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Does Exchange Rate Matters for Foreign Direct Investment Inflow to Ethiopia?

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Abstract
This study examines the effect of exchange rate on foreign direct investment inflows in Ethiopia. The aim of the study is to investigate how foreign investors through FDI respond to change in exchange rate level in Ethiopia. In line with the explanatory variable exchange rate; economic growth, inflation, trade openness, and external debt are added as a control variable in the study. The study uses explanatory research design and quantitative research approach with secondary time series data utilized over the study period 1992-2017(26 years). More specifically, the study adopts an autoregressive distributed lag (ARDL) model. Furthermore, the long run relationships of variables are quizzes through bound tests and confirm the existence of a long-run relationship among variables. So, in order to investigate the short run relationship among variables, the error correction model is employed in the study. The finding of the study reveals that; exchange rate level and foreign direct investment have a positive relationship in the short run as well as in the long run and statically significant at 1 percent significance level. So, devaluation of Ethiopian Birr against US dollar affects foreign direct investment positively in both cases. But, the last year effect (one period lag) of devaluation on current year foreign direct investment was found negative. On the other hand, variables like economic growth and inflation have a negative relationship with foreign direct investment in the long run as well as in the short run. But, except economic growth, inflation found insignificant in the long run. External debt found positive and insignificant in the long run. However, the relationship between trade openness and foreign direct investment were found positive and statically significant. This study suggests that the government shall ensure the stability of the exchange rate once devaluation is made.
Keywords: exchange rate, foreign direct investment, Autoregressive distributed lag model
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1. INTRODUCTION

Foreign direct investment is defined as companies from one country making a physical investment into another country and it is a measure of foreign ownership of productive assets, such as factories, mines, and land (Ali et al, 2017). As highlighted in Cushman (1985), Foreign Direct Investment (FDI) is an international flow of capital that provides a parent company or multinational organization with control over foreign affiliates.

According to Cambazoglu (2016), FDI occurs when the benefits of manufacturing in the host country outweigh the loss of large scale production associated with one plant in the home country. The choice of investment location is an important criterion for a multinational firm while deciding on FDI. So, for the host country, increasing foreign direct investment can be used as one measure of growing economic globalization. Because, the foreign direct investment can provide a firm with new markets and marketing channels, cheaper production facilities, access to new technology, products, skills, and financing. Besides, evidence shows that, with suitable host-country investment climate and policies, foreign direct investments (FDI) have the potential to play a significant role in economic development; especially in developing countries. Because, FDI provides a major source of capital which brings with it up-to-date technology and offers so many prospects for greater diversification of the industrial base and exports, which contribute to the integration of economies to the rest of the world. Over time, FDI associates with many positive externalities in the form of employment generation, skills transfer, technological progress, and enhanced productivity and efficiency. Ultimately, these factors have a positive impact on economic growth and consequential poverty reduction.

According to Goldberg (2009), by 2005, the inflows of FDI around the world were rose to $916 billion and more than half of these flows were received by businesses within developing countries. Particularly, the role of FDI is quite critical in Africa, given the fact that poverty levels are generally high while domestic savings and income remain extremely low as income is mainly channeled to consumption expenditure. In this respect, an increase in FDI is deemed necessary to close the development financing gap characteristic of Sub-Saharan Africa (Asiedu, 2002). Given the benefits of FDI inflows, attracting FDI has become an important policy objective of many countries in Africa. Because; the level of poverty in Africa is very high when it is compared to those developed countries. Relating to Africa, Recent empirical evidence suggests that, a sustained rate of economic growth of between 8 and 10 percent is necessary to reverse the spread of poverty (Asiedu, 2002). So, in order to achieve this, attracting foreign direct investment becomes an important tool. But, identifying factors that attract foreign direct investment is an endless homework in whole over the world (Asiedu, 2002). Supporting to this, there are many theories trying to explain the determinants of foreign direct investment and there are few important

variables that play a role in decisions relating to foreign direct investment (Froot and Stein, 1991). Additionally, a number of studies are conducted across the world to identify the major determinants of foreign direct investment. But, they do not end up with the same results. The justifications behind differences in results are, the effect of each variable across the countries is different and have different implication. For example, from traditional economic factors; the host countries macroeconomic policies, the legal system, political stability, market size and availability of raw materials are some of the very important variables in deciding foreign direct investments. Apart from this, on a contemporary basis, foreign exchange rate level has also emerged as critical in attracting foreign direct investment. However, the empirical evidence of the relationship between exchange rate level and FDI flows has not been clear cut (Kosteletou and Liargovas, 2000). While, a number of empirical studies argued that, one of the many influences on foreign direct investment activity is the behavior of exchange rates (Asmah and Andoh, 2013).

An exchange rate is defined as the domestic currency price of a foreign currency matter both in terms of their levels and their volatility (Asmah and Andoh, 2013). So, among determinants of FDI, one of the most important determinants is the behavior of exchange rate level (which shows the level of domestic currency against foreign currencies). In the context of Ethiopia, Ethiopia is one of a sub-Saharan country working for sustainable economic development to overcome poverty. The Ethiopian government is making so many policy arrangements to improve economic growth from time to time and one of this is attracting foreign direct investment through exchange rate (devaluation of home currency against the US dollar). In this case, the devaluation of the local currency against foreign currency has its own implication for foreign direct investment. According to Froot and Stein (1991), Depreciation of a host countries currency reduces its production cost and lowers the relative cost of capital and thereby, supports foreign direct investments. So, after depreciation, foreign investors can acquire more capital with their existing wealth (Froot and Stein, 1991). Additionally, a number of theories and empirical evidence support the idea of, devaluation of a home currency against foreign currency attracts foreign direct investments.

Hence, by considering the above facts and absence of any study conducted in Ethiopia to examine the effect of exchange rate on foreign direct investment, this study focuses on the effect of exchange rate level on foreign direct investment inflows in context of Ethiopia. In order to examine the effect of exchange rate on foreign direct investment inflows; economic growth, inflation; Trade openness and External debt are added as a control variable for this study.

