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# Determinants of Foreign Direct Investment: Evidence from Provincial Level Data in Indonesia

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## Abstract

Foreign direct investment (FDI) is especially important for developing countries. This study investigates the determinants of FDI in the case of Indonesia. Most empirical researches in this field used time series data of a single country or panel data of several countries. Although panel data analysis is more comprehensive, however results taken from cross-country analysis cannot be directly applied to any specific country in the dataset and therefore lacks practicality. In this research, panel data analysis of a single country is performed to overcome the aforementioned shortcomings. Five determinants of FDI are tested using panel data of 33 Indonesian provinces over 10-year period of time. Two methodologies are adopted, random/fixed effects model and Granger Causality. The results show that only market size significantly affects FDI when tested using both methodologies. Human capital and financial market development show significant result in one of the two methodologies. While, economic growth and infrastructure did not show any significant results at all. This research stresses the importance of comprehensive single country analysis since only one out of five commonly discussed determinants is applicable in the case of Indonesia. Governments should therefore carefully reconsider the use of cross-country analysis as a basis of their policy formulations.

**Keywords:** Foreign Direct Investment, Market Size, Human Capital, Financial Market Development, FDI Determinants

**JEL Classification Code:** C33, F21, J24, O47, O53

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## 1. Introduction

Foreign direct investment (FDI) is one of the commonly discussed topics in economics. Many researchers as well as government officials view FDI as a way to foster the economy. There are many positive aspects of FDI that can help the economy grow. Examples include technology spillover, knowledge spillover, employment of local labor, increased production and many others. As a result, many governments around the world, especially those of the developing countries pass legislations and policies in favor of foreign investments. This is also the case in Indonesia.

Since FDI has been seen as a growth determinant, many researchers have devoted their time to analyse the determinants of FDI. There are numerous findings and varying results, however there are five particularly striking determinants in the literature. These are economic growth, market size, human capital, financial market development and infrastructure. The aim of this research is to investigate the determinants of FDI in the case of Indonesia. This is important since Indonesia is a developing country whereby the government sees FDI as a crucial driver of its economy. By empirically testing factors contributing to inward FDI, the government can initiate the right policies in order to attract as many FDI as possible. Thus, commonly discussed factors from the literature are tested in this research to find out whether these determinants are applicable to Indonesia.

Furthermore, most researches tend to focus on analyzing either time series study of a single country or panel data of multiple countries. Although panel data analysis is more informative and comprehensive compared to the time series analysis, yet the results taken from cross country analysis cannot be directly applied to any specific country in the dataset and therefore lack practicality. In this research, panel

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data analysis of a single country is carried out to overcome the aforementioned shortcomings. The analysis is done using 10 year data of 33 provinces in Indonesia. Hence, the results are comprehensive and can be directly applied to Indonesia. Moreover, the data analysis is performed using two different methodologies to double check the results. All in all, the results of this research have both practical as well as theoretical contributions.

## 2. Literature Review

There are many possible reasons as to why multinationals decide to invest in other countries. These reasons provide prospective determinants of FDI. Indonesia should focus on improving aspects which are deemed important by foreign investors. In order to do that, it is crucial to know the determinants of FDI in the case of Indonesia. The result of this research is important in making sure that the government is creating policies which are effective and efficient in fostering inward FDI.

Although there are numerous literature examining the determinants of FDI, however the results might differ for different countries. The reasons why foreigners invest in Indonesia as a developing country might be different compare to the reasons of inward FDI into the United States. This is supported by the fact that the largest beneficiary of inward FDI into Indonesia is Singapore, followed by other countries such as Japan and South Korea. These home countries are all located in Asia. Many developing countries have received FDI from Western countries that might be attracted to different host countries characteristics compare to multinationals from Asian countries. Therefore, it is important to understand the specific determinants of inward FDI to Indonesia.

