

Does Higher Misery Index Dry Up Foreign Direct Investment Inflows in Pakistan? An ARDL Bound Testing Approach

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ABSTRACT

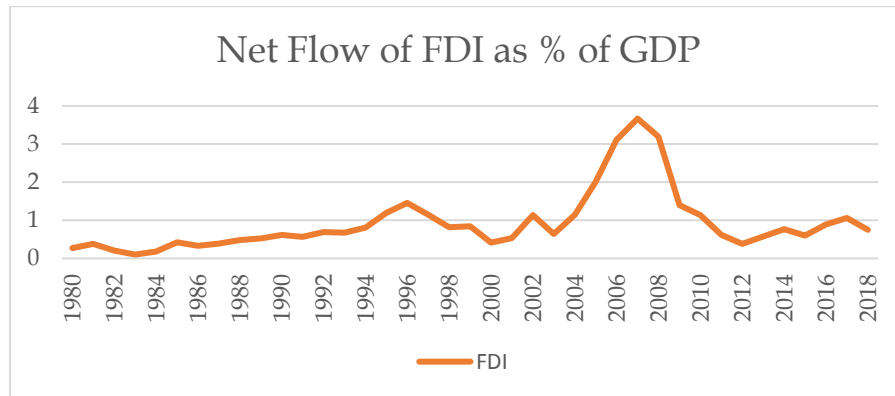
Inflows of foreign direct investment are one of the main drivers of globalization and play a significant role in narrowing the investment-savings gap in developing nations. This study's main goal is to examine how the Misery Index has affected FDI inflows to Pakistan between 1980 and 2021. The ongoing study also looks at how the money supply and exchange rate affect FDI inflows. Error Correction Model is utilized to analyze observed short-run relationships, while the long-run relationship is examined using the Autoregressive Distributed Lag approach to co-integration. In the short run, the Exchange Rate and Misery Index are the key FDI factors. The money supply and exchange rate are also important long-term factors of FDI. The study suggest that administration of Pakistan should entirely interest-free exchange rate rule sterile of fixed exchange rates thus as to expand foreign direct investment and provide to GDP, this is because profitable capability of any FDI is constructed on exchange rate constancy.

1. Introduction

World War II is the most destructive conflict in the history, which affected every field of life around the world and the consequences traumatized the world till 1970. This resulted in widespread dominance of world powers over the under developing countries in terms of limited flow of investment, and the countries suffered with financial and economic distress terribly. However luckily the investment flow in such countries observed an upward trend after the 1970 years (Awan, Khan & Zaman, 2011). Resultantly, foreign investment turned to be the main source of economic growth for a country that seems necessary for their welfare. (Liang et al., 2021; Rahman, & Bakar, 2018) Therefore, the development of local businesses increases the competitiveness of home as well as investing countries (Amin et al., 2022). Similarly, it overcomes the gaps which arise in foreign exchange, investment- saving and tax revenue in developing economies (Quazi, 2007).

Since the independence in 1947 Pakistan has gone through number of challenges. For instance, terrible terrorism, unsolved unemployment issues, drastic rule of law disorder, corruption, instable political system, inadequate infrastructure, and the ever-increasing adverse energy shortfall (Talat & Zeeshan, 2013). Despite those challenges, the foreign investors are still interested to show their interest to invest in Pakistan. Low transportation cost, low-priced labor, better economic policies, and profitable returns on investment attracts foreign investors to make investments in Pakistan (Zeeshan & Talat 2014; Rahman, Chaudhry, Meo, Sheikh, & Idrees, 2021). In Pakistan, the flow of FDI has surprisingly

increased from 1980 to 2018 and these flows are however lower than other developing countries due to irregularities in economic policies and international economic inconsistencies (Sajid et al., 2021). Furthermore, the fluctuation of FDI is shown in figure 01, where FDI flows remained high in 2007 after that the rapid decreasing trend is observed;



Source: World Development Indicator (WDI) 2020

Therefore, this study of intends to investigate and analyze the leading attributes which responsible for decreasing FDI inflows in Pakistan. A Misery Index is introduced as a key contributor of FDI: it has distinguished characteristics as compared to the other indices studied in previous studies. The recently established index covers unemployment rate, inflation rate, real interest rate, and real per capita GDP growth rate. This index is taken for the first time in academic literature, as it is not been taken into consideration in any research before. The study aims to incorporate misery index as a main contributor of FDI inflows of Pakistan.

