



Bachelor Thesis
International Bachelor of Economics & Business Economics

THE EFFECT OF FOREIGN DIRECT INVESTMENT AND TRADE OPENNESS ON UNEMPLOYMENT RATE IN ASEAN COUNTRIES

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Abstract

In this thesis, it analyzes the causal effect of the inflow of foreign direct investment and trade openness on the unemployment rate in ASEAN countries from the year 1991 to 2015. The thesis uses panel unit root, panel cointegration, and panel causality tests to estimate the results of the panel data. The thesis finds that there are a relationship and causal effect of trade openness and inflow of foreign direct investment on the unemployment rate. There is a long-term relationship between inflow of foreign direct investment and unemployment rate in Cambodia and Thailand, and there is a long-term relationship between trade openness and the unemployment rate in Myanmar, Brunei Darussalam, Lao PDR, Thailand, Singapore, and the Philippines. Nevertheless, the thesis finds that there is a causal effect of trade openness and inflow of foreign direct investment on the unemployment rate in the long-run but no causal effect in the short-run. This thesis suggests that higher value of trade openness and inflow of foreign direct investment may decrease the unemployment rate.

1.0 Introduction

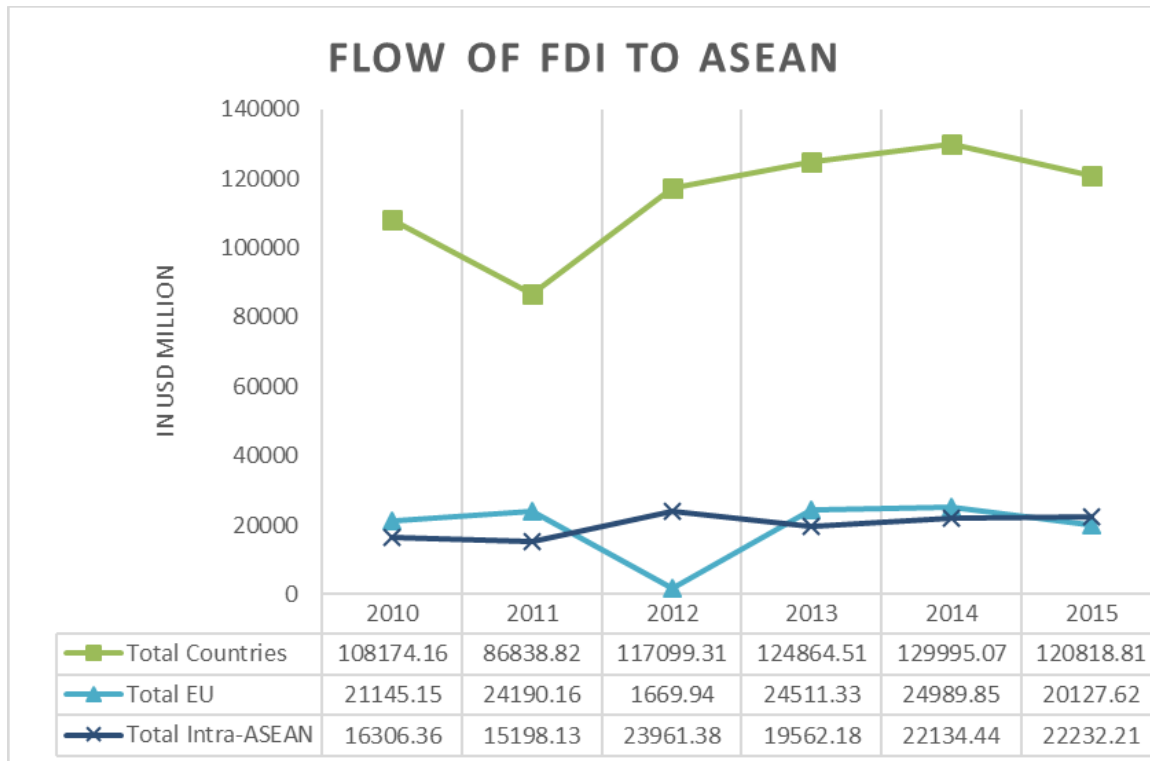
In the world of globalization, ASEAN grows faster with better human resources and physical infrastructure. The growing of economic activity has become the fundamental indicators for many researchers and economic agents to put interest towards this kind of situation. According to Report of ASEAN Community 2015, It is predicted that in 2050, ASEAN will be the fourth largest economy. Labor force expansion, nowadays, becomes one of the sources of economic growth. The improvements of economic activity also are pushed by the productivity enhancement. Despite the huge growth of economic activity, the diversity of ASEAN people itself becomes the advantage. Each ASEAN countries has their role to develop ASEAN even more.

Even though the growth of the economy is a great achievement, the purpose of having great economy activity is to help human being to achieve high standard of living. One of the problems faced by every country in the world is unemployment. Stated in the ASEAN Community 2015, youth unemployment rate is still high among total unemployment rate in ASEAN. It is higher than East Asia and South Asia. High youth unemployment rate leads to loss of opportunities for better economic growth. The need of external sources is needed to overcome the obstacle. Foreign direct investment and the flow of export and import are one of the favorable ways to reduce the unemployment rate in total.

Foreign direct investment is one of the important aspects of the development of the economy in ASEAN countries. FDI accelerates the economic development in most countries in the world. It develops technology and creates new jobs in the host countries. Furthermore, increase in quality to achieve not only in the internal market but also potential market outside countries can be achieved. Nowadays, a stability of a country is the key for investors to make investment decisions and has a big role for FDI inflow.

One of the largest sources of foreign direct investment transferred to the ASEAN countries remains intra-ASEAN investment. The flow of foreign direct investment from intra-ASEAN countries increased after the implementation of ASEAN. Before ASEAN Economic Community (AEC) had been implemented in 2015, the inflow of foreign direct investment was still dominated by the European Union countries. From the graph, the source of FDI inflow from Intra-ASEAN countries is more stable than from EU countries even though total FDI from the rest of the world is more volatile than Intra-ASEAN countries

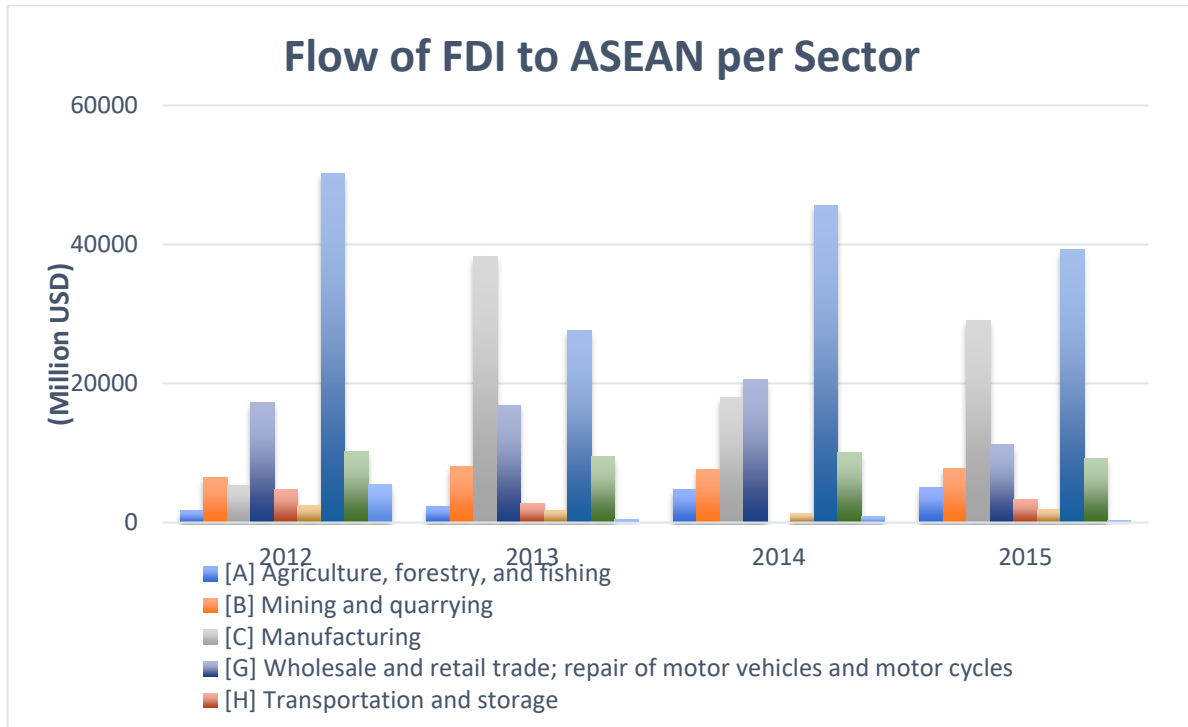
Figure 1. Inflow of FDI to ASEAN in million USD)



