



The effect of shadow economy on foreign direct investment: Empirical evidence in emerging market economies 1988-2018



 Aghni Majida

Martakusuma¹

 Wahyu Widodo²⁺

^{1,2}Faculty of Economics and Business, Diponegoro University, Semarang, 50241, Indonesia.

¹Email: aghniksm02@gmail.com

²Email: wahyurwid2002@gmail.com



(+ Corresponding author)

ABSTRACT

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This paper aims to examine the effect of shadow economy on foreign direct investment (FDI) in emerging market economies (EMEs) starting from 1988 to 2018. The error-correction model (ECM) is applied to estimate the dynamic panel data in the short run model, and for the long run model, this study applied ordinary panel data approach to both the fixed effect model (FEM) and the random effect model (REM). This study considers the global financial crisis of 1998 by dividing the estimation into three periods, i.e., pre-crisis, post-crisis, and all periods. The results show that shadow economy had a significantly negative effect on FDI inward both in the long run and the short run during the pre-crisis period, while economic growth, trade openness, policy rate, population, and infrastructure had various significant effects on FDI inward. The long-run estimation revealed that economic growth, policy rate, inflation, and the human development index (HDI) were all significant factors. Only the exchange rate, as one of efficiency-seeking motives and macroeconomic factors, has a significant role in FDI in EMEs. This analysis suggests that policymakers need to consider shadow economy along with investor motives and macroeconomic variables to provide more FDI, while investors need to consider the country's advantages that could potentially provide a rate on return on investment.

Contribution/ Originality: This study contributes to examining FDI determinants using shadow economy, investor motives, and macroeconomic factors simultaneously, with a specific emphasis on EMEs, which strengthens and complements existing literature that observes FDI determinants in different approaches separately. It investigates the relationships dynamically over thirty-one years and includes global financial crisis phenomena in the analysis.

1. INTRODUCTION

Lack of funds and low-quality resources are the main problems for developing countries. Policymakers suggest that developing countries must increase FDI to promote economic growth. In order to attract investors, policymakers must adapt regulations with a higher rate of return and an economic stability orientation (Blalock & Gertler, 2005). High investment will affect unemployment reduction and more technology transfer (Todaro & Smith, 2014).

With the global economic crises experienced in the late 1990s and 2000s, structural reform has changed many aspects of economics. In the 1990s, macroeconomics adopted structural reforms that led to improvements in FDI in EMEs (International Monetary Fund (IMF), 2003). A number of EMEs implement reductions in trade

barriers and international capital flow restrictions. In tandem with these developments, transportation and communication technologies have advanced significantly. The regulations stimulate easier investment and a higher rate of return for investors in EMEs.

Based on data retrieved from World Bank (2023) UN Trade and Development UNCTAD (2023) and IMF (2023) EMEs have higher economic growth than advanced and world economies. Meanwhile, FDI inward over the past five years shows stagnancy. This condition suggests that there are misspecifications in the Gross Domestic Product (GDP) calculation, called shadow economy. Shadow economies represent economic instability and tax evasion (Schneider & Enste, 2000) which are affected by low economic development, high unemployment rate, and ineffective government policy (Zolkover & Kovalenko, 2020). Shadow economies in EMEs still exist at an average of 11-30 percent in 14 countries, with 1 countries for approximately less than 10 percent, and 7 countries accounting for more than 30 percent (World Bank, 2023). In alignment with the theory, the existence of shadow economy has a negative relationship with FDI (Bayar, Remeikiene, Androniceanu, Gaspareniene, & Jucevicius, 2020; Buszko, 2021; Koyuncu & Ozen, 2021). Nevertheless, Ali and Bohara (2017) and Cuong, Luu, and Tuan (2021) found that shadow economy can be significantly positive for FDI. Hence, this study found that shadow economy has potentially affected the stagnation of FDI. Therefore, economic growth is insufficient to fully stimulate FDI.

FDI inward is also determined by the investor motives and macroeconomic factors (Arbatli, 2011; Dunning, 1988). Economic growth and population are part of market-seeking motives classified as market size that improve FDI (Adhikary, 2017; Resmini, 2000). Based on data retrieved from World Bank (2023) China, India, and Indonesia have the largest market-share in EMEs, with more than 200 million people. The market-size advantages of EMEs have the potential to attract larger FDI.