The study is organized in five sections, firstly the introduction section as discussed above, the second section following the review of previous studies. In the same way the third section discusses data and methodology. The findings of the study are analyzed in section four and the fifth section accompanied with conclusion and recommendations.

1.1. Problem Statement

The statistical data shows that Pakistan has decreasing trend in foreign direct investment as % of GDP since 2008. Similarly, the trend of inflow FDI demonstrate that it follows a decreasing trend from 2008 to 2020, however, it takes a little upward trend after 2012 to 2014 and reaches to 0.74828 % of GDP in 2018. The issue highlights some gaps existing in the literature. The reason behind this issue could be the low quality of product, rising unemployment rate, possibility of low GDP growth and high inflation in Pakistan economy. One of the possible reasons of sharp decrease in growth is attributed to low productivity ([Agenor, Canuto, & Jelenic, 2012](#)).

Unfortunately, the economy of Pakistan has been suffering from higher inflation rates, increased population growth, lower growth rates, inadequate levels of investments caused by poor savings give birth to poor socio-economic infrastructure which cause lower growth rates in most of macroeconomic indicators ([Zaman, Shah, Mushtaq Khan, & Ahmad, 2012](#)).

Inadequate foreign investments due to poor security situation and unemployment are responsible for the lower rates of growth in recent years (Mustafa & Zafar, 2017). The inconsistent outcomes of different studies exhibit that it is still indispensable to reinvestigate the effect of inflation, interest rate, unemployment, and GDP growth rate on foreign direct investment of Pakistan.

2. Literature Review

For economic growth and development of an economy, FDI flows have been the attention of researchers for the expansion of market size in poor economies (Liang, Shah & Bifei, 2021): it surges the confidence of foreign investors for investment in those countries where high economic growth rate remained an attraction for FDI inflows in 68 developing countries for the period of 2005-2007 (Mottaleb & Kalirajan, 2010). Moreover, the further investigation on the relationship of FDI, economic growth and exports revealed a positive association in economic growth and FDI for 1987 - 2006 on a panel data study (Oyatoye et al., 2011). Several studies clarify the two-way causal relationship between gross domestic product and FDI: two-way causal association between FDI and GDP existed in India (Chakraborty & Basu 2002; Rahman, & Bakar, 2019) and this relationship also confirmed the bi-directional association in GDP growth and foreign direct investment (Choe, 2003; Basu, Chakraborty & Reagle, 2003; Ozturk & Kalyoncu, 2007).

Foreign investors are more likely to trust on foreign investment, the profit margins of their investments grow in high inflation rate and the high price level attracted more FDI inflows in Pakistan (Zaman et al. 2006, Awan 2011 and Gul et al. 2012). Similarly, the high rate of return on investment promotes FDI inflows for foreign investors (Addison & Heshmati 2003; Rahman, Bakar & Idrees, 2019; Quazi 2007), but the study of Billington (1999) examined a negative association between interest rate and FDI. On the contrary, FDI, particularly Greenfield investment creates the opportunities of employment in the domestic country. The study of Chang (2005) investigated the relationships among FDI, unemployment, economic growth and trade in Taiwan and concluded that the increase in economic growth and exports attract more FDI inflow, whereas export growth affects negatively on the outflow of FDI and the relationship does not exist in unemployment and FDI inflow. Kausar, Bhatti, Gull (2020) investigated positive and significant effects of capital investment and labour force changes on economic growth in Pakistan but the inflation has insignificant link with GDP.

The foreign exchange rate is a key variable to attract foreign investment. For this, a study is conducted by Akhtar (2000) about the determinants of FDI, the findings of aforesaid study exhibited that the rate of exchange, relative rate of interest and market size have a positive significant association with FDI, whereas the studies of Benassy-Quere et al. (2001), Kandiero & Chitiga (2006) and Yol, & Ngie (2009) confirmed the result of Akhtar's (2000) findings about the positive significant relationship of FDI and exchange rate. Conversely, Coleman & Tettey (2008) determined the opposite relationship in currency rate and foreign direct investment. In addition to this, Khan et al. (2012) observed a two-way positive association between the currency rate and foreign direct investment.

In their evaluation of the FDI-related parameters in Malaysia from 1970 to 2008, Shahrudin et al. (2010) found that the GDP growth and the quantity of money had a positive, statistically significant association with Foreign direct investment. In Nigeria, Oladipo, (2013) studied the features of foreign direct investment for the period of 1985-2010 and found that currency rate, interest rate, trade openness and money supply have a positive substantial impact on FDI, but government recurrent spendings' impact is insignificant on FDI.