Source: Aseanstat.org

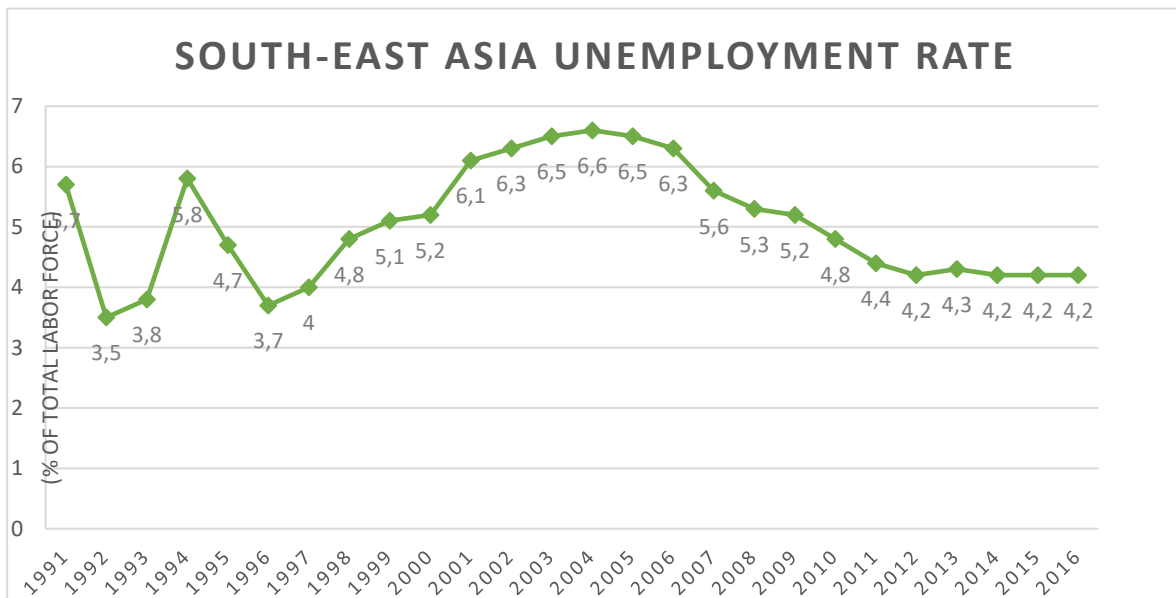
The inflow of FDI is still concentrated in several sectors. Financial and insurance sector became the most attractive among twenty-one sectors in ASEAN. In 2012, FDI flew to financial sectors around \$ 38272,4 million. As time went by, it declined to \$ 27662,74 million in 2013 and manufacturing could attract more FDI since it had \$ 38272,4 of FDI inflow. Right after the decline of financial and insurance sector, the sector started to increase again in 2014 but slightly declined in 2015. Those economic agents who invest in ASEAN are interested in Financial and insurance, information and communication, transportation and storage, professional, scientific and technical, wholesale and retail trade, real estate, and manufacturing since these eight sectors have FDI inflow above \$ 1000 million. In 2011, the flow of FDI to ASEAN dropped sharply due to lack of confidence of world towards investment potential in ASEAN. In 2012, there is also a sharp decline of flow of FDI to ASEAN due lack of confident. As the inflow of FDI increases time to time, based on ASEAN database, the growth domestic product moves in the same direction. Indirectly, FDI gives a positive movement towards economic growth in ASEAN. Through FDI inflow from intra-ASEAN, developed countries invest to host countries and make both countries better.

Figure 2. Flow of FDI to ASEAN Per Sector (in million USD)



Source: Aseanstat.org

Figure 3. Unemployment rate in ASEAN



Source: unescap.org

Based on the data from World Bank, from 1991 to 1997, the unemployment rates fluctuated due to lack of certainty in economic activity in ASEAN. Moreover, because of the financial crisis that happened in ASEAN, it increased dramatically from around 3.7% to 6% of labor force. Several theories such as cyclical unemployment state that unemployment can occur because there is not enough demand for employment due to lack of demand for goods and services. Companies cut the expenditure by not hiring much employment due to the stickiness of wages in the short run. As a result, the number of labor force participants exceeds the number of the job vacancy. Another theory explaining the increase in unemployment is involuntary unemployment (Christiano et al. (2010)). It explains that people can be fired involuntarily and they are not able to replace to the old job with the new one due to a downturn in economic activity. One of the popular theories of unemployment, Marxist theory, describes that unemployment occurs because of an unstable capitalist system from the past and when a crisis happens. After in the year 2004, unemployment rate starts to decrease back to 4%, and it is more stable compared to in the 1990s.

Several studies underline the importance of openness in the international trade. The theory that trade openness can be a supportive element for the growth of economic activity is obtained through the study by Grossman and Helpman (1991). The argument of how trade openness affects economic growth is that the enlarging of the source of capital for intermediate goods and advanced technology transferred are generated by the widening of the international trade between countries. By considering the volume of international trade and the openness of the trade in emerging countries, it explains the trend of the unemployment rate. Empirical results done by Felbermayr et al. (2011) explain that the beneficial relationship between trade openness and the unemployment rate is estimated about how unemployment rate decreases due to trade openness in the long run. With the developing of the international trade matters in the ASEAN, firms find out where they can enhance their productivity through finding more people with high productivity by increasing the job vacancies. Moreover, the expanding of international trade forces the unproductive firms to exit the market and are replaced by the productive firms. In the long run, the number of unemployment rate will be lower due to higher productivity of producing goods and services. In the empirical finding done by Hasan et al. (2011), international liberalization causes the reducing of the unemployment rate in the flexible labor market. In the condition which has a high employment rate, the reducing of the unemployment rate happens in the export sectors. With the high level of trade liberalization, people who are already hired will be less like to be unemployed.

A Recent study done by ASEAN Secretariat and United Nations in the report of ASEAN Investment Report (2016) explains that competitiveness of ASEAN creates more willingness of investors to choose ASEAN as an excellent destination to invest their money. Furthermore, with the launch of ASEAN Economic Community in 2015, investors found that this is an excellent opportunity for higher integrated networking between regions in ASEAN under conditions that negative shock occurring outside regions can be absorbed with the implementation of AEC. Beside the improvement of investment environment is satisfying in ASEAN, ASEAN members states which are Singapore and Thailand make Intra-ASEAN as a source of FDI inflow by implementing a production network strategy to increase the effectiveness of supply chain. Some MNEs operating in Thailand expand their production to CLMV since the transportation is easier from these four countries. By looking all these improvements in ASEAN, hoping that these will contribute economic activities and develop the connectivity and commitment of economic agent towards MNEs to invest in the region or as a partner business. This paper will discuss deeply how FDI and trade openness affect the unemployment rate.