The motivation behind a researcher for conducting this study is that; initially, Ethiopian government considered exchange rate as a mechanism for attracting foreign direct investment and managed with a recent correction through a devaluation of 15% in 2017. Secondly, there is no known study that has been undertaken to examine the effect of exchange rates on foreign direct investment in Ethiopia. And, finally, the result of different studies conducted across the world was contradicting one another. So, it is helpful for the country to conduct research on; to what extent exchange rate and foreign direct investments are related in Ethiopia. The broad objective of this study is to examine the effect of exchange rate on foreign direct investment inflows in the context of Ethiopia and the present study seeks to test the following hypotheses.

H1*: Exchange rate has a positive and significant effect on Foreign Direct Investment*

2. Literature Review

Different studies have been conducted to establish the potential factors that would determine the inflow of FDI into a host country both in Africa and elsewhere in the developing worlds of Asia and South America. The factors which were identified as determinants of FDI are greatly varied from study to study and from country to country (UNCTAD, 2003).

Batra et al (2003) argue that; the determinants of foreign direct investment to Africa are different from the determinants to the other parts of the world. Asiedu (2004) agrees with this argument and states that; the lessons from East Asia and Latin America countries do not apply to African countries. Apart from this, several empirical studies have analyzed the relationship between FDI and exchange rate changes in terms of both the level and volatility. Furthermore, some have also included the effects of exchange rate expectations (Baek and Okawa, 2001). Based on this fact, the following section discusses Empirical literature conducted in the study area.

There are many studies that have been conducted so far on the effect of exchange rate on foreign direct investments across the world. The result of each study differs from each other and shows a different implication. So, this section discusses previous studies conducted on the effect of exchange rate on foreign direct investment.

One of the earliest studies conducted on the relationship between exchange rate and foreign direct investment was the work of Goldberg and Klein (1998), who conducted study to determine the relationships among trade, foreign direct investment and the real exchange rate between a set of South East Asia and Latin American countries including both USA and Japan. The objective of the study was to examine the effect of trade and the real effective exchange rate on foreign direct investment. The study, in general, concluded that; the host country currency depreciation was the main reason for increased return to the host countries through foreign direct investments. Specifically, the study suggests that; depreciation of the currencies of the South East Asian countries when compared to the Japanese yen are were responsible for increased foreign direct investment to South East Asian

countries from Japan.

Following the study by Goldberg and Klein (1998), the numbers of studies were conducted to examine the relationship between foreign direct investment and exchange rate. For instance, Sadewa (2002) conducted a study on the effect of exchange rate on foreign direct investment in Japan. The objective of the study was to examine whether the depreciation of the host country currency attracts foreign direct investment or not. In doing so, the study was conducted based on an option pricing approach. The study was conducted using foreign direct investment remittance data which flows from Japan to the United States of America during the study period. The finding of the study indicates that; the FDI flows may decrease as the currency of the host country depreciates. Further, the study explains the negative relationships between the two variables were based on external factors such as technological effect. This means, if the foreign firms have a technological advantage in making an investment, the currency depreciation reduces Foreign Direct Investment flows from the foreign country. However, when foreign firms have a technological disadvantage over the host country, the level of foreign direct investment in the host country may increase.

The other study conducted by Udomkerdmongkol et al (2006) supports the finding of the Goldberg and Klein (1998), which states that; depreciation of host country currency may affect foreign direct investment positively. Udomkerdmongkol et al (2006) conducted a study on the effect of exchange rate on foreign direct investment to a sample of 16 emerging market countries using panel data for the period 1990-2002. In doing so, the study used three variables to capture separate exchange rate effects. Those are, the nominal bilateral exchange rate to the $US was used to captures the value of the local currency. Secondly, Changes in the real effective exchange rate index (REER) was used as a proxy for expected changes in the exchange rate. And finally, the temporary component of bilateral exchange rates was used as a proxy for the volatility of the local currency. The finding of the study indicates that; ceteris paribus, there is a negative relationship between the expectation of local currency depreciation and foreign direct investment inflows. However, devaluation of host country currency against foreign currency attracts foreign direct investment inflows. On the other hand, the study found a negative relationship between foreign direct investment and volatility of exchange rate and this discourage foreign direct investment inflows to host country.

Among the number of studies conducted across the world, the study of Yaprakli (2006) is the classical study which shows how the exchange rate affects foreign direct investment. Yaprakli (2006) conducted a study on the economic determinants of foreign direct investment in Turkey. The objective of the study was to examine how foreign direct investment reacts to change in macro-economic variables in Host County. The finding of the study indicates that; the exchange rate has an effect on FDI from income and cost perspectives. In this case, the following justification was given by the study to show how the exchange rate affects foreign direct investment. Initially, Depreciation of host country currency allows foreign investor whose production is export-oriented to increase the national input in terms of production along with exports and profits. And this is called the income effect. In such cases, depreciation of a host country currency in the foreign exchange markets positively affects FDI. However, the use of imported inputs in the production by an export-oriented investor and a high degree of dependence on imported inputs can cause the investor's exports and profits to decrease. This is known as the cost-effect, and in such cases, a depreciation of the domestic currency in the foreign exchange markets negatively affects FDI. The net effect of foreign exchange rates on FDI changes with respect to the magnitude of income and cost effects. If the income effect is greater than the cost effect, an increase in the exchange rate positively affects foreign direct investment.

However, the case is different if the cost effect is greater than the income effect. Which implies, the greater the cost-effect compared to income effect, increase in exchange rate negatively affects foreign direct investment. Finally, the finding of the study indicates that; the effect of exchange rate on foreign direct investment can be decided based on cost and income effect.