The empirical literature shows many determining factors of FDI which affect it in short and long run, but the significance level of these factors is determined from earlier studies. So, the previous research depicts, comprising main factors like market size, rapid increase in price level, rate of return, level of unemployed labor force, price of labor, infrastructure, rate of exchange, debt burden, political uncertainty, money supply and foreign trade are the components contribute to FDI. Through the literature review, employment, high Price level, rate of interest and GDP growth impact on FDI inflows positively and negatively, but we use these variables into one index that is misery index. The study thoroughly examines the influence employment, real GDP growth on foreign direct investment in short and in long- term.

3. Data Source and Methodology

3.1. Data Sources and variables

Secondary time series data is used for the analysis obtained from several databases. Data for each variable like rate of unemployment, inflation, exchange rate, gross domestic product, money supply, on FDI net inflows are taken from World Development Indicators. However, the information regarding the real interest rate is taken from the Pakistani Handbook of Statistics. The variables under study are Inflation rate, unemployment rate, rate of real interest, real Gross domestic product per capita growth rate, foreign direct investment, real effective rate of exchange, and money supply. Here, FDI is taken as the dependent variable and misery index, money supply and real effective exchange rate are observed as the independent variables.

3.1.1. A Misery Index

The Novel Misery Index (NMI) established for the first time in the history of Pakistan and we can support this index in the light of existing misery indices. [Arthur Okun](#) (1960), economist, invented Misery Index, aiming at combining inflation rate and unemployment rate together. He views that high unemployment and [inflation](#), are inseparable, which depicts miserable condition of a common person, for such reason the index is named as the Discomfort Index (Anaele & Nyenke, 2021).

Robert Barro (1999), one of the most prolific scientists in the domain of Economics successfully form the 'Barro Misery Index' together with the inclusion of the real gross domestic product growth rate and interest rate in Discomfort Index. He stated that these two variables are the leading parameters in the distressed people. Furthermore, the real gross domestic product growth rate and the financial position of an individual are positively connected with each other, while the real interest rate reflects adverse effect on the life of a common person.

Steve Hanke (2011) proposed a modified misery index after evaluating the Barro misery index. In this index, he included the real per capita gross domestic product growth rate instead of the real gross domestic product growth rate. Since the later does not account for the impact of population growth and it is possible to estimate the modified misery index.

Henderson discovered a substantial drawback; he criticized that in both the Barro and Hanke misery indices considering the above-mentioned parameters. Both forgot the Irving Fisher effect. He said that these indices depict double counting of inflation. Henderson created another misery index from the Modified Misery Index, which excluded nominal interest rates and does not double count the impact of inflation.

Henderson's misery index is greater than other indices, but in order to prevent double counting of inflation, it omitted the most crucial variable that is interest rate. Based on the indices mentioned above, the Misery Index is presented in this research. The real interest rate, the inflation, percentage of GDP, the unemployment is included with Misery Index. The issue of inflation of double counted is resolved in this index. This index also considers the real interest rate, something the Henderson index does not do because of double-counted inflation. As a result, this misery index seems more appropriate than other indices.

3.2. Model Specification and Estimation Technique

Here, the model with a suitable estimation and novel technique used in the underlying study, in which regression equation gets importance to examine the effect of the misery index on FDI along with the money supply and the real effective exchange rate as other control variables from 1980 to 2021.

$$\ln(FDI_t) = \beta_0 + \beta_1 \ln(NMI_t) + \beta_2 \ln(RE_t) + \beta_3 \ln(MS_t) + U_t - - - - - (1)$$

In the above equation, we have involved β_0 as an intercept and β_1, β_2 and β_3 are expressed as long run coefficients of NMI, RE and MS respectively, and the error term is U_t .

This is an empirical study; however, the regression findings are often erroneous and mismatched with non-stationary variables. It is important to observe stationary variables. Dickey and Fuller (1988) formulated a version of augmented unit root test, known as Augmented Dickey Fuller test. The ADF test is more responsive than DF and PP test. One of the characteristics of this test is appropriate with negative coefficient value and serial correlation. The PP and ADF tests recognized in the academic works and findings of the tests are generalized.

