formulated. Previous literature has confirmed that there is a positive relationship between FDI and economic growth, but the direction of causality among the two variables remains unclear since the findings differ from one research to another. As this paper's focus is in determining the direction in which the causality takes place, we have come to the first hypothesis:

*Hypothesis 1: FDI is motivated by economic growth*

However, the direction of the causality between FDI and economic growth has remained unclear. In some countries, the empirical findings show that FDI motivates economic growth, in others the opposite applies, and in some cases even a two-way causality between FDI and economic growth is found. This leads to a second hypothesis:

*Hypothesis 2: There is a two-way causality between FDI and economic growth.*

Regarding trade openness and economic growth, there have also been many theoretical and empirical studies that confirm the positive relationship between trade openness and economic growth. In some cases, it is found that there is a trade-driven growth, where economic growth is motivated by the country's open trade regime. This leads to a third hypothesis of:

*Hypothesis 3: Trade openness is motivated by economic growth*

So far the previous literature has not mentioned regarding the two-way causality between trade openness and economic growth. Sarkar (2008) findings, however, confirm that among the East Asian countries there seems to be no causality between trade openness and economic growth, but the causality among the developed nations is positive. Therefore, it might be reasonable to predict that there is no two-way causality between trade openness and economic growth.

*Hypothesis 4: There is no two-way causality between trade openness and economic growth.*

### **III. Data and Methodology**

This paper will focus on checking whether there is a causality between FDI and economic growth as well as causality between trade openness and economic growth. The data is obtained from two groups of countries that both promote political and economic integration based on their regions. The two groups are the European Union (EU) and Association of Southeast Asian Nations (ASEAN). There are fourteen EU countries included in this research; Netherlands, Germany, Austria, Cyprus, Denmark, Finland, France, Greece, Ireland, Italy, Portugal, Spain, Sweden, and the United Kingdom. All member countries are included except for the transition countries and Belgium. Countries are selected based on data availability and the United Kingdom is included since the data is obtained from 1980-2015 when the UK was still an EU member. In determining the country sample, this paper follows the sets of countries used by Moudatsou and Kyrkilis (2011) where the same fourteen EU countries and four ASEAN countries were analyzed to check for the causality between FDI and economic growth. The transition economies are not taken into account because, during the change from centrally planned to market economy, the policies implemented by the governments might have affected the condition of FDI, trade openness, and hence economic growth. During transitional period the transition countries' economic development is way behind the initial member countries. This would lead to heterogeneity problems and therefore it is better to exclude them out. The current EU member countries, except for the transition countries, became members of the European Union at the same time.

ASEAN countries comprise the second group of countries analyzed in this paper. Due to data availability, only five ASEAN countries with the highest GDP are taken into account, the countries are Indonesia, Malaysia, Singapore, Thailand and the Philippines. The remaining other five ASEAN countries are not considered because during the period of analysis the countries are not stable in terms of economic and political conditions, some are also very conservative in international trade and financial markets. These factors hinder FDI inflows and international trade, therefore the initial conditions in the excluded ASEAN and ASEAN-5 countries are different in the first place. In this paper, two groups of regionally-integrated countries (ASEAN and EU) are used since the countries in each group tend to be in the same stage of economic growth, and hence they share similar policies regarding FDI and trade activities.

### III.1 Variables

There are three main variables that are the focus of this research. They are foreign direct investment, trade openness, and GDP per capita. Specific measures are used to estimate FDI and trade openness in this research. Two models are used in this paper, the first one is to check for the causality between economic growth and FDI, the dependent variable being economic growth. The second one is to check for causality between economic growth and trade openness, the dependent variable being economic growth.

#### 1. Foreign Direct Investment

FDI is measured as a ratio of FDI inflows of country  $i$  at time  $t$  to gross fixed capital formation (GFCF) of country  $i$  at time  $t$ . This measure is used to take into account the effect that FDI has on the investment activities in host countries. In testing for causality between economic growth and FDI, Moudatsou and Kyrkilis (2011) use FDI/GFCF as a measure of FDI.

- FDI inflows: FDI inflows is the value of inward direct cross-border investments made by non-resident to the reporting economy. It includes reinvestment of earnings, equity capital, and other capitals. The non-resident investor has a significant control of the enterprise's management in the reporting economy. The existence of foreign direct investment can be confirmed only when non-resident owns 10% or more of the ordinary shares. The FDI inflows obtained from the *World Development Indicators* of the World Bank are stated in terms of percentage of GDP of said country.
- Gross Fixed Capital Formation (GFCF): includes all acquisition and purchase of new or secondhand assets by resident producers for their own personal use. There are many assets that are taken into account for the calculation of GFCF, including land improvements, machinery, plant and equipment purchases, and constructions. Disposal of fixed assets is then subtracted from the total. Data is obtained from the *World Development Indicators* of the World Bank.

#### 2. Trade Openness

Trade openness is measured by the ratio of total exports plus total imports to total GDP of country  $i$  at time  $t$ . Total exports, total imports, and total GDP are all indicated in USD.

- Total Exports of Goods and Services: the value of all goods and services that are being exported and provided to the rest of the world by country *i*, Services such as communication, financial, personal, information as well as government services are taken into account in the measure. Employees compensation and transfer payments are excluded from the measure. Data is obtained from *World Development Indicators* of the World Bank and stated in terms of USD.
- Total Imports of Goods and Services: represents the value of goods and services imported and received from the rest of the world by country *i*. Obtained from *World Development Indicators* of the World Bank stated in terms of USD.

### 3. Economic Growth

Economic growth is represented by the GDP per capita of the selected countries. GDP gives an almost precise picture of a state of a country's economy, and in this paper GDP per capita is used because it normalizes the amount of GDP each country has based on their population. All data used in this paper are annual data and are obtained from World Development Indicators of the World Bank.

- GDP per capita: the value of all final goods and services that are produced within a country's borders at a specific time period. GDP per capita is GDP divided by midyear population. Obtained from *World Development Indicators* of the World Bank in terms of USD.

## III.2 Methodology

To check for causality between FDI and economic growth the first step is to perform a unit root test to check for stationarity of the data. Augmented Dickey-Fuller (ADF) unit root test will be performed to ensure whether variables in this paper contain a unit-root or if they follow a random walk model. Secondly, Johansen co-integration test will be conducted on FDI, trade openness, and economic growth variables. Lastly to check for causality between FDI, trade openness, and economic growth Vector Error Correction Model (VECM) will be performed.

### a. Unit Root Test

Unit root test is necessary to be performed in order to check for stationarity of the variables used in a research. The Augmented Dickey-Fuller (ADF) unit root test is going to be used in this paper. Dickey and Fuller (1979) came up with the procedure to test whether a variable in a

dataset has a unit root or if the variable follows a random walk model. When data are indexed in a particular time order, it is necessary to check for unit root's presence. The null hypothesis of this test would be that there is a unit root present, while the alternate hypothesis is the variable is generated through a stationary process. However, the alternate hypothesis would differ depending on the use of different unit root tests. Hamilton (1994) shows that there are four different scenarios in which the ADF unit root test can be run. There would be no difference in the null hypothesis. It is always the case that the null hypothesis is there is a unit root present in the variable. Whether a drift term is included in the null hypothesis and whether t-statistics obtained through a regression with a constant term or a time trend matter because the null hypothesis could differ from one case to another.