Osinubi and Amaghionyeodiwe (2009) conducted a study on the effect of exchange rate volatility on foreign direct investment inflows in Nigeria. The objective of the study was to examine if the volatility of the exchange rate affects foreign direct investment inflows in the short run as well as in the long run. The study was conducted using secondary time series data range from 1970 to 2004. For this purpose, the study was estimated through the econometric analysis of time series model by including the exchange rate and interest rate as control variables. The finding of the study suggests that; there is a positive relationship between inward Foreign Direct Investment and exchange rate level in Nigeria. Further, the findings of the study implied that; the depreciation of the naira against foreign currencies was the reason for increased the level of real inward foreign direct investment to Nigeria.

Ellahi (2011) conducted an empirical study to show the impact of exchange rate volatility on foreign direct investment for the Pakistan economy. The study was conducted through secondary time series data over the period of 1980 to 2010. The estimation technique used in the study was the autoregressive distributed lag (ARDL) to find the short run as well as the long run relationship among variables. The study was included the real gross domestic product (GDP), capital account balance, trade openness, real exchange rate and volatility of exchange rate as independent variables along with the introduction of a dummy variable for the structural adjustment

program. While foreign direct investment was used as the dependent variable. The finding of the study suggests that; exchange rate level and foreign direct investment were positively related during the study period in Pakistan. Furthermore, since the study was conducted to examine the short run as well as the long-run relationship of the variables. The result of the study shows that; the effect of exchange rate on foreign direct investment was positive in the long run but it negatively affected foreign direct investment in the short run.

Otieno (2012) conducted a study to determine the impact of exchange rate fluctuations on foreign direct investment inflows in Kenya. The study was conducted by using a thirty year period data (1981 to 2010). The objective of the study was to examine the impact of exchange rate fluctuation on the level of foreign direct investment inflows to Kenya along with control variable inflation rate and economic growth rate. The finding of the study suggests that; there is no significant relationship between the exchange rate and foreign direct investment. Which means; the impact of exchange rate fluctuation on foreign direct investment is insignificant. However, the relationship between the two variables was found positive, whereby, an increase in the exchange rate fluctuations of the local currencies leads to an increase in FDI inflows.

Parajuli (2012) conducted a study to examine the relationship between the exchange rate, foreign direct investment and trade in the developing economy of Mexico from the Organization for Economic Corporation and Development countries; and how exchange rates and the volatility of exchange rates impact the flow of FDI. The objective of the study was to examine the reaction of foreign direct investors from members of OECD countries to Mexico with the level of the exchange rate. The study was conducted using data from 1994 to 2008. The finding of the study indicates that; there was a positive correlation between the expectations of exchange rates and foreign direct investment.

Furthermore, the study suggests that; the coefficient on the variable exchange rate indicated appreciation in the home currencies encourages outward FDI flows from members of OECD countries to Mexico.

Renani and Mirfatah (2012) conducted a study to examine the relationship between the exchange rate and foreign direct investment. The main goal of the study was evaluating the determinants of inward foreign direct investment and particularly volatility of exchange rate in Iran by using the Johansen and Juselius's co-integration system approach. The study was conducted by using secondary time series data range from the period of 1980Q2-2006Q3. In order to achieve the objective of the study, the study was conducted by including economic growth, world crude oil prices and Trade openness as a control variable for the study. The finding of the study reveals that; gross domestic product, trade openness and exchange rate have a positive relationship with foreign direct investment. But, world crude oil prices and the volatility of the exchange rate were found to have a negative relationship with foreign direct investment.

Muema (2013) conducted a study on the determinants of foreign direct investment in Kenya. The aim of the study was to identify the most drivers of foreign direct investment in Kenya. In doing so, the study was conducted by including so many independent variables that determine foreign direct investment. And, one of the variables was the level of host country currency against foreign currencies (exchange rate). The finding of the study reveals that; there was a strong positive correlation between foreign direct investment and the change in exchange rate level in Kenya, which indicates that, higher foreign direct investment inflows were associated with the weakening of Kenya shilling. The conclusion of the study further explains that; the key factor that determined changes in foreign direct investment in Kenya was the exchange rate of the Kenyan shillings by (KES) to the other currencies proxied by the rate of change to the USD.

GT Kabura (2014) conducted a study to examine the linkage between foreign direct investment inflows and the level of the exchange rate in Kenya. The study was conducted for a ten years period from 2004-2013 using secondary data on FDI remittances as well as the spot rate for exchange rate over that period with data collected quarterly. Inflation and GDP were used as control variables. A trend analysis between the FDI & Exchange Rates of the study revealed that, a relationship that one was determined by the other. Correlation analysis of the two variables showed a strong positive association. Meaning that; an increase in one variable was likely to result in an increase in the other variable. The regression analysis revealed a strong relationship between FDI, KES/USD exchange rate, GDP per capita and the inflation rates.

Ahmed (2015) conducted a study to provide evidence on the relationship between real exchange rate and foreign direct investment inflows in Turkey. The study was conducted to investigate the effect of exchange rate on foreign direct investment with quarterly data covering the period 1989Q1-2011Q1 for the Turkish economy was used. In line with the target variable real exchange rate; the study was carried out by including control variables such as trade openness and inflation rate. For this purpose, the bound testing approach and ARDL estimation techniques were used to examine the short and long run relationship among the variables. The finding of the study indicates that; the real exchange rate affects foreign direct investment positively in the long run as well as in the short run. Furthermore, the study suggests that, in addition to the real exchange rate, trade openness and inflation rate were found positively affects foreign direct investment.

Martins (2015) conducted a study to examine empirically the impact of the real effective exchange rate volatility on Brazilian foreign direct investment inflows. The study was conducted by using annual data ranges

from 1976 - 2013. To achieve the objective of the study, the study was carried out by including 6 more determinants of foreign direct investment inflows. Those are (GDP growth, population growth, trade openness, inflation, information infrastructure, and financial development) as a control variable. The ARDL model was used for estimation purpose in order to estimate both short and long-term effects. The Empirical finding of the study revealed that; the volatility of the real exchange rate affects significantly and negatively foreign direct investment inflows in both short and long-term.

