ANALYZING SECTORIAL LEVEL DETERMINANTS OF INWARD FOREIGN DIRECT INVESTMENT (FDI) IN ASEAN

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Abstract: The paper studies economic determinants of sectorial level (Extractive sector, manufacturing and assembly sector, infrastructure sector and service sector) foreign direct investment (FDI) to six Asean countries (Malaysia, Indonesia, Singapore, Thailand, Vietnam and Philippine). The study covers over a period of sixteen years, from 2001 to 2016, by employing static panel data model. This study includes inflation, gross domestic product growth, government expenditure on education, electric power consumption, exchange rate, trade openness and lending interest rate as economic variables. These factors are based on their relative importance from previous empirical literature. Overall findings reveal that there is a mix result in terms of key determinants of sectorial level inward FDI which proves that FDI is not a single phenomenon and that each sector must be treated on its own terms to attract FDI into the country.

Key words: Foreign Direct Investment, Panel Data, Sectorial Foreign Direct Investment, ASEAN Economies

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Introduction

Today, globalization emphasizes on the importance of international economy particularly in developing countries due to a number of reasons and these include rapid increase of financial needs, information technology, and new skills. In this case, foreign direct investment (FDI) plays a central role in economic development and fulfills the gap between developing and developed nations.

In 2016, globally trend of FDI holding has decreased about 2 per cent to $1.75 trillion. Although UNCTAD forecast recovery of FDI flows in 2017–2018, it is assumed to be below their 2007 peak. Developing Asia is predicted to increase about 15 percent in 2018, to $515 billion, as a better sign and better economic outlook in Asian economies. This significant improvement of Asian economies would enhance investors' confidence especially in China, India and ASEAN countries.

Today, Asia is an emerging region with investment liberalization by spreading their industrial investment across broad range through an introduction of new and friendly economic and trade policies and new regulations in investment. This form

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of investment liberalization signifies the importance of Asia as a region suitable for FDI. There has been a number of studies which analyze the key determinants of inward FDI in overall country level or regional level, but this study solely focuses on the key determinants of foreign direct investment (FDI) in different sectors in six ASEAN countries namely Indonesia, Malaysia, Thailand, Singapore, Vietnam and Philippine. In the case of different sectors, FDI flows in four forms: 1) FDI in extractive sector, 2) FDI in infrastructure sector, 3) FDI in manufacturing and assembly sector and 4) FDI in services or offering sector. Each form comes with distinctive benefits and threatened harms and each faces such a distinctive policy challenges that each form requires to be analyzed on its own. Most of the literature is available on topics related to determinants of country level and aggregated Foreign Direct Investment (FDI) but gives little attention to the ones related to sector-wise Foreign Direct Investment (FDI)

Literature Review

In the early years of 19th century, foreign direct investments (FDI) were mainly involved in agricultural industries, which produced mostly primary commodities. However, in the late 19th century, the political movements and new technology, and knowledge management period pushed most of the countries to diversify and restructure their investments from agricultural sector to manufacturing sector. In the late 1980s, foreign direct investments (FDI) have been directed to non-manufacturing sector such as services sector including finance, communication and information technology, distribution services, transportation, and business activities. This literature review will form the basis for the research exploring the body of knowledge and understanding on the subject set by other researchers, and also framing the scope of the current discussion in this research work. This paper aspires to determine the decision making process explicitly for foreign direct investments into Asean region.

A number of studies have been conducted to identify the key determinants of inward Country-wise FDI, but there is an observable lack of research to identify key determinants of inward sector-wise FDI. Ever since Hymer (1960) proposed his idea on foreign direct investment (FDI), there has been ongoing debate about the key factor that attracts inward FDI and how this could improve understanding of policy maker related to FDI in today's globalized context or setting. Hymer (1960) introduces the Ownership Advantage Theory, which studies ownership advantages as a key determinant for inward foreign direct investment (FDI), followed by a Product Life Cycle Theory by Vernoon, (1966) and OLI Paradigm Theories by Dunning (1980), which aims to identify the key factor that attracts inward FDI.