Other than that, efficiency-seeking motive variables play an important role in stimulating FDI, including trade openness, exchange rate, and inflation. Based on data retrieved from IMF (2023) inflation in EMEs has varied by country over the past five years. 19 countries showed low inflation, 2 countries had medium inflation, and 1 country had high inflation. The trade openness average attained more than 40 percent (World Bank, 2023). Furthermore, exchange rate determinations depend on the country system (Bruegel, 2023). It shows that efficiency-seeking motives could potentially attract FDI due to a lower inflation rate and higher trade openness. On the other hand, policymakers need to consider the economic conditions and systems of exchange rates among countries.

In addition, infrastructure and human capital are presented resource and assets-seeking motives. Due to scarcity of human capital, we prefer to use HDI. Bayar et al. (2020) explained that HDI has enhanced FDI, and previous studies seldom considered the shadow economy and human development as FDI determinants. Based on data retrieved from UNDP (2023) HDI average in EMEs is classified as middle or high HDI. It means that the level of health, education, and income in EMEs, as quality resources, have improved within the past five years.

Moreover, investors also consider the rate of return, which includes the interest rate, in their profit estimation (Blanchard, 2017; Froyen, 2019; Mankiw, 2017). Interest rate in this paper used policy rate as a proxy, as pointed out in the Mundell-Fleming theory. Policy rate in EMEs has differing specifications by country. Based on data retrieved from Bloomberg (2023a); Bank for International Settlements (2023); IMF (2023) and Federal Reserve Bank of St. Louis (2023) EMEs predominantly adjusted their policy rates with less than 5 percent in 11 countries, 5-10 percent in 6 countries, and more than 10 percent in 5 countries. To stimulate the rate of return, EMEs mainly set the policy rate lower than the global interest rate. In alignment with Adrian, Natalucci, and Wu (2024) the majority of EMEs are affected by global interest rate volatility rather than expectation from historical experience.

The main objective of this study is to examine FDI determinants. This study differs from previous studies by simultaneously including consideration of shadow economy, investor motives, and policy rate as FDI

determinants in EMEs within thirty-one years of observation. Previous studies and data calculations found various results about the shadow economy and investor motives that created a research gap for the analysis. A higher shadow economy along with the investor motives can possibly lead to an increase FDI or decrease in FDI, which depends on region, country condition, or investment policy.

Specifically, the economic growth in EMEs within the past five years, along with FDI stagnancy, can possibly be affected by shadow economy. Based on the theoretical explanation, the relationship of shadow economy to FDI is expected to be significantly negative. However, some empirical research indicates uncertainty in the relationship, which policymakers and investors may overlook. So, it is necessary to observe and confirm comprehensively the effect of shadow economy as an FDI determinant in the specific group of regions, which can be impactful to increase economic growth for the countries and improve profit for the investors.

Investor motives and macroeconomic factors also potentially affect FDI; however, the condition has varied by country. Based on the theoretical explanation, market-seeking and resource- and assets-seeking motives are expected to have significant and positive results, because they represent market size and availability of the resources as advantages for the investment. On the other hand, higher exchange rates and inflation, as well as the efficiency-seeking motives, led to lower FDI. In contrast, another efficiency-seeking motive, higher trade openness, improved FDI (Dunning, 1988). In addition, policy rates are expected to have a positive effect on FDI (Blanchard, 2017). To utilize FDI inwardly, this study was conducted to fill the research gap, add more variables, and complement weaknesses from previous studies to cover all aspects that could potentially impact FDI.

2. LITERATURE REVIEW

Shadow economy existed due to GDP miscalculation, which is the limitation of the estimation (Froyen, 2019). It demonstrates unemployment, high levels of government debt, recession, or high levels of tax and complexity of regulation that cause ineffective decisions (Schneider & Enste, 2000). Predominantly, economic instability caused by shadow economy is a potential problem leading to stagnation or lower FDI inward.

Theoretically, a higher shadow economy can lower the rate of return for the investors that generate lower FDI, but in previous studies, the results have been diverse. In line with the theory, Bayar et al. (2020) confirmed the long-run relationship of shadow economy to be significantly negative to FDI in the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. Whereas, in causality test, short-run estimation showed that shadow economy has significantly affected FDI. This connection is generated by high taxes and labor burdens, which represent economic instability. Similarly, Koyuncu and Ozen (2021) found a significantly negative relationship between the shadow economy and FDI in the Organization for Economic Co-operation and Development (OECD) countries for the long-run estimation. As supported by Buszko (2021) the negative correlation found between shadow economy and FDI in Poland.

