Impact of Macroeconomic Factors on Foreign Direct Investment (FDI): Evidence from ASEAN Countries

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Abstract

The main objective of this research is to examine the impact of various macroeconomic factors on foreign direct investment (FDI) inflow of the Association of Southeast Asian Nations (ASEAN) member countries. The selected macro-economic factors are gross domestic product (GDP), foreign exchange rate and inflation rate and these are independent variables of the study. FDI is determining through the amount of inflow during the study period and it is treated as a dependent variable. For the analysis the study undertakes the trend & growth analysis and applied Panel data analysis for 10 ASEAN countries over the period of five years from 2009 to 2013.The study conducted Pooled OLS model and random effect model. To identify the individual specific effect correlated with independent variable of the study applied fixed effect model. Finally the study applied Hausman test to find out the suitable model among the random effect and time effect. The result of the study stated that the trend and growth of FDI inflow is positive and progressive. The macro economic factors of GDP and inflation are significant and impact on FDI inflow, foreign exchange rate is not significant and there is no impact on FDI inflow.

Keywords: *Foreign Direct Investment, macroeconomic factors, ASEAN countries, Gross domestic product (GDP), foreign exchange rate and inflation rate*

1. Introduction

Association of Southeast Asian Nations (ASEAN) is an association of countries in Southeast Asia created for the promotion of cultural, economic and political development of the member countries.

According to ASEAN association website, this association was formed on 8 August 1967 by five countries Indonesia, Malaysia, Philippines, Singapore and Thailand. Later the membership has extended to include Brunei Darussalam (1984), Viet Nam (1995), Lao PDR and Myanmar (1997) and Cambodia (1999).

The term foreign direct investment (FDI) is defined by IMF (2003) is a long term investment and committed to engage in economic activities in the host country and has been proven, it is less volatile compare to other form of economic investment. The ASEAN member countries are mutually invest within them in the form FDI. ASEAN foreign direct investment data base (2013) indicates FDI inflows in to ASEAN from ASEAN member states is US$93,105 million for the year 2012.

According to ASEAN community in figures (ACIF) the average rate of growth of FDI inflow is 8.5 per cent every year for the overall period of 1995 to 2013 in this community. ASEAN year book (2013) indicates that the share of FDI inflows in to ASEAN countries by source country (for the period of 2005 to 2012) within ASEAN countries is 15.3 per cent and the rest of the countries contribution is 84.7 per cent.

FDI inflow is closely connected to the economic growth of the host country in

many respects such as increase of capital and tax revenue. For the development of the host country often try to expect the FDI investment into new infrastructure and other economic projects to boost the development of the country. FDI plays an important role in rapid economic growth of developing countries through bridging the gap between the domestic savings and investment further to improve the technology, management know how from developed countries (Vinod Kumar, 2013).

Apart from the economic development the FDI can transfer the soft skills to the host country in the form of training and job creation, further the chance to access research and development resources (UNCTAD 2010). According to Slaughter and May (2012) the FDI provides the benefits to the local population in the form of generate employment opportunities by establishment of new businesses. The technological transfer is also the mutual benefit of both countries involved in the transactions.

Macroeconomics is one of the two most general fields in economics. The major indicators of Macroeconomics are gross domestic product (GDP), unemployment, inflation, savings, investment, price index etc. According to Blanchard, Olivier (2011) macroeconomics encompasses range of concepts and variables, but mainly it concentrates on phenomena of output, unemployment and inflation. The output is measured through the total income of the country or total value of final goods and services or sum of value added in the economy. The output is usually measured through the gross domestic product.

Many theoretical and empirical based studies have been conducted to determine the impact of economic factors in FDI. In particular few studies have been organized to identify the impact of the economic factors like GDP, rate of economic growth, rate of inflation etc. on FDI.

2. Literature Review

The member countries combined nominal GDP had grown to more than US$2.6 trillion in 2015. According to ASEAN community in figures, if ASEAN were a single entity, it would rank as the seventh largest economy in the world. A study conducted by Azam,K.M. and Naeem – ur –Rehman Khattak (2009) examined the effects of various economic factors on FDI in to Pakistan, the study analyzed several economics factors like market size (measured through GDP), domestic investment, return on investment, external debt, taxes etc. The study concluded that GDP, return on investment and trade openness is statistically significant with positive sign. Further the study identified external debt and taxes are significant but negative signs.

