

FDI-TRADE NEXUS: EMPIRICAL ANALYSIS ON ASEAN-5

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ABSTRACT

This paper investigates the dynamic linkages between FDI and trade of ASEAN-5 countries using the Autoregressive Distributed Lag (ARDL) bounds testing approach. Empirical results suggest that FDI and import are complement to each other in long run but import tends to substitute FDI in short run. Conversely, export tends to substitute FDI in long run, however, complementary linkage was found between FDI and export in short run.

1. INTRODUCTION

The significance of FDI role in economic growth in ASEAN became more evident in 1980s and thus acted as crowd-puller to further draw FDI inflows into the region (Chia, 1996). Due to that, FDI activities are prevailing in ASEAN region, hence provoke trade and intensify interdependence among these countries. ASEAN had recorded tremendous net FDI inflows with increment of 48% from US\$13.7 billion in 2002 to US\$20.3 billion in 2003 (ASEAN Statistical Yearbook, 2005). Likewise, the ASEAN-5¹ countries lucratively attracted FDI inflow in 1990s with US\$29.89 billion in the year 1997, but declined to US\$19.03 billion as affected by Asian Financial Crisis in the following year. Notwithstanding, the FDI inflow into ASEAN-5 prolong constructive with progressive performance and achieved US\$34.13 billion in the year 2005 (UNCTAD, 2006) as depicted in Table 1. In term of trade, ASEAN region has revealed an impressive trade performance either within the region or trading with external region as shown in Table 1. The export amount within and external ASEAN region recorded progressive performance from US\$139.04 billion to US\$606.81 billion from the year 1990 to 2005. Similarly, the import figures also portraying parallel trend from US\$157.96 billion reaching US\$537.49 billion between the year 1990 and 2005 period. These two indicators reveal the growing trade activities of ASEAN countries particularly with external region countries that are align with the process of globalization and trade liberalization.

Although there is a significance growth rate in FDI and trade, nevertheless, the relationship between both variables remains distinctively unexplored particularly in the ASEAN region. There are several studies performed to investigate the relationship between FDI and export. Those findings declared that both FDI and export are complementary and mutually supportive². This study will adopt the Heckscher-Ohlin-Samuelson-Mundell principle as the theoretical framework in investigating the relationship between FDI and trade in ASEAN-5 countries. In

Table 1
FDI Inflow and Trade Balance of ASEAN-5 from 1990 to 2005

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
FDI																
Indo	1,092	1,482	1,770	2,003	2,108	4,346	6,194	4,678	-241	-1,865	-4,550	-2,978	145	-597	1,896	5,260
Mal	2,611	4,043	5,138	5,741	4,851	5,815	7,297	6,323	2,714	3,895	3,788	554	3,203	2,473	4,624	3,967
Phil	550	556	776	1,238	1,591	1,459	1,520	1,249	1,752	1,247	2,240	195	1,542	491	688	1,132
Sing	5,575	4,887	2,204	4,686	8,550	11,535	9,682	13,753	7,314	16,578	16,484	15,649	7,338	10,376	14,820	20,083
Thai	2,575	2,049	2,151	1,807	1,369	2,070	2,338	3,882	7,492	6,091	3,350	3,886	947	1,952	1,414	3,687
Total	12,403	13,017	12,039	15,475	18,469	25,225	27,031	29,885	19,031	25,946	21,312	17,306	13,175	14,695	23,442	34,129
Export																
Indo	25,675	29,142	33,967	36,823	40,055	45,417	49,814	56,298	50,370	51,243	65,403	57,361	59,166	64,107	72,330	85,660
Mal	29,452	34,349	40,772	47,131	58,844	73,914	78,327	78,740	73,305	84,455	98,229	88,005	94,058	104,968	126,503	140,471
Phil	8,117	8,801	9,751	11,129	13,304	17,502	20,408	24,882	29,414	36,576	39,783	32,664	36,502	37,026	39,689	41,255
Sing	52,730	58,966	63,472	74,012	96,825	118,268	125,014	124,985	109,895	114,680	137,804	121,751	125,177	144,182	179,547	229,804
Thai	23,068	28,428	32,472	36,969	45,261	56,439	55,721	57,374	54,456	58,440	69,057	64,968	68,108	80,333	97,414	109,623
Total	139,042	159,686	180,434	206,064	254,289	311,540	329,284	342,279	317,440	345,394	410,276	364,749	383,011	430,616	515,483	606,812
Import																
Indo	21,837	25,869	27,280	28,328	31,983	40,630	42,929	51,304	35,280	33,321	43,595	37,534	38,310	42,243	54,895	57,701
Mal	29,258	36,648	39,855	45,650	59,600	77,691	78,418	79,030	58,319	64,966	81,963	73,866	79,869	83,618	105,287	114,213
Phil	13,042	12,858	15,465	18,772	22,641	28,341	34,126	38,622	31,496	32,568	37,027	34,921	37,180	39,502	42,345	47,418
Sing	60,774	66,095	72,171	85,234	102,670	124,507	131,338	132,437	101,732	111,060	134,545	116,000	116,441	127,934	163,854	200,163
Thai	33,045	37,569	40,686	46,077	54,459	70,786	72,332	62,854	42,971	50,342	61,924	61,962	64,645	75,805	95,353	117,991
Total	157,956	179,039	195,457	224,061	271,353	341,955	359,143	364,247	269,798	292,257	359,054	324,283	336,445	369,102	461,734	537,486