In contrast, according to Ali and Bohara (2017) the shadow economy differential has increased FDI inflows due to the existence of tax benefits for multinational corporations. Based on Abdullayevich (2015) shadow economy relationships have varied by the group of countries. The shadow economy was found to be significantly negative in European countries, significantly positive in American countries, and insignificant in Asia. This study has shown that the effect of shadow economy can be different depending on geographic conditions, government system efficiency, size of market, and cheap labor costs in response to its existence. On the other hand, Cuong et al. (2021) found that shadow economy significantly promotes FDI through green field investments, which is possible in some countries with a higher level of informal economy. Tax avoidance and government interference in assessing resources and policies generate this shadow economy. Here, the company profits more by operating in an informal market. Several contradictions from previous studies were attributed to formality cost. Theoretically, the negative effect on the shadow economy is generated by unhealthy competition and lower market efficiency, which impact lower economic activities in the formal market. On the other hand, the positive

effect on the shadow economy is generated by the improvement of formality in the market. Entering the formal market can yield significant profits through various incentives. Nevertheless, formality requires more budget for the compensation that might be challenging to government decisions (Dell'Anno, 2022). In addition, there are some possibilities that initiated positive relationship of shadow economy to FDI, including domination of shadow economy, lower impact of FDI in economic activities, and foreign capital flow from informal markets (Buszko, 2021). The Theory of Dunning (1988) classified three investor motives, including market-seeking, resource-and assets-seeking, and efficiency-seeking motives. Moreover, Arbatli (2011) noted that macroeconomic factors and economic policies affect FDI determination. Market-seeking motives and macroeconomic components such as GDP per capita, economic growth, and real GDP have significantly positive effects on FDI (Adhikary, 2017; Alshamsi, Hussin, & Azam, 2015; Andrašić, Mirović, & Kalaš, 2019; Anwar, 2016; Dewi & Triaryati, 2015; Fitriyah, Rahmawati, & Narmaditya, 2021; Suharto, 2013; Taufik, 2014; Tsitouras, Mitrakos, Tsimpida, Vlachos, & Bitzenis, 2020; Xaypanya, Rangkakulnuwat, & Paweenawat, 2015). Moreover, population appeared to be significantly positive for FDI (Resmini, 2000; Wadhwa & Reddy, 2011).

Market size defines the existence of opportunities in FDI that can utilize resources and economies of scale. On the other hand, the GDP approach may generate bias by putting high-population countries into less-attractive categories. It is the opposite of the market size opportunities. So, this study recommends using GDP per capita along with GDP absolute as an alternative to cover the whole market size (Chakrabarti, 2001). In order to provide market size perspectives correctly, the population can be used in separated variables as market size proxy along with GDP per capita to avoid the double counting estimation, which is additionally implied in Dunning (1988).

The resource- and asset-seeking motives presented by HDI and infrastructure, have significant and positive results. Empirically, HDI contributed to promoting FDI in the long-run, which was seldom considered a FDI determinant in the previous studies. On the other hand, the individual connections between HDI and FDI have varied. Technology intensive and service industries are the main preferences for fulfilling the human capital needs (Bayar et al., 2020). Other than that, infrastructure showed a positive sign for FDI due to accessible facilities in economic activities (Sharma, Nayagam, & Chung, 2012; Tsitouras et al., 2020; Wadhwa & Reddy, 2011; Wijaya, Astuti, Tarigan, & Edyanto, 2020; Xaypanya et al., 2015). These resource- and asset-seeking motive findings are related to advanced industrial countries that required more skilled workers to facilitate their advanced businesses. It becomes a contradiction in comparison to the traditional economic variable orientation that considers cheaper and unskilled labor, to minimize the cost and maximize the rate of return for the investors. In addition, communications infrastructure is also one of the fundamentals sought by multinational enterprises (MNEs) (Dunning, 2002). Efficiency-seeking motive, as measured by trade openness, was found to significantly stimulate FDI (Boateng, Hua, Nisar, & Wu, 2015; Faroh & Shen, 2015; Resmini, 2000; Škuflic & Botric, 2006). On the other hand, some of the previous studies showed significantly negative effects on FDI. Anwar (2016) explained that the relationship occurs due to the deficit balance of payment. Supported by Mudiyansele, Epuran, and Tescaşiu (2021), which presented Romanian case, they found a significantly negative relationship between trade openness and FDI in the long-run and short-run. Specifically, trade openness could be positive or negative, depending on the region (Adhikary, 2017; Xaypanya et al., 2015). Based on the previous studies, level of exchange rate found to be significantly positive for FDI, differs from the exchange rate volatility found to be significantly negative (Alba, Park, & Wang, 2009; Campa, 1993). In addition, higher rates of inflation led to lower FDI (Anwar, 2016; Boateng et al., 2015; Da Silveira, Samsonescu, & Triches, 2017; Suharto, 2013).