The GDP is one of the important factors to influence the FDI of any country. A study conducted by Tsai (1994) found that the GDP has positive effect on FDI. Another study conducted by Jaspersen et al., (2000) found that there is no positive effect between GDP and FDI. The macroeconomic instability and investment restrictions are negatively impact on FDI (Asiedu, 2005).

Exchange rate otherwise called foreign exchange rate or forex rate is how much one country currency is worth compared to a different one. Inflation rate is one of the factors to determine the foreign exchange rate (O'Sullivan, Arthur; Steven M. Sheffrin, 2003). According to Benassy-Quere et al (2001) the impact of exchange rate on FDI is depends on the types of investment viz. horizontal FDI and vertical FDI.

A study conducted by Patrick, E, Emmanuel, D.H and Prudence, A.O (2013) examined the factors determine the FDI in Ghana. It found that the exchange rate of the country and trade openness were statistically significant. Nair-Reichert, U. and Weinhold, D. (2001) study applied panel data for 24 developing countries for the period of 1971 and 1985. The study mainly analyses the relation between FDI and product growth and concluded that these are strongly heterogeneous and FDI positively influenced by country's degree of trade openness.

Kun-Ming CHEN, Hsiu-Hua RAU, and Chia-Ching LIN (2006) conducted a study impact of exchange movements on FDI. The study revealed that the relationship between exchange rate and FDI is crucial and dependent and both motives of the investing firms.

Alex Ehimare Omankhanlen (2011) conducted a study; the main objective is to find out the effect of inflation and exchange rate in the contribution of the country FDI in Nigeria. The study concluded that the there is no effect on inflation and FDI on the same time there is significant relationship between economic growth and FDI. The stable inflation rate is desirable for the smooth inflow of FDI. A study conducted by Anna (2012) and Singhania (2011) indicates that the higher or lower level of inflation rate of the country effect on profitability as well as the higher or lower price of product leads to affect the profitability. Both the studies concluded that stable inflation rate is material for the FDI inflow in to the host country.

From the literature review it is clear that most of the studies related to FDI inflow and macro-economic factors consider GDP, foreign exchange rate and rate of inflation. The previous studies conducted in different period of time with different results. The present study is also has taken the same factors for the analysis for different period of time. The following is the research model of the study.
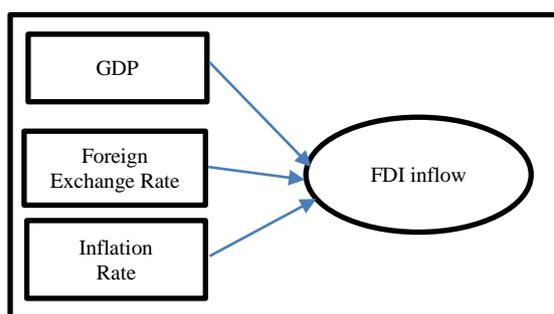

Figure 1: Research Frame work

Thus the following hypothesis was established to empirically explore in this study on the basis of above literature discussion.

Hypothesis 1: The inflow trend of FDI among the ASEAN countries are progressive.

Hypothesis 2: The GDP has an impact on FDI

Hypothesis 3: The foreign exchange rate has an impact on FDI

Hypothesis 4: The rate of inflation has an impact on FDI

3. Research Methodology

The objective of the study is to examine the impact of selected macroeconomic factors (GDP, foreign exchange rate and inflation rate) of the ASEAN countries on foreign direct investment (FDI) inflow in to member countries. The study was

adopted the ex-post facto research design. The study has analysed the data for the period of four years from 2009 to 2014. The present study is mainly based on secondary quantitative data; the secondary data has been collected from the publications of ASEAN organisation. The secondary data related to literature of the study is collected from books, journals, research articles and World Wide Web (internet) etc.

For the data analysis the study mainly applied two methods viz. cubic trend equation model and panel data analysis (Azam,K.M. and Naeem – ur –Rehman Khattak. 2009). The study applied compound growth rate and Trend analysis through Cubic Trend equation of FDI inflow in member countries, the model is given below.

$$\text{Growth Rate } b = \frac{\sum xy}{\sum x^2}$$

$$\text{Trend} = a+bx \quad \text{Where } a = \frac{\sum Y}{N} \qquad Eq.\ (1)$$

The study primarily analyses the impact of macroeconomic factors on FDI inflow. The FDI inflow is a dependent variable of the study. It measures through the amount of FDI inflow in US dollar coming in to the member countries during the study period. The selected macroeconomic factors are GDP, foreign exchange rate and inflation rate are independent variable of the study.