Notes: All figures are in US\$ billion. Data obtained from UNCTAD and International Financial Statistics, various issues. Indo, Mal, Phil, Sing and Thai refer to Indonesia, Malaysia, the Philippines, Singapore and Thailand, respectively.

particular, the international trade is treated either complement or substitute for international mobility of factor that refers as FDI. Comprehensively, increase in the impediments of factor mobility may lead to trade expansion, while increasing restriction in trade may accelerate factor mobility. Therefore, the aim of this study is to address the exploration of the relationship between FDI, export and import among the ASEAN-5 countries from the perspective of causality linkage. The identification of the relationship between FDI and trade in ASEAN-5 countries as either FDI is trade-substitute or reciprocal supportive is essential for enhancing the international competitiveness of these countries. It can provide thorough understanding for policy makers of ASEAN-5 countries to further enhance and establishing sustainable economic policies. Moreover, most of the previous studies used provincial and bilateral data to analyze the linkage between FDI and trade, but only a few studies examined the causal relationship between FDI and trade particularly at the aggregate level. In view of this, this study intends to fill up the gap in the literature on the issue of FDI-Trade nexus in ASEAN region using updated aggregate data.

1.1 FDI and Trade in ASEAN-5

The presence of FDI in ASEAN region commenced in 1980s and become prominent determinants of economic growth in the region. In fact, FDI was undesirable initially in ASEAN region until 1990s where the region transformed into FDI hub. One of the justifications is related to fast growing foreign investment activities in late 1980s particularly when Japan and Newly Industrialized Economies (NIEs) expanding their investment policies abroad into ASEAN region. This is due to the intention of Japan and NIEs to thwart appreciation of home currency during the Plaza Accord 1985³ and thus loss privileged market access into several Organization of Economics Co-Operation and Development (OECD) countries.

Prior to financial crisis in 1997, the FDI inflows into ASEAN countries had significantly grow from US\$12.01 billion to US\$34.10 billion in 1990 and 1997 respectively (UNCTAD, 2000). In regard to that, the most FDI preference destination in ASEAN region was ASEAN-5 countries. The FDI inflow into ASEAN-5 accounted for 85% of total FDI inflow into ASEAN countries with average growth rate of 7% during that period. The FDI inflow into ASEAN-5 increased from US\$12.40 billion in 1990 towards US\$29.89 billion in 1997, particularly Singapore and Malaysia that had recorded impressive FDI inflow (see Table 1). Nevertheless, the Asian Financial Crisis in 1997 had leave inverse implication on the FDI inflow and caused declination. The FDI inflow decreased from US\$29.89 billion in 1997 to US\$19.03 billion in 1998. Despite that, FDI inflow into ASEAN-5 remain at slow pace in growth due to economic recession in United States as well as September 11 incident in 2000 and 2001 and Severe Acute Respiratory Syndrome (SARS) in year 2003 that deficiently affected world economic depression.

The favorable development in the ASEAN region had triggered the trade expansion in the region. The significance of trade become obvious since the formation of ASEAN Free Trade Area (AFTA) with increment in the export and import activities either internal or external of the region. The total exports of ASEAN-5 countries increased from US\$139.04 billion in the year 1990 to US\$606.81 billion in the year 2005. The export performance within the timeframe was not deeply affected by the Asian Financial Crisis in 1997 with a slight decrease in year 1998 that stood at US\$317.44 billion in 1998 compared to US\$342.28 billion in previous year.