These mixed findings of efficiency-seeking motives are generated by the differences in the region and macroeconomic conditions, especially the trade openness that has varied results. The negative effect of the exchange rate and inflation on FDI reflects investor considerations to avoid higher costs and unproductive investment. Higher prices led to unproductive activities, which encouraged investors to shift their investments to other potential investment prospects (Sukirno, 2016). Exchange rate fluctuations should be controlled by

decreasing capital market inefficiency to accelerate FDI (Froot & Stein, 1991). Furthermore, to increase the rate of return, the investor can consider the internalization advantages of the host country. This consideration intends to minimize the risk and cost of exchange rate fluctuation (Dunning, 1988).

Moreover, as an economic instrument, policy rates were found to be significantly positive for FDI. In ASEAN countries, macroeconomic stability has led the policy rate to be positive and significant (Anwar, 2016). In addition, Sari and Hasmarini (2023) noted that higher policy rates generate differences between the policy rate and foreign interest rate. This study found that a higher rate of return positively encourages FDI in Indonesia. Mankiw (2017) explained that higher domestic interest rate differences compared to international interest rates will attract capital flows due to the higher rate of return. Investors are more likely to consider the rate of return from a short-term perspective because of the policy rate adjustment for the specific period. It is opposite from the real interest rate effect on FDI because of the long-run consideration, which includes demographic and productivity growth (Wang, 2020).

3. DATA AND METHODOLOGY

3.1. Sample and Data Collection

To cover long-run and short-run effects, the panel data used in this study periodically covered 31 years of observation from 1988-2018, consisting of 22 EME countries. The data used in this study were retrieved from several international institutions, such as the World Bank, UNCTAD, United Nations Development Program (UNDP), IMF, Bank for International Settlements (BIS), etc. The data include global financial crises in 1998 and 2008, in which the estimation is divided into three groups of samples, i.e., before crises 1998, after crises 1998, and all time periods. The availability of shadow economy data is the primary reason for choosing the study period.

3.2. Research Variables and Operational Definitions

The dependent variable of this study is FDI, and the independent variables are shadow economy, economic growth, exchange rate, trade openness, policy rate, inflation, population, HDI, and infrastructure. The variables described in Table 1.

Table 1. Summary of the variables.

No.	Variables	Short form	Definitions/Measurement
1	Foreign direct investment	FDI	Foreign direct investment inward, in percentage of GDP and retrieved from the 2023 updated UNCTAD.
2	Shadow economy	SE	Dynamic general equilibrium (DGE) estimates of informal (% of GDP), in growth and retrieved from the 2023 updated world bank.
3	Economic growth	GDP	GDP growth (Annual, at constant price 2015), in percentage retrieved from the 2023 updated world bank.
4	Exchange rate	ER	Real effective exchange rate (Annual, consumer price index - CPI), in percentage and retrieved from the 2023 updated Bruegel.
5	Trade openness	TRADE	Trade openness (Share of GDP), in percentage and retrieved from the 2023 updated world bank.
6	Policy rate	R	Policy rate (End of period), in percentage and retrieved from the 2023 updated Bloomberg, Bank for international settlements, IMF, and federal reserve bank of St. Louis.
7	Inflation	INF	Annual inflation, average CPI, in percentage and retrieved from the 2023 updated IMF.
8	Population	POP	Total population, in growth and retrieved from the 2023 updated world bank.
9	Human development index	HDI	Estimate a long and healthy life, access to knowledge and a decent standard of living, in percentage and retrieved from the 2023 updated UNDP.
10	Infrastructure	INFRA	Mobile cellular subscriptions (Per 100 people), retrieved from the 2023 updated world bank.