The panel data analysis includes 10 ASEAN countries and the five year periods of 2009 to 2013. This analysis is conducted through some sequence of activities firstly; the collected data are analysed with Pooled OLS model and random effect model then Breusch and Pagan Lagrangian Multiplier test conducted for the comparison of these two models. Secondly the study applied fixed effect model, it analyses the individual specific effect correlated with independent variables. Thirdly the study applied Hausman test to find out the suitable model among the random effect and time effect.

4. Results and Discussion

4.1 Trends in FDI inflow of ASEAN countries

FDI inflows of member countries for the period of 6 years from 2009 to 2014 are taken for the computation of trend and growth rate. The country wise details of trend and growth are presented Table 1, 2 and 3.

able 1 Growth Rate and Trend of Foreign direct investment net inflows
[Brunei Darussalam, Cambodia, Indonesia, Lao PDR] (Value is US$ million)

Year	X	Brunei Darussalam (FDI inflow)		Cambodia (FDI inflow)		Indonesia (FDI inflow)		Lao PDR (FDI inflow)	
		Amount	Trend	Amount	Trend	Amount	Trend	Amount	Trend
2009	-2.5	371	659.714	539	551.809	4,877	9083.428	319	199.381
2010	-1.5	625	686.628	783	782.552	13,771	11966.46	333	292.0953
2011	-0.5	1,208	713.542	892	1013.295	19,242	14849.49	301	384.8096
2012	0.5	865	740.457	1,557	1244.038	19,137	17732.51	294	477.5238
2013	1.5	725	767.371	1,275	1474.781	18,443	20615.54	427	570.2381
2014	2.5	568	794.285	1,726	1705.524	22,276	23498.57	913	662.9524
Value of a		727		1128.667		16,291		431.1667	
Growth Rate		26.9142		230.7429		2,883.029		92.7142	

Table 2 Growth Rate and Trend of Foreign direct investment net inflows
[Malaysia, Myanmar, Philippines] (Value is US$ million)

Year	X	Malaysia (FDI inflow)		Myanmar (FDI inflow)		Philippines (FDI inflow)	
		Amount	Trend	Amount	Trend	Amount	Trend
2009	-2.5	1,405	5350.24	963	1674.904	1,963	856.2585
2010	-1.5	9,156	6875.011	2,249	1684.276	1,298	1709.087
2011	-0.5	12,001	8399.782	2,057	1693.647	1,816	2561.916
2012	0.5	9,400	9924.553	1,354	1703.019	2,797	3414.744
2013	1.5	12,297	11449.32	2,621	1712.39	3,859	4267.573
2014	2.5	10,714	12974.09	946	1721.762	6,200	5120.405
Value of a		9162.167		1698.333		2988.833	
Growth Rate b		1524.771		9.3714		852.8286	

Table 3 Growth Rate and Trend of Foreign direct investment net inflows
[Singapore, Thailand, Viet Nam] (Value is US$ million)

Year	X	Singapore (FDI inflow)		Thailand (FDI inflow)		Viet Nam (FDI inflow)	
		Amount	Trend	Amount	Trend	Amount	Trend
2009	-2.5	26,155	37616	4,853	6358.285	7,600	7439.572
2010	-1.5	53,547	42849.8	9,112	7694.971	8,000	7769.543
2011	-0.5	55,285	48083.6	8,999	9031.657	7,519	8099.514
2012	0.5	60,980	53317.4	10,699	10368.34	8,368	8429.486
2013	1.5	36,138	58551.2	13,000	11705.03	8,900	8759.457
2014	2.5	72,098	63785	11,537	13041.72	9,200	9089.429
Value of a		50700.5		9700		8264.5	
Growth Rate b		5233.8		1336.686		329.9714	