Although the export of ASEAN-5 countries undergone declination again in year 2001, it regains momentum towards sustainable level in year 2005 (see Table 1). In term of import performance, the trend is similar to the export performance with a slow down in the years 1998 and 2001, with US\$269.80 billion and US\$324.28 billion respectively. Generally, the imports of ASEAN-5 countries pose strong upward trend and recorded US\$537.49 billion in the year 2005 (see Table 1).

2. RELATIONSHIP BETWEEN FDI AND TRADE

The relationship between FDI and trade can be reviewed based on well known Heckscher-Ohlin-Samuelson-Mundell framework. The centre piece of the framework is either international trade of goods substitute international movement of production factors, referring to FDI and vice-versa. Mundell (1957) postulated that commodity movements will substitute factor movements at certain extent. The effort of countries in building protectionism for their domestic and infant industries contributes to arising barriers in either trade or factor mobility. Eventually, increment in trade obstacles will induce factor movements while increment in impediments of factor movements will provoke trade. Besides that, Vernon (1966) introduced the product life cycle model of internationalization by examining United States (US) Multinational Enterprises (MNEs) during the period of 1950s and 1960s. The model explained the chronological from production of new product domestically towards export the product and lead to abroad production. Hence, the fundamental of the model emphasizes on the linkage between export, import and FDI as both the three components have significant relationship.

Several studies had proven that there is a significant relationship between FDI and trade. In related to that, some studies proclaimed that FDI and trade are reciprocal accommodating or complementary such as Culem (1988), Ozawa (1992), Ruggiero (1996) and Wei, et al. (1999). This is due to the spill over effects of FDI that leads to expansion of productivity in host country via transfer of technologies as well as management skills. Hence, this will contribute to growth of exportation ability in host country. Correspondingly, inflow of FDI indirectly generates the increasing demand for raw materials and thus may lead to increasing imports. Meanwhile, other studies revealed that the relationship between FDI and trade is influenced by the motive of FDI as either market-seeking or factor-seeking and hence FDI may become trade substitute or vice versa (Horst, 1972; Graham and Krugman 1989; Phongpaichit, 1990; Brouthers, et al. 1996; Goldberg and Klein, 1997). The main reason is due to the motives or strategies of MNEs in penetrating foreign market. Besides that, the degree of comparative advantage in home and host country also becomes a prominent determinant of the relationship between FDI and trade (Kojima, 1975 and 1982). Furthermore, the relationship between FDI and trade is identified as export-oriented FDI when MNEs allocate the productions abroad due to comparative advantage in host country. This phenomenon enables MNEs to enjoy lower cost of production via transfer of technology and skill management in the host country. At certain level, importation of product back to home country or third market will occur and thus contribute favorable impact to the home country in term of triggering its export. This phenomenon is parallel to the product life cycle model introduced by Vernon (1966). Notwithstanding, FDI is trade substitute if FDI flows from home country with comparative advantage to host country with comparative disadvantage. Moreover, Kojima also pointed out

that FDI flowing into capital-intensive industries has the tendency to be trade-substitute while FDI flowing into labor-intensive industries tends to be trade-creating particularly in developing host countries.

Besides that, Culem (1988) performed study to examine the bilateral flows of FDI particularly among six industrialized countries from 1969 to 1982 period. The result depicted that robust growing markets become the preference of foreign investors but high labor cost lead to discouragement of FDI inflows into those countries⁴. Furthermore, the finding also indicated that existence of long-run positive linkage between host country import and FDI inflow due to the sequence of foreign investment. The chain commences with export from home country to host country and consequently swap to FDI upon gaining stability in the host country. Therefore, import and FDI inflow has noteworthy relationship in long term. In related to that, Ozawa (1992) proclaimed that FDI has major influence on the improvement of the comparative advantage that leads to increase in trade flows and hence indicates a close relationship between FDI and trade.

3. ESTIMATION METHOD AND THE DATA

In this study, the Autoregressive Distributed Lag (ARDL) bounds testing approach proposed by Pesaran, et al. (2001) will be used to examine the dynamic relationship between FDI, import and export for the ASEAN-5 countries. As pointed out by Narayan and Narayan (2005), the bounds test which is based on the estimation of an unrestricted error correction model (UECM) has several advantages over the conventional type of cointegration techniques. First, the standard Wald or *F*-statistics used in the bounds test has a non-standard distribution under the null hypothesis of no-cointegration relationship between the examined variables, irrespective whether the underlying variables are *I*(0), *I*(1), or fractionally integrated. Therefore, the bounds test obviates the uncertainty associated with pre-testing for unit roots as it does not require the information for the order of integration of the variables. Second, it is more robust when applied on a small sample study compare to Engle and Granger (1987) or Johansen type of cointegration methods. Third, the short as well as long-run parameters of the model could be estimated simultaneously. Fourth, once the orders of the lags in the ARDL model have been appropriately selected, we can estimate the cointegration relationship using a simple ordinary least square (OLS) method.