#### b. Co-integration Test

The presence of co-integration indicates that there is a long-run relationship between variables in a time series. A series can be considered to be co-integrated when some linear combination of the variables has a lower order of integration even though the individual series are integrated. Based on economic theories it is believed that some pairs of economic variables in the short-run may drift apart from one another as a result of seasonal adjustments, but in the long-run they should not be too much apart (Dwyer, 2015). The governments might have to intervene through stabilization policies if the variables end up drifting too much apart in the long-run. The idea was also inspired by equilibrium relationships where variables tend to deviate away from the initial point but in the end, they would be pushed back towards the equilibrium, in this case, equilibrium acts as the stationary point.

In the long-run components of variables would deviate towards the equilibrium, but on the other hand in the short run the components of variables would be more dynamic. The idea of co-integration was first suggested by Granger (1981) where he also confirms the relationship between error correction models and co-integration. Furthermore, Engle and Granger (1987) develop empirical examples, estimation procedures, and tests that are extended from Granger's previous work (1981), they come up with two-step estimator to test for co-integration. The two-step estimator would work best on single equation models. In order to test for co-integration unit root tests and tests where there are unidentified parameters under the null are combined. Elements such as autoregressive, error correction, and the moving

average are connected through the representation theorem developed by Engle and Granger. Co-integration test determines whether a time series is co-integrated with a co-integrating vector  $\alpha$ . A time series can be said as co-integrated when after first differencing it achieves stationarity but it is already stationary with a linear combination of  $\alpha'x_t$ .

There are many kinds of co-integration test but in this paper, Johansen's approach (1988) will be conducted. One of Johansen's approach disadvantages is that the test cannot be performed on a panel data set, but the test is very useful for multiple equation models (Johansen, 1988). Hence, countries will be tested individually and not in a group of a regionally-integrated union. There are two types of Johansen tests which are trace and eigen value. The null hypothesis for the trace test is that there is  $r$  co-integrating variables and the alternative hypothesis of  $n$  co-integrating variables. On the other hand, the eigen value tests the null hypothesis that there is  $r$  co-integrating variables present against the alternative hypothesis which is the presence of  $r+1$  co-integrating variables.

#### c. Causality Test

After testing for co-integration by using Johansen's approach, we have now identified the number of co-integrating equations in the dataset. To determine the causality between FDI, economic growth, and trade openness, VECM needs to be conducted. VECM is useful to estimate when a model contains unit roots in its variables, also to examine long-run relationships among the time series while taking into account the direction as well as causality between the variables in the model.

Testing for causality has been one of the most difficult issues to overcome in economics. Difficulties in checking for causality arise because it is hard to distinguish for correlation and causality, it is possible that during the process common factors are ignored and when these common factors are considered the existing causality that was first found might disappear. In this paper, there are two causalities that are going to be checked for. First, the causality between FDI and economic growth, and the second causality would be between trade openness and economic growth.

To test for causality between FDI and economic growth

$$\Delta GDP_{it} = \alpha_0 + \sum \alpha_{1j} \Delta GDP_{it-1} + \sum \alpha_{2j} \Delta FDI_{it-1} + \varphi ECT_{it-1} + \varepsilon_{1it}$$

(i = 1...n<sub>1</sub>) (i = 1...n<sub>2</sub>)

$$\Delta FDI_{it} = b_0 + \sum b_{1j} \Delta FDI_{it-1} + \sum b_{2j} \Delta GDP_{it-1} + \varphi ECT_{it-1} + \varepsilon_{2it}$$

(j = 1...n<sub>1</sub>) (j = 1...n<sub>2</sub>)

To test for causality between trade openness and economic growth

$$\Delta GDP_{it} = \alpha_0 + \sum \alpha_{1j} \Delta GDP_{it-1} + \sum \alpha_{2j} \Delta TRADE_{it-1} + \varphi ECT_{it-1} + \varepsilon_{1it}$$

(i = 1...n<sub>1</sub>) (i = 1...n<sub>2</sub>)

$$\Delta TRADE_{it} = b_0 + \sum b_{1j} \Delta TRADE_{it-1} + \sum b_{2j} \Delta GDP_{it-1} + \varphi ECT_{it-1} + \varepsilon_{2it}$$

(j = 1...n<sub>1</sub>) (j = 1...n<sub>2</sub>)

$\Delta$  is the difference operator,  $GDP_{it}$  is the GDP per capita of country  $i$  at time  $t$ ,  $FDI_{it}$  is the FDI inflows as a percentage of gross fixed capital formation of country  $i$  at time  $t$ , and  $TRADE_{it}$  represents the trade openness measured by the ratio of total exports plus total imports over total GDP of country  $i$  at time  $t$ .  $ECT_{it-1}$  represents error correction term that is derived from the long run relationship under co-integration,  $\varepsilon_{1it}$  and  $\varepsilon_{2it}$  represents the white noise error terms,  $n_1$  and  $n_2$  are the lag orders.

By running the vector error correction model we are able to distinguish between the short-run and long-run granger causality. According to Moudatsou and Kyrkilis (2011) the presence of long-run causal relationship between economic growth and FDI as well as economic growth and trade openness can be identified through the coefficients of the lagged error terms ( $\varphi$ ). The coefficients also show that the variables that are being tested for causality are adjusting to their long-run equilibriums. If the coefficient  $\varphi$  is statistically significant in the first equation it can be concluded that FDI and trade openness granger causes economic growth (GDP), but only under the condition that the coefficient  $\varphi$  is insignificant in the second equation. However, if in both of the equations  $\varphi$  is significant it can be concluded that there is a two-way relationship between the two variables being tested.

Table 3.1 Descriptive Statistics of ASEAN Countries' Variables

ASEAN Country Group					
No	Country	Statistic	Variables		
			GDP (USD)	FDI	Trade Openness
1	Indonesia	Mean	2240.35	0.030972	0.409878
		Median	2167.375	0.034545	0.401673
		Maximum	3834.056	0.123352	0.531801
		Minimum	1230.84	-0.138908	0.308716
		Std. Dev.	741.7995	0.05169	0.060806
2	Malaysia	Mean	6489.983	0.137107	1.288401
		Median	6587.105	0.133397	1.436066
		Maximum	10878.39	0.239178	1.747239
		Minimum	3308.772	0.00258	0.704226
		Std. Dev.	2306.057	0.056076	0.344687
3	Singapore	Mean	31097.35	0.475285	2.801296
		Median	30574.31	0.407486	2.888216
		Maximum	51855.08	1.083354	4.002955
		Minimum	13308.99	0.120153	1.613434
		Std. Dev.	12174.42	0.278506	0.80224
4	Thailand	Mean	3438.589	0.088575	0.904214
		Median	3508.234	0.070942	0.892974
		Maximum	5775.137	0.290488	1.391697
		Minimum	1403.696	0.015444	0.405
		Std. Dev.	1367.383	0.067773	0.335151
5	Philippines	Mean	1749.096	0.060057	0.590722
		Median	1632.288	0.062146	0.67087
		Maximum	2639.868	0.138826	0.808167
		Minimum	1380.682	-0.012	0.322887
		Std. Dev.	334.9623	0.038645	0.151451
	ASEAN-5	Mean	9003.073	0.158399	1.198902
		Median	3547.593	0.092563	0.781446
		Maximum	51855.08	1.083354	4.002955
		Minimum	1230.84	-0.138908	0.308716
		Std. Dev.	12488.83	0.209695	0.95463