3.3. Research Model

This paper empirically examines FDI determinants in EMEs divided into: (i) Model 1, pre-crisis (period 1988-1996) and post-crisis (period 1997-2018); and (ii) Model 2, which represents all periods and includes crises as qualitative variable. This paper used clustered robust standard errors, except for the short-run analysis in Model 1. Several factors affect FDI inward movement, as discussed above. The empirical model is described in the Equation 1.

$$FDI_{it} = \beta_0 + \beta_1 SE_{it} + \beta_2 GDP_{it} + \beta_3 ER_{it} + \beta_4 R_{it} + \beta_5 TRADE_{it} + \beta_6 INF_{it} + \beta_7 POP_{it} + \beta_8 HDI_{it} + \beta_9 INFRA_{it} + \varepsilon_{it} \quad (1)$$

The model selection is adopted by combining the dynamic panel data model. The model employed the error-correction model (ECM) for the short-run analysis and ordinary panel data model for the long-run estimation. Asteriou and Hall (2021) explained ECM as a reparameterized model from the general linear autoregressive distributed lag (ARDL) derivation. ECM is an econometrics model that applies moving equilibrium by adjusting the short-run relationship from the long-run movement (Durr, 1992). To present short-run estimation, this paper applied an ECM, which is described in the Equation 2.

$$DFDI_{it} = \beta_0 + \beta_1 DSE_{it} + \beta_2 DGDP_{it} + \beta_3 DER_{it} + \beta_4 DR_{it} + \beta_5 DTRADE_{it} + \beta_6 DINF_{it} + \beta_7 DPOP_{it} + \beta_8 DHDI_{it} + \beta_9 DINFRA_{it} + \beta_{10} ECT + \varepsilon_{it} \quad (2)$$

Based on a theoretical framework, procedures begin with order integration, continue with panel cointegration tests, ECM estimation, long-run relationships, and short-run relationships. The theoretical frameworks refer to Engle and Granger (1987); Durr (1992) and Asteriou and Hall (2021).

4. RESULTS

4.1. Descriptive Statistics

Table 2 shows that all variables have a greater standard error than the mean and median, except exchange rate, trade openness, and HDI. Table 2 indicates the presence of an outlier in the data. Clustered robust standard errors are suggested to be used.

Table 2. Descriptive statistics.

Variables	Obs.	Mean	Median	Std. dev.	Min.	Max.
FDI	682	2.466	2.00	2.603	-11.6	29.01
SE	660	-0.008	-0.007	0.009	-0.03	0.022
GDP	682	4.011	4.386	4.189	-14.53	33.99
ER	682	99.84	99.59	26.86	0.00	282.6
TRADE	682	64.744	52.097	43.290	0.00	220.41
R	682	188.37	7.5	3971.2	0.00	103484
INF	682	58.430	5.788	390.14	-1.552	7356.8
POP	660	0.01	0.01	0.02	-0.24	0.21
HDI	682	0.694	0.708	0.108	0.00	0.879
INFRA	682	51.20	27.35	54.56	0.00	212.4

4.2. Order of Integration

This paper used unit root tests with three different methods, including ADF-Fisher Chi-square (Gujarati & Porter, 2009; Levin, Lin, & Chu, 2002) and Im, Pesaran, and Shin (2003). The order of integration analysis found that all variables are not stationary at level but become stationary at the first difference. The results are presented in Appendix, Table 5.

4.3. Panel Cointegration Test

The estimation found that all variables have no unit root problem and are classified as cointegrated models. If the model is cointegrated, ECM can be applied to the analysis (Gujarati & Porter, 2009). Cointegration test used in this paper refers to Kao (1999).

4.4. Results of Error Correction Model (ECM)

The estimation contained long-run and short-run models. For the long-run analysis, the estimation applied an ordinary panel data model. And, for the short-run analysis, the estimation applied the ECM model. The ECM model represents short-run estimation adjusted for the long-run modifications (Gujarati & Porter, 2009).

4.4.1. Long-Run Relationships

Long-run relationships are classified into two models: (i) fixed effect model for model 1; and (ii) random effect model for model 2. It has been obtained by Chow test, Hausman test, and Breusch-Pagan test, presented in Appendix, Table 6. The long-run estimation procedure refers to Wadhwa and Reddy (2011); Abdullayevich (2015); Xaypanya et al. (2015); Anwar (2016) and Andrašić et al. (2019). Determinant of FDI in the long-run is presented in Table 3.

Table 3. Long-run estimation results.