The determinants of FDI certainly relate to the original question of the motivation behind investing abroad. There are different determinants of FDI according to the different motivations. One of the common classifications of the reasons behind investing abroad is market seeking and efficiency/resource seeking (Saini & Singhanian, 2018). Multinationals that invest abroad to capture the local market surely are attracted to determinants such as market size and growth rate of the country. Market size which is normally proxied by nominal GDP has been proven to be a valid determinant of FDI in many studies. Starting from the early 20th century until the latest study in 2018, scholars have proven that market size is a significant determinant of FDI. Nunnenkamp and Spatz (2002) found that market size, human capital and trade openness, though only in the manufacturing sector, are determinants of FDI in its sample of 28 developing countries. The data taken was over a decade from 1987 until 2000.

There are always overlapping determinants that have been found to be significant from research to research. However,

market size is a determinant which has stood strong up until now. Mottaleb (2007) also found that market size, alongside growth rate, industrial value added, infrastructure and cost of business are the determinants of FDI. Although the time span taken was rather short (2003-2005), however the study included 60 countries in its dataset. Mottaleb and Kalirajan (2010) proved once again that market size, economic growth, trade openness and business friendly environment are significant determinants of FDI. The time span used was also 3 years from 2005 to 2007, however the number of countries increased to 68.

Later research also found that market size is still a valid determinant regardless of globalization and changes in the business world. Dellis et al. (2017) proved that market size, labor cost, trade openness and tax revenues are determinants of FDI according to analysis of dataset taken from 21 OECD countries over a decade from 2005 to 2014. Their findings are supported by Saini and Singhanian (2018) a year later using similar dataset. The dataset also spanned over a decade from 2004 to 2013 and covered 20 countries. They found that market size, freedom index, efficiency scores, trade openness and capital formulation are the determinants of FDI.

Furthermore, market size was also found to be a significant determinant of FDI in time series analysis. Ang (2008) proved that financial development, market size, economic growth, infrastructure, trade openness, diminished currency and corporate tax rate are determinants of FDI in Malaysia using data from 1960 to 2005. Market size and economic growth are often found to be significant determinants together since these two are indicators of market seeking FDI. Economic growth was also found to be significant determinant of FDI in time series analysis of Pakistan by Rehman et al. (2012). The analysed time span was almost 3 decades from 1980 to 2008. They found that the determinants of FDI in Pakistan are economic growth and political stability.

Other researchers also specifically analysed the determinants of FDI taking into account not only the host country indicators but also the home country. Blonigen and Piger (2011) used Bayesian Model Averaging and found out that the determinants of FDI include gravity variables, cultural distance, parent-country per capita GDP, relative labor endowments and regional trade agreements. It can be seen that their research introduced a new point of view in analysing determinants of FDI. They showed that the relative terms between home and host countries are very important instead of solely looking at the host country's figures. Last but not least, Walsh and Yu (2010) introduced a sectoral and institutional approach at finding the determinants of FDI using panel data of 27 countries from 1985 to 2008. They found that FDI stocks is a determinant of FDI in the primary sector. Flexible labor markets and deeper financial markets are determinants of FDI in secondary sector. Lastly, determinants of FDI in tertiary sector are infrastructure and

independent judiciary. As it can be seen, there are still not many researches focusing on provincial FDI. Therefore, one of the research contributions of this paper is the use of provincial data set.

It can be seen that several determinants have been empirically tested and proven many times to have positive effect on the amount of inward FDI. Determinants that frequently overlapped in previous literature are tested in this research to see whether those determinants are also applicable in the case of Indonesia. The two previously discussed determinants are certainly included in this research. These two are market size and economic growth. Apart from the two determinants, there are also other determinants that appear numerous times in previous literature. These determinants include infrastructure (Ang, 2008; Mottaleb, 2007; Tran et al., 2020), human capital (Dizon & Cruz, 2020; Nguyen, 2021; Nunnenkamp & Spatz, 2002) and financial market development (Ang, 2008; Walsh and Yu, 2010). Thus, these three determinants are also included in the analysis. In total there are five determinants that are tested in this research to see whether these are the right determinants of inward FDI into provinces in Indonesia. The hypotheses are introduced in the next chapter of this paper.

