Djulius, Horas

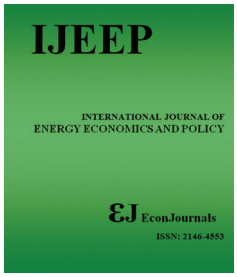
Article

Energy use, trade openness, and exchange rate impact on foreign direct investment in Indonesia

International Journal of Energy Economics and Policy

Provided in Cooperation with:
International Journal of Energy Economics and Policy (IJEEP)

Reference: Djulius, Horas (2017). Energy use, trade openness, and exchange rate impact on foreign direct investment in Indonesia. In: International Journal of Energy Economics and Policy 7 (5), S. 166 - 170.



International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2017, 7(5), 166-170.

Energy Use, Trade Openness, and Exchange Rate Impact on Foreign Direct Investment in Indonesia

Horas Djulius*

Faculty of Economics and Business, Universitas Pasundan, Indonesia. *Email: horasdjulius@unpas.ac.id

ABSTRACT

We conducted an inquiry on the short run and long run impact of energy use, trade openness, and exchange rate on foreign direct investment (FDI) in Indonesia from 1981 to 2015. Energy use is one of the key variables because host countries cannot easily anticipate short-term energy shortage, whereas foreign investors interpret such shortage as an indicator of progress and readiness of the manufacturing sector. We use the error correction model to explain the interrelationship between predictors and their effect on FDI. Results show that short run trade openness significantly affects FDI. By contrast, long-term energy use and trade openness variables have a positive and significant influence, whereas exchange rate has a negative linkage.

Keywords: Foreign Direct Investment, Energy Used, Trade Openness, Exchange Rate, Error Correction Model
JEL Classifications: F21, F31, Q43

1. INTRODUCTION

Foreign direct investment (FDI) is an important variable in improving the economic development of developing countries. Indonesia is a developing country in Southeast Asia that requires FDI to support its development. FDI inflows in Indonesia started to increase dramatically in 2004. FDI inflows in 2005 were higher than the previous peak in 1996, which further increased by another 170 percent from 2005 to 2014. According to the Investment Coordinating Board of the Republic of Indonesia (Sjöholm, 2016), this strong growth continued in 2015, wherein FDI increased by almost 20 percent from 2014 to 2015.

Energy is one of the important factors that encourage FDI. Compared with other countries, Indonesia is a wasteful country in terms of energy consumption (measured by energy intensity). However, Indonesia continues to have low energy consumption per capita. Indonesia is expected to reach energy deficit in 2019 if the country's energy management will not improve. Countries aim to avoid energy deficit because it entails heavy dependence on other parties or countries. A number of studies examined the causal relationship between energy or electricity consumption on some independent variables, such as economic growth, prices, employment, and FDI. Previous studies analyzed energy consumption (Elliott et al., 2013; Sbia et al., 2014; Zaman et al., 2012). Empirical studies found the a negative impact of FDI on energy consumption; these studies concluded that FDI was not explained by excessive energy practices (Lee, 2013; Sbia et al., 2014). However, most econometric models find a positive correlation between FDI and energy consumption as shown in high energy use (Omri and Kahouli, 2014; Zaman et al., 2012). Several empirical results showed a significant relationship between energy use and FDI (Tang, 2009; Sadorsky, 2009; Chandran et al., 2010). Long-term influence of energy consumption on FDI is observed, but no relationship was found in the short term (Bekhet and Othman, 2011). Other possible factors that affect FDI are trade openness and exchange rate. According to the Global Competitiveness Report, Indonesia's domestic market index ranked third from 2013 to 2014, with a value of 6.2 of the total value of 7, whereas the Indonesian foreign market index ranked fourth with a value of 6.4. The report states that the Indonesian market has a considerable potential for domestic and foreign investments. Economic openness greatly affects the behavior of investors. A country with an open economy will attain high