Khandare (2016) conducted a study on the effect of exchange rate on foreign direct investment in the case of India and China. The study was carried out for analyzing the impact of the exchange rate level on foreign direct investment inflows. The study was used correlation and regression analysis to examine the relationship between the variables. The secondary time series data was utilized during the study period from 1991 to 2014. The finding of the study was shows mixed results on the relationship between two variables.

It is found that; the exchange rate is positively correlated with foreign direct investment in the case of India, while the correlation result shows a negative relationship between foreign direct investment and exchange rate in the case of China.

WK Njuguna (2016) conducted a study to determine the relationship between exchange rates and foreign direct investment in Kenya. The independent variables used in the study was the exchange rates (KES/USD), inflation as determined by the consumer price index and economic growth as computed by gross domestic product; While, Foreign direct investment was used as the dependent variable for the study. The study was conducted over a period of ten years from January 2006 to December 2015 using secondary data on FDI remittances as well as the spot rate for the exchange rate over that period with data collected monthly. In this study, Inflation and economic growth were used as control variables. The finding of the study concluded that; exchange rates, inflation, and economic growth do influence the levels of foreign direct investment in Kenya. The implication given for the relationship between the exchange rate and foreign direct investment was in that, a devaluation of currency can attract foreign direct investment in Kenya. It was noted that; an increase in exchange rates resulted in an increase in FDI.

Ali et al (2017) conducted a study on the effect of exchange rate on foreign direct investment inflows evidence from Somalia. The study was done by applying multiple regression models under OLS method. in addition to the exchange rate, inflation, domestic investment and lack of governance were used as control variables. The result of the study shows that; there is a negative and significant relationship found between the exchange rate and foreign direct investment in Somalia. However, the finding of the study suggests a positive and significant relationship between inflation and foreign direct investment. Furthermore, domestic investment found positively affects FDI, and a negative but insignificant relationship is observed between the lack of government and foreign direct investment in Somalia.

Naseem (2017) conducted a study to investigate the relationship of Foreign Direct Investment (FDI) with the exchange rate in Pakistan. The study was conducted through time series data over the study period of 11 years (2003-2013). In line with the target variable exchange rate; the study included economic growth, export, imports, and inflation as a control variable for the study. The method applied under this study for estimation technique was multiple regression, descriptive statistics, and correlation analysis. The finding of the study reveals that; the exchange rate and foreign direct investment were positively correlated in Pakistan during the study period. Specifically, the study implies that; foreign direct investment is most probably associated with Rupee depreciation in Pakistan.

Mohamed et al (2017) conducted a study to examine the relationship between real exchange rate and foreign direct investment inflows in South Africa. The study was conducted by applying the estimation technique of autoregressive distributed lag (ARDL) with bounds testing method to estimate the short run as well as the long-run relationship among variables. The secondary time series data was used over the study period of 1987-2016. In this study, in addition to the real exchange rate, they included domestic market size and trade openness as a control variable. The result of the bound test reveals long-run co-integration relationships among variables, implying real exchange rate, and domestic market size stimulate the foreign direct investment in the long run. The finding of the study indicates that; exchange rate affects foreign direct investment negatively. Furthermore, the study implies the exchange rate instability is likely to be substantially harmful to a positive effect of FDI and should be avoided in South Africa.

Muhammad and Hassan (2017) conducted a study to investigate the impact of exchange rate on foreign direct investment inflows in Pakistan. The study was conducted by using the estimation technique of autoregressive distributed lag model (ARDL) with bound test method to examine the long run relationship of variables. Along with the exchange rate, the target variable, the cardinal variable such as external debts and market size were included in the study. The finding of the study reveals that; the Exchange rate is found positive and highly significant with foreign direct investment inflows in the short run as well as in long-run. Furthermore, it is observed that; the variable Market size was positively correlated with foreign direct investment in the short run as well as in the long run. Additionally, External debts were surprisingly shown a positive relationship with foreign direct

investment in long-run but negatively correlated in short-run.

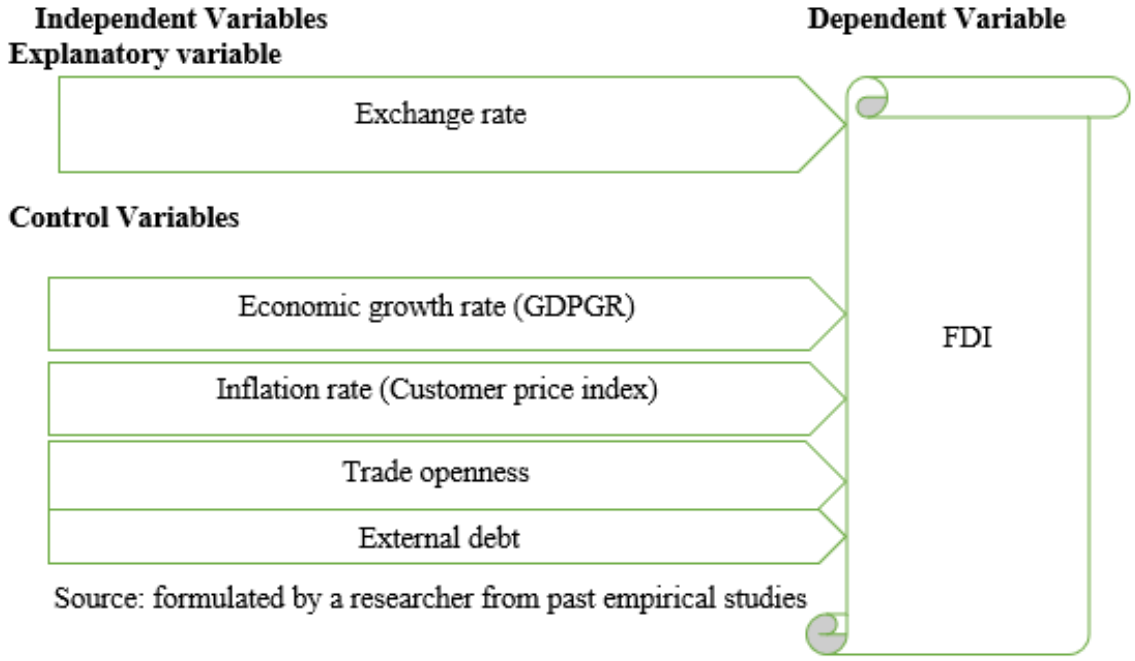
Usman et al (2017) conducted a study to examine the effect of exchange rate volatility on foreign direct investment in Pakistan. The study was done by using the estimation technique of ARDL with bound test method to identify the long run relationship among variables.