Table 3.2 Descriptive Statistics of EU Countries' Variables

EU Country Group					
No	Country	Statistic	Variables		
			GDP (USD)	FDI	Trade Openness
1	Netherlands	Mean	41312.65	0.608359	1.011503
		Median	41918.73	0.17005	0.98379
		Maximum	52121.2	4.00963	1.565525
		Minimum	29136.27	0.03795	0.6325
		Std. Dev.	8060.216	0.861897	0.295456
2	Germany	Mean	35730.63	0.060769	0.529791
		Median	35911.58	0.02057	0.473479
		Maximum	45260.08	0.553227	0.899332
		Minimum	26065.94	-0.037856	0.294965
		Std. Dev.	6006.321	0.099183	0.203731
3	Austria	Mean	38638.01	0.093075	0.75359
		Median	38687.09	0.029704	0.722047
		Maximum	47946.06	1.117811	1.067337
		Minimum	27404.62	-0.260559	0.497222
		Std. Dev.	7201.691	0.226771	0.193738
4	Cyprus	Mean	24003.66	0.559937	1.133786
		Median	24713.43	0.114581	1.11818
		Maximum	32651.91	13.15078	1.270134
		Minimum	13164.53	-2.305527	0.989988
		Std. Dev.	6011.569	2.312441	0.072305
5	Denmark	Mean	50730.84	0.090631	0.706634
		Median	52163.23	0.038434	0.643391
		Maximum	61174.27	1.020015	1.038316
		Minimum	36145.97	-0.201739	0.436195
		Std. Dev.	8026.849	0.19549	0.206416
6	Finland	Mean	37248.95	0.103417	1.994745
		Median	35925.36	0.045917	2.015424
		Maximum	49366.64	0.465787	2.144297
		Minimum	25662.12	-0.154256	1.762976
		Std. Dev.	7812.82	0.147554	0.101764
7	France	Mean	35502.4	0.071215	0.416977
		Median	35739.56	0.066897	0.41795
		Maximum	41702.4	0.177939	0.629424
		Minimum	26963.86	-0.001696	0.262261
		Std. Dev.	5173.62	0.049985	0.119364

Table 3.2 Descriptive statistics of EU countries' variables (continued)

No	Country	Statistic	Variables		
			GDP (USD)	FDI	Trade Openness
8	Greece	Mean	22324.89	0.037848	0.409017
		Median	21552.05	0.038559	0.396972
		Maximum	30056.68	0.101005	0.636223
		Minimum	18050.26	-0.000256	0.225149
		Std. Dev.	3767.233	0.023669	0.138084
9	Ireland	Mean	35586.64	0.479562	1.308479
		Median	35285	0.165787	1.309979
		Maximum	65249.68	3.382752	2.233424
		Minimum	16961.45	-0.210265	0.593128
		Std. Dev.	14500.31	0.665338	0.5302
10	Italy	Mean	32503.28	0.029232	0.412025
		Median	33723.87	0.022532	0.428219
		Maximum	38239.07	0.093443	0.579526
		Minimum	24451.6	-0.018708	0.261816
		Std. Dev.	4301.661	0.02572	0.103261
11	Portugal	Mean	18563.31	0.119401	0.505069
		Median	19795.31	0.074766	0.514814
		Maximum	22831.21	0.641282	0.83236
		Minimum	12303.68	0.014195	0.261233
		Std. Dev.	3764.294	0.130021	0.163755
12	Spain	Mean	25361.3	0.098407	2.088082
		Median	25493.97	0.085136	2.024041
		Maximum	32461.85	0.260108	2.797426
		Minimum	17295.15	0.028086	1.812353
		Std. Dev.	5153.473	0.053074	0.244941
13	Sweden	Mean	42463.73	0.146017	0.69557
		Median	40102.43	0.076749	0.731649
		Maximum	55163.64	1.047183	0.986395
		Minimum	31094.31	-0.065224	0.390296
		Std. Dev.	7979.403	0.204165	0.213358
14	UK	Mean	32544.85	0.168387	0.456819
		Median	32659.94	0.109558	0.476309
		Maximum	41182.62	0.579193	0.592722
		Minimum	21617.46	-0.003679	0.330928
		Std. Dev.	6513.867	0.149411	0.094964
	EU	Mean	50730.84	0.090631	0.706634
		Median	52163.23	0.038434	0.643391
		Maximum	61174.27	1.020015	1.038316
		Minimum	36145.97	-0.201739	0.436195
		Std. Dev.	7922.444	0.192947	0.203731

## IV. Empirical Results

### IV.1 Unit Root Test Results

Table 4.1 EU ADF Test Results

EU Country Group GDP per capita							
	Countries	ADF-test Stat (levels)	Critical Values*		ADF-test Stat (first differences)	Critical Values*	
1	Netherlands	-1.849909	<b>1%</b>	-4.252879	-3.750967	<b>1%</b>	-4.262735
2	Germany	-3.833356	<b>5%</b>	-3.54849	-6.573528	<b>5%</b>	-3.552973
3	Austria	-0.699518	<b>10%</b>	-3.207094	-4.688647	<b>10%</b>	-3.209642
4	Cyprus	0.889356			-4.224835		
5	Denmark	-0.846033			-4.720585		
6	Finland	-1.842162			-3.957619		
7	France	-0.440637			-4.300237		
8	Greece	-2.461284			-2.36983		
9	Ireland	-1.499372			-2.958368		
10	Italy	0.623958			-4.855616		
11	Portugal	-1.434618			-3.251285		
12	Spain	-2.516214			-2.571913		
13	Sweden	-2.196925			-4.497017		
14	UK	-2.069597			-3.695127		

FDI as a share of GFCF							
	Countries	ADF-test Stat (levels)	Critical Values*		ADF-test Stat (first differences)	Critical Values*	
1	Netherlands	-3.538388	<b>1%</b>	-4.252879	-3.823937	<b>1%</b>	-4.262735
2	Germany	-4.412911	<b>5%</b>	-3.54849	-8.415609	<b>5%</b>	-3.552973
3	Austria	-2.333366	<b>10%</b>	-3.207094	-14.42789	<b>10%</b>	-3.209642
4	Cyprus	0.952002			-4.071706		
5	Denmark	-3.706127			-7.655631		
6	Finland	-5.377316			-12.57202		
7	France	-2.042198			-6.348581		
8	Greece	-3.55502			-8.35619		
9	Ireland	-1.219737			-6.718846		
10	Italy	-5.387822			-6.389259		
11	Portugal	-4.979763			-4.440476		
12	Spain	-3.938107			-7.997496		
13	Sweden	-2.944809			-7.414267		
14	UK	-3.388374			-8.783481		

Notes: \*indicates McKinnon critical values used to reject hypothesis of a unit root at the significance level of 1%, 5%, and 10%.

Table 4.1 EU ADF Test Results (continued)

EU Country Group							
Trade Openness (Ratio of Trade to GDP)							
	Countries	ADF-test Stat (levels)	Critical Values*		ADF-test Stat (first differences)	Critical Values*	
1	Netherlands	-2.498571	<b>1%</b>	-4.252879	-6.657699	<b>1%</b>	-4.262735
2	Germany	-2.002671	<b>5%</b>	-3.54849	-5.501921	<b>5%</b>	-3.552973
3	Austria	-2.990476	<b>10%</b>	-3.207094	-6.396097	<b>10%</b>	-3.209642
4	Cyprus	-2.916391			-6.077465		
5	Denmark	-2.195923			-5.060881		
6	Finland	-1.207199			-3.785767		
7	France	-2.520842			-5.596556		
8	Greece	-3.411644			-4.850731		
9	Ireland	-2.177635			-4.605533		
10	Italy	-3.212864			-5.797463		
11	Portugal	-2.478268			-3.636678		
12	Spain	-2.695918			-3.471309		
13	Sweden	-1.610904			-5.544276		
14	UK	-2.535792			-5.732605		

Notes: \*indicates McKinnon critical values used to reject hypothesis of a unit root at the significance level of 1%, 5%, and 10%.