### 3. Research Methods

Based on the literature review, the hypothesis is proposed below. Since this is an economic research, the hypothesis proposed is shown in the form of an econometric model.

$$\text{IFDI}_{i,t} = \beta_0 + \beta_1 \text{MSZ}_{i,t} + \beta_2 \text{GROWTH}_{i,t} + \beta_3 \text{HC}_{i,t} + \beta_4 \text{FMD}_{i,t} + \beta_5 \text{IFR}_{i,t} + e$$

The hypothesis tests the determinants of FDI in the case of Indonesia. As discussed in the literature review, there are five determinants of FDI that are included in this equation. This equation was also partly taken from Li & Liu (2005) who specifically studied about the endogenous relationship of FDI and economic growth. IFDI corresponds to inward FDI, MSZ corresponds to market size, GROWTH corresponds to economic growth, HC corresponds to human capital, FMD corresponds to financial market development, IFR corresponds to infrastructure, and  $e$  represents the error term. Due to the use of panel data, the province is indicated by subscript  $i$  and the year is indicated by subscript  $t$ .  $\beta$  is used to represent the coefficient of each variable.

Ordinary least squares (OLS) regression is a generalized linear modeling technique which can be used to model a single response variable which has been recorded on at least an interval scale, it can be applied to single or multiple explanatory variables Hucheson (2011). This regression method is commonly used by researchers worldwide

including those in the field of FDI (Alfaro et al., 2004; Carkovic & Levine, 2002; Cheung & Lin, 2004). OLS is a simple regression which is easily understood by many people. Therefore, it is beneficial to use OLS in order to be able to deliver the message to the public. This method is able to analyze the effect of explanatory variables on the dependent variable. The importance or significance of each variable in the equation can be known through several statistical results, such as  $R^2$  or adjusted  $R^2$ ,  $F$  statistic and  $P$ -value. This method can also be carried out using many statistical packages available. Several of the examples are SPSS, Eviews and STATA.

This method is used to estimate unknown parameters in a linear regression model and it minimizes the sum of squared vertical distances between the observed and predicted responses. However, to provide the best estimates, there are certain assumptions that must be met. There are several assumptions in the classical linear regression model. The first one is strict exogeneity of the regressors. It means that the errors have mean zero and that the regressors are not correlated with the errors. This assumption is very important in performing OLS. If the regressors are endogenous, then OLS estimations are not accurate. The second assumption is regarding multicollinearity. The regressors have to be linearly independent, if not then the regression coefficient cannot be computed. The third assumption is homoscedasticity. This is regarding the variance of error term. If the error term does not have the same variance in every observation, it is referred to as heteroscedasticity and OLS estimates become inefficient. The next assumption is nonautocorrelation. This is also related to the error term, the errors should not correlate between observations. If they do, then generalized least squares is better than OLS. Last but not least is normality. Unlike the previous four, this assumption is not necessary, however it reassures the validity of OLS. The errors should have normal distribution conditional on the regressors (Ordinary Least Squares, 2012).

OLS can be used for both bivariate as well as multivariate equations. As it can be seen from the proposed hypothesis, it has several explanatory variables. Furthermore, the data used in this research is panel data because it contains both cross-sectional and time-series data. Therefore, pooled OLS is not sufficient for this type of dataset. This is where the random effects and fixed effects model come into play. In order to use random effects model, individual-specific effect should be a random variable that has no correlation with explanatory variables at any time whether it is in the past, present or in the future of the same individual. Furthermore, the individual-specific effect should have constant variance and the regressors should not be perfectly collinear including a constant. Lastly, all regressors but the constant have variance that is not zero and not too many extreme values (Schmidheiny, 2011).