This thesis structure is explained as follows. Chapter 2 explains the review of selected literature, the framework of hypotheses about the effect of inflow of foreign direct investment and trade openness on the unemployment rate, and the variables in the paper. Chapter 3 discusses the data sample and the methodology used in this study. The empirical results estimated in the study are described in chapter 4. The last chapter which is chapter 5 interprets the conclusion based on the empirical results and what is the policy recommendations to overcome the problem stated.

2.0 Literature review

According to ASEAN Investment Report 2016, FDI is well known as one of the best sources of economic growth within countries. As mentioned in the introduction, the macroeconomic stability is a variable that is important to be analyzed by investors before they invest in the host countries. Therefore, studying the causal effect of the unemployment and the inflow of FDI becomes popular and important to the destination country. The sample of EU countries taken by Seyf (2000) explains that he found that inflow of FDI creates more jobs. The number of jobs created might be correlated with the level inflow of FDI. Aside from the creation of jobs, it is implausible to encourage FDI inflow to reduce unemployment extensively. Incentives for investors to invest in new firms is necessary to attract more inflow of FDI. Contradictory with the previous studies stated above, a paper done by Chang (2006) states that there is no relationship between unemployment rate and inflow of FDI.

In the paper explaining foreign direct investment and job creation done by Jayaraman and Singh (2007), it found that there is a long-term causality from foreign direct investment to the unemployment rate. Proactive policies should be taken to attract more FDI flowing into a country. Another paper containing data from seven developing countries, Mucuk and Demirel (2013) found that there is a long-run relationship between foreign direct investment and unemployment rate and long-run causality from FDI to unemployment rate by using panel unit root, panel cointegration and panel causality tests based on data collected from 1981 to 2009.

Another study reveals that foreign direct investment has a major role in the movement of unemployment in Pakistan (Zeb et al., 2014). The paper uses several variables which are corruption, inflation and population size beside foreign direct investment and unemployment rate. The research uses OLS to find the effect of FDI on unemployment. Because of foreign direct investment, many job opportunities are created and successfully lowers the unemployment rate. Policy recommendation concerning the result of the finding is that government should focus on

the monetary and fiscal policies targeting to reduce the unemployment since FDI strengthens economic growth and creates more jobs.

In 2014, a paper studied by Strat et al. (2014) found that there is no Granger causality relation between the inflow of FDI and the unemployment in the six countries and one direction causal was found in the remain seven countries. The study is conducted by analyzing the causal effect of how FDI affect unemployment in the host country. The data used by the paper is panel data of the latest EU members which are collected from 1991 - 2012. The researchers use Toda Yamamoto procedure which can be implemented in the level VARs. From the study, they find that three of the thirteen countries have a causal relation from the inflow of foreign direct investment with the unemployment rate. Also, the government of these three countries should design policies related to FDI to reduce unemployment. Meanwhile, the other finding of this paper describes that the other three countries have the reverse causality relation between inflow of FDI and unemployment rate. Higher unemployment rate attracts more inflow of FDI hence investors can see this problem as their benefit providing them with more certainty of cheap labor. These findings must be considered due to the matter that the causal relation can change.

Taking Macedonia as the sample of data, Djambaska and Lozoska (2015) researched the relationship between foreign direct investment and unemployment. By using multiple linear regression analysis using yearly data from 1999 to 2013. They found the empirical results explaining that FDI does not affect insignificantly to unemployment rate but corruption decrease statistically significant unemployment rate.

The study explaining the impact of foreign direct investment on labor market done by Mayom (2015) finds that there is a negative relationship between inflow of foreign direct investment and unemployment rate. The increase of inflow of foreign direct investment is correlated with the decrease in the unemployment rate. This paper uses Ordinary Least Square to estimate the effect of the inflow of foreign direct investment on the labor market. The sample of the paper is 48 Sub-Saharan African countries from 1991 to 2009.

Research explaining the impact of FDI on the unemployment rate in Malaysia (Irpan et al. (2016)) acknowledges that FDI gives a significant impact on the unemployment rate in Malaysia including Gross domestic product, foreign workers, and exchange rate. The paper uses autoregressive distributed lag to determine the long run relationship between two variables. Those variables affect unemployment rate significantly. Contradictory with the previous studies stated above, a paper done by Chang (2006) states that there is no relationship between unemployment rate and inflow of FDI.

Explaining about the other variable, trade openness, the empirical findings of the short and long-run effect of Free Trade Agreement between U.S. and Canada researched by Trefler (2004) find that when Canada implements the tariff cuts, the industries experience the increase of low productivity plants. It decreases the unemployment by 12%. On the other hand, in the high level of labor productivity companies, the decrease of unemployment by 15% happens. When U.S. implements massive tariff cut at the plant level, labor productivity increases by 14%. The data is U.S. products and Canadian industries, and it is collected from 1980 to 1996. The methodology used by the paper is OLS.

Another paper explaining the relationship between unemployment and trade openness presents the results by using Ricardian specification, OLS estimates, instrumental variable estimations, and Heckscher-Ohlin specification estimations (Dutt et al., 2009). The data of trade is estimated by using Heckscher-Ohlin and Ricardian comparative advantages. The type of data used is cross-country data in the variables. The estimations of Ricardian prediction find, with strong and robust evidence, that trade openness and unemployment are negatively correlated. Contradictory, the effect of trade on unemployment in the capital abundant countries is positively correlated, but it turns into negative correlated when the country is labor abundant. Also, in this paper, they find that the positive correlation between unemployment and trade openness happens in the short-run followed by the new lower steady state of unemployment in the long run.

In the paper done by Felbermayr et al. (2011), it explains the relationship between trade openness and the unemployment rate in the 20 rich OECD countries. The panel data used in the paper is collected from 1983 to 2003. In the paper, the empirical strategies which are adopted by writers are GMM panel regressions, 2SLS regressions, and panel regressions. The result from the tests is that trade openness does not lead to the increase of structural unemployment in the long run. To make it more precise, the researchers control business cycle effects. The paper suggests to focus on the long-run effect and pays attention to the business cycle shocks.

In the paper done by Hasan et al. (2012), it explains the relationship between the increase of unemployment and trade liberalization. The paper uses the data based on state and industry-level unemployment and the trade protection. In the paper, they do not find the evidence of the effect of trade liberalization on the unemployment rate, but they find the beneficial result that the less protective of international trade or the more open of international trade leads to a huge decrease in unemployment and people who already get a job are less likely be fired.

The paper researched by Nwaka et al. (2015) states that the increase in the level of trade openness leads to the increase of unemployment rate in the long run. This finding in Nigeria is estimated by using vector error correction, and the data used are from 1970 to 2010. On the other hand, in the short run, the increase in the trade openness' level and the foreign price shocks reduce the unemployment rate. The opening of the economy to the international relation is the way to transfer technology, resource and the moving of labor from low productivity areas to high productivity areas. The inability of Nigeria in achieving low unemployment through trade openness is because of the bad policies adopted by Nigeria and the establishment of weak institution.

The Table 1 and 2 below summarize the research studying the relationship between foreign direct investment and unemployment rate and trade openness and unemployment rate.