To test whether there is a unit root present in the time series in this research, Augmented Dickey-Fuller unit root tests are run on GDP per capita, FDI as a share of gross fixed capital formation, and trade openness. The null hypothesis for the ADF test is that the time series contains a unit root and the alternative hypothesis is that there is no unit root in the time series and the variable was generated through a stationary process. In order to check for stationarity of variables in the research, ADF tests are run under three hypotheses: it is stationary at levels (with no unit roots), stationary at first differences (one unit root), and the last hypothesis is that it is stationary at second differences. The results of ADF tests are represented in table 4.1 and 4.2. It is found that at levels most of the variables are not stationary. However, after being differentiated once a big fraction of the variables become stationary. This result is in line with existing literature; Abbas et al. (2014), Moudatsou and Kyrkilis (2011), Sothan (2017) where after conducting unit root test, variables being analyzed are only stationary at first differences.

Table 4.3 and 4.4 summarize the result of the ADF tests. I(0) indicates that the variables are stationary at levels, I(1) indicates that the variables are stationary at first differences, and I(2) stationary at second differences. In order to answer the two research questions; the first one

being causality between FDI and economic growth and the second one is causality between trade openness and economic growth, co-integration test will be applied to the variables in question that share the same level of integration. In the case of answering the first research question, EU countries that share the same level of integration in GDP and FDI are Austria, Denmark, France and Sweden. From the ASEAN countries, it is found that Indonesia, Malaysia, Thailand and the Philippines have the same level of integration. Moudatsou and Kyrkilis (2011) also find that Austria, Denmark, Sweden, Indonesia, Singapore, Thailand and the Philippines share the same level of integration in GDP and FDI. As for the second research question, the EU countries that are integrated into the same level of GDP & trade openness are Germany, Austria, Denmark, France, Italy, and Sweden. The ASEAN countries are Indonesia, Singapore, Thailand, and the Philippines.

Table 4.2 ASEAN ADF Test Results

<b>ASEAN Country Group</b>							
<b>GDP per capita</b>							
<b>Countries</b>	<b>ADF-test Stat (levels)</b>	<b>Critical Values</b>	<b>ADF-test Stat (first differences)</b>	<b>Critical Values</b>			
1	Indonesia	-0.444179	<b>1%</b>	-4.252879	-4.322366	<b>1%</b>	-4.262735
2	Malaysia	-2.119201	<b>5%</b>	-3.54849	-5.398761	<b>5%</b>	-3.552973
3	Singapore	-3.118582	<b>10%</b>	-3.207094	-6.100381	<b>10%</b>	-3.209642
4	Thailand	-1.971957			-4.359231		
5	Philippines	-0.069757			-4.216668		
<b>FDI as a share of GFCF</b>							
<b>Countries</b>	<b>ADF-test Stat (levels)</b>	<b>Critical Values</b>	<b>ADF-test Stat (first differences)</b>	<b>Critical Values</b>			
1	Indonesia	-2.286176	<b>1%</b>	-4.252879	-4.292396	<b>1%</b>	-4.262735
2	Malaysia	-4.198811	<b>5%</b>	-3.54849	-6.40708	<b>5%</b>	-3.552973
3	Singapore	-4.900005	<b>10%</b>	-3.207094	-7.839887	<b>10%</b>	-3.209642
4	Thailand	-3.495401			-7.854089		
5	Philippines	-4.080379			-8.345904		
<b>Trade Openness (Ratio of Trade to GDP)</b>							
<b>Countries</b>	<b>ADF-test Stat (levels)</b>	<b>Critical Values</b>	<b>ADF-test Stat (first differences)</b>	<b>Critical Values</b>			
1	Indonesia	-3.900886	<b>1%</b>	-4.252879	-8.055547	<b>1%</b>	-4.262735
2	Malaysia	0.03762	<b>5%</b>	-3.54849	-4.229376	<b>5%</b>	-3.552973
3	Singapore	-1.476886	<b>10%</b>	-3.207094	-5.427074	<b>10%</b>	-3.209642
4	Thailand	-2.814028			-6.340696		
5	Philippines	-1.380375			-5.930383		

## IV.2 Co-Integration Test Results

Table 4.3 Group of co-integration (FDI and economic growth)

EU				ASEAN			
No	Country	GDP per capita Series	FDI Series	No	Country	GDP per capita Series	FDI Series
1	Netherlands	I(2)	I(1)	1	Indonesia	I(1)	I(1)
2	Germany	I(1)	I(0)	2	Malaysia	I(1)	I(1)
3	Austria	I(1)	I(1)	3	Singapore	I(1)	I(0)
4	Cyprus	I(2)	I(1)	4	Thailand	I(1)	I(1)
5	Denmark	I(1)	I(1)	5	Philippines	I(1)	I(1)
6	Finland	I(1)	I(0)				
7	France	I(1)	I(1)				
8	Greece	I(2)	I(1)				
9	Ireland	I(2)	I(1)				
10	Italy	I(1)	I(0)				
11	Portugal	I(2)	I(0)				
12	Spain	I(2)	I(1)				
13	Sweden	I(1)	I(1)				
14	UK	I(2)	I(1)				

Table 4.4 Group of co-integration (trade openness and economic growth)

EU				ASEAN			
No	Countries	GDP per capita Series	Trade Openness Series	No	Countries	GDP per capita Series	Trade Openness Series
1	Netherlands	I(2)	I(1)	1	Indonesia	I(1)	I(1)
2	Germany	I(1)	I(1)	2	Malaysia	I(1)	I(2)
3	Austria	I(1)	I(1)	3	Singapore	I(1)	I(1)
4	Cyprus	I(2)	I(1)	4	Thailand	I(1)	I(1)
5	Denmark	I(1)	I(1)	5	Philippines	I(1)	I(1)
6	Finland	I(1)	I(2)				
7	France	I(1)	I(1)				
8	Greece	I(2)	I(1)				
9	Ireland	I(2)	I(1)				
10	Italy	I(1)	I(1)				
11	Portugal	I(2)	I(2)				
12	Spain	I(2)	I(2)				
13	Sweden	I(1)	I(1)				
14	UK	I(2)	I(1)				

Table 4.5 Johansen Co-Integration Results (FDI and Economic Growth)

GDP & FDI					
EU Country Group					
	Country	Hypothesized number of CEs	Eigen Value	Trace Statistic	5% Critical Value
1	Austria	None	0.479829	25.69743	15.49471
		At most 1	0.160838	5.435905	3.841466
2	Denmark	None	0.339769	16.60324	15.49471
		At most 1	0.113454	3.733089	3.841466
3	France	None	0.393865	19.08467	15.49471
		At most 1	0.145672	4.565767	3.841466
4	Sweden	None	0.408593	19.58735	15.49471
		At most 1	0.181439	5.405603	3.841466
ASEAN Country Group					
	Country	Hypothesized number of CEs	Eigen Value	Trace Statistic	5% Critical Value
1	Indonesia	None	0.490647	22.40186	15.49471
		At most 1	0.046892	1.488838	3.841466
2	Malaysia	None	0.413911	17.43993	15.49471
		At most 1	0.027898	0.877139	3.841466
3	Thailand	None	0.564943	26.09716	15.49471
		At most 1	9.49E-02	2.79336	3.841466
4	Philippines	None	0.28491	18.02457	15.49471
		At most 1	0.218149	7.628809	3.841466

Table 4.5 and 4.6 show the result of the Johansen co-integration tests. First, when checking for the co-integration of the GDP and FDI series, it is found that among the selected EU and ASEAN countries, they are all at least have one co-integrating equation. Therefore, it can be said that there is a long run association between FDI and economic growth based on the data included in this research which covers the year 1980-2015. Moudatsou and Kyrkilis (2011) find that among the selected EU and ASEAN countries the variables have at least two co-integrating equations.