FDI coming in because investors have high expectations of business turnover in the host country (Liargovas and Skandalis, 2012). Economic openness can enable countries with abundant resources to export goods and allow countries with scarce factor of production to import goods. The advantages of economic openness through trade include wide market access, high levels of efficiency and economic competitiveness, and improved employment opportunities. Several studies found a positive relationship between trade openness and FDI flow (Biglaiser et al., 2006; Chakrabarti, 2001). The reference rate of Jakarta Interbank Spot Dollar Rate released by Bank Indonesia shows that the rupiah exchange rate in 2016 was approximately Rp. 13,000 per US dollar. Research in Morocco and Nigeria found that exchange rates had a significant negative effect on FDI (Bouoiyour, 2007; Udoh and Egwaikhide, 2008). Other studies in Nigeria showed that exchange rate does not affect the entry of FDI (Ahmed and Mayowa, 2012). Exchange rates can affect investments in various ways depending on the investor's intention. When the focus of the investor was the local market, the appreciation of the local exchange rate increases the FDI due to the increased purchasing power of local consumers. When the goal of the investor is export, the appreciation of the local currency reduces FDI inflows through low competitiveness given the increase of labor costs (Bénassy-Quéré et al., 2001). A negative and significant relationship of exchange rate volatility to FDI was found among EU member states in Central and Eastern Europe (Arratibel et al., 2009).

The intention of foreign investors to invest in the host country can be observed from the perspective of international trade and the ability of the industrial sector to support FDI, which can be proxied through the energy use of a country. The effect of energy use as an economic variable on FDI is rarely studied, particularly for short-term and long-term periods. The main determinants of FDI in a host country are trade openness, market size, labor force, infrastructure, and investment rate of return. The experiences of South Asian countries illustrate the importance of trade openness to attract FDI (Sahoo, 2006). A positive and significant relationship exists between trade openness and FDI. Trade openness increases the export-oriented inflows of FDI, whereas trade restrictions increases FDI tariffs. The openness of economic trade increased positively with the size of capital inflows of export-oriented exports. In addition to trade liberalization, FDI relies on political stability, exchange rate stability, and market size of the economy. Thus, developing countries must stabilize their exchange rate and political situation along with trade openness to attract more FDI (Liargovas and Skandalis, 2012). FDI decisions depend on the various characteristics of host countries, such as exchange rates, market size, trade openness, political stability (risk), labor costs, investment costs, trade costs, human capital, trade deficits, foreign debt, domestic investment, human capital, inflation, taxes, budget deficits, government consumption, and energy used (Blonigen, 2005). Other factors that attract FDI were also found, such as institutional quality, physical infrastructure, import tariffs, macroeconomic stability, and political stability (Trevino et al., 2002).

Therefore, this study highlights the factors that affect FDI in Indonesia using the macroeconomic variables of energy used, trade openness, and exchange rate in the short and long term.

2. RESEARCH METHOD

2.1. Data

Energy use indicates the use of primary energy, which is equal to original production, plus imports and stock changes and minus exports (kg of oil equivalent per capita). The growth of energy use in developing countries is closely connected to modern sectors of growth (i.e., manufacturing, transportation, and urban regions). Trade openness is the sum of exports and imports of goods and services (% of gross domestic product [GDP]). Trade openness is calculated as part of GDP. Exchange rate was determined by national authorities, in this case, Bank Indonesia. Exchange rate is calculated as an annual average based on monthly averages (Rp/USD). FDI is equity flow in the reporting economy, which summarizes equity capital, reinvestment of earnings, and other capital (US Dollar). We obtained the data from World Bank, Bank Indonesia, and Statistics Indonesia from 1981 to 2015.

2.2. Model

We construct an error correction model that associates energy use, trade openness, and exchange rate to foreign investments in the short- and long-term.

Long-term model

$$FDI = \alpha_0 + \alpha_1.Ener + \alpha_2.Open + \alpha_3.ER + \xi \quad (1)$$

We transform the equations into error correction models to measure short-term and long-term effects.