In the case of fixed effects model, it does not require as many assumptions. Fixed effects model only needs to assume the last assumption of random effects model. OLS cannot analyse panel data, therefore random/fixed effect is used in this research. Hausman test is carried out to determine which test should be done. Apart from these two models, Granger causality is also performed as the second research methodology used in this paper.

Granger causality is rather famous in experimental as well as non-experimental field that includes dynamic econometric time series methodology (Awe, 2012). Granger causality is a statistical concept of causality that is based on prediction and its mathematical formulation is based on linear regression modeling of stochastic processes (Granger, 1969; Seth, 2007). A well-known requirement for Granger causality test is stationarity of the variables. Therefore, a test should be carried out in the beginning to make sure that these variables are stationary. There are numerous stationarity tests, however many of them are applicable only for time series data. A between-group panel unit root test is called Im, Pesaran and Shin (IPS) unit root test. The null hypothesis of this test suggest that the variable has a unit root, which means that they are not stationary (Samimi et al., 2013). This test is performed first to make sure that the data can be used in the granger causality analysis. Granger causality is normally used in time series data and was developed by Granger in 1969. The main idea behind granger causality is that if the past values of a variable can predict the current value of another variable even when past values of the second variable are included in the model, then the first variable exerts a causal influence on the second variable (Lopez & Weber, 2017). This can be done the other way as to see whether there is also a causal influence from the second variable to the first. The result therefore suggests whether there is no causality, unidirectional causality or bidirectional causality.

In the case of Granger causality in panel data, there are numerous ways to test it. There is a method put forward by Hurlin and Venet (2001), Hurlin (2004) and Hansen and Rand (2006). In this method, there are three tests that should be done, which are homogenous and instantaneous non-causality hypothesis (HINC), homogenous causality hypothesis (HC) and heterogenous non-causality hypothesis (HENC) (Beyzatlar et al., 2014). Another method is by using the dynamic error correction model where the causality is determined by testing for significance of the coefficients on the lagged variables (Samimi, et al., 2013). There is also a test called Dumitrescu-Hurlin test which determines causality in panel data and assumes that causality might differ across individuals (Lopez & Weber, 2017). The panel Granger causality test in this research is carried out using Eviews 11 where the test is done in normal Granger causality way, however it does not allow the data from one cross-section to enter the lagged values of data from the next cross section.

## 4. Results and Discussion

As explained in previous chapter, pooled OLS is not sufficient in this case, therefore either random effects or fixed effects model are going to be used. All of the analysis are done using Eviews 11. Both random effects and fixed effects are run before performing Hausman test. Hausman test indicates which model is more suitable. Therefore, Hausman test is reported first, then random or fixed effects model are shown next based on the Hausman test result. Fixed effects model is chosen as indicated by below.

The null hypothesis of Hausman test is that random effects model is appropriate. Since the  $p$  value is lower than 5% (0.0026), therefore null hypothesis is rejected, consequently fixed effects model is selected. In order to overcome the problem of heteroscedasticity, robust fixed effects model is applied. There are in total 330 observations of 33 provinces from 2010 to 2019 included in the analysis. The probability of the  $F$  statistic is less than 5% (0.0000), which means that the overall model is significant.

The value of  $R^2$  is 0.87 and adjusted  $R^2$  is 0.85, it shows that the variables used in the estimation has accounted for more than 85% of the variance of inward FDI. The table above shows test results of determinants of FDI. As mentioned in the literature review, there are five commonly discussed determinants of FDI, which are market size, economic growth, human capital, financial market development and infrastructure. The results show that out of these five variables, two variables, market size and human capital are significant at 5% confidence level.