The purpose of the study was to examine the impact of the exchange rate, exchange rate volatility, GDP, trade openness and current account balance on foreign direct investment in Pakistan for the period of 1981 to 2015. The finding of the study shows that; exchange rate volatility and current account balance were affected by foreign direct investment negatively in short as well as in the long run. However, the exchange rate found positively affects foreign direct investment over the study period in Pakistan.

Lindström and Sten (2018) conducted a study on the effect of exchange rate on foreign direct investment in South Korea and China. The study was conducted through the econometric model where the dependent variable is the annual FDI inflow and the independent variable of interest was the real effective exchange rate.

In doing so, the data used to analyze the relationship between two variables was range from 1986 and 2015. The result of the study implies that; foreign direct investment and exchange rate have a negative relationship. That means, depreciation of the local currency against foreign currency leads to a decrease of FDI inflows.

Figure 2.1: a conceptual framework of the study



Source: formulated by a researcher from past empirical studies

3. Methodology

To examine the effect of exchange rate on foreign direct investment, the study used explanatory research design and quantitative research approach.

3.1. Model specification and Control Variables

In order to examine the effect of exchange rate on FDI inflows in Ethiopia, there is an estimated equation where FDI inflow in Ethiopia is reflected as a function of the following variables (including control variables):

FDI=f(ER, GDPGR, INF, TOP, ED)…… (1)

FDI = the net FDI inflows as % of GDP.
ER = Exchange rate level (USD/ETB).
GDPGR = Economic Growth rate.
INF =Inflation rate.
TOP =Trade openness (ratio of import plus export to GDP).
ED = External debt (as a percentage of GDP).

3.2. Model equation of the study

The above equation number (1) can be rewritten in the following econometric model with its functional forms.

$LFDI_t = \beta_0 + \beta_1 ER_t + \beta_2 GDPGR_t + \beta_3 INF_t + \beta_4 LTOP_t + \beta_5 LED_t + c$ …… (2)

Whereas; β0 is the intercept and βi (i=1, 2, 3, 4, 5,) represents the coefficient for each of the independent variables.

LFDI = is the foreign direct investment inflows into Ethiopia, and measured as a percentage of economic growth (%GDP) and natural logarithm is applied for this variable.
ER = is the level of the exchange rate against the USD dollar (USD/ETB).
GDPGR= is the economic growth rate.
INF = is the annual inflation rate (annual percentage change of the average customer price index)
LTOP = is trade Openness which is measured by; import plus export as a percentage of economic growth; (% of GDP) which means (Import + Export/GDP) and also, natural logarithm is used for trade openness.
LED = represents the external debt; which is the overall external debt of the country as a percentage of economic growth (% of GDP). Also, the natural log is used for this variable.
C = is the constant term of the regression.

3.3. Discussion of Model Used

In this study, the researcher used Autoregressive Distributed Lag (ARDL), Model. The approach was introduced by Pesaran, Shin, and Smith (2001) with an objective to examine the long and short-run relationships among the variables of interest.

The reason behind using the autoregressive distributed lag model in this study is in that; all series (variables) are stationary at a different level; which means, some of them are stationary at level (LFDI, GDPGR, INF) while the remaining variables are stationary at first difference (LTOP, LED, ER). So, when series are integrated at different levels, it is better to use the ARDL model (Brooks, 2008). Additionally, the ARDL cointegration method is better than the traditional cointegration techniques suggested by Johansen (1988) and Johansen and Juselius (1990) for the following reasons. Initially, ARDL is easily applicable; it means, all the variables under the study are not required to be integrated at the same order. It uses the variables regardless of whether they are at purely (0), or purely (1) or fractionally integrated (i.e., a mixture of both); secondly, It avoids too many specifications, like the number of endogenous and exogenous variables to be included and shows an optimal number of lags to be applied in the study; In addition to this, it enables variables to show different optimal lags within a given study (Bhasin & Gupta, 2017). Thirdly, it estimates all together parameters of both short and long-run estimates along with variance-covariance matrix. Subsequently, it provides reliable and consistent results, which alternate cointegration methods cannot produce. And finally, it is more efficient in case of small or infinite sample size (Arize, 2017).

General to a specific representation of autoregressive distributed lag (ARDL) model is written in the following manner.

$Yt= \mu oi + \sum_{i=1}^{p} \alpha jyt-1 + \sum_{i=1}^{q} \beta jXt-1 + \varepsilon it$ ..... (3)

Whereas Yt is a vector, μoi is the intercept and variables in Xt are allowed to be purely I(0) or I(1) or fractionally cointegrated; β and α are coefficients; j=1,….k is a number of independent variables. P is the lag length of dependent variable and q is the optimal lag for independent variables. While the term εit represents a vector of error terms

After the general ARDL model is specified, the next step is to check if there any long-run relationships among variables.

The long-run relationships of variables are tested through the bounds testing approach developed by Peseran et al. (2001). The hypothesis of the bound test co-integration is stated as follows.

H0=β1= β2= β3= β4= β5= 0, No long run relationship among variables
H1= β1 ≠ β2 ≠ β3 ≠ β4 ≠ β5 ≠ 0, there is a long run relationship among variables

To accept or reject the null hypothesis of the bound test co-integration; two asymptotic critical value bounds provide a test for co-integration. when the independent variables are I(0) or I(1) a lower value assuming the regressors are I(0) and an upper value assuming purely I(1) regressors. If the F-statistic is above the upper critical value, the null hypothesis of long-run relationship can be rejected irrespective of the orders of integration for the time series and the converse is also true.