While looking to different regions, Onyeiwu and Shrestha (2004), Asiedu (2006), Khalid and Varoudakis (2007), and Zenegnaw (2010) study FDI in African countries and found that FDI flows into Africa are negatively correlated with the level of inflation. Gharaibeh (2015) studies some Middle East countries using

ordinary least square (OLS) and that inflation rate, lending interest rate, trade openness and public education have statistically significant relationships with FDI inflows into Bahrain for the period of 1980 to 2013. Furthermore, Nakamura and Oyama (1998) find that the FDI inflows into Asian countries are affected by exchange rate of that country. Ismail and Yussof (2003),Choong et al. (2007), Osili, (2004), Khair et al. (2006), Brahmasrene and Jiranyakul (2001), and Kamaly (2007),suggests that some of the key factors that attract inward FDI to ASEAN country include market size of the country, economic policies and trade liberalization. Hsieh et al., (2005) studies selected market of Vietnam, Laos, Myanmar and Cambodia and he suggests that GDP per capital (Market size) and trade openness is positively contributed to attracting inward FDI to the region. Nhu and Haughton (2002) studies, however, are focused on US FDI to Vietnam and it was due to some Bilateral Trade agreements between the US and Vietnam. Al Shubiri (2016) study Oman and finds that GDP growth is more significate determinant of DI. There is one common point to all these studies and that all the above researchers study the country level determinants of inward FDI. However, this study will analyze the sectorial level determinants of inward FDI.

Zeb, Qiang and Shabbir (2014) state that trade openness, market size and labor force are the explanatory variables of foreign direct investment in Infrastructure sector in Pakistan. Karim, Winters, Coelli and Fleming (2003) study the determinants of inward foreign direct investment (FDI) in the manufacturing sector in Malaysia from 1988 to 2000. Their results indicate that GDP, lending interest rate, labour productivity significantly influenced the level of FDI inflows into Malaysia. However, exchange rate, trade openness and wage are not important in influencing FDI into manufacturing sector of Malaysia. Furthermore, Tsaurai (2015) who uses the ARDL testing approach finds that there is no relationship between FDI and trade openness in Zimbabwe.

Moreover, Kandiero and Chitiga (2006) discover that openness in the manufacturing sector had a negligible impact on inward FDI in African countries. But Chakrabarti (2001) discovers that trade openness is an important factor and it has higher probability in attracting more FDI than other explanatory variables such as worker wages level, exchange rates, and GDP growth rate. In addition, Chung and Alcacer (2002) examines selected US states, and his studies on the country's technical capabilities as a determinant of inward FDI in manufacturing from 1987-1993 suggest that different industry may have different variable that attract inward FDI. His studies also found that only in pharmaceutical industry and electronics firms where the extensive use of R&D and domestic technological capabilities are highly significant. Thus, this not only gives more open source that the determinant of inward FDI not only can be different from one region to another or from one country to another country, but it also can be different from one industry to another industry which need to be explored further.

Hong and Ronne (2012) study Brazil inward FDI and indicate that market size, and inflation rate are positive significant, while trade openness is not a positive

determinant of FDI. Furthermore, Vijayakumar (2010) examines determinants of FDI inflows in emerging economies including Brazil, Russia, China, and South Africa (BRICS) from 1975-2007 and suggests that exchange rate, market size, and labor cost are the positive determinants of FDI, whereas trade openness is not significant and economically less important determinants of FDI inflows in BRICS countries.

This study contributes to the existing literature by examining the determinants of foreign direct investment at the sectorial level in Asean countries which include Malaysia, Indonesia, Singapore, Thailand, Vietnam and Philippine. This is due to the fact that this FDI at sectorial level of these Asean economies gain little attention for an analysis of FDI inflows related to different sector. There is an observable lack of research into FDI determinants on the sectorial level, which is interesting and need to be further explored since FDI is related to industry rather than to countries (Buigues-u and Jacquemin, 1994).

Data and Methodology

Ambiguous and mixed result is provided by the literature on which key factors are required by a country to attract overall inward FDI or different sectors may have different factors that attract inward FDI. This study will help to analyze each sector using panel data model to understand each sector separately and its key factors that attract inward FDI to those sectors.