Granger causality determines whether one variable granger causes the other variable. There are two main variables in this research which are FDI and economic growth. However, since determinants of FDI are also studied in this research, therefore granger causality of the six expected FDI determinants and FDI are also reported. These six FDI determinants are economic growth, market size, trade openness, human capital, financial market development and infrastructure. Since economic growth is one of the six determinants, therefore there are still six variables in total that are going to be analysed against FDI using Granger Causality test. The number of lag used in the analyses is two. Therefore, several of the variables have less number of observations due to this matter. The results are shown in Table 3 below. The null hypothesis of Granger Causality is always the same where one variable does not Granger Cause the second variable. It means that the probability has to be less than 0.05 to be able to reject the null hypothesis, which means that variable  $A$  Granger causes variable  $B$ .

Looking at the first set of variables, which are FDI and market size, the results show that market size does Granger Cause FDI but FDI does not Granger Cause market size. This is not the case with the rest of the relationships between FDI

and proposed FDI determinants other than financial market development. Economic growth does not Granger Cause FDI and also the other way around. The same result is found with human capital and infrastructure. FDI does not Granger Cause human capital and infrastructure vice versa. Financial market development is the only one similar to market size. It does Granger cause FDI, however FDI does not Granger cause financial market development. Granger Causality is simple yet meaningful in order to observe the relationship between two variables. As always, there are expected and unexpected results.

The results of this research show that not all of the commonly discussed variables are the determinants of FDI in the case of provinces in Indonesia. These five determinants of FDI are tested using two different research

methodologies, which are the fixed effects model and granger causality. Both methods provide different results for the determinants except for market size, economic growth and infrastructure. The first variable, market size has been proven to have significant effect on FDI using both methodologies. Economic growth and infrastructure are not determinants of FDI when tested using both methodologies. Human capital and financial market development showed different results according to different methodologies used.

Economic growth is seen to be one of the major determinants of FDI (Addison & Heshmati, 2003; Ang, 2008; Mottaleb, 2007), however as stated by Simionescu (2016) in his study of the European Union countries, there are several countries whereby higher GDP did not result in higher FDI. In this case, economic growth does not show any significant result in both methodologies. This is why single country analysis is very important apart from cross-country analysis. There are different country characteristics that simply cannot be generalised into a single result. This result is also supported by a time series study of Canada where the results show that economic growth does not affect FDI vice

**Table 1:** Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq d.f.	Prob.
Cross-section random	18.271789	5	0.0026

**Table 2:** Fixed Effects Model Results

Variables	Coefficient	Standard Error	t-Statistics	Probability
C	-1964052.	645291.4	-3.04366	0.0025
MSZ	0.002600	0.001227	2.11980	0.0349
GROWTH	7807.311	11885.73	0.65686	0.5118
HC	33264.62	9253.394	3.59486	0.0004
FMD	-1.894272	1.165881	-1.62476	0.1053
IFR	-5028.468	2861.218	-1.75746	0.0799

**Table 3:** Granger Causality Results

Null Hypothesis	Obs.	F-Stats	Prob.
MSZ does not Granger Cause FDI	297	17.9108	0.0000
FDI does not Granger Cause MSZ		0.0360	0.8497
GROWTH does not Granger Cause FDI	297	0.0049	0.9441
FDI does not Granger Cause GROWTH		0.0502	0.8229
HC does not Granger Cause FDI	297	0.1474	0.7013
FDI does not Granger Cause HC		0.6962	0.4048
FMD does not Granger Cause FDI	297	6.6051	0.0107
FDI does not Granger Cause FMD		3.5615	0.0601
IFR does not Granger Cause FDI	297	0.3330	0.5644
FDI does not Granger Cause IFR		3.2963	0.0705

versa (Asheghian, 2011). Both of these studies support the results of this research whereby economic growth is not a determinant of inward FDI.