The following ARDL model is estimated in order to test for co-integration among the variables.

$$\Delta LFDIt = \beta 0 + \beta 11\, LFDIt-1 + \beta 12\, LFDIt-2 + \beta 21 ERt-1 + \beta 22 ERt-2 + \beta 31 GDPGRt-1 + \beta 32 GDPGRt-2 + \beta 41 INFt-1 + \beta 42 INFt-2 + \beta 51 LTOPt-1 + \beta 521 LTOPt-2 + \beta 61 LEDt-1 + \beta 62 LEDt-2 \sum_{a}^{h} \lambda 2\, \Delta\, ER\, t-a + \sum_{b}^{h} \lambda 3 \Delta GDPGRt-b + \sum_{c}^{h} \lambda 4\, \Delta\, INFt-c + \sum_{d}^{h} \lambda 5\, \Delta L\, TOPt-d + \sum_{e}^{h} \lambda 6\, \Delta LEDt-e + \varepsilon t \quad (4)$$

Whereas

Δ = is the back shift operator
β_0 = denotes the intercept term
β = (i = 1…6) represent the long-run coefficients of variables
($LFDI_{t-1}$, ER_{t-1}, GDP_{t-1}, INF_{t-1} $LTOP_{t-1}$, LED_{t-1}) represent one period lagged variables
Λ = (i = 1… 6) denote the short-run coefficients of variables at lag orders
h = denotes the lag length that obtained using Akaike information criterion (AIC)

εt = represents the white noise error term.

In the bounds testing approach, the existence of a long-run relationship among variables is confirmed by comparing the F-statistics. In this case, the model should have to be modified to error correction model; in which, to identify the short run relationship of the variables. The error correction model formulated for this study takes the following form.

$$\Delta LFDIt = \beta 0 + \beta 1 \sum_{a}^{h} i\,(LFDIt - 1) + \beta 2 \sum_{b}^{h} i\,(ERt - 1) + \beta 3 \sum_{c}^{h} i\,(GDPGRt - 1) + \beta 4 \sum_{d}^{h} i\,(INFt - 1) + \beta 5 \sum_{e}^{h} i\,(LTOPt - 1) + \beta 6 \sum_{f}^{h} i\,(LEDt - 1) + \mu ECM\,(-1)\varepsilon t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .. (5)$$

Whereas

$ECM\,(-1)$ = error correction term lagged by one period.

εt = vector of white noise error terms.

h= the optimal lag length of each variable in the autoregressive process.

, μ = error correction parameter that measures the speed of adjustment towards the long-run equilibrium.

In order to see if the autoregressive distributed lag (ARDL) makes the model viable, the method provides the following diagnostic tests, where in case one of them fails, then the entire model is not feasible.

The diagnostic tests are composed by; Serial correlation test (it allows to see if there is autocorrelation between the variables by using the lag range multiplier test of residual serial correlation), Ramseys Reset test (uses the square of the fitted values in order to see if the functional form is practical), Normality test (based on a test of skewness , kurtosis and Bera-Jarque of residuals) and Heteroscedasticity test (based on the regression of squared residuals on squared fitted values). Additionally, with the intention of checking for the steadiness of the coefficients in the model, the cumulative sum of recursive residuals (CUSUM) and cumulative sum of recursive residuals squares (CUSUMQ) tests are applied for confirmation of inexistent structural breaks (unexpected movements in a time series).

4. Results and discussion

4.1. Unit Root Test

Under the unit root test, several tests are available but the most commonly used are the Augmented Dickey-Fuller (ADF) and Philip and Peron (PP) tests. So, hereunder, the results of both tests are performed to confirm stationarity of the series. The hypotheses of these tests are also stated as.

Table 4. 1: P-values for the ADF test.

At Level		At 1st difference	
Variables	INTERCEPT	INTERCEPT	Decision
LFDI	0.0004***	0.0003***	Stationary at I(0)
ER	0.9990	0.0286**	Stationary at I(1)
GDP	0.0002***	0.0001***	Stationary at I(0)
INF	0.0098***	0.0000***	Stationary at I(0)
LTOP	0.0939*	0.0012***	Stationary at I(1)
LED	0.6950	0.0102**	Stationary at I(1)

Source: researcher own completion using E-view 10 software

NB: *** shows stationarity of variables at 1 percent significance level, ** shows 5 percent significance level, * shows 10 percent significance level.

Table 4.2: P-values for PP test.

At Level		At 1st difference	
Variables	Intercept	Intercept	Decision
LFDI	0.0001***	0.0000***	Stationary at I(0)
ER	0.9869	0.0221**	Stationary at I(1)
GDP	0.0002***	0.0001***	Stationary at I(0)
INF	0.0104**	0.0000***	Stationary at I(0)
LTOP	0.0609*	0.0012***	Stationary at I(1)
LED	0.6200	0.0107**	Stationary at I(1)

Source: researcher own completion using E-view 10 software

NB: *** shows stationarity of variables at 1 percent significance level, ** shows 5 percent significance level, * shows 10 percent significance level.

Econometric models of time series data require that; the stationarity is tested as a prerequisite for running the data. For this purpose, as it is shown in the above tables 4.1 and 4.2 respectively; Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) tests to check that; the integration of all variables under the study are not I (2) is tested. Because the F statistic obtained from the variables integrated at I (2) is not easy to be interpreted in a meaningful

way. In addition, if data is not stationary, a problem of spurious correlation arises, and the econometric model becomes invalid because of inferential estimates obtained from are bias and inconsistent and results in misleading conclusions. With this fact, from the above unit root test performed under ADF and PP tests all variables are confirmed as to be stationary. But, the levels of stationarity are different. For example, variable LFDI, GDP growth rate, and Inflation are stationary at level. And other variables like exchange rate, Trade openness and external debt are stationary at first difference. This is the main reason why this study used the ARDL model; because the ARDL model is very useful when variables are stationary at a different level. In line with this, the null hypothesis of a unit root (non- stationary) of variables is rejected at a 5 percent significance level for all variables. Because, if the p-value is greater than 0.05 the null hypothesis of a unit root will fail to rejected; which means that; there is a unit root and therefore, the variable is non-stationary. If the p-value is less than 0.05 the null hypothesis is rejected; which means that there is no unit root, and therefore, since all variables p-value is less than 0.05, which means (stationary) the researcher rejected the null hypothesis of a unit root.