Table 1: Selected empirical studies about foreign direct investment and unemployment

Authors	Country	Period	Methodology	Conclusion
Seyf (2000)	European Union (401 Japanese firms)	1994	Linear and non-linear regression	FDI increases employment
Chang (2006)	Taiwan	1981-2003	Vector autoregression (VAR)	No relationship
Jayaraman and Singh (2007)	Fiji	1970-2003	Unit root, Cointegration, ARDL, and Granger Causality	FDI decreases unemployment
Mucuk and Demirel (2013)	7 Developing Countries	1981-2009	Panel unit root, cointegration, and causality tests	FDI decreases unemployment
Zeb et al. (2014)	Pakistan	1995-2011	Multiple regression analysis	FDI Decreases unemployment
Strat et al. (2014)	The Latest EU members	1991-2012	Vector autoregression (VAR)	No causality
Djambaska and Lozanoska (2015)	Republic of Macedonia	1999-2013	Multiplier linear regression analysis	No relationship
Mayom, David (2015)	48 Sub-Saharan African Countries	1991-2009	Ordinary Least Square	FDI decreases Unemployment
Irpan et al. (2016)	Malaysia	1980-2012	Autoregressive distributed lag (ARDL)	FDI decreases unemployment

Table 2: Selected empirical studies about trade openness and liberalization, and tariff cuts and unemployment

Authors	Country	Period	Methodology	Conclusion
Trefler (2004)	Canada and U.S.	1996	Plant- and industry-level analysis	Tariff cuts decreases unemployment
Dutt et al. (2009)	Cross sectional data of 110 countries	1985-2004	Ricardian and H-O specification and OLS estimation	Trade openness decreases unemployment on labor abundant-countries
Felbermayr et al. (2011)	20 OECD countries	1983-2003	GMM panel regressions, 2SLS regressions, panel regressions	Trade openness decreases unemployment
Hasan et al. (2012)	India	four rounds (1987-88, 1993-94, 1999-2000, 2004-5)	State-level and industry level analysis	Trade liberalization decreases unemployment
Nwaka et al. (2015)	Nigeria	1970-2010	Vector error correlation	Trade increases unemployment

2.1. Hypotheses

The explanations of the selected papers about foreign direct investment, trade openness, and unemployment in the previous section are used to define the hypotheses about the relationship and causality between FDI, trade openness, and unemployment in this part. In the previous section explaining the selected papers, there are various results of trade openness and FDI affecting unemployment in several countries. The empirical findings describe that there are positive and negative effects of trade openness and foreign direct investment to unemployment. The first hypothesis represents as follows:

Hypothesis 1: Inflow of foreign direct investment decreases unemployment rate in ASEAN Countries

As explained in the previous section, most empirical findings which have researched about FDI and unemployment state that inflow of foreign direct investment is associated with the lower unemployment rate. This paper estimates the effect of foreign direct investment to unemployment rate in ASEAN countries

On the other hand, as described in the previous section, some of the papers define that trade openness decreases unemployment rate in several countries and the rest of them define that trade openness increases the unemployment rate. This paper focuses on the effect of trade openness on the unemployment rate.

Hypothesis 2: Trade openness decreases unemployment rate in ASEAN Countries.

From the empirical evidence explained in the previous section, it is found that there is a causal effect between trade openness, foreign direct investment, and unemployment rate. Regarding the empirical evidence, this paper hypothesizes as follows:

Hypothesis 3: Trade openness and foreign direct Investment decreases unemployment rate in ASEAN Countries in the long-run

Hypothesis 4: Trade openness and foreign direct investment decreases unemployment rate in ASEAN Countries in the short-run

3. Data and Methodology

By following the strategic estimations used by Mucuk and Demirsel (2013), This paper estimates the relationship and causality between unemployment and inflow of foreign direct investment, unemployment and Trade openness, and unemployment and real exchange rate. ASEAN countries which are Indonesia, Thailand, Singapore, Malaysia, Philippines, Vietnam, Laos, Brunei Darussalam, Cambodia, Myanmar. This paper excludes Timor-Leste since it is not an ASEAN member country. As mentioned above, this paper contains three variables which are inflow of foreign direct investment (FDI), Unemployment (UNEMPL) and Trade openness (TRADE). This paper takes the sample period from 1991 to 2015 covering twenty-five years of data. These data can be obtained in the data bank of world bank, the database of UNCTAD, and database of UNESCAP. The paper chooses the inflow of FDI in the percentage of GDP not in the value of stock since it is more reasonable to choose flow than stock and the inflow of FDI excludes the type of FDI and the destination sector which FDI inflows into. The data of FDI inflow in terms of stock is rarely provided by any database. Total unemployment rate is chosen as the dependent variable in this study because it records all the unemployment without having to consider sex, education, age, etc. Trade openness is chosen to be the second independent variable because some papers have found that trade openness affects unemployment. The reason why the period of the data is obtained from 1991 to 2015 is because of the limited data availability in the database.

3.1. Variable Explanation

In this paper, the selected variables are inflow of foreign direct investment and trade openness as independent variables or treatment variables. The dependent variable is unemployment rate. The details of each variable used in this paper are explained as follows.

Inflow of Foreign Direct Investment

Inflow of FDI is one of two independent variables. In the next section of this paper, the estimation of how this variable affects independent variables is described. Inflow of FDI represents the value of the flow of direct investment done by foreign investors. It covers all liabilities and assets. The data collected for this paper is based on annual data.

Trade Openness

Trade openness is the independent variable beside inflow of foreign direct investment. Trade openness is calculated by summing export and import of goods and services divided by gross domestic product. It is a measurement of how a country open to the international trade. The higher the number, it means that the higher the grade of openness to the international trade. The data collected of trade openness is based on annual data.

Unemployment rate

Unemployment rate is the dependent variable, In the next section, the estimation of how this variable is related and caused by trade openness and inflow of foreign direct investment. Unemployment rate is calculated by dividing the total number of people searching for the job and still unemployed with total labor force. The data collected of the unemployment rate is based on annual data.

Table 2: Descriptive Statistics

No	Country	Descriptive Statistics	Variable		
			Unemployment	FDI Inflow	Trade openness
1	Myanmar	Mean	3.24	4.288	0.097059
		Median	3.2	2.3	0.003469
		Maximum	4	18.6	0.473168
		Minimum	2.4	0	0.001674
		Standard Deviation	0.379693	4.962301	0.173397
2	Cambodia	Mean	0.768	6.436	1.088165
		Median	0.5	6.6	1.138631
		Maximum	2.5	13	1.446145
		Minimum	0.1	1	0.487243
		Standard Deviation	0.64982	3.702463	0.271535
3	Vietnam	Mean	2.26	6.036	1.198901
		Median	2.2	5.3	1.151175
		Maximum	2.9	11.9	1.787674
		Minimum	1.7	3.2	0.662123

		Standard Deviation	0.358236	2.329678	0.353091
4	Brunei Darussalam	Mean	2.848	7.032	1.043707
		Median	2.6	3.5	1.056379
		Maximum	4.6	45.3	1.20574
		Minimum	1.2	0.1	0.848971
		Standard Deviation	1.152215	9.353953	0.075579
5	Laos	Mean	1.788	3.648	0.727966
		Median	1.8	3.6	0.743103
		Maximum	2.5	9.7	0.966173
		Minimum	1.3	0.2	0.381823
		Standard Deviation	0.404475	2.559642	0.142808
6	Indonesia	Mean	6.988	0.968	0.565158
		Median	6.4	1.2	0.543589
		Maximum	11.1	2.7	0.961862
		Minimum	2.7	-2.6	0.419377
		Standard Deviation	2.169931	1.335016	0.108802
7	Thailand	Mean	1.472	2.864	1.136846
		Median	1.2	2.7	1.202677
		Maximum	3.4	6.6	1.40437
		Minimum	0.6	0.8	0.777458
		Standard Deviation	0.75306	1.436106	0.219413
8	Singapore	Mean	3.184	15.736	3.598947
		Median	3	16.1	3.597734
		Maximum	5.1	26.5	4.396567
		Minimum	2	4.2	3.111562
		Standard Deviation	0.876869	6.408775	0.37343
9	Malaysia	Mean	3.24	4.164	1.790445
		Median	3.2	3.7	1.817677
		Maximum	4	8	2.204074
		Minimum	2.4	0.5	1.341551
		Standard Deviation	0.379693	1.974605	0.264762
10	Philippines	Mean	8.5	1.436	0.825227