Similar to economic growth, market size has also been seen as one of the main determinants of FDI. This is due to the theory of market-seeking FDI. The fixed effects model show that market size significantly affects FDI. This is also the case with Granger Causality. This result is expected since Indonesia is the fourth most populous country in the world. The market size is very big, therefore many multinationals are interested in establishing their business in Indonesia to capture the local market. This result is supported by many literature as previously mentioned in the literature review.

Another determinant of FDI is the level of schooling or human capital. This variable has significant effect on FDI in fixed effects model, but not in Granger Causality. This shows that lagged values of human capital cannot be used to predict future values of FDI. However, it is one of the two significant determinants of FDI in the fixed effects model. It shows that although lagged values of education cannot be used to forecast FDI, yet the current value is a significant factor in determining value of FDI. Therefore, government should take human capital into account when constructing policies to attract foreign investment into the country. This shows that multinationals do not only focus on marketing their products in Indonesia but they are also interested in setting up production plant, since skilled labor is one of their considerations when making investment in Indonesia.

Infrastructure is also quite frequently discussed as a determinant of FDI. However, similar to previously discussed variables, infrastructure is also not a determinant of inward FDI into Indonesian provinces. A study in Bahrain showed that infrastructure is also not a determinant of FDI (Gharaibeh, 2015). Study of the effect of infrastructure on FDI in Africa also showed that there are no significant effect of different kinds of infrastructure on FDI (Michiels, 2018). The results showed that all three types of infrastructure, namely transportation, communication and electricity do not significantly affect FDI in Africa. Therefore, the result of this research found supports from previous literature.

Although not as commonly discussed as the other determinants, financial market development also received attention as one of the determinants of inward FDI. There are conflicting results from the two methodologies. Fixed effects model shows that financial market development has no significant effect on FDI, while it was proven to granger cause FDI. The result of fixed effects model is supported by a study conducted on developing countries whereby financial development was found to be insignificant (Phung, 2016). This result is also somehow supported by a study in Botswana. The study found that there is no direct causal relationship between banking sector development and inward FDI (Tsurai, 2014). Despite insignificant effect

in fixed effects model, financial market development was proven to Granger cause FDI, this shows that it takes time in order for financial market development to affect inward FDI. Therefore, government should pay attention to this variable as well.

Looking at the fact that only one determinant is supported by both methodologies, it shows that despite the common results of previous literature, inward FDI in the case of Indonesia is not affected by economic growth and infrastructure. Therefore, if the government wants to attract more inward FDI into the country, they should pay close attention to market size. Human capital and financial market development were proven to affect FDI by at least one of the two methodologies. Thus, these two variables should also be given extra attention from the government. These results affect how the government should design their nationwide plan so that they can attract foreign investments more efficiently and effectively. It is also important for the government not to generalize and based their strategies on research performed using cross-country data including those of similar countries, such as Asian countries or developing countries. This research shows the importance of performing single country analysis that can be used as reference by local governments when creating policies.

## 5. Conclusion

In this study, panel data of 33 provinces over 10 years period of time from 2010 to 2019 was analyzed using fixed effects model and Granger Causality in this study. Despite numerous empirical supports for five determinants of FDI, which are market size, economic growth, human capital, infrastructure and financial market development, only one out of these five determinants proved to be significant in two different methodologies employed. This determinant is market size, it shows that many foreign investors are focused on capturing Indonesia's local market that is considerably large. Furthermore, human capital and financial market development showed significant result in one of the two methodologies used. Government should also take these two factors into considerations when formulating FDI related policies. This research made use of panel data of a single country instead of time series of a country or cross-country panel data, therefore it has direct practical implications for Indonesian local authorities as well as theoretical contributions.

There are several limitations of this study including the limited number of factors included in the analysis, the length of panel data and the methodologies used. Future research are advised to study more determinants and include longer time series. Similar studies should also be carried out in other countries so that the results can be directly used by the analyzed country. The results of this research stressed

the importance of a more in-depth single country analysis since common determinants found in the literature do not always apply to a particular country due to country-specific characteristics.

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