The stationary time series are followed in long term relationships of all variables. As a result, various cointegration approach like Johansen tests (1990), maximum likelihood such as Johansen (1988, 1991) and Engle & Granger (1987) test are introduced to the cohesive variables. This type of methodology is valid when the variables are amalgamated at the 1st difference; and are not fit with small data. Employing ARDL cointegration method which is acceptable, if the model variables are integrated at level, 1st difference or mutually integrated (Pesaran & Pesaran, 1997). The Autoregressive distributed lag model with its generalizability seems to be highly practical for small samples (Pesaran & Shin, 1999).

The ARDL model is expressed as follows;

$$\Delta \text{Ln}(FDI_t) = \beta_0 + \sum_{i=0}^q \beta_{1i} \Delta (\text{Ln}FDI_{t-1}) + \sum_{i=0}^q \beta_{2i} \Delta (\text{Ln}NMI_{t-1}) + \sum_{i=0}^q \beta_{3i} \Delta (\text{Ln}RE_{t-1}) + \sum_{i=0}^q \beta_{4i} \Delta (\text{Ln}MS_{t-1}) + \beta_{5i} (\text{Ln}FDI_{t-1}) + \beta_{6i} (\text{Ln}NMI_{t-1}) + \beta_{7i} (\text{Ln}RE_{t-1}) + \beta_{8i} (\text{Ln}MS_{t-1}) + U_t \text{ --- --- --- (2)}$$

Where, Δ symbolizes the 1st difference, and q is optimal length of the lag, where β_0 is constant, $\beta_1, \beta_2, \beta_3$ and β_4 , are coefficients of short-term parameters, and $\beta_5, \beta_6, \beta_7$ and β_8 are coefficients of long-term parameters.

To discuss the long run associations as specified in Equation (1), the F- statistic used to confirm the cointegration, whose value is corresponding with the critical value of F-statistics, However, if F-statistic value is greater than the upper bound, then it is not accepted the null hypothesis and the variables are co-integrated. Contrary to this, if F- statistic value is smaller than the lower bound value, at that point it is accepted null hypothesis, and there will be no cointegration exists amongst variables. The error correction technique is applied for short run relationship; yet it requires long run association among the variables.

The Equation (3) represents error correction technique:

$$\Delta \text{Ln}(FDI_t) = \beta_0 + \sum_{i=0}^{q1} \beta_{1i} \Delta (\text{Ln}FDI_{t-1}) + \sum_{i=0}^{q2} \beta_{2i} \Delta (\text{Ln}NMI_{t-1}) + \sum_{i=0}^{q3} \beta_{3i} \Delta (\text{Ln}RE_{t-1}) + \sum_{i=0}^{q4} \beta_{4i} \Delta (\text{Ln}MS_{t-1}) + \lambda(\text{Ln}EC_{t-1}) + \varepsilon_t \text{ --- --- --- (3)}$$

Here, optimal lag length represents q_1, q_2, q_3 , and q_4 and the parameter how quickly the disequilibrium is adjusted is denoted by λ , in which the error correction term indicates EC. After examining short-and long-term relationships, the goodness of fit model is examined by reliability test which is acclaimed as a robust test to check the reliability of regression model.

4. Findings and Discussion

Since the unit root is a common issue with time series, the study examines stationary test in support of variables under study prior to analysis. For this, PP and ADF tests are utilized to verify stationary variables. This involves the variables in log form, Phillips Perron and ADF tests are applied on each variable with the presumption of “no trend”. The results are tabulated below in the table 4.1 about the stationary of the variables at level and first difference.

Table: 4.1
Unit Root Tests

Variables	ADF Test		Phillips Perron Test	
	(At Level)	(At First Difference)	(At Level)	(At First Difference)
ln(RE)	-2.1401*	-	-1.9605*	-
ln(FDI)	-1.6315	-4.8824**	-.9896	-4.205315**
ln(NMI)	0.1588	-5.3535**	.19577	-5.355001**
ln(MS)	-0.1496	-5.3163**	-.1574	5.326023**

Source: Author's Calculation

*Indicates variable stationary at level and ** demonstrates variable stationary at 1st difference on 5% significance level.

Table 4.1 demonstrates that the exchange rate is stationary at level, whereas FDI, the misery index and the money supply are integrated at 1st difference in both tests. Here, we can note from the above-mentioned table that the variables are integrated at level and at first difference. In this case, we apply ARDL approach of co-integration. Subsequently testing the stationary of variables, the outcomes affirm a long run connection between variables.