The UECM used in the present study has the following form as expressed in Equation (1):

$$\Delta \ln FDI_t = \beta_0 + \beta_1 \sum_{i=1}^p \Delta \ln FDI_{t-i} + \beta_2 \sum_{i=0}^p \Delta \ln EX_{t-i} + \beta_3 \sum_{i=0}^p \Delta \ln IM_{t-i} + \beta_4 \ln FDI_{t-1} + \beta_5 \ln EX_{t-1} + \beta_6 \ln IM_{t-1} + \varepsilon_t \quad (1)$$

where *FDI*, *EX* and *IM* are FDI, exports and imports, respectively; Δ denotes a first difference operator; \ln represents natural logarithmic transformation; β_0 is an intercept and ε_t is a white noise error term.

There are two steps in testing the cointegration relationship between *FDI*, *EX* and *IM*. First, the Equation (1) is estimated by OLS technique. Second, the null hypothesis of no-cointegration $H_0: \beta_4 = \beta_5 = \beta_6 = 0$ is tested against the alternative of $H_1: \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$ by the means of *F*-test. Two sets of critical value bounds for the *F*-statistics are generated by Pesaran,

et al. (2001). If the computed F -statistic falls below the lower bound critical value, the null hypothesis of no-cointegration cannot be rejected. Contrary, if the computed F -statistic lies above the upper bound critical value, the null hypothesis is rejected, implying that there is a long-run cointegration relationship amongst the variables in the model. Nevertheless, if the calculated value falls within the bounds, inference is inconclusive.

The general-to-specific procedure by Hendry can be used to obtain a parsimonious UECM by dropping sequentially the insignificant first difference variables. The long-run elasticity of the independent variable is then calculated using the ratio of the estimated coefficient of one-lagged independent variable over the estimated coefficient of one-lagged dependent variable (multiplied with a negative sign). For the short-run elasticity of the independent variable, it is captured by the estimated coefficients of the first differenced variable in Equation (1).

In this study, yearly data of FDI and trade of ASEAN-5 countries from 1971 to 2005 were obtained from FDI-Online UNCTAD and International Financial Statistics (IFS). The value of the FDI and trade is the aggregate of the five ASEAN countries and the trade consists of total export and import. All the data are transformed into log form prior estimation is conducted.

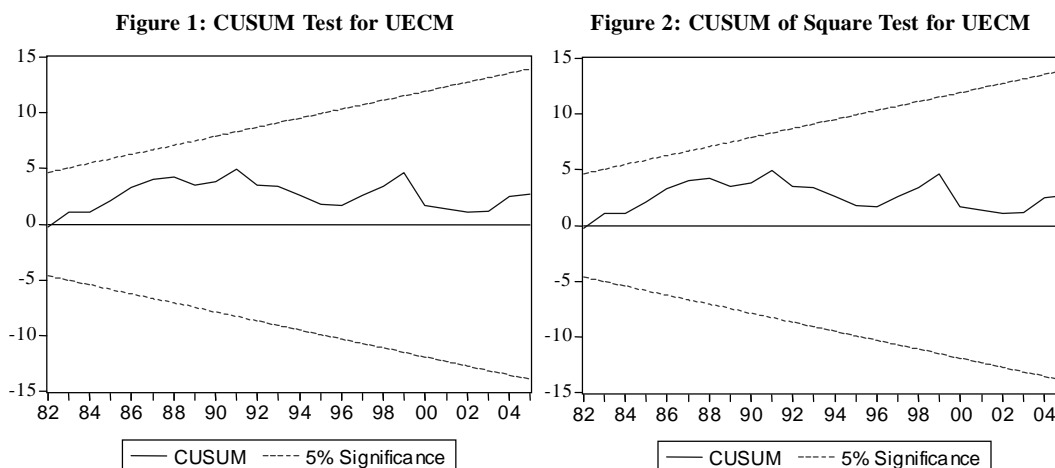
4. RESULTS AND DISCUSSIONS

A parsimonious estimated UECM is reported in Table 2. The model is well fitted as it passes all the diagnostic tests, namely Jarque-Bera normality of the residuals test, Breusch-Godfrey serial correlation LM test, ARCH test and Ramsey RESET specification test. This indicates that the residuals of the estimated model are serially uncorrelated and normally distributed with constant variance in a correct functional form. Furthermore, the estimated parameters are structural stable over time as the plots of the CUSUM and CUSUM of square statistics are well within the 5% critical bounds (see Figures 1 and 2).