11		Median	8	1.5	0.805385
		Maximum	11.8	2.7	1.082503
		Minimum	6.5	0.2	0.602453
		Standard Deviation	1.629928	0.674463	0.168005
	Panel Data	Mean	3.4288	5.2608	1.250045
		Median	2.8	3.55	1.018493
		Maximum	11.8	45.3	4.396567
		Minimum	0.1	-2.6	0.001674
		Standard Deviation	2.543022	5.825417	0.926836

This paper hypothesizes that annual FDI inflow has a negative causal effect on the annual unemployment rate meaning that the increase of FDI inflow leads to the decrease of the unemployment rate in the short- and long-run. The other hypothesis states that Trade openness also has a negative causal effect with the unemployment rate meaning that the increase of trade openness causes the decrease of the unemployment rate in the short- and long-run. By following the paper done by Mucuk and Demirsel (2013), the paper uses three kinds of methodology

1. Panel unit root tests

- Levin, Lin and Chu test (LLC)
- Im, Peseran and Shin test (IPS)
- Hadri test

2. Panel cointegration tests

- Pedroni
- Dynamic Ordinary Least Squares (DOLS)
- Fully Modified Ordinary Least Squares (FMOLS)

3. Panel causality test

- Granger Causality Test

3.2. Panel Unit Root Tests

Panel unit root tests are conducted to test whether there is a presence of stationarity in the data series of ASEAN countries. In the panel unit root tests, the paper uses three types of unit root test developed by several researchers. They are Levin, Lin, and Chu (LLC), Im, Peseran and Shin

(IPS) and Hadri. According to Wongkhae et al. (2012), if the panel data is used, then results are more developed when more methodologies are used.

3.2.1. LLC Test

In the LLC test, the degree of persistence in individual regression error, the trend and the intercept coefficient of the data are granted to vary among individuals. In the process of expanding both time-series and cross-section dimensions of the panel data, the pooled t statistic is limited by normal distribution that relies upon the specification of regression, and it is free from the nuisance parameters. The unit root test of individual is limited in terms of power against alternative hypothesis with high tendency to deviate from equilibrium. LLC proposes a better panel unit root test for cross section data.

The tests measured are meant to test whether null hypothesis which the data contains unit root is accepted, or null hypothesis is rejected which alternative hypothesis is accepted explaining that the data is stationary (Levin et al. 2002).

The econometric model that is used by Levin et al. (2002) in their paper can be presented as follows:

$$\Delta y_{it} = \rho y_{it-1} + \sum_{L=1}^{P_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \quad m=1,2,3 \quad (1)$$

In the equation, lag order P_i can differ across individuals. For notational simplicity, d_{mt} is used to express the vector of deterministic variables, and α_m is used to express the corresponding vector of coefficients for a precise model $m=1,2,3$. Thus, $d_{1t} = \theta$ (the empty set) ; $d_{2t} = \{1\}$ and $d_{3t} = \{1,t\}$. Considering P_i is unknown, the researchers propose that three-step process is recommended in the tests (Levin et al. 2002).

1. Step 1: implementing Augmented Dicky-Fuller Test (ADF) regressions and generating orthogonalized residuals

$$\Delta y_{it} = \rho y_{it-1} + \sum_{L=1}^{P_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \quad (2)$$

For each country, ADF regressions are implemented. As mentioned above, the lag order p_i is allowed to vary across individuals. Different ADF regressions are used for each cross section (Levin et. Al., 2002).

2. Step 2 : Estimating the ratio of long run to short run standard deviations

Based on the null hypothesis of a unit root, the long run variance for the model in the first step can be computed as follows:

$$\sigma_{yi}^2 = \frac{1}{T-1} \sum_{t=2}^T \Delta y_{it}^2 + 2 \sum_{L=1}^k w_{kL} \left[\frac{1}{T-1} \sum_{t=2+L}^T \Delta y_{it} \Delta y_{it-L} \right] \quad (3)$$

In the paper explaining test for unit root done by Schwert (1989) found that under the null hypothesis of unit root, the long-run variance estimation based on first difference has smaller bias in the finite data sample than the long-run variance estimation based on the residuals in level regression (Levin et al. (2002)).

3. Step 3: Comparing the estimation of panel test statistics and the LLC table values (2002).

Panel test statistics are estimated and compared to the LLC table values (2002). If the null hypothesis is rejected, the alternative is accepted which is that the data is stationary (Levin et al. (2002)).

LLC is a good method to check for stationarity according to Baltagi (2005). The author mentions that LLC is applicable to micro panel data. LLC proposes that a number of cross section individuals is between 10 and 250 and time series is between 25 and 250. According to Unfortunately, LLC tests cannot deal with the independence assumption between cross section data, and it cannot be used if cross-section data is correlated.

3.2.2. Im, Peseran and Shin Test (IPS)

The LLC test needs ρ to be homogeneous across i . IPS acknowledges that coefficient of y_{it-1} can be heterogeneous and it suggests an alternative testing process which is based on averaging individual unit root test statistics. The suggestion of IPS is an average of the ADF tests when u_{it} is constantly related to different serial correlation properties across cross-sectional data (Baltagi, 2005)

In the paper Im et al. (2003), considering data of N cross sections observed T time periods, the stochastic process (y_{it}) is generated by the first-order autoregressive process as follows:

$$y_{it} = (1 - \phi_i)\mu_i + \phi_i y_{i,t-1} + \varepsilon_{it}, \quad i = 1, \dots, N, t = 1, \dots, T, \quad (4)$$

The Initial values of variable y_{i0} are given, the intention of the test is that it wants to test the null hypothesis of unit root $\phi=1$ for all cross section of data samples. It can be expressed as follows:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \varepsilon_{it} \quad (5)$$

In the IPS test, coefficient β_i is used to determine the hypothesis. The null hypothesis is $H_1: \beta_i = 0$. For all samples and the alternative hypothesis can be described if $H_1: \beta_i < 0$. For testing whether the null hypothesis is rejected or accepted, t-bar statistics is used. t-bar statistics can be functioned as follows (Im et al. (2003)).

$$\bar{Z} = \frac{\sqrt{N}[\bar{t} - E(\bar{t})]}{\sqrt{Var(\bar{t})}} \rightarrow N(0,1) \quad \bar{t} = \frac{1}{N} \sum_{i=1}^N t_{\beta_i} \quad (6)$$

Based on the paper done by Zhu and Zhao (2008), finite sample properties from IPS test is more favorable than from the LLC test. Baltagi (2005) explains that IPS can deal with the heterogeneous coefficients among the cross-sectional data.

3.2.3. Hadri test

Different with the previous tests which are LLC test and IPS test, the test accomplished by Hadri (2002) as the expansion of the study about Hadri test done by Kwiatkowsky et al. (1992) in terms of time series, the null hypothesis is the data sample is stationary. In the paper done by Hadri (2002), it recommends a residual-based Lagrange multiplier test. For the test, the null hypothesis is that the individual series y_{it} ($i = (1, \dots, N)$) are stationary over a deterministic level or trend, contrary to the alternative hypothesis of a unit root in panel data (Hurlin and Mignon, 2004:7) The test is based on the following regressions developed by Maeso-Fernandez et al. (2004).

$$y_{it} = \alpha_i + \gamma_i t + \sum_{t=1}^T u_{it} + \varepsilon_{it} \quad (7)$$

Based on the function stated above (7), the error term has two components which are white noise (ε_{it}) and random walk ($\sum_{t=1}^T u_{it}$). The Hadri test has a baseline that the null hypothesis of stationary the variance of the random walk part (σ_u^2) is zero. $\frac{\sigma_u^2}{\sigma_\varepsilon^2}$ which under the null hypothesis,

has a standard normal distribution represents Hadri's statistic. According to Newey and West (1987), the Lagrange Multiplier is calculated as follows:

$$L\hat{M} = \frac{1}{N} \sum_{i=1}^N \left[\frac{\frac{1}{T^2} \sum_{t=1}^T S_{i,t}^2}{\hat{\sigma}_\varepsilon^2} \right], S_{i,t}^2 = \sum_{j=1}^j \hat{\varepsilon}_{i,t} \quad (8)$$

$\hat{\sigma}_\varepsilon^2$ is known as the consistent Newey and West (1987) long-run variance of the disturbance terms calculations. According to Mucuk and Demirsel (2013) and Wongkhae et al. (2012), three-panel unit root tests are used to establish or verify the stationary of ASEAN countries panel data in the model.