First, we select the optimal length of lag for studying long-term relationship (Bahmani-Oskooee & Bohal, 2000) adopted the Schwarz Bayesian Criterion (SBC). This technique in likelihoods gets advantage over sample data. To select optimal lag length, a comparison of the values of F- statistic is necessary with the values of lower bound and upper bound.

Table: 4.2
Bound Test

Dependent Variable	F-Statistic	Optimal Lag
FDI	5.9615*	2
Critical Values	Lower Bound Value	Upper Bound Value
5%	3.79	4.85
10%	3.17	4.14

Source: Author's Estimation

The best lag selection, as shown in Table 4.2, is two, with F-statistic value 5.9615 that is more than both the upper bound value 4.85 and the lower bound value of 3.79 at the 5% significance level. Therefore, the null hypothesis of integration is accepted, and the dependent and independent variables exhibit long-term relationship at the optimal lag 2.

We demonstrate the cointegration of the variables after choosing the optimal lag length. Through ARDL, the Schwarz Bayesian Criterion is used to identify long run coefficients.

TABLE: 4.3
Estimated Long Run Coefficients ARDL (2,0,0,1)

Regressors	Coefficients	S. Error	t-Ratio	Prob.
ln(NMI)	-.84324	.51093	1.6504	0.112
ln(RE)	-2.2813	.47352	4.8178	0.000***
ln(MS)	3.9340	1.5171	2.5931	0.016**
C	-1.8857	7.0393	.26788	0.791

Note: ***, **, & * indicates 1, 5, & 10 level of significance.

The ARDL long- term coefficients are displayed in Table 4.3. Long-term effects of the misery index on FDI are negative yet insignificant and the exchange rate has a negative yet significant effect on FDI in long run; one percent rise in the rate of exchange causes a 2.2813 % decrease in FDI and the findings of the present investigation are supported by studies by Coleman & Tettey (2008) and Mahmood et al. (2011). The fact that the p-value is less than 5% indicates that the money supply has a major impact on foreign direct investment (FDI), money supply (MS) and foreign direct investment (FDI) have a positive relationship with each other; One percent rise in money supply results in a 3.9340% increase in foreign direct investment and the studies of Oladipo and Shahrudin et al. (2010) confirmed the results.

This section examined the short-term correlation between foreign direct investment (FDI) and the independent variables non-misery index (NMI), exchange rate (ER), and money supply (MS). The results of the error correction representation for the ARDL model are shown in Table 8. The letter "d" stands for short-run elasticities.

TABLE: 4.4
Short-run Estimation, ARDL (2, 0, 0,1)

	Coefficients	S. Error	T-Value	P-Value
dln(FDI)	0.34082	0.1633	2.0864	0.047**
dln(NMI)	-0.55330	0.2500	2.2134	0.034**
dln(RE)	-1.4971	0.4596	3.2570	0.003***
dln(MS)	0.56067	1.1220	0.4997	0.622
ECM(-1)	-0.65625	0.15785	4.1575	0.000***
R ²	0.49482	Adjusted R ²		0.3685
F-Stat	4.7015	Prob.(F-Stat)		0.004
AIC	-14.8537	DW-Stat		2.2743
SBC	-19.8726			

Note: ***, **, & * indicates 1, 5, & 10 level of significance.

The short-term correlation between the Misery Index (NMI), exchange rate (ER), money supply (MS), and foreign direct investment (FDI) is seen in Table 4.4. NMI and FDI have a negative and substantial relationship. Here, the real interest rate, the inflation rate, the unemployment rate, and the real GDP per capita serve as the four components of the misery index. Since the other variables are held constant, we investigate the individual effects of each variable on the misery index. Finally, we establish a connection between the FDI flow and the misery index. If the inflation rate increases while keeping all other factors constant, the misery index also increases, but the foreign direct investment flow is decreased. We can look at the favorable indirect relationship between FDI and inflation. Onyeiwu & Shrestha (2004); Haile & Assefa (2006), Mehmood, Azam, & Mahr. (2022). and Twimukye, E. (2006) verified the finding of this research. While the inflation, GDP, unemployment, and rate of interest remain unchanged, the misery index increases while FDI flow declines. The negative correlation between the unemployment rate and FDI inflows is also emphasized in the study

Rafiq et al. (2010). Additionally, the interest rate increases but unemployment rate, inflation rate, and growth rate persist impassive.