4.2. Optimal lag selection criteria

Selecting appropriate lag length is the series issue in studying a time series analysis; because, if the inappropriate lag selection is made, it may leads overall the result of the study biased because of model misspecification. So, here under the appropriate lag length for the study is performed through a VAR selection model.

Table 4.5: VAR model

VAR Lag Order Selection Criteria
Sample: 1992 2017
Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-201.9496	NA	1.352784	17.32914	17.62365	17.40727
1	-98.92602	145.9501	0.005635	11.74384	13.80543	12.29078
2	-25.79237	67.03918*	0.000501*	8.649365*	12.47804*	9.665113*

Source: E-views 10 si Software
* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

As it is shown in the VAR model, table 4.4; there are four criteria to select a lag length for the model. All criteria show two lag lengths for the model, which is very interesting for the consistency of the model. So, since the FPE and AIC criterions are useful for small sample size; the researcher used two lag lengths for this model. The number of lags that the ARDL model must have, in order for the model to be feasible is 2. But, later in the short term estimations, the software chooses the optimal number of lags for each variable assuming a maximum of 2 (in accordance with the VAR model).

Test for Co-integration of Variables

To investigate the existence of co-integration among variables, the researcher used the bounds testing approach developed by Peseran et al. (2001). Although, the stationarity levels of the series are analyzed before the bound test is carried out. Since, the models which are estimated with non-stationary regression models lead to spurious regression problems (Granger & Newbold, 1974); the results do not reflect the true relationship. In such a case, the results of t and F tests are no longer valid (Gujarati, 2002).

After determining the stationarity level of the series, the existence of co-integration among the series is tested. Bounds testing approach suggested by Peseranat et al. (2001) is used to check if cointegration exists among variables. If cointegration is found among variables, the following two stages should have to be performed in accordance with Peseranat et al. (2001). In first of these stages, to decide whether there is a relation of co-integration between the variables is; decided by comparing the critical values in Pesaran et al. (2001) with the calculated F statistics. If the calculated F statistics is less than Pesaran's lower bound, there is no relation of co-integration among the series. If the calculated F statistics is greater than the upper bound, there is a relation of co-integration among the series. If the F statistics is between the lower and upper bounds, a decision cannot be given about whether there is co-integration or not. Secondly, after performing the bound test, if existence of a long-run relationship among the variables in the model is confirmed, then, with the error terms obtained from the long-run equation, error correction model which gives the short-run equation among the variables is estimated through the

ARDL method developed by Peseran and Shin (1999).

Table 4.3: Result of Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	8.086208	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
Actual Sample Size	24	Finite Sample: n=35		
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04
		Finite Sample: n=30		
		10%	2.578	3.858
		5%	3.125	4.608
		1%	4.537	6.37

Source: generated from E-views 10

As it is possible to observe in Table 4.6, according to the bounds test, the calculated F-statistic is above the upper critical bound values (higher than at 90%, 95%, 97.5% and 99% upper bounds), which means that; the model rejects the null hypothesis of no level effects. And this implies that; there is cointegration between the variables. Existence of co-integration among variable reveals, the study should have to estimate with error correction model in order to know the short run relationship among variables.

Model Diagnostic test

To ascertain the goodness of fit of the estimated model, the diagnostic tests are conducted. The diagnostic test suggests that; the model passes the test of serial correlation, non-normality of the errors, heteroscedasticity associated with the model and finally steadiness of the model.

Long run estimation of the model (FDI inflows)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	0.089824	0.014374	6.249200	0.0002***
GDPGR	-0.046305	0.019807	-2.337831	0.0476**
INF	-0.021149	0.012667	-1.669600	0.1335
LED	0.365569	0.370912	0.985596	0.3532
LTOP	3.077081	0.550274	5.591903	0.0005***
C	-0.810616	0.305199	-2.656023	0.0290

Source: generated from E-views 10 software

Note: *** indicates 1 percent significance level and ** indicates 5 percent significance level

$$FDI = -0.810 + 0.09EX - 0.046GDP - 0.021INF + 0.3655ED + 3.07TOP$$

From the above regression result; the variable exchange rate has a positive and statically significant relationship with foreign direct investment at 1 percent significance level. This implies that; in the long run, the exchange rate affects foreign direct investment positively. Which means, ceteris paribus, 1 unit increase in exchange rate causes 8.9824 percent increase in foreign direct investment. On another way, the implication is; One Ethiopian birr devaluation against US dollar causes foreign direct investment to increase by 8.9824 percent. In this case, by making other things remaining constant, it is the general hypothesis that; investors prefer such as the economy for investment purpose. Because, the currency is depreciated or subject to devaluation means, the foreign investors get more purchasing power in the host country. The general assumption behind this is; devaluation encourages export-oriented investor in which he /she is going to get more profit from export, then more market share in the shape of more exports and hence rise in FDI inflows. The result of this finding is consistent with studies conducted by Muhammad and Hassan (2017), Osinubi and Amaghionyeodiwe (2009), Aqeel & Nishat (2004), Akram and Alem (2017), and Muema, (2013).