Short-term model

$$DFDI = \delta_0 + \delta_1.DEner + \delta_2.DOpen + \delta_3.DER\delta_4.Ener(-1) + \delta_5.Open(-1) + \delta_6.ER(-1) + \delta_7.ECT(-1) \quad (2)$$

Where;
DFDI = Changes in foreign direct investment
DEner = Changes in energy use
DOpen = Changes in trade openness
DER = Changes in exchange rate
Ener(−1) = Energy use, last period
Open(−1) = Trade openness, last period
Er(−1) = Exchange rate, last period
ECT(−1) = Error correction term
Error correction term is the residual value of the static equation or the long-term model in Equation (1).

$$\hat{\varepsilon} = FDI - \beta_0 - \beta_1.Ener - \beta_2.Open - \beta_3.Er \quad (3)$$

3. RESULTS AND DISCUSSION

The descriptive statistical analysis provides an overview of the data to represent the variables used in the research model. This descriptive statistical analysis shows the behavior of each independent variable in influencing the movement of dependent variables. First, we separately test the stationarity of each

independent variable. A cointegration test of all predictors of FDI is then conducted. We then estimate the static equation model followed by estimating short- and long-term equations.

Table 1 describes the stationary test results for detecting spurious regression for two or more variables that appear statistically significant.

Based on the unit root test, all independent and dependent variables are stationary on the first difference and not stationary at the level.

In the cointegration test, residual is stationary at the level to avoid spurious regression. Table 2 presents the results.

The results show that error correction term is stationary. Thus, the correction term error can be applied in the short-term mode. A long-term relationship exists between research variables.

Table 3 illustrates the relationship between energy use, trade openness, and exchange rate on the static equation. All variables have a significant influence on the 95% level.

The short-term equation estimation in the short-term model is shown in Table 4.

Table 4 shows significant ECT, which means that the ECM model is valid and can be used to analyze observed variables.

The regression coefficients for the relationship between energy use, trade openness, and exchange rate variables are obtained through calculations, as described in the Appendix. The equations for the long-term relationship are as follows.

$$FDI=-4.72E09+1.01\ ENER+2.376E10\ OPEN-69535 \quad (4)$$

The equation shows that energy use and trade openness have a positive and significant relationship in influencing FDI in the long run, whereas the exchange rate variable has a negative and significant relationship to FDI. This finding indicates that the real strengthening of funding sources of energy development, trade openness, and exchange rate affects the performance of FDI in Indonesia.

Short-term energy use has a positive but insignificant relationship to FDI, whereas long-term energy use has a positive and significant linkage. In developing countries, the development of the manufacturing sector, transport sector, and other modern sectors in urban areas can be represented by energy use. Thus, foreign investors consider energy use as a proxy for sector advancement that has interaction with their potential investment business. Foreign investors believe that the host country does not lack the energy needed in the manufacturing sector. Their factory plant does not lack energy when the business operates. The business is also supported by other businesses, which serve as a supplier or market. Explanations lead to a positive influence between energy use and foreign direct investors (Omri and Kahouli, 2014; Zaman et al., 2012). This finding may not be considered by foreign investors in the short run, but foreign investors learn from what they understand about energy use role in the long run. Thus, long-term decision toward investment is driven by the energy use of host country. Moreover, lack of energy supply may be a big problem for foreign investors if the host country is a developing country where energy supply is not as much as in developed countries. This problem stems from the fact that their products become less competitive due to high production costs.

Trade openness in both the short and long term has a positive and significant relationship to FDI. The results indicate the increase of open international trade of the host country and the inflow of FDI. Indonesia has long adhered to an open economy. Trade openness provides benefits for the countries involved because of the loss of barriers, both tariff and non-tariff, and the smooth progress of inter-country mobility (Agiomirgianakis et al., 2003; Anyanwu, 2011; Asiedu, 2002; Demirhan and Masca, 2008). For foreign investors, trade openness is related to the business. First, trade openness means they can easily import the needed supplies. Second, trade openness means that foreign investors can export their products in the host country. Third, trade openness means the ease of export and import of their business partners, suppliers, and buyers.