There are two types of Johansen co-integration test, the first one is trace statistic and the second one is max-eigen statistic. However, to check for co-integrating equations from both tests the same mechanism is used. In this case to determine the number of co-integrating equations we compare the trace statistic and the critical value. It also has to be taken into account that the null hypothesis would be different depending on the hypothesized number

of co-integrating equations. The null hypothesis when the hypothesized CEs is 'none' would be there are no co-integrated equations, and if the hypothesized CEs is at most one, the null hypothesis is that there is at most one CE, and so on. When the trace statistic is bigger than the critical value, the null hypothesis is rejected.

Table 4.6 Johansen Co-Integration Results (Trade Openness and Economic Growth)

GDP & Trade Openness					
EU Country Group					
	Country	Hypothesized number of CEs	Eigen Value	Trace Statistic	5% Critical Value
1	Germany	None	0.613165	25.30823	15.49471
		At most 1	0.023361	0.61458	3.841466
2	Austria	None	0.284206	17.45613	15.49471
		At most 1	0.204463	7.090885	3.841466
3	Denmark	None	0.339318	15.65918	15.49471
		At most 1	0.086665	2.810215	3.841466
4	France	None	0.523883	22.95813	15.49471
		At most 1	0.048361	1.437501	3.841466
5	Italy	None	0.41176	19.78022	15.49471
		At most 1	0.140544	4.392223	3.841466
6	Sweden	None	0.520418	25.16638	15.49471
		At most 1	0.207924	6.060532	3.841466
ASEAN Country Group					
	Country	Hypothesized number of CEs	Eigen Value	Trace Statistic	5% Critical Value
1	Indonesia	None	0.492616	23.28189	15.49471
		At most 1	0.069973	2.248803	3.841466
2	Thailand	None	0.800368	45.95641	15.49471
		At most 1	0.086806	2.451796	3.841466
3	Singapore	None	0.442351	16.75296	15.49471
		At most 1	0.058536	1.568291	3.841466
4	Philippines	None	0.401216	16.67306	15.49471
		At most 1	0.024677	0.774592	3.841466

Table 4.6 shows the results of Johansen co-integration test on trade openness and economic growth which is represented by GDP. It is shown by the trace statistic that is bigger than critical values that all countries tested for co-integration have at least one co-integrating equation. This also confirms the long-run association between trade openness and economic growth.



### IV.3 Causality Test Results

Table 4.7 VECM Results Long-Run Causality between FDI & Economic Growth

FDI & Economic Growth						
EU – Long-Run Causality (ECT)						
No	Country		Coefficient	Std. Error	t-Statistic	Prob.
1	Austria	(CE 1)	-0.648803	0.267053	-2.429491	0.0185
		(CE 2)	1131.451	877.4204	1.28952	0.2027
2	Denmark	(CE 1)	-0.675626	0.243894	-2.770161	0.0077
		(CE 2)	-69.27757	1355.353	-0.051114	0.9594
3	France	(CE 1)	-0.285238	0.16992	-1.678662	0.099
		(CE 2)	-736.2906	2830.783	-0.260101	0.7958
4	Sweden	(CE 1)	-0.459232	0.200606	-2.289224	0.026
		(CE 2)	1026.935	1278.675	0.803124	0.4254
ASEAN - Long Run Causality (ECT)						
No	Country		Coefficient	Std. Error	t-Statistic	Prob.
1	Indonesia	(CE 1)	-0.593599	0.113466	-5.231509	0.000
		(CE 2)	142.8779	363.4189	0.393149	0.6958
2	Malaysia	(CE 1)	-0.653095	0.307312	-2.125184	0.0382
		(CE 2)	1559.993	1394.448	1.118717	0.2682
3	Thailand	(CE 1)	-0.418967	0.198946	-2.105931	0.0399
		(CE 2)	496.0306	562.8841	0.88123	0.3821
4	Philippines	(CE 1)	-0.866937	0.270614	-3.203597	0.0023
		(CE 2)	887.7843	392.1927	2.263643	0.0276

Table 4.7 shows the results obtained from vector error correction tests, where the variables taken into account are FDI and economic growth as represented by GDP. CE 1 stands for co-integrating equation 1, which has FDI as the dependent variable and GDP as the independent variable. On the other hand, CE 2 stands for co-integrating equation 2 where now GDP is the dependent variable and FDI as the independent variable. The two variables take turns in being the dependent variable in order to see whether there is a bidirectional causality between FDI and economic growth. Table 4.7 summarizes the long run causality between the variables being examined. To test for the long-run causality, the rule of thumb is if the coefficient of ECT (error correction term) is negative and the p-value is less than 5% (indicating significance) then it can be said that there's a long run causality running from the independent variables to the dependent variable.

It can be concluded that among the selected EU countries, in the long-run inward FDI is motivated by economic growth in Austria, Denmark, and Sweden. Whereas in France it is found that there is no long-run causality between FDI and economic growth. Based on the ASEAN sample, in all countries including Indonesia, Malaysia, Thailand, and Philippines inward FDI is motivated by economic growth in the long run. In the case of Philippines, it is found that there is a two-way causality where economic growth is motivated by inward FDI in the long-run. The majority of the countries in both EU and ASEAN show that there is a causality coming from economic growth to FDI. This is in line with the empirical findings where it is found that economic growth is an incentive for inward FDI (Al Nasser 2010, Mohamed and Sidiropoulos 2010). Countries with higher levels of economic growth tend to attract FDI more because there is a likelihood that the scale of production would be more efficient and hence economies of scale are attainable, therefore growing markets are usually more profitable for horizontal FDI (Carstensen and Toubal, 2004). However, it is also reasonable that economic growth is motivated by FDI, like in the case of Philippines. FDI contributes to economic growth in a way that it brings technological spillovers, improves human capital, enhances international trade integration as well as the business environment (OECD, 2002).

*Table 4.8 VECM Results Short-Run Causality between FDI & Economic Growth*

Short-Run Causality (Wald Test)						
EU Country Group						
No	Country		Test Statistic	Value	df	Prob.
1	Austria	(CE 1)	Chi-square	8.461687	2	0.0145
		(CE 2)	Chi-square	5.672176	2	0.0587
2	Denmark	(CE 1)	Chi-square	0.325803	2	0.8497
		(CE 2)	Chi-square	2.505831	2	0.2857
3	France	(CE 1)	Chi-square	5.319535	2	0.07
		(CE 2)	Chi-square	2.697852	2	0.2595
4	Sweden	(CE 1)	Chi-square	2.958431	2	0.2278
		(CE 2)	Chi-square	2.562569	2	0.2777
ASEAN Country Group						
No	Country		Test Statistic	Value	df	Prob.
1	Indonesia	(CE 1)	Chi-square	25.81353	2	0.000
		(CE 2)	Chi-square	2.272937	2	0.321
2	Malaysia	(CE 1)	Chi-square	1.834719	2	0.3996
		(CE 2)	Chi-square	0.950514	2	0.6217
3	Thailand	(CE 1)	Chi-square	16.40763	2	0.0003
		(CE 2)	Chi-square	1.391195	2	0.4988

4	Philippines	(CE 1)	Chi-square	6.476953	2	0.0392
		(CE 2)	Chi-square	6.407491	2	0.0406

To test for short-run causality, Wald coefficients test is performed with the null hypothesis that there is no short-run causality running from independent variable to the dependent variable. When p-value obtained from Wald test is bigger than 5% we accept the null hypothesis. From table 4.8 among the EU sample, it can be seen that inward FDI is motivated by economic growth only in Austria and France in the short run. Among the ASEAN sample inward FDI is also motivated by economic growth in Indonesia, Thailand and the Philippines. Again, in the case of Philippines economic growth is motivated by inward FDI in the short run so there is an indication of a two-way causality between inward FDI and economic growth in the Philippines.