Here different statistical approaches are adopted to analyze inward FDI sectorial level, and the data to study the issue can be a time series, cross section or panel data (or a combination of both). In order to study the Sector-wise FDI determinants in Asean countries, a panel data model has been used, which include, Pooled (OLS) Model, Fixed Effect Model and Random Effect Model. Panel Data Model (PDM) is considered to be more comprehensive model over simple cross-section or simple time-series data because it covers both time series data and cross-section data and it can give more informative output and more variability (Baltagi and Kao, 2001). This means PDM can produce more efficient and more reliable estimates and they are being increasingly used in many applications of modern econometrics (Gujarati, 2003). Furthermore, PDM has the capacity to handle more complicated behavioral models like culture issue, technological changes, etc. (Greene, 2003; Hausman, 1978). Panel Data Model (PDM) can be expressed as follows:

$$PDM : Y_{it} = \alpha_i + \Upsilon_t + \beta X_{it} + U_{it} \quad (1)$$

Where: U_{it} is error term effect and α_i is individual effects (cross sectional) and Υ_t is time series effect and the total sample size = N x T.

PDM examines fixed effect and random effects of entity and the difference between both lies in the role of dummy variables. If dummies act as part of error term, (Random Effect Model), while if dummies are part of the intercept, then it falls into Fixed Effect Model. In fixed effect, the intercepts vary across time and groups, whereas in the case of random effect, the error variances vary across groups and time and slope is constant in both.

In Fixed Effect Model, $Y_{it} = \alpha + \mu_i + \beta X_{it} + u_{it}$ (In case of variation on 'i' and 't' the effect will go to intercept. While in Random Effect Model, $Y_{it} = \alpha + \beta X_{it} + (U_{it}+V_{it})$.(In case of variation on 'i' and 't' the effect will go to Error Term). To find out whether fixed effect or random effect will be more fitted to research model, Hausman (1978) specification test is used. Furthermore, the Fixed Effect Model is tested by incremental F-test and random effects is tested by using Lagrange Multiplier (LM) test. To investigate further either Fixed Effect Model will provide accurate result, over Pooled (OLS) the F-test is required. If F-test is significant, it suggests that Fixed Effect Model will be best fitted in this study over Pooled (OLS). The Null Hypothesis of F-test is that there were no fixed effects.

Model Representation

FDI mainly flows in four different forms: 1) FDI in extractive sector, 2) FDI in Infrastructure sector, 3) FDI in Manufacturing and Assembly and 4) FDI in Service or offering sector. This paper analyzes economic factors of FDI inflow in six Asean countries for all four sectors (Extractive, Infrastructure, Manufacturing and Service sectors) using Panel Data Model from 2001-2016. This paper examines four models of Economic factors; each model is for each sector.

$$\text{Model 1: Extractive-Sector FDI: } FDIE_{it} = \alpha + \beta_0 + \beta_1 INF_{it,} + \beta_2 GDPG_{it} + \beta_3 GEE_{it} + \beta_4 TO_{it} + \beta_5 EXC_{it} + \beta_6 EPC_{it} + \beta_7 LIR_{it} + \mu_{it} \quad (2)$$

$$\text{Model 2: Infrastructure-Sector FDI: } FDII_{it} = \alpha + \beta_0 + \beta_1 INF_{it,} + \beta_2 GDPG_{it} + \beta_3 GEE_{it} + \beta_4 TO_{it} + \beta_5 EXC_{it} + \beta_6 EPC_{it} + \beta_7 LIR_{it} + \mu_{it} \quad (3)$$

$$\text{Model 3: Manufacturing-Sector FDI: } FDIM_{it} = \alpha + \beta_0 + \beta_1 INF_{it,} + \beta_2 GDPG_{it} + \beta_3 GEE_{it} + \beta_4 TO_{it} + \beta_5 EXC_{it} + \beta_6 EPC_{it} + \beta_7 LIR_{it} + \mu_{it} \quad (4)$$

$$\text{Model 4: Service-Sector FDI: } FDIS_{it} = \alpha + \beta_0 + \beta_1 INF_{it,} + \beta_2 GDPG_{it} + \beta_3 GEE_{it} + \beta_4 TO_{it} + \beta_5 EXC_{it} + \beta_6 EPC_{it} + \beta_7 LIR_{it} + \mu_{it} \quad (5)$$

where β_0 is the intercept, 't' is a time specific effect (t = 1,…..T) ,'i' is cross section specific effect (i = 1……N) μit is the error term effect , FDIEit is Extractive-Sector FDI, $FDII_{it}$ is Infrastructure-Sector FDI, and $FDIM_{it}$ is Manufacturing-Sector FDI , $FDIS_{it}$ is Service-Sector FDI, and INF is Inflation Rate %, GDPG is GDP growth Rate % , TO is Trade openness ,GEE is Govt Expenditure on education , EXC is Exchange rate, LIR is Lending Interest Rate%, and EPC is Electric Power Consumption.