Short-term exchange rate has a negative but not significant relationship to FDI, whereas the long-term exchange rate has a significant influence. This finding shows that a depreciating exchange rate is one of the considerations of foreign investors to invest their capital. For developing countries whose currencies are lower than foreign currencies, an increase in exchange rates means that foreign investors can buy goods in host country cheaply. This finding benefits foreign investors if their goal is to re-export. A strong domestic currency (host country) attracts investors if their goal is the host country's domestic market (Ahmed and Mayowa, 2012; Bouoiyour, 2007; Udoh and Egwaikhide, 2008). Re-export and domestic market motives were observed among foreign investors in Indonesia. The present study supports the second

Table 1: Unit root test

Variable	Level		First difference		Second difference	
	ADF statistics	Significant level	ADF statistics	Significant level	ADF statistics	Significant level
FDI	−0.371496	x	−5.408025	***	−4.867565	***
Ener	−0.178559	x	−6.488443	***	−6.311502	***
Open	−1.096626	x	−5.135984	***	−8.983179	***
Der	−0.506825	x	−6.772241	***	−8.404403	***

Source: Research data processing, [x]non significant; ***significant at 99% level

Table 2: Cointegration test

Variable	ADF	Mac Kinnon statistic			P
	statistics	1%	5%	10%	
ECT	−5.860797	−3.653730	−2.957110	−2.617434	0.0000

Source: Research data processing

Table 3: Static equation estimation

Variable	Regression coefficient	P value
Intercept	−1.51E+10	0.0000
Ener	0.091129	0.0442
Open	5.73E+10	0.0002
Er	−1062276.	0.0234
R^2=0.75		
F stat=30.63, P=0.00		

Source: Research data processing

Table 4: Short-term equation estimation

Variable	Regression coefficient	P value
C	−1.18E+09	0.4633
D (ENER)	0.028020	0.7430
D (OPEN)	5.85E+10	0.0003
D (ER)	−537204.1	0.1411
ENER(−1)	0.002367	0.9352
OPEN(−1)	5.94E+09	0.5074
ER(−1)	−17384.38	0.9520
ECT(−1)	0.252919	0.0363
R^2=0.57		
F stat=4.84, P=0.00		

Source: Research data processing

hypothesis because Indonesia is a large market whose purchasing power is increasing.

4. CONCLUSION

Trade openness has a significant effect on FDI in the short term. Foreign investors define trade openness as the ease of their product's export and import and other supporting businesses. All predictors have long-term significant influences. Exchange rate has a negative effect, which means that the appreciation of the host country currency increases foreign investor interest. This finding means that the motive of foreign direct investors is to make the domestic market its main target in the long run. The open exchange rate policy is preferred by foreign investors because it reflects the relative comparison between the host country economy and world economy. Trade openness has a positive influence, which means that an open host country economy has a high inflow of FDI.

Foreign investors demand policy for economic openness given that it guarantees the supply and marketing of their products and their business partners. Energy use has a positive influence and is an important indicator for foreign investors that the host country is ready to accept external investment. High energy use refers to the availability of energy needed by FDI and can also describe the readiness and modernity of other FDI's supporting sectors. Long-term energy supply planning is one of the keys to the success of host countries in managing an economy that looks forward to external sources of growth.

5. ACKNOWLEDGMENT

The author is grateful to the anonymous referees of the journal for their useful suggestions to improve the quality of the article. The usual disclaimer applies.

REFERENCES

Agiomirgianakis, G.M., Asteriou, D., Papathoma, K. (2003), The Determinants of Foreign Direct Investment: A Panel Data Study for the OECD Countries, (Report No. 03/06). London, UK: Department of Economics, City University London.

Ahmed, E., Mayowa, G. (2012), The determinants and impacts of foreign direct investment in Nigeria. International Journal of Business and Management, 7(24), 67-77.

Anyanwu, J. (2011), Determinants of Foreign Direct Investment Inflows to Africa, 1980-2007, African Development Bank Group Working Paper, September. p131.

Arratibel, O., Furceri, D., Martin, R., Zdzienicka, A. (2009), Effect of exchange rate volatility on macroeconomic performance in Nigeria. Interdisciplinary Journal of Contemporary Research in Business, 9(34), 149-155.

Asiedu, E. (2002), On the determinants of foreign direct investment to developing countries: Is Africa different? World Development, 30(1), 107-119.