Table 4.9 VECM Results Long-Run Causality between Trade Openness & Economic Growth

Trade Openness & Economic Growth						
EU – Long-Run Causality (ECT)						
No	Country		Coefficient	Std. Error	t-Statistic	Prob.
1	Germany	(CE 1)	-0.034197	0.044412	-0.769988	0.4447
		(CE 2)	1797.612	1738.655	1.033909	0.3058
2	Austria	(CE 1)	-0.057314	0.090273	-0.634896	0.5282
		(CE 2)	-3904.26	1708.187	-2.285616	0.0262
3	Denmark	(CE 1)	-0.12159	0.043059	-2.823783	0.0066
		(CE 2)	-923.5343	1731.585	-0.533346	0.596
4	France	(CE 1)	0.002379	0.01214	0.195955	0.8454
		(CE 2)	-426.0621	407.4609	-1.045651	0.3004
5	Italy	(CE 1)	0.000703	0.025536	0.027515	0.9782
		(CE 2)	-1016.569	806.1864	-1.260961	0.2127
6	Sweden	(CE 1)	-3.11E-06	3.58E-06	-0.87082	0.3877
		(CE 2)	-0.323801	0.116144	-2.787929	0.0073
ASEAN - Long Run Causality (ECT)						
No	Country		Coefficient	Std. Error	t-Statistic	Prob.
1	Indonesia	(CE 1)	-0.428339	0.233275	-1.836196	0.0718
		(CE 2)	-72.82959	593.8661	-0.122636	0.9029
2	Thailand	(CE 1)	-0.13799	0.168225	-0.820271	0.4157
		(CE 2)	167.5846	322.5272	0.519598	0.6055
3	Singapore	(CE 1)	-0.14874	0.092856	-1.601825	0.115
		(CE 2)	277.8744	868.4768	0.319956	0.7502
4	Philippines	(CE 1)	-0.062293	0.056876	-1.095241	0.2783
		(CE 2)	137.755	58.59161	2.351105	0.0224

Now, trade openness and economic growth are the variables being taken into account in the second model of VECM in this research. We refer to table 4.9 for the results of the causality test between trade openness and economic growth in the long run. CE 1 represents co-integrating equation 1 where trade openness is the dependent variable and GDP is the independent variable. CE 2 is co-integrating equation 2 where now GDP is the dependent variable and trade openness is the independent variable. All variables in are in their first differences since when vector error correction is conducted, it automatically changes the variables being analyzed into first differences and not levels. As seen from table 4.9 the long run causality between the variables is as follows; trade openness is motivated by economic growth in Denmark and the United Kingdom and in the case of Austria and Sweden it is the other way around, where economic growth is motivated by trade openness. Among the ASEAN countries, it is found that there is no long-run causality between trade openness and economic growth except for the Philippines where economic growth is motivated by trade openness. Previous theoretical and empirical studies confirm both directions in which the causality moves, whether trade openness causes economic growth or the other way around. A trade-open regime would lead to an exposure to foreign competition (Balassa, 1978), an increase in access to better technology and ease of capital attainment (McKinnon, 1964), also generates economies of scale. All of these factors contribute to a growing economy. To support the finding that economic growth motivates trade openness, it is mentioned in a previous literature that economic growth might increase a country's exports through specialization, thereby enhancing better performance in international trade (Konya, 2004). The empirical findings from the previous literature suggest that as productivity increase, a country's exports would increase as well (Ghartey, 1993 and Salvatore and Hatcher, 1991).

Table 4.10 summarizes the results of short-run causality between trade openness and economic growth obtained from performing the Wald test. It can be seen that among the EU countries, trade openness is motivated by economic growth only in Germany. Where in Denmark, Italy, and Sweden economic growth is motivated by trade openness in the short-run. For the ASEAN sample, every country shows that there is indeed a short-run causality between trade openness and economic growth. Trade openness is motivated by economic growth in Indonesia and Thailand. Where in Singapore and the Philippines economic growth is motivated

by trade openness. There is no indication of a bidirectional relationship between trade openness and economic growth in the short run both among the EU and ASEAN sample.

*Table 4.10 VECM Results Short Run Causality Between Trade Openness & Economic Growth*

Trade Openness & Economic Growth Short Run Causality (Wald Test)						
EU Country Group						
No	Country		Test Statistic	Value	df	Prob.
1	Germany	(CE 1)	Chi-square	18.00468	2	0.0001
		(CE 2)	Chi-square	2.238424	2	0.3265
2	Austria	(CE 1)	Chi-square	0.903892	2	0.6364
		(CE 2)	Chi-square	2.516725	2	0.2841
3	Denmark	(CE 1)	Chi-square	1.781456	2	0.4104
		(CE 2)	Chi-square	7.490035	2	0.0236
4	France	(CE 1)	Chi-square	2.893389	2	0.2353
		(CE 2)	Chi-square	2.763982	2	0.2511
5	Italy	(CE 1)	Chi-square	2.906277	2	0.2338
		(CE 2)	Chi-square	8.777403	2	0.0124
6	Sweden	(CE 1)	Chi-square	2.421231	2	0.298
		(CE 2)	Chi-square	9.70431	2	0.0078
ASEAN Country Group						
No	Country		Test Statistic	Value	df	Prob.
1	Indonesia	(CE 1)	Chi-square	12.52813	2	0.0019
		(CE 2)	Chi-square	3.133174	2	0.2088
2	Thailand	(CE 1)	Chi-square	7.348905	2	0.0254
		(CE 2)	Chi-square	2.041596	2	0.3603
3	Singapore	(CE 1)	Chi-square	5.769632	2	0.0559
		(CE 2)	Chi-square	10.34746	2	0.0057
4	Philippines	(CE 1)	Chi-square	0.587335	2	0.7455
		(CE 2)	Chi-square	11.38863	2	0.0034

## **V. Conclusion**

This research examines the causal relationship between inward foreign direct investment, trade openness, and economic growth in selected EU and ASEAN countries. Data of the years 1980-2015 is used in this research. First, the data is used to test for stationary by using ADF unit root test. After running the unit root tests it is found that in some countries FDI, trade openness, and economic growth are stationary only after taking the first differences. The countries whose FDI, trade openness, and economic growth are stationary after the first differences are then tested for co-integration using Johansen approach. The result shows that all selected countries have at least one co-integrating equation in the long run. The last step is to check for causality by using vector error correction.

There are two main issues covered in this research; the first one is the causality between FDI and economic growth and the second one is the causality between trade openness and economic growth. Empirical results show that in both selected EU and ASEAN countries both cases appear. There are some countries in which FDI is motivated by economic growth (Austria, Denmark, Sweden, Indonesia, Malaysia, Thailand, Philippines) and trade openness is motivated by economic growth (Denmark, UK). However, it is also found that economic growth is motivated by FDI (Philippines) and where economic growth is motivated by trade openness (Austria, Sweden, Philippines). There are some indications of a bidirectional relationship between FDI and economic growth that is found in the Philippines but no indication of bidirectional relationship found between trade openness and economic growth. These findings support the initial hypotheses that FDI and trade openness are motivated by economic growth, a two-way causality between FDI and economic growth, and that there is no two-way causality between trade openness and economic growth.