3.3. Panel Cointegration tests

The cointegration tests of this paper use Pedroni's panel cointegration approach which is established by Pedroni (1997,1999 and 2000). This technique checks whether between three variables, there is a long run relation between two relations which are FDI and unemployment, and unemployment and trade openness. The first cointegration tests developed by Pedroni which is Pedroni's cointegration test in 1999 can be shown as follows (Pedroni, 1999: 656):

$$y_{it} = \alpha_i + \delta_i t + \beta_{1i} x_{1,it} + \beta_{2i} x_{2,it} + \dots + \beta_{Mi} x_{M,it} + \varepsilon_{it} \quad (9)$$

For $i = 1, \dots, N$; $t = 1, \dots, T$; $m = 1, \dots, M$

In the equation, t represents number of observations over time, i represents how many countries are in the panel, and m represents the number of regressions variables. In the Pedroni's test, it has been developed seven panel cointegration statistics for varying slopes and intercepts. The Pedroni tests are divided into two groups which are pooled and group mean panel cointegration test. Four of the seven panel cointegration statistics which are pooled panel cointegration statistics are within-dimension based statistics and the rest of them which are group mean panel cointegration statistics are between-dimension based. The pooled panel cointegration test statistics can be represented as follows (Ho and Huang, 2009):

$$\text{Panel } v \text{ statistics} = \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\varepsilon}_{i,t-1}^2 \right)^{-1} \quad (10)$$

$$\text{Panel rho-statistics} = \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\varepsilon}_{i,t-1}^2 \right)^{-1} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i} (\hat{\varepsilon}_{i,t-1} \Delta \hat{\varepsilon}_{it} - \hat{\lambda}_i) \quad (11)$$

$$\text{Panel PP-statistics} = \left(\hat{\sigma}^2 \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{\varepsilon}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} (\hat{\varepsilon}_{i,t-1} \Delta \hat{\varepsilon}_{it} - \lambda_i) \quad (12)$$

$$\text{Panel ADF-statistics} = \left(\hat{s}^{*2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^* \right) \quad (13)$$

The group-mean panel cointegration test statistics are as follows:

$$\text{Group rho-statistics} = \sum_{i=1}^N \left(\sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{t=1}^T \left(\hat{e}_{i,t-1}^2 \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \quad (14)$$

$$\text{Group PP-statistic} = \sum_{i=1}^N \left(\hat{\sigma}_i^2 \sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{t=1}^T \left(\hat{e}_{i,t-1}^2 \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \quad (15)$$

$$\text{Group ADF statistic} = \sum_{i=1}^N \left(\sum_{t=1}^T \hat{S}_i^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{t=1}^T \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^* \quad (16)$$

$\hat{\sigma}^2$ represents the pooled long run variance, \hat{L} is used for correcting autocorrelation in the panel model. When the v-statistics which is one-sided test has positive values, which is larger than 1.64, it means that null hypothesis is rejected and there is no cointegration. Contradictory with the v statistics, the other statistics measurement need to have negative values for rejecting the null hypothesis which is smaller than 1.64. According to Manddala and Wu (1999), these methodology combining time series and cross-section statistic tests clearly prove that the panel is cointegrated. These seven tests can provide individual specific short-run dynamics, individual specific fixed effects, deterministic trends, and individual specific slope coefficient (Pedroni, 2004).

3.3.1. Panel DOLS and FMOLS estimation.

Knowing that Ordinary Least Square estimation is incompatible with the time-series data, the cross-section can be used to reduce the bias in the time-series data (Dreger and Reimer, 2005). To solve the problem, either DOLS or FMOLS can be used to estimate the results. DOLS is a parametric estimation which takes lagged of first difference for controlling endogeneity (Saikkonen, 1991). On the other hand, FMOLS is a non-parametric which can overcome serial correlation problem. A simple panel regression model is presented as follows:

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{it} \quad (17)$$

$$x_{it} = x_{i,t-1} + \varepsilon_{it} \quad (18)$$

Based on the equation above, Kao and Chiang (2000) proposed that DOLS and FMOLS are asymptotically normal. The coefficient of FMOLS can be obtained based on the following equation:

$$\hat{\beta}_{FMOLS} = [\sum_{i=1}^N \sum_{t=1}^T (x_{it} - \bar{x}_{it})']^{-1} [\sum_{i=1}^N (\sum_{t=1}^T (x_{it} - \bar{x}_{it})) y_{it}^+ + T y_i^{\wedge}] \quad (19)$$

y_i^{\wedge} represents the serial correlation term. For overcoming the endogeneity, y_{it} changes into y_{it}^+ .

The coefficient of DOLS can be obtained based on the following equation

$$\hat{\beta}_{DOLS} = \sum_{i=1}^N [\sum_{t=1}^T z_{it} z_{it}']^{-1} [\sum_{t=1}^T z_{it} z_{it}^{\wedge}] \quad (20)$$

z_{it} can be obtained through $2(K+1) \times 1$ and z_{it}^{\wedge} can be obtained from $x_{it} - \bar{x}_{it}$. These two estimations methods were developed by Pedroni (2000). He suggests that for panel data sample, comparing both FMOLS and DOLS is necessary, and for individual, FMOLS is necessary.

3.4. Panel Causality Tests

For checking the direction of causality between variables in the panel data, Panel causality test can be used. The fact from the paper done by Eangel and Granger (1987) is that if two nonstationary variables tested are cointegrated, a vector autoregression (VAR) in first differences will be misspecified. In this paper, a model with a dynamic error correction representation which means that the VAR is added with a one period lagged error correction term is used to check the long-term equilibrium relationship between FDI, unemployment, and trade openness. The regression of Granger causality can be shown as follows:

$$\begin{aligned} \Delta FDI_{it} = & \alpha_{1i} + \sum_k \theta_{11ik} \Delta FDI_{it-k} \\ & + \sum_k \theta_{12ik} \Delta UNENMPL_{it-k} + \sum_k \theta_{13ik} \Delta TRADE_{it-k} + \lambda_{1i} ECT_{it-1} + u_{1it} \end{aligned}$$

$$\begin{aligned} \Delta UNEMPL_{it} = & \alpha_{2i} \\ & + \sum_k \theta_{21ik} \Delta UNEMPL_{it-k} \\ & + \sum_k \theta_{22ik} \Delta FDI_{it-k} + \sum_k \theta_{23ik} \Delta TRADE_{it-k} + \lambda_{2i} ECT_{it-1} + u_{2it} \end{aligned}$$

$$\Delta TRADE_{it} = \alpha_{3i} + \sum_k \theta_{31ik} \Delta TRADE_{it-k} + \sum_k \theta_{32ik} \Delta TRADE_{it-k} + \sum_k \theta_{33ik} \Delta UNEMPL_{it-k} + \lambda_{3it} ECT_{it-1} + u_{3it}$$

In the equation above, Δ represents the first difference of the variable, ECT represents the error-correction term, and k represents the lag length. In the regression, the panel Granger causality tests are tested by checking whether all the coefficient of ΔFDI_{it-k} , $\Delta UNENMPL_{it-k}$, and $\Delta TRADE_{it-k}$ are statistically different from zero which is group based on a standard F-test. The coefficient of the error correction which is $\lambda_{i,i}$, same with the other three variables, shows the long run causality if it is significant. For checking whether the variables can move back to the long run equilibrium, the coefficients of the ECTs can be used.