Bénassy-Quéré, A., Fontagné, L., Èche-Révil, A.L. (2001), Exchange rate strategies in the competition for attracting foreign direct investment. Journal of the Japanese and International Economies, 15(2), 178-198.

Biglaiser, G., de Rouen, K.Jr. (2006), Economic reforms and inflows of foreign direct investment in Latin America. Latin American Research Review, 41(1), 51-75.

Blonigen, B.A. (2005), A review of the empirical literature on FDI determinants. Atlantic Economic Journal, 33(4), 383-403.

Bouoiyour, J. (2007), The determining factors of foreign direct investment in Morocco. Saving and Development, 1, 91-105.

Chakrabarti, A. (2001), The determinants of foreign direct investment: Sensitivity analyses of cross-country regressions. Kyklos, 54(1), 89-114.

Chandran, V.G.R., Sharma, S., Madhavan, K. (2010), Electricity consumption-growth nexus: The case of Malaysia. Energy Policy, 38(1), 606-612.

Demirhan, E., Masca, M. (2008), Determinants of foreign direct investment flows to developing countries: A cross-sectional analysis. Prague Economic Papers, 17(4), 356-369.

Elliott, R.J.R., Sun, P., Chen, S. (2013), Energy intensity and foreign direct investment: A Chinese city-level study. Energy Economics, 40(2013), 484-494.

Bekhet, H.A., Othman, N.S. (2011), Causality analysis among electricity consumption, consumer expenditure, gross domestic product (GDP) and foreign direct investment (FDI): Case study of Malaysia. Journal of Economics and International Finance, 3(4), 228-235.

Lee, J.W. (2013), The contribution of foreign direct investment to clean energy use, carbon emissions and economic growth. Energy Policy, 55, 483-489.

Liargovas, P.G., Skandalis, K.S. (2012), Foreign direct investment and trade openness: The case of developing economies. Social Indicators Research, 106(2), 323-331.

Omri, A., Kahouli, B. (2014), Causal relationships between energy consumption, foreign direct investment and economic growth: Fresh evidence from dynamic simultaneous-equations models. Energy Policy, 67, 913-922.

Sadorsky, P. (2009), Renewable energy consumption and income in emerging economies. Energy Policy, 37(10), 4021-4028.
Sahoo, P. (2006), Foreign direct investment in South Asia: Policy, trends, impact and determinants. South Asia, 56, 1-76.
Sbia, R., Shahbaz, M., Hamdi, H. (2014), A contribution of foreign direct investment, clean energy, trade openness, carbon emissions and economic growth to energy demand in UAE. Economic Modelling, 36, 191-197.
Sjöholm, F. (2016), Foreign Direct Investment and Value Added in Indonesia, IFN Working Paper.
Tang, C.F. (2009), Electricity consumption, income, foreign direct investment, and population in Malaysia: New evidence from multivariate framework analysis. Journal of Economic Studies, 36(4), 371-382.
Trevino, L.J., Daniels, J.D., Arbelaez, H., Upadhyaya, K.P. (2002), Market reform and foreign direct investment in Latin America: Evidence from an error correction model. The International Trade Journal, 16(4), 367-392.
Udoh, E., Egwaikhide, F.O. (2008), Exchange rate volatility , inflation uncertainty and foreign direct investment in Nigeria. Botswana Journal of Economics, 5, 14-31.
Zaman, K., Khan, M.M., Ahmad, M., Rustam, R. (2012), Determinants of electricity consumption function in Pakistan: Old wine in a new bottle. Energy Policy, 50, 623-634.

APPENDIX

After we obtained the error correction term, the next step is to estimate the ECM for the short term by the ordinary least square method. Subsequently the short-run regression coefficient is attained (equation 2), long-term regression coefficient (equation 4) is acquired through:

$$\alpha_0 = \delta_0/\delta_9$$
$$\alpha_1 = (\delta_5+\delta_9)/\delta_9$$
$$\alpha_2 = (\delta_6+\delta_9)/\delta_9$$
$$\alpha_3 = (\delta_7+\delta_9)/\delta_9$$
$$\alpha_4 = (\delta_8+\delta_9)/\delta_9$$