Table 2
Unrestricted Error Correction Model Results

<i>Variable</i>	<i>Coefficient</i>	<i>SE</i>	<i>t-statistic</i>	<i>p-value</i>
Dependent variable: $\Delta \ln FDI_t$				
Constant	-3.737	0.648	-5.763	0.000
$\ln FDI_{t-1}$	-0.724	0.122	-5.941	0.000
$\ln EX_{t-1}$	-0.940	0.393	-2.393	0.025
$\ln IM_{t-1}$	1.796	0.488	3.681	0.001
$\Delta \ln FDI_{t-2}$	0.798	0.150	5.306	0.000
$\Delta \ln EX_{t-2}$	2.336	0.517	4.522	0.000
$\Delta \ln IM_t$	1.817	0.222	8.196	0.000
$\Delta \ln IM_{t-1}$	-0.476	0.230	-2.068	0.050
$\Delta \ln IM_{t-2}$	-2.487	0.564	-4.407	0.000
Diagnostic Tests				
R^2	0.808			
	0.744			
JB	0.419 (0.811)			
AR[2]	0.401 (0.269)			
ARCH[2]	0.916 (0.908)			
RESET[2]	0.127 (0.050)			

Notes: JB is the Jarque-Bera statistic for testing normality. AR[2] and ARCH[2] are the Lagrange Multiplier tests of 2nd order serial correlation and ARCH effects, respectively. RESET refers to Ramsey RESET specification test.



We then proceed to test for the presence of long-run relationship by comparing the computed *F*-statistic against the critical values provided by Pesaran, et al. (2001). The reported *F*-statistic (12.93) in Table 3 is obviously greater than the upper bound critical value of 6.36 at the 1% significant level, indicating there is a stable long run cointegration relationship among *FDI*, *EX* and *IM*.

Table 3
Bounds Test for Cointegration Analysis Result

Computed <i>F</i> -statistic: 12.93	Critical Value	
	Lower-bound	Upper-bound
10% significance level	3.17	4.14
5% significance level	3.79	4.85
1% significance level	5.15	6.36

Notes: The bounds critical values are obtained from Pesaran, et al. (2001, pp. 300), Table CI(iii) Case III: Unrestricted intercept and no trend (k = 2).

It is of interest to know about both the short-run and long-run elasticities of *FDI* with respective to *EX* and *IM* when they are cointegrated. Following the ARDL bounds testing procedure, the estimated short-run and long-run elasticities from the UECM are presented in Table 4. Interestingly, results show that *EX* and *IM* have different signs during different time frames. In the short-run, *EX* is positively correlated with *FDI* but *IM* has negative impact towards the *FDI*. Conversely, in the long-run, *IM* has a positive effect on *FDI* while *EX* is negatively related to *FDI*. The results obtained are analogous to the findings of Culem (1988) who stated that existence of long run positive relationship between host country import and *FDI* inflow. This is due to the motive of the MNEs in penetrating foreign market where initially by exporting to the ASEAN-5 countries before switching to *FDI*. This is an essential strategy for the MNEs as to build up their presence upon investing in the host country. When MNEs has developed sturdy presence in the host country, eventually switching towards *FDI* will not be an obstruction. Therefore, this will lead to the increasing volume of import in ASEAN-5 countries. On the other hand, import tends to substitute *FDI* in the short run in ASEAN-5 countries. The

importation of products for domestic consumption may inversely affect the FDI inflows due to sufficiency in fulfilling the local market demand.

Table 4
Estimated Short-and Long-run Elasticities

<i>Variable</i>	<i>Short-run</i>	<i>Long-run</i>
<i>EX</i>	2.336**	-1.299**
<i>IM</i>	-1.146**	2.482**

Note: Asterisks (**) denote significant at 5% level.