Empirical Findings

Findings from static Panel Data Model estimate the key determinant of sector wise (extractive sector, manufacturing sector, infrastructure sector and service sector) FDI inflow to six Asean countries (Malaysia, Indonesia, Philippine, Singapore, Thailand and Vietnam) over the period of 2001-2016. Inflation (INF), Basic Lending Interest Rate (LIR), GDP Growth Rate % (GDPG), Trade Openness (TO),

Government Expenditure on Education (GEE), Exchange Rate (EXC) and Electric power consumption (EPC) are included in this study in order to identify key variables that led countries in Asean to high FDI. Before we proceed with a static Panel Data Model, we will proceed with Pooled (OLS) model (in Table 1) to analyze the relationship between the variables. Findings from Pooled (OLS) estimate that determinants are different for different sectors. All the independent variables in extractive sector are significant except interest rate (INF) and lending interest rate (LIR) are not significant. GDPG and EXC are 10% significant, whereas GEE is 5% significant. TO and EPC is 1% significant. P-value test hypothesis is that each coefficient is different from zero. In this case, p-value 0.0001 indicates that those variables do have effects on dependent variable FDI. The t-value result also reveals statistical significant value for electric power consumption (EPC), Govt. expenditure on education (GEE), and Trade Openness, which indicate that those variables have significant influence on dependent variable FDIE. Findings from manufacturing sector reveal different results from extractive sector. Electric power consumption (EPC) and exchange rate (EXC) is 1% significant, whereas trade openness is 10% significant. Other variables such as inflation rate (INF), GDPG, govt. expenditure on education (GEE) and lending interest rate (LIR) are not significant. The t-value result also reveals statistical significant value for electric power consumption (EPC), exchange rate (EXC) and Trade openness TO, which indicate that those variables have significant influence on dependent variable FDIM.

Table 1. Finding from Pooled Data Model

	Extractive Sector	**Manufacturing Sector**	**Infrastructure Sector**	**Service Sector**
	Coefficient P-value()	Coefficient P-value()	Coefficient P-value()	Coefficient P-value()
INF	0.19	0.78	2.01	0.31
	(0.8473)	(0.4377)	(0.0473)**	(0.7608)
GDPG	2.75 (0.0837)*	-0.87	0.25	-0.87
		(0.3876)	(0.8012)	(0.3868)
GEE	2.16	0.47	2.29	2.89
	(0.0332)**	(0.6427)	(0.0245)**	(0.0048)***
EPC	6.68	3.63	5.61	5.24
	(<.0001)***	(0.0005)***	(<.0001)***	(<.0001)***
EXC	3.86	3.4	3.99	2.00
	(0.066)*	(0.001)***	(0.0001)***	(0.049)**
TO	7.38	2.9	2.24	2.01
	(<.0001)***	(0.061)*	(0.0274)**	(0.0472)**
LIR	1.04	-1.02	-1.51	2.21
	(0.302)	(0.3095)	(0.1339)	(0.9994)
R-Square	0.4291	0.304	0.5835	0.5624

Note: *, **, ***, indicate 10%, 5%, 1%, significance level respectively. Table represent coefficient and p- value ( )

The determinants of infrastructure and service sector also show different results. All independent variables in infrastructure present significant result except GDPG and lending interest rate, while GDP is 10% significant in extractive sector. Inflation rate (INF) is 5% significant in infrastructure, while it is insignificant in other sectors. Govt. education expenditure is 1% significant in service sector, but not significant in manufacturing sector. Exchange rate and trade openness is 5% significant in service sector. The implication of this finding suggests that every sector has its own determinants to attract FDI. Therefore, each sector of FDI must be treated on its own. Once we have finding from pooled (OLS), the next step will be to proceed with Panel Data Model using Fixed Effect Model and Random Effect Model.