Variable	Model 1				Model 2	
	Pre-crisis		Post-crisis		Coefficient	z-stats
	Coefficient	t-stats	Coefficient	t-stats		
SE	-34.104	-1.68	-43.387	-2.23**	-34.585	-2.43**
GDP	0.044	1.28	0.107	3.13***	0.088	2.72***
ER	-0.003	-0.24	0.0002	-0.02	0.000	0.01
TRADE	0.002	0.08	0.002	0.13	0.011	1.60
R	5.25e-06	1.35	-0.014	-3.16***	-0.00001	-5.21***
INF	-0.0002	-1.65	0.007	0.91	-0.0004	-2.40**
POP	3.267	-0.75	40.301	1.54	2.885	0.51
HDI	0.166	0.11	-10.833	-1.98*	3.553	1.62
INFRA	0.807	1.30	0.004	1.17	-0.003	-0.81
Constant	1.081	0.59	8.813	2.00*	-1.267	-0.90
Crisis (Dummy)	-	-	-	-	0.538	2.86***

Note: * p<0.10, ** p<0.05, *** p<0.01.

The result found that shadow economy has significantly and negatively affected FDI on the first model after the crisis and on the second model. Supported by previous studies retrieved from Bayar et al. (2020); Buszko (2021) and Koyuncu and Ozen (2021). Along with data retrieved from World Bank (2023); UNCTAD (2023) and IMF (2023) the long-run estimation tends to confirm that shadow economy growth leads to stagnancy of FDI in EMEs even though the economic growth improved.

Investor motives as FDI determinants refer to Dunning (1988). First model focused on the post-crisis period, and the second model revealed that economic growth has significantly stimulated FDI. The long-run estimation indicates that market-efficiency motive is more likely affected by economic growth than population growth. In alignment with previous studies, market-seeking motives such as GDP per capita, economic growth, and real GDP improved FDI (Adhikary, 2017; Alshamsi et al., 2015; Andrašić et al., 2019; Anwar, 2016; Dewi & Triaryati, 2015; Fitriyah et al., 2021; Suharto, 2013; Taufik, 2014; Tsitouras et al., 2020; Xaypanya et al., 2015).

HDI, as a resource- and assets-seeking motive, has a significantly negative relationship with FDI in the long-run. It indicates that a higher cost of labor lowers FDI (Dunning, 1988). The result differs from Bayar et al.

(2020) who showed a positive sign between HDI and FDI. In addition, efficiency-seeking motive presented by inflation affects FDI in the long-run. The second model showed a significantly negative relationship between inflation to FDI. The findings relate to [Suharto \(2013\)](#); [Boateng et al. \(2015\)](#); [Anwar \(2016\)](#) and [Da Silveira et al. \(2017\)](#).

The policy rate has a significantly negative effect on FDI. Differ from [Anwar \(2016\)](#) and [Sari and Hasmarini \(2023\)](#). The main reason suggested is policy rate adjustments that depend on the country's decisions. Based on the data retrieved from [Bloomberg \(2023a\)](#); [Bank for International Settlements \(2023\)](#); [IMF \(2023\)](#) and [Federal Reserve Bank of St. Louis \(2023\)](#) EMEs applied different kinds of policy rates. Furthermore, significantly positive sign of crises explained the encouragement of FDI during the crises period.

4.4.2. Short-Run Relationships

Short-run relationships apply the first difference as an ECM. The short-run estimation procedure refers to [Sharma et al. \(2012\)](#) and [Wijaya et al. \(2020\)](#). FDI determinant in the short-run, presented in [Table 4](#). In line with Granger's representation theorem, explained by [Engle and Granger \(1987\)](#) the results found that coefficient of ECT is valid due to statistically significant and negative results.

Table 4. Short-run estimation results.

Variable	Model 1				Model 2	
	Pre-crisis		Post-crisis		coefficient	t-stats
	coefficient	t-stats	coefficient	t-stats		
D(SE)	-48.507	-2.01**	-15.903	-1.55	-10.347	-1.58
D(GDP)	0.033	0.83	0.056	2.95***	0.032	2.22**
D(ER)	0.004	0.07	0.003	0.49	0.006	1.20
D(TRADE)	0.011	0.62	0.057	2.74**	0.042	3.07***
D(R)	-3.12e-06	-0.12	-0.011	-3.16***	-7.80e-06	-
D(INF)	-0.000	-0.23	-0.0006	-0.08	-0.0001	-1.64
D(POP)	-1.59	-0.32	59.678	1.67	5.722	2.21**
D(HDI)	-0.401	-0.10	16.076	0.99	0.613	0.63
D(INFRA)	0.864	1.94*	0.029	2.49**	0.025	2.28**
ECT(-1)	-0.99	-9.24***	-0.75	-7.29***	-0.523	-
Constant	-0.064	-0.26	-0.327	-2.29**	-0.080	-0.63
Crisis (Dummy)	-	-	-	-	-0.244	-1.27
Diagnostic test results:						
R-square	22.48		43.52		28.28	
Cointegration (Kao test)	0.00		0.00		0.00	
Serial correlation (Wooldridge test)	0.001		0.00		0.00	
Normality (Shapiro-Wilk)	0.00		0.00		0.00	
Heteroskedasticity (BG test)	0.00		0.00		0.00	

Note: * p<0.10, ** p<0.05, *** p<0.01.