4.0. Empirical Results

Variables which are included in the time series data are required to be stationary for preventing false regressions between those variables in the panel data analysis which shows cross section and time series analysis at the same time. In this study, as mentioned in the previous section which is data and methodology section, Levin, Lin and Chu, Im, Pesaran and Shin, and Hadri are used to estimate whether there is an existence of unit root in the data or not. The results of unit root test are presented in table 3 below.

Table 3: Panel unit root tests Results

	Levin,Lin and Chu		Im, Pesaran and Shin		Hadri	
	Statistic	Probability	Statistic	Probability	Statistic	Probability
UNEMP	-2.41316	0.0079	-2.45842	0.0070	3.26158	0.0006
FDI	-3.09363	0.0010	-3.62662	0.0010	3.56639	0.0002
TRADE	-0.80052	0.2117	0.64701	0.7412	6.94137	0
Δ UNEMP	-10.4876	0	-10.2074	0	0.90198	0.1835
Δ FDI	-14.3835	0	-11.9596	0	2.32008	0.0102
Δ TRADE	-8.77192	0	-1.10172	0	1.98856	0.0234

Note: Automatic lag length selection is based on modified Schwarz and Bartlett Kernel.

In the result above, unemployment and foreign direct investment inflow are stationary since the probability values are smaller than 0.05 and it means that the null hypothesis which the series contain unit root is rejected in the LLC and IPS tests. Contrary with the two tests, Hadri test has a different result. In the Hadri's test, the result shows that the null hypothesis which the series data does not contain unit root is rejected. On the other hand, trade openness variable has different results. In the LLC and IPS' test, the probability values of trade openness are bigger than 0.05. It means that the null hypothesis is accepted. Meanwhile, Hadri's test describes that the null hypothesis which states that the data series does not contain unit root is rejected. It can be concluded that most of the tests estimated by implementing LLC, IPS, and Hadri support each other.

According to the results, at the sample's first difference, all the variables are stationary, and most of the statistic result support each other. The existence of stationary in the data presents that in the long run, there can be a relationship between variables.

By analyzing Table 3, the presence of stationary in the data implies that there is an existence of a long-run relationship. To test whether there is a long-run relationship between variables in the data, The Pedroni Panel Cointegration Test is used to determine the result. 7 tests were developed by Pedroni to estimate the cointegration in the panel data. The null hypothesis in the tests is that there is no cointegration. The estimation of seven tests of Pedroni can be seen in Table 4.

Table 4: Panel Cointegration Test Result

Within-dimension	Constant	Constant and trend
Panel v-Statistic	-0.126037	-1.49886
Panel rho-Statistic	-0.402705	0.546677
Panel PP-Statistic	-2.214662**	-1.116449
Panel ADF-Statistic	-2.580041	-1.349104
Between-dimension		
Group rho-Statistic	-1.061885	0.524404
Group PP-Statistic	-4.344603	-2.929491
Group ADF-Statistic	-4.858193	-2.387950

Note: all statistic stated above are from Pedroni's method (1999) and the adjusted values may be compared to the N (0.1) distribution. The critical value of v-statistic which is estimated by Pedroni (2004) is 1.64 ($k > 1.64$ for rejecting the null hypothesis) and the rest of tests are -1.64 ($k < -1.64$ for rejecting the null hypothesis). ** represents that the null hypothesis can be rejected at 5% level of critical value.

From seven tests conducted, in the constant level, four of them are significant since the values of PP and ADF in both within-dimension, and between-dimension are smaller than -1.64. On the other hand, v-statistic and rho in both within-statistic and between-dimension are insignificant

since the value of v-statistic is smaller than 1.64 and the value of rho-statistic is bigger than -1.64. It can be confirmed from Pedroni's tests that there is a long-term relationship between three variables which are unemployment, foreign direct investment, and trade openness.

Having results which show that there is a long-term relationship between variables, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) are used to calculate the estimation of the panel cointegration vector in this study. The result of DOLS and FMOLS estimations can be seen in Table 5.

Table 5.1: The result of DOLS and FMOLS (Unemployment and FDI)

No	Country	DOLS		FMOLS	
		Coefficient	t-statistic	Coefficient	t-statistic
1	Myanmar	0.034007**	2.637007	0.007449	0.990309
2	Cambodia	-0.135393*	-5.368652	-0.136957*	-6.738175
3	Vietnam	-0.003245	-0.095745	0.009179	0.308023
4	Brunei	-0.025663	-0.515773	-0.018153	-0.378648
5	Lao PDR	0.000863	0.024627	0.00649	0.209231
6	Indonesia	-0.349804	-0.441713	-0.450817	-1.055971
7	Thailand	0.716316*	9.412024	0.421353*	4.827534
8	Singapore	-0.010276	-0.148374	0.037113	0.951872
9	Malaysia	-0.013995	-0.186809	0.025258	0.423542
10	Philippines	-0.588333	-0.811199	-0.495397	-1.005589
11	Panel Group	-0.037552	-0.346429	-0.059448	-0.955641

Note: * represents statistical significant at 1% level of critical value. ** represents statistical significant at 5% level of critical value.

Table 5.1 describes the result of Dynamic Ordinary Least Squares and Fully Modified Ordinary Least Squares estimation explaining the long-run relationship between foreign direct investment and unemployment. The paper uses these two methods to calculate the panel cointegration vector since there is a long-term relationship in the panel data. By comparing both, it can be seen from the table that Myanmar and Thailand have a positive correlation since they are significant and their coefficients of FDI variable are positive. Differently, Cambodia has a negative correlation between FDI and unemployment since the Cambodia's coefficient of FDI is negative and it is significant. From the three countries which are significant, only two countries which are Thailand and Cambodia get the same result from both DOLS and FMOLS. On the other side, Vietnam, Brunei Darussalam, Lao PDR, Indonesia, Thailand, Singapore, Malaysia, Philippines and the panel group are not significant. These results can be elucidated that foreign direct investment in the Thailand has a disadvantageous in terms of unemployment rate. For one unit of increase in FDI leads to 0.716316 increase in unemployment rate and it is contradictory from the theoretical background explaining that foreign direct investment is assumed to create more jobs and transfer technology. The positive relationship of FDI to unemployment rate can be explained by the type of foreign direct investment such as capital investment (Noorbakhsh et al. (1999)). The flow of FDI in Thailand is concentrated in capital intensive industries. From 2014 to 2015, the inflow of foreign direct investment in manufacturing increased 61%, and the inflow of foreign direct investment to services industries decreased 21% in ASEAN.

Stated by ASEAN Investment report in 2016, direct investors chose to invest their equity in form of capital such as machinery to develop their investment activity. There is a mismatch between the inflow of FDI and the selected priority development sectors in Thailand. Stated in the report of ASEAN Community in 2015, Thailand concentrates to develop agriculture, automotive and electronics, tourism and hospitality sectors. However, according to the ASEAN database, the inflow of FDI is concentrated in financial and insurance, manufacturing, mining and quarrying since the sectors are concentrated in technology and machinery. One of the reasons that might explain why FDI increases unemployment is that the type of investment is brownfield investment such as buying an existing firm and merging companies (Mucuk and Demirsel, 2013). Another

reason that might explain why inflow of FDI increases unemployment is the flexibility of labor flow (Chen et al. (2005)) between ASEAN countries meaning that foreign companies import the labor force from outside. Contradictory with Thailand, Cambodia has a negative effect of FDI on unemployment. For every one unit of increase in FDI leads to -0.135393 decrease of the unemployment rate. The reasons why it happens are the flow of labor, field type of investment, and labor-intensive industries financed by FDI inflow. Foreign companies choose to hire local people of Cambodia to work in their companies since Obtained from National Wages and Productivity Commission, Cambodia is one of several ASEAN countries which have low wages. Moreover, stated in ASEAN Investment Report 2016, investors are interested to invest in CLMV countries which are Cambodia, the Lao PDR, Myanmar, and Vietnam. Meanwhile, the investment that investors invest in Cambodia is greenfield investment which creates more jobs.