Table 2 shows result for Two-Way Fixed Effect Model. As compared to pooled (OLS) estimation, Fixed Effect Model is considered to be more comprehensive. While looking into the results from Two Way Fixed Effect Model, findings from the analysis of Extractive, manufacturing and assembly, infrastructure and service sector of Asean suggest a mixed result in terms of key determinants of inward FDI. Electric power consumption (EPC) and exchange rate (EXC) are found to be significant factors in all sectors at 1% and 5%. GDPG is non-significant, in all sectors of Asean, while Inflation (INF) is significant at 5% in only infrastructure sector of Asean, govt. expenditure on education (GEE) is significant at 1% in service sector but does not significant in other sectors of Asean. Lending interest rate (LIR) is significant at 5% only in extractive sector but insignificant in other sectors of Asean. Trade openness is insignificant in manufacturing sector, but it is significant in all other sectors of Asean. This finding links to the previous study by Ghosh (2007) who found out that neither trade openness had impact on FDI trends nor trade openness is effected by FDI in developing countries. Hausman test and F-test both (significant value) suggest that the Fixed Effect Model is more appropriate in analyzing every sector in this research data. Redundant test also suggests that two-way Fixed Effect Model is best fitted model to analyze. R-Square results also show large values which indicate that the model is fit to analyze. Most of the researchers agree upon inflation (INF) and trade openness (TO) being the main determinant of aggregated /accumulated FDI, but it is clear from the finding in this research that inflation (INF) and trade openness (TO) are not a significant determinant of every sector of FDI.

Table 2. Finding from Fixed Effect Data Model

	Extractive Sector	**Manufacturing Sector**	**Infrastructure Sector**	**Service Sector**
	Coefficient P-value()	Coefficient P-value()	Coefficient P-value()	Coefficient P-value()
INF	0.87	0.96	1.89	0.31
	(0.2384)	(0.3395)	(0.0416)**	(0.7608)
GDPG	1.03	-1.02	0.73	-0.87
	(0.3662)	(0.3103)	(0.469)	(0.3868)

GEE	0.35	0.12	0.29	2.89
	(0.8661)	(0.9043)	(0.7719)	(0.0048)***
EPC	2.71	2.12	5.37	5.24
	(0.0168)**	(0.0371)**	(<.0001)***	(<.0001)***
EXC	2.02	2.65	2.56	2.00
	(0.0465)**	(0.0097)***	(0.0212)**	(0.049)**
TO	3.95	0.8	2.63	2.01
	(0.0004)***	(0.4237)	(0.0100)**	(0.0472)**
LIR	-1.8	-1.39	-0.68	0.99
	(0.0346)**	(0.1682)	(0.4992)	(0.9994)
R-Square	0.6664	0.5421	0.723	0.6713
Hausman Test (P-value)	(0.004)	(0.0028)	(0.0287)	(0.0158)
F-test	0.0043	0.0487	0.0181	0.00369
Redundant Test (P-value)	(0.001)	(0.000)	(0.001)	(0.000)

Note: *, **, ***, indicate 10%, 5%, 1%, significance level respectively. Table represent coefficient and p- value ( ). All results are derived using Fixed Effect Model estimation as suggested by the F-test significant value. The F-test indicates a hypothesis that there are no fixed effects, and therefore, we can easily reject the null. So in this case, the OLS would not give reasonable results.

Results Discussion

Findings of this study suggest that inward FDI is not a single phenomenon. This make more sense because FDI in extractive sector will have its own impact and own determinants than FDI in infrastructure or manufacturing or services. Findings from this research also suggest that each broad category of FDI must be treated on its own terms. Indeed, past studies have aggregated all FDI flows together (country level or regional level) and try to find some unique relationship to host-country and its determinants. This study examines each sector individually, which is more comprehensive approach adopted from the best of previous analysis or researches, which studies the inward FDI as a whole at country level or regional level. This study offers new findings and perspectives about how important is to understand the impact or determinants of each sector individually while study the determinants of inward FDI.