The result found that shadow economy had a significantly negative relationship with FDI in the first model during the pre-crisis period. The estimation suggests that shadow economy improved FDI inward in the short-run but only happened before 1998. The findings relate to [Bayar et al. \(2020\)](#). It suggests that after the crisis era, shadow economy will not affect FDI in the short-run.

Market-seeking motives in the short-run, presented by economic growth and population, demonstrate significantly positive relationships with FDI on the second model. It suggests that market-size affects FDI during

the thirty-one years of observation. The findings align with Suharto (2013); Taufik (2014); Alshamsi et al. (2015); Dewi and Triaryati (2015); Xaypanya et al. (2015); Anwar (2016); Adhikary (2017); Andrašić et al. (2019); Tsitouras et al. (2020) and Fitriyah et al. (2021). In addition, for the population related to Resmini (2000), and Wadhwa and Reddy (2011).

The resource- and asset-seeking motive, presented by infrastructure, was found to be significantly positive in the first and second models. It suggests that resource- and asset motive in the short-run are affected by infrastructure rather than HDI, due to the insignificant findings of HDI. This finding is supported by Wadhwa and Reddy (2011); Sharma et al. (2012); Xaypanya et al. (2015); Tsitouras et al. (2020) and Wijaya et al. (2020).

Trade openness demonstrated significantly positive relationship with FDI on the first model after the crisis and on the second model. It suggests that efficiency-seeking motives in the short-run are affected by trade openness rather than inflation and exchange rates due to the insignificant findings. This finding is supported by Resmini (2000); Škuflic and Botric (2006); Boateng et al. (2015), and Faroh and Shen (2015).

The policy rate showed a significantly negative effect on the first model during the post-crisis period and on the second model. The short-run relationship explanation differs from Anwar (2016) and Sari and Hasmarini (2023). The main reason is due to various decisions of policy rate adjustment in EMEs (database of Bank for International Settlements (2023); Bloomberg (2023b); Federal Reserve Bank of St. Louis (2023), and IMF (2023)).

5. CONCLUSION

This empirical study examines whether shadow economy growth influenced FDI in the short-run before the crisis happened. Then, after the crisis, shadow economy growth tends to affect FDI in the long-run. In line with the theory and previous studies, shadow economy must be concerned with attracting FDI. Larger shadow economy indicates economic instability and tax evasion (Schneider & Enste, 2000). The shadow economy's growth stimulates lower FDI because of greater uncertainty. The findings and subsequent analysis indicate that the growth of the shadow economy contributes to both FDI stagnation and increased economic growth in EMEs. The policymakers can pay attention to minimizing the shadow economy growth by applying tax benefits to lower the economic instability. Investor motives also play an important role in attracting FDI in EMEs, both after the crisis period and in the thirty-one year observation period. This study confirmed that market-seeking motives exert a positive and significant effect on FDI in EMEs. It is concluded that economic growth can influence FDI in the long-run and the short-run. On the other hand, population only affects FDI in the short-run. The study also revealed that resource- and asset-seeking motives consider accessibility in the short-run and labor costs in the long-run. These conclusions, as assessed by the findings of infrastructure acceleration, significantly promote FDI in the short-run, while HDI has a significantly negative effect in the long-run. Other than that, the exchange rate has no significant role in FDI in EMEs. The efficiency-seeking motives in EMEs are affected positively by trade openness in the short-run and negatively by inflation in the long-run.

The policy rate, as a macroeconomic factor that represents the rate of returns for investors and the scope of the open economy, shows a significantly negative impact on FDI both in the long-run and short-run. The relationship occurs due to the setting of time period and different types of policy rate determination in each country. In addition, the study found that during crises period, FDI in EMEs was higher because of regulatory adoption. Based on the conclusions above, the investors need to consider their investment impact implementation using a time period. Investors might utilize their profits for the long-run or the short-run. Furthermore, investors can observe market advantages and variable fluctuations to maximize their investment profit. In addition, to provide more FDI in EMEs, policymakers need to ensure policies that are possible to expand the country's market and achieve economic growth. Moreover, governments need to minimize the market risk to attract more FDI in EMEs by decreasing shadow economy growth and stabilizing macroeconomic variables.