The result of the analysis shows that the FDI inflow trend of Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar and Philippines are increasing. The hypothesis of the study is the inflow trend of FDI among the ASEAN countries is progressive. According to analysis the hypothesis is accepted the inflow trend of FDI in ASEAN countries is progressive. To probe further, the calculated value of trend for each items are graphically plotted in figure 2.
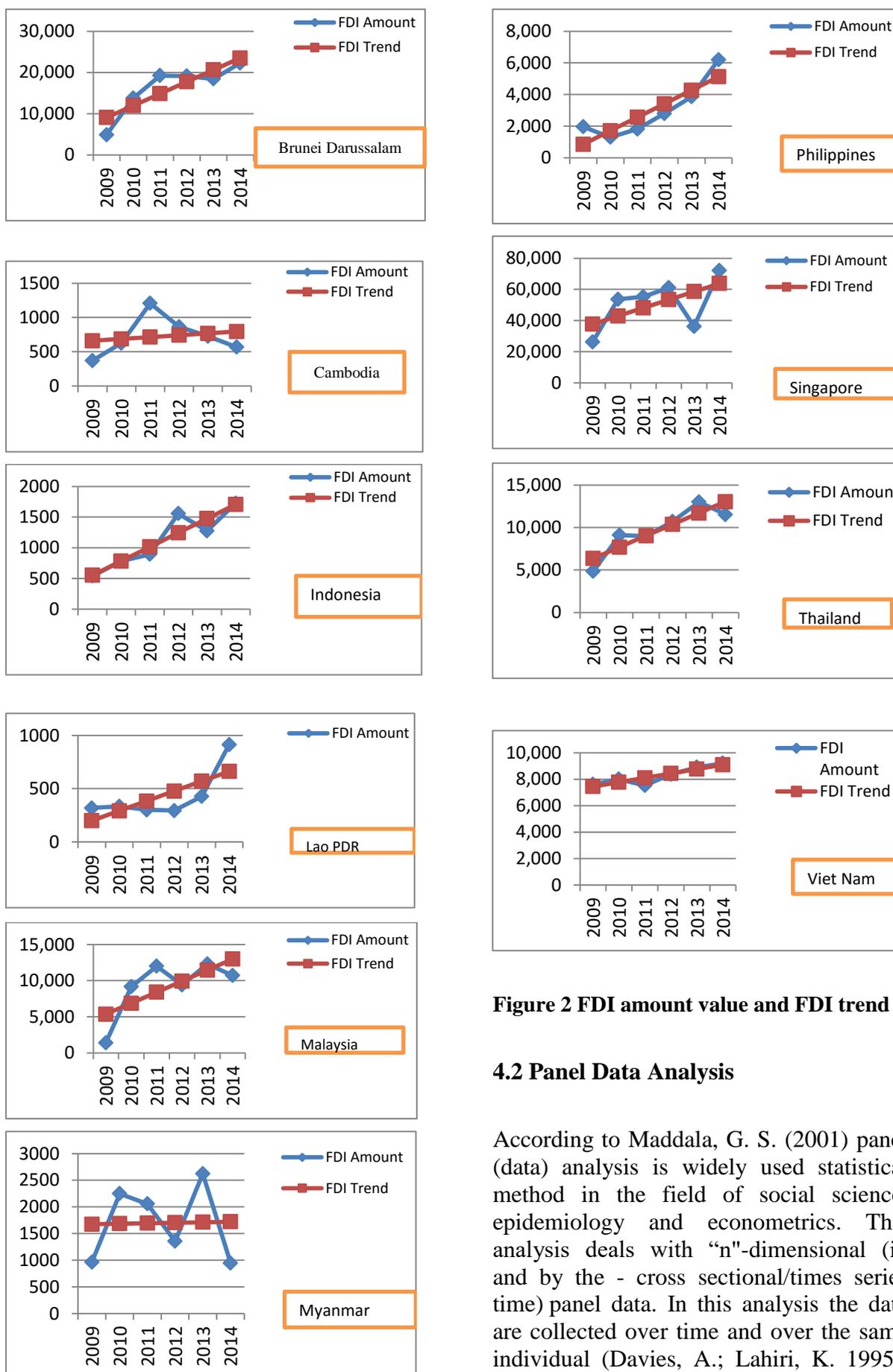
Figure 2 FDI amount value and FDI trend

4.2 Panel Data Analysis

According to Maddala, G. S. (2001) panel (data) analysis is widely used statistical method in the field of social science, epidemiology and econometrics. This analysis deals with "n"-dimensional (in and by the - cross sectional/times series time) panel data. In this analysis the data are collected over time and over the same individual (Davies, A.; Lahiri, K. 1995).

Panel data contain observations of multiple phenomena obtained over multiple time periods for the same firms or individuals (Diggle, Peter J. et.al. 2002) and (Fitzmaurice et al. 2004).

The present research is analysed through panel data model, here the data collected over time (2009 to 2015) and over the same individuals (ASEAN countries) of 10 countries and then a regression is run over these two dimensions.