The empirical results in this study can be further justified by Vernon's (1996) International Product Life Cycle. Initially, the ASEAN-5 countries will have the ability to expand their export volume upon FDI inflow into the countries. Consequently, there is a significance positive linkage between FDI and export in short run in those countries. From the perspective of International Product Life Cycle, the phenomenon takes place at the new product stage and will resume until reaching maturing stage. Cost advantage particularly low labor cost eventually will stimulate the expansion of production level in the ASEAN-5 countries upon the massive inflow of FDI. The huge production level contributes to the ability of the host country to enlarge their export volume. Nevertheless, the import volume will exceed the export volume as the product progress through the standardized product stage. The changes in the cost advantage particularly the labor cost will increase as time past. As a result, MNEs will be forced to shift their investment to other countries which can provide cost advantage in term of lower labor cost. Due to that, the production level will be affected and diminish the export volume. However, the market demand in the ASEAN-5 countries still remains favorably and the only ways to maintain the market is by importing the products from other countries. Consequently, the import volume will exceed the export volume. This is the reason explaining the positive long run effect between FDI and import and positive relationship between FDI and export in short run.

Despite that, the other justification on the positive long run linkage between FDI and import is due to the shift of the industries⁵ in ASEAN-5 countries. Initially, ASEAN-5 countries rely much on labor-intensive industries and this scenario may change in the future. As those countries experienced robust economic growth and FDI inflow, the dependency on industries may shift upward the value chain from labor-intensive to capital intensive. Due to that, the import level may exceed the export volume in long run period as cost of production will increase compared to previously depend on labor. Furthermore the motives of the FDI also play essential role in explaining relationship between FDI, export and import in long run as well as short run. The positive relationship between FDI and export in short run exist in ASEAN-5 countries which is similar to the findings of Phongpaichit (1990) and Root (1994). In fact, the motive of MNEs conducting foreign investment in ASEAN-5 countries is due to factor seeking motive. The low labor cost markets available in ASEAN region enable MNEs to gain competitive advantage. Ultimately, this has lead to the growth in exportation in ASEAN-5 countries. Nevertheless, the relationship between FDI and import become positive in long run due to market seeking motive of FDI as proclaimed by Graham and Krugman (1989). As the labor cost increase due to the encouraging economic growth in ASEAN-5 countries, the FDI into the

region will shift towards market seeking motive. Therefore, the import volume of products will exceed the export volume in ASEAN-5 countries in order to support the great demand.

5. CONCLUSION

The objective of this paper is to investigate the relationship between FDI and trade of ASEAN-5 countries in term of short run and long run. ARDL bounds testing approach by Pesaran, et al. (2001) was employed in order to establish the direction of causality between FDI and trade. Empirical evidence showed that there is a positive relationship between FDI and import in long run but import tends to substitute FDI in short run. On the other hand, export tends to substitute FDI in the long run, however complement FDI in the short run.

The empirical results showed that there is a significance relationship between FDI and trade either from the perspective of long run or short run in ASEAN-5 countries as proclaimed by Culem (1988), Ozawa (1992), Ruggiero (1996) and Wei, et al. (1999). FDI and trade tend to be complement in ASEAN-5 countries which are considered as developing countries and have high dependency on labor-intensive industries, particularly in manufacturing sector. Besides that, the comparative advantage of industries in ASEAN-5 countries as host countries against home countries may as well contributed to the complementary relationship between FDI and trade (Kojima, 1975 and 1982). This is due to most of the major sources of FDI inflow into ASEAN-5 countries are from developed countries such as United States, Japan and European Union. Due to that, ASEAN-5 countries are viewed as providing comparative advantage in term of massive low labor cost to the developed countries. Subsequently, the MNEs can enjoy lower production cost and eventually expand the trade activity due to increasing productivity level. Besides that, the spillover effects in term of technology absorption as well as management skills also contributed to the expansion of productivity in ASEAN-5 countries and stimulate the trade activities in the region. The continuous effort and measurements⁶ taken by ASEAN-5 countries in attracting FDI has eventually stimulates the growth of trade as well.

Notes

1. The ASEAN-5 countries refer to Indonesia, Malaysia, the Philippines, Singapore and Thailand.
2. See for example: Lipsey and Weiss (1981), Blomstrom, et al. (1988) and Pfafermary (1996).
3. Plaza Accord 1985 was signed during the meeting of the Finance Ministers and Central Bank Governors of the Group of 5 or known as G5 (United States, Japan, Germany, France and Britain) in 1985. The major outcome of the meeting was agreement in depreciating the US\$ against the Japanese Yen.
4. See for example, Pain (1993) and Hatzius (2000).
5. See Kojima (1975) and (1982).
6. These measurements consist of establishment ASEAN Free Trade Area (AFTA) in 1992, ASEAN Industrial Cooperation (AICO) Scheme in 1996 and ASEAN Investment Area (AIA) in 1998.

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