Result of Error Correction Model (ECM)

ARDL Error Correction Regression
Dependent Variable: D(LFDI)
Selected Model: ARDL(1, 2, 2, 2, 2, 1)
Case 3: Unrestricted Constant and No Trend
Sample: 1992 2017
Included observations: 24

ECM Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.987421	0.130499	-7.566487	0.0001
D(EX)	0.343870	0.060731	5.662155	0.0005***
D(EX(-1))	-0.442568	0.059164	-7.480415	0.0001***
D(GDPGR)	-0.064081	0.007289	-8.791821	0.0000***
D(GDPGR(-1))	0.020271	0.005404	3.751140	0.0056***
D(INFLATION)	-0.017625	0.002505	-7.034990	0.0001***
D(INFLATION(-1))	0.014696	0.003362	4.371416	0.0024***
D(LED)	-0.566134	0.261333	-2.166331	0.0622*
D(LED(-1))	-0.781392	0.308819	-2.530255	0.0352**
D(LTOP)	5.159871	0.685694	7.525035	0.0001***
ECM(-1)*	-0.977494	0.090420	-10.81054	0.0000***

R-squared	0.937055	Mean dependent var	0.087488
Adjusted R-squared	0.888635	S.D. dependent var	0.409904
S.E. of regression	0.136791	Akaike info criterion	-0.837168
Sum squared resid	0.243252	Schwarz criterion	-0.297227
Log-likelihood	21.04602	Hannan-Quinn criter.	-0.693922
F-statistic	19.35285	Durbin-Watson stat	2.303989
Prob(F-statistic)	0.000003		

Source: generated from E-views 10 software.

The aim of running the error correction model is to see the short run relationship among the variables and to know at what percentage disequilibrium in the short run will be corrected in the long run. From the above error correction model, the mark of ECM term giving the error correction coefficient; which is negative and statistically significant as expected. This means that; the adjustment speed is good. According to Bahmani-Oskooee (1999), if ECM is negative and statistically significant, the variables are co-integrated in the long run. The error correction term (ECM), which indicates the speed of adjustment has a value of -0.977494. It is considered as correctly signed and also statistically significant. This implies that; the short run disequilibrium, as well as inconsistencies, are being adjusted and corrected in the long run at a percentage of 97.74. The negative sign is a confirmation of the existence of equilibrium in the long term.

From the above short-run coefficients of the variables, it can be seen that; the variable exchange rate and inward FDI has a positive relationship and statically significant at 1 percent significance level. The coefficient on the exchange rate variable shows 34.3870 percent. This implies, in the short run, ceteris paribus, 1 unit increase of domestic currency against US dollar causes 34.3870 percent increase in foreign direct investment. Or, 1 birr devaluation against the US dollar causes foreign direct investment to increase by 34.3870 percent in the current year. And, it is an indication for an immediate reaction of the foreign direct investor when devaluation is made. The result of the short-run effect is the same with the result of long-run effect; which implies that, foreign direct investors are aware of the exchange rate variable in short as well as in the long run. So, as highlighted in the long run estimation of variables; it's the general hypothesis that investor prefers such economy for investment purpose whose currency is depreciated against foreign currencies. The result of this study is consistent with the finding established by Muhammad and Hassan (2017), Osinubi and Amaghionyeodiwe (2009), Aqeel & Nishat (2004) and Akram and Alem (2017). On the other hand, the previous year level of the exchange rate (EXR_1) affects the foreign direct investment of current year negatively and statistically significant at the 1 percent significance level.

This means the one period lag or last year devaluation of birr against US dollar affects FDI inflow of current year negatively. Or, the current year devaluation affects the next year FDI inflow negatively. And this may happen if the firm investment is the import-oriented type of investment.

5. Conclusion

The general objective of this study was to examine the effect of exchange rate on foreign direct investment inflows in Ethiopia. In addition to the exchange rate, some macro-economic variables like economic growth rate, inflation rate, trade openness, and external debt were included in the study as a control variable. To achieve the objective of the study, the study used explanatory research design and quantitative research approach with a secondary time series data utilized over the study period (1992-2017). In order to estimate the extent of the effects of each variable, several tests were needed to be done. Firstly, a multicollinearity test was checked through a correlation matrix; in order to see, if there was an issue between variables. Then, the stationarity tests were made through unit root test and proved to have mixed results; in which, some variables were stationary at the level and others at first differences. To this end, the study used autoregressive distributed lag (ARDL) model of estimation technique to identify short run as well as the long-run effect of the exchange rate on foreign direct investment. The existence of a long-run relationship among the variables was confirmed through ARDL-Bound test. Additionally, other tests (such as the serial correlation, Ramsey's rest, normality, heteroscedasticity tests, Cusum, and Cusum Squares) were confirmed that a model is feasible. Subsequently, the empirical findings of this particular study suggested the following conclusions. The finding of the study indicates that; exchange rate affects foreign direct investment positively in the long run as well as in the short run and statically significant at 1 percent significance level in both cases. Furthermore, one period lag or the last year effect of exchange rate on current period foreign direct investment was found negative and statically significant at 1 percent significance level.

The finding of the study implies that; foreign direct investors are interested to make an investment when devaluation takes place in Ethiopia. But, continuous devaluation reduces the level of foreign direct investment inflows into Ethiopia. The finding further suggests that, in addition to the exchange rate, economic growth and trade openness were found as the most drives of foreign direct investment inflows in Ethiopia. The finding of the study reveals that; trade openness found positively affects foreign direct investment and statically significant at 1 percent significance level in the long run as well as in the short run. On the other hand, economic growth affects foreign direct investment negatively and statically significant at 5 and 1 percent significance level in the long run as well as in the short run respectively. But, the last year level of economic growth has a positive impact on the current year foreign direct investment and statically significant at 1 percent significance level.

The other variables such as inflation rate and external debt have an insignificant effect on FDI inflow into Ethiopia in the long run and this proves that; these variables are not many important factors in determining FDI in Ethiopia. While they are significant to determine of foreign direct investment in the short run. Therefore, from the finding of the study, it is possible to understand that, the decision of foreign direct investors is a serious issue which needs consideration for both risk and benefit involved in making an investment. As it is observed, the firm does not make an investment based on short term macroeconomic factors, while, they give consideration for long term relationship of these factors.

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