The results of this study support a past or previous research by Schmaljohann (2013) who examines that extractive (primary sector) FDI has different determinants than manufacturing (secondary sector) or services and infrastructure (tertiary sector) FDI. The results are also in-line with the previous research conducted by Moran (2011), that FDI is not a homogeneous phenomenon and presenting distinctive policy challenges, but it also has different results in the different sectors (extractive sector, infrastructure, manufacturing and assembly, and services). Hence, each broad category of FDI must be treated on its own terms. The results are also linked to Kreinin et al., (1999) who compare FDI across different sectors and find out that natural resources (extractive sector),

manufacturing sector and services sectors have different results and determinates from each other.

Conclusion

This paper investigates the determinants of inward FDI on sectorial level in six countries in Asean region (Malaysia, Indonesia, Philippine, Singapore, Thailand and Vietnam) using panel data model over a period of 2001-2016. The aim of the study is to understand whether and to what extent FDI undertaken in different sectors reacts to the characteristics of the host countries. The finding of this study suggest that different sector may have different factor that attract inward FDI. Besides, there is an observable lack of research into FDI determinants on the sectoral level, which is interesting since FDI is related to industry rather than to countries.

Limitation and Suggestion for Future Research

The limitations of this study are confined to a data analysis of sixteen years due to lack of availability of sector-wise FDI data. Also, only a few determinants are examined under sector wise FDI. Furthermore, this study only analyzes six Asean countries as mentioned based on their data available. Future research can be extended by involving other factors as well as other countries in Asean region. This study gives new results that determinants vary from sector to sector. Therefore, this research will help to understand the importance of sector wise FDI and will give idea to the future researchers to work on sector-wise FDI instead of aggregated FDI.

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ANALIZA OKREŚLENIA POZIOMU SEKTORA BEZPOŚREDNIEJ INWESTYCJI ZAGRANICZNEJ (BIZ) W ASEAN

Streszczenie: W artykule przedstawiono uwarunkowania gospodarcze na poziomie sektorowym (sektor wydobywczy, sektor produkcji i montażu, sektor infrastruktury i sektor usług) bezpośrednich inwestycji zagranicznych (BIZ) dla sześciu krajów Asean (Malezja, Indonezja, Singapur, Tajlandia, Wietnam i Filipiny). Badanie obejmuje okres szesnastu lat, od 2001 do 2016 r., poprzez zastosowanie statycznego modelu danych panelowych. Badanie to obejmuje inflację, wzrost produktu krajowego brutto, wydatki rządowe na edukację, zużycie energii elektrycznej, kurs walutowy, otwartość handlową i oprocentowanie kredytu jako zmienne ekonomiczne. Czynniki te opierają się na ich względnej wadze z poprzedniej literatury empirycznej. Ogólne wyniki wskazują, że istnieje mieszany wynik pod względem kluczowych czynników wpływających na napływ BIZ na poziomie sektorowym, co dowodzi, że bezpośrednie inwestycje zagraniczne nie są pojedynczym zjawiskiem i że każdy sektor musi być traktowany na własnych warunkach w celu przyciągnięcia bezpośrednich inwestycji zagranicznych do tego kraju.
Słowa kluczowe: bezpośrednie inwestycje zagraniczne, dane panelowe, sektorowe bezpośrednie inwestycje zagraniczne, gospodarki ASEAN.

东盟内向外国直接投资（FDI）的行业层面决定因素分析

摘要：本文研究了六个东盟国家（马来西亚，印尼，新加坡，泰国，越南和菲律宾）的行业层面（采掘业，制造业和装配业，基础设施业和服务业）的外商直接投资的经济决定因素。该研究涵盖了从2001年到2016年的16年时间，采用静态面板数据模型。这项研究包括通货膨胀，国内生产总值增长，政府教育支出，电力消费，汇率，贸易开放和贷款利率作为经济变量。这些因素是基于它们相对以前经验文献的重要性。总体调查结果显示，就部门层面内向外商直接投资的关键决定因素而言，存在混合结果，这证明外国直接投资不是单一现象，必须按照自己的条件对待每个部门以吸引外国直接投资进入该国。
关键词：外商直接投资，面板数据，外商直接投资，东盟经济体