The empirical findings in this research are in line with the existing literature, where inward FDI is motivated by economic growth. Previous literature confirms that economic growth of a country is an incentive for FDI inflows (Al Nasser 2010, Mohamed and Sidiropoulos 2010). One of the several factors that might catch investors' interest in investing in faster-growing markets is the bigger likelihood that scale of production would be more efficient in a larger market through the concept of economies of scale. The other factor is because higher level of economic growth indicates a higher level of aggregate demand which in turn leads to greater

opportunities of making profits. A growing economy would matter most to the investors who seek to do horizontal FDI, since then economies of scale would be feasible. Empirical findings regarding the causality between trade openness and economic growth in this research are also in line with the previous literature, especially with Sarkar (2008) where among the East Asian countries it is found that there is no causality between trade openness and economic growth but in developed economies the causality is positive.

For further research, it would be desirable to employ a more recent data sample consisting more countries. Since this research only covers 14 EU members and 5 ASEAN members, it would be better if all member countries can be included in the observation so that the direction of causality between variables could be analyzed among all member countries. One of the limitations of this research is that it only uses one measure of trade openness and FDI, it is suggested to use different kinds of measure in order to check for causality since the results would turn out differently from one measure to another. As a measure of economic growth in this research, GDP per capita also has its limitations and has been criticized by some economists because it does not take into account the quality of a country's environment, how output and leisure can contribute to quality of life, and it does not include productivity activities that are not recorded as market transactions. It might be interesting to use another measure of economic growth beside GDP per capita.

The direction of causality between FDI, trade openness, and economic growth is found to be different from one country to another. It can be said that causality is country-specific, depending on the state that each country is currently in.

### **Policy Recommendation**

Policies that are implemented in a country matter in order to be able to reap the most potential out of FDI inflows and trade activities. According to OECD (2002) there are three main determinants for FDI: the profitability of individual projects, the ease of which subsidiaries' operations can be integrated with investor's global strategies in the host country, and lastly the quality of enabling environment of the host country. For developed economies the three determinants do not seem to be a trouble, but for developing economies in order to catch up a set of policies should be implemented. From the empirical findings, it is found that in most

cases there is a growth-led FDI and growth-led trade openness. Hence it is important for countries to improve their infrastructure, and pay attention to their integration regarding international trade and lastly to improve relevant competences on a national scale. An enabling domestic business environment is as important in attracting international investment as it is vital in mobilizing domestic resources. Policymakers should aim to achieve a state of macroeconomic stability in order to sustain higher employment, price and external accounts stability which all would contribute to a high economic growth. The domestic financial system needs to be strengthened to be able to facilitate and complement the foreign investments. By developing capital markets and financial instrument as well as promoting savings would not only enhance business opportunities coming from the FDI inflow but also reduce funding constraints.



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## Appendix

Table 1. VECM Results FDI & Economic Growth (EU)

FDI & Economic Growth							
EU Country Group (Vector Error Correction)							
No	Country		Error Correction			(CE 1)	(CE 2)
			(CE 1) D(FDI)	(CE 2) D(GDP)			
1	Austria	Coefficient	-0.648803	1131.451	R-squared	0.722915	0.224906
		Std. Error	0.26705	877.42	Adj. R-squared	0.671603	0.08137
		t-statistic	[-2.42949]	[ 1.28952]	Sum sq. resids	0.975535	10530849
					S.E. equation	0.190081	624.525
					Log likelihood	11.2761	-255.9346
					Akaike AIC	-0.319763	15.87483
					Schwarz SC	-0.047671	16.14692
					Mean dependent	0.001171	596.0013
					S.D. dependent	0.331696	651.5977
2	Denmark	Coefficient	-0.675626	-69.27757	R-squared	0.410879	0.117611
		Std. Error	0.24389	1355.35	Adj. R-squared	0.301782	-0.045794
		t-statistic	[-2.77016]	[-0.05111]	Sum sq. resids	0.938593	28985377
					S.E. equation	0.186448	1036.114
					Log likelihood	11.91307	-272.6406
					Akaike AIC	-0.358368	16.88731
					Schwarz SC	-0.086276	17.1594
					Mean dependent	0.000612	681.6718
					S.D. dependent	0.223132	1013.175
3	France	Coefficient	-0.285238	-736.2906	R-squared	0.276344	0.172857
		Std. Error	0.16992	2830.78	Adj. R-squared	0.142333	0.019682
		t-statistic	[-1.67866]	[-0.26010]	Sum sq. resids	0.025254	7008900
					S.E. equation	0.030583	509.4987
					Log likelihood	71.56735	-249.217
					Akaike AIC	-3.973779	15.4677
					Schwarz SC	-3.701686	15.73979
					Mean dependent	0.001683	424.9485
					S.D. dependent	0.033023	514.588
4	Sweden	Coefficient	-0.459232	1026.935	R-squared	0.301067	0.112045
		Std. Error	0.20061	1278.67	Adj. R-squared	0.171635	-0.052391
		t-statistic	[-2.28922]	[ 0.80312]	Sum sq. resids	0.845439	34349120
					S.E. equation	0.176954	1127.914
					Log likelihood	13.63774	-275.442
					Akaike AIC	-0.462893	17.05709
					Schwarz SC	-0.190801	17.32919
					Mean dependent	0.001665	714.9646
					S.D. dependent	0.194423	1099.48

Table 2. VECM Results FDI & Economic Growth (ASEAN)

ASEAN Country Group (Vector Error Correction)							
No	Country		Error Correction			(CE 1)	(CE 2)
			(CE 1) D(FDI)	(CE 2) D(GDP)			
1	Indonesia	Coefficient	-0.593599	142.8779	R-squared	0.568216	0.131251
		Std. Error	0.11347	363.419	Adj. R-squared	0.488256	-0.029628
		t-statistic	[-5.23151]	[ 0.39315]	Sum sq. resids	0.020624	211565.5
					S.E. equation	0.027638	88.51981
					Log likelihood	74.90923	-191.4604
					Akaike AIC	-4.176317	11.9673
					Schwarz SC	-3.904225	12.23939
					Mean dependent	0.00179	76.89332
					S.D. dependent	0.038634	87.2369
2	Malaysia	Coefficient	-0.653095	1559.993	R-squared	0.427667	0.10039
		Std. Error	0.30731	1394.45	Adj. R-squared	0.321679	-0.066205
		t-statistic	[-2.12518]	[ 1.11872]	Sum sq. resids	0.089451	1841743
					S.E. equation	0.057559	261.1757
					Log likelihood	50.69952	-227.1653
					Akaike AIC	-2.709062	14.13123
					Schwarz SC	-2.436969	14.40332
					Mean dependent	-0.000156	221.5961
					S.D. dependent	0.069886	252.937
3	Thailand	Coefficient	-0.418967	496.0306	R-squared	0.556973	0.12746
		Std. Error	0.19895	562.884	Adj. R-squared	0.474931	-0.034122
		t-statistic	[-2.10593]	[ 0.88123]	Sum sq. resids	0.057959	463965.8
					S.E. equation	0.046332	131.0874
					Log likelihood	57.85975	-204.4174
					Akaike AIC	-3.143015	12.75257
					Schwarz SC	-2.870923	13.02466
					Mean dependent	0.002182	129.3555
					S.D. dependent	0.06394	128.9066
4	Philippines	Coefficient	-0.866937	887.7843	R-squared	0.408658	0.525152
		Std. Error	0.27061	392.193	Adj. R-squared	0.299151	0.437217
		t-statistic	[-3.20360]	[ 2.26364]	Sum sq. resids	0.031344	65833.94
					S.E. equation	0.034072	49.37909
					Log likelihood	68.00265	-172.1983
					Akaike AIC	-3.757737	10.7999
					Schwarz SC	-3.485644	11.07199
					Mean dependent	0.002774	28.1255
					S.D. dependent	0.040699	65.82222