The Misery Index therefore rises, while the foreign direct investment declines. These findings are consistent with research by Alam, Nur Alam, & Hoque (2020), Adebayo, Onyibor, & Akinsola (2021), Azam & Luqman (2008) and Ahmad, & Khan (2018). Mehmood et al. (2022). However, misery index decreases but FDI flow increases as real GDP per capita increases while keeping other factors constant. It is notable that FDI and real GDP per capita have an indirect positive relationship. The findings of this study are validated by Awan et al. (2014), Agudze, & Ibhagui (2021), Falki (2009), Hasan (2021), and Mottaleb & Kalirajan (2010). Similarly, RE and FDI have negative yet significant relationship. When all other variables are held constant, the exchange rate coefficient (1.4971) demonstrated that a one percentage increase in the exchange rate causes 1.4971 percentage point decrease in the flow of FDI.

In the short term, there is a positive but insignificant relationship between the money supply and FDI. The coefficient (-.65625) for the term of error correction is significant at 5% significance level. The error correction term's negative sign indicates how quickly the short-term disequilibrium to long-term equilibrium is converging. Alternatively, FDI's rate of transition from last year's disequilibrium to this year's equilibrium is 65% faster. The corrected coefficient of determination is 37 percent, indicating that other explanatory variables are responsible for a 37 percent variation in FDI. Since the p-value of the F-statistic value is smaller than 5%, this model often fits the data well.

The two reliability tests are the Cumulative Sum (CUSUM), and the Cumulative Sum Square (CUSUMSQ). It examines methodical variations in regression coefficients, whereas the CUSUMSQ test discusses parameter deviation from reliability. The coefficients in the ECT value is unchanged when the plot of residuals stays inside the critical bound of the 5% significance level.

Figures 1 and 2; show two plots that, at the 5% level of significance, are inside the critical bound, indicating that the model is structurally unchanged.

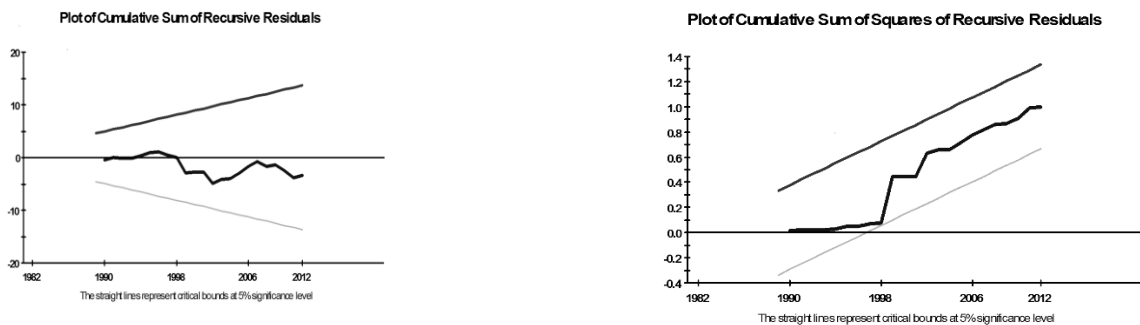


Figure 1

Cumulative Sum of Recursive Residuals & Cumulative Sum of Square of Recursive Residuals

5. Conclusion and Policy Implication

Globalization is attributed to effect foreign direct investment significantly. It is useful to bridge the investment-saving gaps for developing nations. This research determined how foreign direct investment flows affect by the misery index in Pakistan. Additionally, this study also examined how money supply and exchange rate affect FDI inflows. The unit root PP and ADF tests are used to determine whether all variables are stationary. Then, for long-term relationships, we employed the ARDL technique of cointegration, and for short-term analysis, an error-correction model is applied. In this study, FDI is determined by the misery index, exchange rate, and money supply.

Researchers can use panel data to examine the same FDI factors that are examined in this study considering the findings. The measures of each variable are not covered in this research, which used a version of the misery index. Researchers can therefore contribute by determining the measure of each variable. To encourage more foreign direct investment, policymakers should to raise responsive and profitable environment for overseas investors. There should be stable government, along with their strategies and regulations. Since stable government is imperative for all investments. Shareholders should not fright over government change and publicizing policies that may affect investment. Since trusting regime policies, laws, and governance attract more foreign direct investment and capital investments. The failure of stable governance is discouraging FDI inflow and ultimately GDP consistently. However, government needs to take practical measures for instance regulation of sea ports, air ports, power houses, improved security, expansion of roads and infrastructure etc., to attract more foreign direct investment.

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