Table 5.2 The Result of DOLS and FMOLS (Unemployment and Trade Openness)

No	Country	DOLS		FMOLS	
		Coefficient	t-statistic	Coefficient	t-statistic
1	Myanmar	-1.160369*	-3.77042	-1.127948*	-4.588852
2	Cambodia	0.267338	0.812918	0.356076	1.24821
3	Vietnam	-0.448297	-2.084001	-0.435886**	-2.116877
4	Brunei	16.99557**	2.499166	21.08098*	3.587535
5	Lao PDR	-2.400701*	-4.089051	-2.615225*	-4.191137
6	Indonesia	10.26968	0.873079	4.044989	0.771568
7	Thailand	-3.085201*	-8.16362	-1.927493*	-3.205111
8	Singapore	1.795298**	2.143503	1.682024**	2.495975
9	Malaysia	0.109178	0.221641	0.295122	0.703355

10	Philippines	7.40639*	3.372487	7.677692*	3.776979
11	Panel Group	2.974889**	2.151938	2.903034*	3.771702

Note: * represents statistical significant at 1% level of critical value. ** represents statistical significant at 5% level of critical value.

In the table 5.2 showing the result of Dynamic Ordinary Least Squares and Fully Modified Ordinary Least Squares describes the long-run relationship between trade openness and unemployment. By comparing both results, it is shown that several countries have significant results. Myanmar, Vietnam, Lao PDR, Thailand, Singapore, Philippines and the panel group have significant results of the statistic. Among the significant countries, Myanmar, Lao PDR, and Thailand have a negative relationship since the coefficients of both countries are negative. Every one unit of increase in trade openness leads to -1.160369 decrease of unemployment rate in Myanmar. In Lao PDR, every one unit of increase in trade openness leads to -2.400701 decreases of the unemployment rate. Moreover, in Thailand, every one unit of increase in trade openness leads to -3.085201 decrease of the unemployment rate. On the other hand, Brunei Darussalam, Singapore, Philippines, and Panel group have a positive relationship since the coefficients of the countries are positive. In Brunei Darussalam, every one unit of increase in Trade openness leads to 16.995577 increase of unemployment rate. In Singapore, an increase one unit of trade openness causes 1.795298 increase of unemployment rate. In the Philippines, every one unit of increase in trade openness causes 7.40639 increase of unemployment rate. Moreover, all the countries are parallel since both DOLS and FMOLS shows same results. Structural unemployment can be a reason why there is a positive relationship between the unemployment rate and inflow of foreign direct investment. A mismatch between what companies need and the skill of worker leads to a replacement of workers into robots. In the time when workers are replaced by robots or advanced technology, workers need to learn what robots can do so that workers can be hired again by the companies.

Table 5.3 Panel Granger Causality and VECM Results

	Short-run causality			Long-run causality
	Δ UNEMP	Δ FDI	Δ TRADE	ECT
Δ UNEMP		0.78197 [0.4587]	0.82576 [0.4393]	-3.24E-19 [0.0]
Δ FDI	0.43268 [0.6493]		0.85034 [0.4287]	-4.99E-17 [0.645]
Δ TRADE	0.00364 [0.9964]	11.0293 [0.00003]		1.43E-18 [0.8488]

Note: in the short run causality tested by using granger causality, the non-brackets numbers are F statistic, and the numbers in brackets are p-values. In the long causality tested by using VECM, the no brackets numbers are coefficients, and the numbers in brackets are p-values.

In table 5.3 above, it describes the short-run and long-run causality between unemployment, FDI, and trade openness. In the short-run causality, the coefficient of unemployment is insignificant for both FDI and Trade openness. It means that there is no short-run causality from unemployment to FDI and trade openness. The coefficient of FDI is insignificant for both unemployment and trade openness. It can be concluded that there is no short-run causality from FDI to the unemployment rate and trade openness. Meanwhile, the coefficient of trade openness is insignificant for unemployment, but it is significant for FDI. It can be seen that there is a short-run causality from trade openness to FDI. On the other hand, the results of long-run causality show that there is a long-run causality from FDI and trade openness to unemployment rate since the coefficient of unemployment's ECT is significant at the level of 1%. Contradictory, the trade openness and FDI's ECT coefficients are statistically insignificant. It can be interpreted that FDI and trade openness are the important factors for the labor policies in the ASEAN countries.

5. Conclusion

This paper underlines the effectiveness of FDI and trade openness to solve the unemployment problem in ASEAN countries. In the world where globalization is an important issue, unemployment becomes the crucial problem which needs to be overcome. Knowing that ASEAN becomes the destination of FDI inflow, there will be sources of finance which flow into ASEAN. The chance for eradicating unemployment rate will be improved with the existence of inflow of FDI. Economic growth is the fundamental indicator to evaluate the improvement of a country meaning that the increase of ability producing goods and services will increase to produce more supply to fulfill the demand of goods and services. The lack of source for improving economic performance within countries especially developing countries which are low income will be assisted by the FDI from foreign countries. Having huge flow of FDI into ASEAN enhances the business opportunity to create more jobs. In this state, the type of FDI will decide where the potential improvements within countries can be developed. In this sense, greenfield investment will have an important for creating more jobs. On the other hand, the positive effect of FDI can not only decrease unemployment but also transfer technology. Describing the effectiveness of FDI towards unemployment, the flow of international trade in ASEAN hold essential components to improve economic growth for declining unemployment rate since decreasing the structural unemployment rate is the way which trade openness.

The impact of FDI and trade openness on unemployment are estimated by collecting data of ASEAN countries as a panel data from the year 1991 to 2015. The findings of the paper's results provide some empirical findings. Both FDI and trade openness are cointegrated. Surprisingly, the inflow of FDI has both positive and negative sides. The inflow of FDI declines the unemployment rate in Cambodia. Contradictory, inflow of FDI can be harmful in Thailand since it increases the unemployment rate. Identically, trade openness also has both negative and positive sides. It increases the unemployment rate in Singapore, Brunei Darussalam, and the Philippines. Contradictory, trade openness leads to a decline in the unemployment rate in Myanmar, Lao PDR, and Thailand. This paper's results are supported by several methodologies. Unit root tests need to be executed by adopting several papers done by Levin et al. (2002), Im et al. (2003), and Hadri

(2002). To know whether the variables are associated each other, panel cointegration tests are conducted by following paper done by Pedroni (1997, 1999 and 2000). A strong long-run relationship between the variables is tested for further explanation by using DOLS, FMOLS and the short-run and long-run causality tests done by done by Eangel and Granger (1987). The paper's theoretical models follow the models presented by Mucuk and Demirsel (2013).

Completely, it can be argued that this paper focuses on the relationship and causality in the short-run and the long-run. Regardless of the explanation of the results above, there are limitations that this paper could not encounter. The lack of data FDI and export and import to calculate trade openness especially for the country which has low economic performances. Another control variables can be added to the econometric estimation to make the calculation more precise. The variables can be educational attainment. Unluckily, the data is not available for all ASEAN countries. It is suggested that the further study of this topic can include several years ahead or before 1991 to make the results more accurate. To the further understanding of this topic, this paper is expected to be a complement for papers working on the short-run and long-run analysis of foreign direct investment and trade openness for employment.

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