Table 3. VECM Results Trade Openness & Economic Growth (EU)

Trade Openness & Economic Growth							
EU Country Group (Vector Error Correction)							
No	Country		Error Correction			(CE 1)	(CE 2)
			(CE 1)	(CE 2)			
			D(TRADE)	D(GDP)			
1	Germany	Coefficient	-0.034197	1797.612	R-squared	0.429306	0.275799
		Std. Error	0.04441	1738.66	Adj. R-squared	0.323622	0.141688
		t-statistic	[-0.76999]	[ 1.03391]	Sum sq. resids	0.009052	13872130
					S.E. equation	0.01831	716.7863
					Log likelihood	88.49696	-260.4816
					Mean dependent	0.018023	581.0478
					S.D. dependent	0.022263	773.6902
					R-squared	0.128871	0.256926
					Adj. R-squared	-0.032449	0.119319
					Sum sq. resids	0.028196	10095812
2	Austria	Coefficient	-0.057314	-3904.26	Adj. R-squared	-0.032449	0.119319
		Std. Error	0.09027	1708.19	Sum sq. resids	0.028196	10095812
		t-statistic	[-0.63490]	[-2.28562]	S.E. equation	0.032316	611.4891
					F-statistic	0.798855	1.867107
					Mean dependent	0.017271	596.0013
					S.D. dependent	0.031804	651.5977
					R-squared	0.292313	0.344637
					Adj. R-squared	0.16126	0.223273
					Sum sq. resids	0.013312	21527867
					S.E. equation	0.022205	892.9325
3	Denmark	Coefficient	-0.12159	-923.5343	F-statistic	2.230491	2.839707
		Std. Error	0.04306	1731.58	Mean dependent	0.017564	681.6718
		t-statistic	[-2.82378]	[-0.53335]	S.D. dependent	0.024245	1013.175
					R-squared	0.113129	0.205651
					Adj. R-squared	-0.051106	0.05855
					Sum sq. resids	0.005975	6731015
					S.E. equation	0.014876	499.2964
					F-statistic	0.688823	1.398021
					Mean dependent	0.011102	424.9485
					S.D. dependent	0.01451	514.588
4	France	Coefficient	0.002379	-426.0621	R-squared	0.113129	0.205651
		Std. Error	0.01214	407.461	Adj. R-squared	-0.051106	0.05855
		t-statistic	[ 0.19596]	[-1.04565]	Sum sq. resids	0.005975	6731015
					S.E. equation	0.014876	499.2964
					F-statistic	0.688823	1.398021
					Mean dependent	0.011102	424.9485
					S.D. dependent	0.01451	514.588
					R-squared	0.113129	0.205651
					Adj. R-squared	-0.051106	0.05855
					Sum sq. resids	0.005975	6731015

Table 3. VECM Results Trade Openness & Economic Growth (EU) continued

5	Italy	Coefficient	0.000703	-1016.569	R-squared	0.223245	0.511752
		Std. Error	0.02554	806.186	Adj. R-squared	0.079402	0.421336
		t-statistic	[ 0.02752]	[-1.26096]	Sum sq. resids	0.007872	7846313
6	Sweden	Coefficient	-3.11E-06	-0.323801	S.E. equation	0.017075	539.0772
		Std. Error	3.60E-06	0.11614	F-statistic	1.552003	5.659955
		t-statistic	[-0.87082]	[-2.78793]	Mean dependent	0.009548	278.0987
7	UK	Coefficient	-0.297395	6067.549	S.D. dependent	0.017796	708.6595
		Std. Error	0.12181	4511.31	R-squared	0.240764	0.440074
		t-statistic	[-2.44154]	[ 1.34496]	Adj. R-squared	0.100165	0.336384
					Sum sq. resids	0.020532	21659833
					S.E. equation	0.027576	895.6651
					F-statistic	1.712415	4.244133
					Mean dependent	0.017188	714.9646
					S.D. dependent	0.02907	1099.48
					R-squared	0.210546	0.300062
					Adj. R-squared	0.064351	0.170444
					Sum sq. resids	0.006638	9105593
					S.E. equation	0.01568	580.7273
					F-statistic	1.440169	2.314969
					Mean dependent	0.007716	579.4399
					S.D. dependent	0.01621	637.6015

Table 4. VECM Results Trade Openness & Economic Growth (ASEAN)

Vector Error Correction							
ASEAN Country Group							
No	Country		Error Correction			(CE 1)	(CE 2)
			(CE 1)	(CE 2)			
			D(TRADE)	D(GDP)			
1	Indonesia	Coefficient	-0.428339	-72.82959	R-squared	0.564503	0.132467
		Std. Error	0.23328	593.866	Adj. R-squared	0.483855	-0.028187
		t-statistic	[-1.83620]	[-0.12264]	Sum sq. resid	0.032598	211269.2
					S.E. equation	0.034747	88.45782
					F-statistic	6.999624	0.82455
					Mean dependent	0.002142	76.89332
					S.D. dependent	0.048365	87.2369
2	Thailand	Coefficient	-0.13799	167.5846	R-squared	0.288471	0.267805
		Std. Error	0.16822	322.527	Adj. R-squared	0.156707	0.132214
		t-statistic	[-0.82027]	[ 0.51960]	Sum sq. resid	0.105919	389338.3
					S.E. equation	0.062633	120.083
					F-statistic	2.189294	1.975089
					Mean dependent	0.026466	129.3555
					S.D. dependent	0.068205	128.9066
3	Singapore	Coefficient	-0.14874	277.8744	R-squared	0.256639	0.334117
		Std. Error	0.09286	868.477	Adj. R-squared	0.118979	0.210806
		t-statistic	[-1.60183]	[ 0.31996]	Sum sq. resid	0.456626	39944143
					S.E. equation	0.130046	1216.311
					F-statistic	1.864299	2.709539
					Mean dependent	0.058851	1134.991
					S.D. dependent	0.13855	1369.155
4	Philippines	Coefficient	-0.062293	137.755	R-squared	0.104498	0.557994
		Std. Error	0.05688	58.5916	Adj. R-squared	-0.061335	0.476142
		t-statistic	[-1.09524]	[ 2.35110]	Sum sq. resid	0.057744	61280.57
					S.E. equation	0.046246	47.64085
					F-statistic	0.630139	6.81704
					Log likelihood	57.92097	-171.0157
					Mean dependent	0.0112	28.1255
			S.D. dependent	0.04489	65.82222		



Table 5. Country Sample

No	EU Countries	No	ASEAN Countries
1	Netherlands	1	Indonesia
2	Germany	2	Malaysia
3	Austria	3	Singapore
4	Cyprus	4	Thailand
5	Denmark	5	Philippines
6	Finland		
7	France		
8	Greece		
9	Ireland		
10	Italy		
11	Portugal		
12	Spain		
13	Sweden		
14	UK		