The limitations of this study are the time period due to the availability of shadow economy data updates and the list of EMEs selected using the latest grouping in 2023. Furthermore, data availability prevented the inclusion of some countries in the list, particularly those that did not apply interest rates.

A recommended suggestion for future research is to expand the study time, covering many countries-specific issues related to shadow economy phenomena, to strengthen and complement the results of this study. In addition, investors need to consider the FDI determinants, observe the potential impact on FDI, and evaluate the country's advantages in their analysis to provide beneficial investment by achieving a higher rate of return.

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APPENDIX

Table 5. Results of unit root tests.

Variables	ADF-fisher chi-square	Levin-Lin&Chu	Im-Pesaran-Shin	Decisions of H.	Variables	ADF-fisher chi-square	Levin-Lin&Chu	Im-Pesaran-Shin	Decisions of H.
Level					First difference				
Heterogeneous intercepts with no trends									
FDI	141.53***	-4.78***	-5.70***	Reject	D(FDI)	820.39***	-13.26***	-15.35***	Reject
SE	240.43***	-7.10***	-8.62***	Reject	D(SE)	996.26***	-16.97***	-16.21***	Reject
GDP	275.94***	-8.93***	-2.66***	Reject	D(GDP)	1020.60***	-17.34***	-16.95***	Reject
ER	98.35***	-4.19***	-9.74***	Reject	D(ER)	511.77***	-14.34***	-13.02***	Reject
TRADE	84.39***	-3.48***	-1.82**	Reject	D(TRADE)	633.13***	-11.24***	-14.14***	Reject
R	695.40***	-41.99***	-2.05**	Reject	D(R)	695.40***	-31.76***	-14.44***	Reject
INF	207.09***	-9.69***	-6.32***	Reject	D(INF)	880.92***	-19.91***	-16.04***	Reject
POP	121.07***	-2.38***	-1.93**	Reject	D(POP)	338.003***	-9.98***	-6.50***	Reject
HDI	22.21	-1.56**	10.17	Accept in ADF and IPS method	D(HDI)	337.59***	-77.98***	-10.52***	Reject
INFRA	1.9565	0.565	12.02	Accept	D(INFRA)	111.5949***	-2.77**	-4.42***	Reject
Heterogeneous intercepts with trends									
FDI	114.55***	-4.31***	-7.00***	Reject	D(FDI)	687.29***	-10.52***	-15.48***	Reject
SE	186.15***	-5.70***	-9.13***	Reject	D(SE)	859.72***	-13.44***	-16.46***	Reject
GDP	228.49***	-7.94***	-10.4***	Reject	D(GDP)	864.01***	-13.98***	-17.00***	Reject
ER	89.05***	-4.95***	-3.72***	Reject	D(ER)	443.96***	-11.46***	-13.34***	Reject
TRADE	75.50***	-2.01**	-3.88***	Reject	D(TRADE)	538.69***	-8.85***	-14.48***	Reject
R	588.59***	-51.35***	-6.04***	Reject	D(R)	588.59***	-24.00***	-14.57***	Reject
INF	206.90***	-9.51***	-8.35***	Reject	D(INF)	762.28***	-9.46***	-16.07***	Reject
POP	79.23***	-2.71***	-0.15	Accept in IPS method	D(POP)	272.43***	-9.46***	-7.67***	Reject
HDI	64.16	-27.52***	-2.67***	Accept in ADF method	D(HDI)	260.96***	-71.05***	-10.50***	Reject
INFRA	12.54	-1.83***	0.01	Accept in ADF and IPS method	D(INFRA)	76.60**	-1.66**	-4.78***	Reject

Note: ** p<0.05, *** p<0.01.

Table 6. Chow test, Hausman test, and Breusch-Pagan test.

Test	Model 1 (Pre-crisis)	Decisions	Model 1 (Post-crisis)	Decisions	Model 2	Decisions
Chow test	0.0003	Fixed effect	0.0000	Fixed effect	0.0000	Fixed effect
Hausman test	0.0468	Fixed effect	0.0063	Fixed effect	0.8632	Random effect
Breusch-pagan test	0.0010	Random effect	0.0000	Random effect	0.0000	Random effect

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