4.2.1 Pooled OLS Model

Pooled OLS is ready means of analysing data; it is a simple and quick benchmark to which more sophisticated regressions can be compared. The result of Pooled OLS is presented in the Table 4

Table 4 Result of Pooled OLS model

FDI	Coefficient	Standard Error	t value	P>/t/
GDP	0.25811	0.0082	3.12	0.003***
Foreign exchange Rate	-0.5953	0.4029	-1.48	0.146
Inflation Rate	770.07752	772.39	1.00	0.324
Cons	3388.619	3423.65	0.99	0.327

Table 4 indicates that the independent variable of GDP at current market price is significant at 1% level, the p value is 0.003. It clearly states that there is a positive relationship between FDI inflow and GDP of ASEAN countries during the study period. The other two independent variables exchange rate and inflation rate are not having significant relation with FDI under Pooled OLS Model.

4.2.2 Random effect Model

The random effects assumption is that the individual specific effects are uncorrelated with the independent variables. The

random effect test result presented in the Table 5

Table 5 Result of Random effect model

FDI	Coefficient	Standard Error	z value	P>/t/
GDP	0.4462	0.1111	4.00	0.000***
Foreign exchange Rate	-0.6634	0.6537	-1.01	0.310
Inflation Rate	494.4127	290.8888	1.70	0.089*
Cons	910.125	5884.701	0.15	0.877

The result of the analysis shows that GDP at current market price is significant at 1% level (p value is 0.000) and inflation rate is significant at 10% level (p value is 0.089) these two factors have impact on FDI inflow of the member countries. The foreign exchange rate is not significant with FDI inflow and no effect on FDI inflow.

4.2. 3 Breusch and Pagan LM Test

Breusch and Pagan Lagrangian Multiplier test conducted for the comparison of OLS model and random effect model. Further it identifying whether the country effect is in the collected data. The Breusch and Pagan LM Test result is presented below.

Table 6 Result of Breusch and Pagan LM Test

	Var	Sd= sqrt (Var)
Fdi	2.01e+08	14167.46
E	1.98e+07	4453.806
u	2.30e+08	15162.15

Test: Var(u) = 0

chi2(1) = 75.59

Prob > chi2 = 0.0000

The p-value < 0.05 therefore reject H0. The random effect model is more appropriate than OLS (Pooled OLS

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model). In other words there are country-specific effects in the data. It is necessary to test individual country wise effect through fixed effect model.

4.2.4 Fixed Effect Model

The fixed effect assumption is that the individual specific effect is correlated with the independent variables. If the random effects assumption holds, the random effects model is more efficient than the fixed effects model. However, if this assumption does not hold, the random effects model is not consistent.

Table 7 Result of Fixed Effect model

FDI	Coefficient	Standard Error	z value	P>/t/
GDP	0.4462	0.1111	4.00	0.000***
Foreign exchange Rate	-0.6634	0.6537	-1.01	0.310
Inflation Rate	494.4127	290.8888	1.70	0.089*
Cons	910.125	5884.701	0.15	0.877

It is noted that GDP and inflation rate are significant with FDI inflow with 1% and 10% respectively. In this case also the inflation rate is not having any impact on the FDI inflow.

4.2.5 Hausman Test

To identify whether the null hypothesis is there in the study, further it has fixed or random effect, therefore to conduct the Hausman test. It is basically tests whether the unique errors (ui) are correlated with the regressors, the null hypothesis is they are not. Already the fixed effects model and random model were run and the estimates are saved after that to perform Hausman test. The test results are as follows.

Table 8 Result of Hausman Test

Independent Variables	Coefficients		(b-B) Difference	Sqrt (diag (V_bv-B)) SE
	(b) fixed	(B)		
GDP	0.05174	0.4462	0.0071	0.0071
Foreign Exchange rate	-0.8780	-0.6634	-0.2146	1.0008
Inflation Rate	473.6747	494.4127	-20.7380	69.7213

Dependent Variable: FDI inflow

Test: Ho: difference in coefficients not systematic

$$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$$
$$= 1.06$$
$$Prob>chi2 = 0.7873$$

The p-value > 0.05, reject H0. Therefore the research is to use the random effect model.

5. CONCLUSIONS

The objective of the study was to analyse the impact of macroeconomic factors on FDI inflow in to the ASEAN countries. The study undertakes the trend & growth analysis for 10 countries for the period 6 years from 2009 to 2014. Further the study applied Panel data analysis for 10 countries over the period of five years from 2009 to 2013. The trend and growth of ASEAN countries FDI inflow is positive and progressive. The Hausman test result supports the random effect model. As per the result of random effect model the macro economic factors of GDP and inflation rate are significant and impact on FDI inflow during the study period. The foreign exchange rate is not significant and there is no impact on FDI inflow during the study period.

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