



**Impact of Foreign Exchange Rate on Foreign Direct Investment:  
Egypt Case****Received date :22/04/2020****Accepted paper :16/10/2020**

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**Abstract**

The objective of this paper is to examine the relation between FDI and exchange rates. In order to understand this relation, each variable had to be first examined on its own. From the literature gathered, a research gap has been reached, which is to further examine the effect of exchange rate levels on FDI in developing countries; namely Egypt. The regression results showed that exchange rate has a significantly positive effect on FDI, meaning that as the domestic currency depreciates, FDI level rises. This result is reached along with the significant and positive effect on FDI of the following variables; openness, GDP per capita growth, urban population, and natural resource endowment. From these results, some policy implications and recommendations are provided.

**Keywords**

Exchange Rates, Foreign Direct Investment, Egypt, Eclectic Paradigm

**JEL Codes**

F21, F31, F63, O55

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## Introduction

International Monetary Fund (IMF) stabilization program for developing countries is based mainly on two tools to correct current economic deficiency; which are reducing public spending and maintaining an adequate real exchange rate (Roca & Priale, 1987). Most of the developing countries started adopting more flexible exchange rate regimes such Argentina, Brazil, Chile and Egypt. It is believed that flexible exchange rate creates economic flexibility in adjusting to economic shocks as well as save the economy from speculation attacks (Frenkel, and Rapetti, 2010).

In November 2016, after signing a loan agreement with IMF Egypt has devaluated its currency nearly by one third and allowed for floating of exchange rate. Foreign exchange rates have an impact on several economic variables as economic growth, employment and foreign direct investment. Foreign direct investment in particular is itself a tool to promote growth and employment. This raises the interest to evaluate how did exchange rate contributed in attracting FDI in Egypt. Evaluating the past thorough econometric and statistical analysis would give a view of how adopted policy of devaluation would impact FDI.

The objective of this paper is to study the effect of foreign exchange rates on foreign direct investment in Egypt. The paper starts with explaining the relation between FDI and Exchange rate, then a model is developed based on dunning theory and examined to examine the impact of Exchange rate on FDI. Finally Limitation of the model is presented and recommendation are provided

## Relation between Exchange rate and FDI: Theoretical View

### **Exchange Rate Levels and FDI**

Th relation between foreign exchange rate and foreign direct investment has developed overtime. It started with denying any relation between the two variables. This was what Mundell (1968) claimed up until the 1990s. It was argued then, that any relation between exchange rates and foreign direct investments is not possible. This was based on the claim that advantages in cost of capital to both foreign and domestic investors are not affected by exchange rates. In addition, it was assumed that there

would be equal expected returns on all assets around the world, given that capital is perfectly mobile. To illustrate this point of view more deeply, returns on domestic assets would fall when domestic currency depreciates. Thus, the relative value of the asset would not change from the perspective of both foreign and domestic investors. Moreover, it was argued that this point of view is true if the theory of purchasing power parity (PPP) holds. However, this interpretation was opposed later (Abbott et al. 2012: 96; De Vita and Abbott 2007: 2554; Froot and Stein 1989: 1-2; Pain and Van Welsum 2003: 827).

The fall of the Bretton Woods has been a major turning point with regards to economic research on the relation between exchange rates and FDI. The level of exchange rates has a crucial impact on FDI in terms of volume of FDI, timing and location (country) of FDI (Pain and Van Welsum 2003: 824). Economic research on this matter is divided into three arguments. The first favors currency depreciation with regards to FDI (Froot and Stein 1989: 21; Klein and Rosengren 1992: 23-25; Cambazoglu and Gunes 2016: 291). While the second favors a currency appreciation (Kosteletou and Liargovas 2000: 145; Lafrance and Tessier 2001: 245; Campa 1993: 621). The third claims that the relation between exchange rate levels and FDI depends on the objective and activities of the foreign firm in the host country (Pain and Van Welsum 2003: 826; Cushman 1985: 306).

From a very general perspective, a depreciation of the host country's currency makes it more attractive for foreign firms to invest in the host country as the cost of capital is considered relatively cheap. Therefore, currency depreciation of the host country increases FDI inflows to the host country. Furthermore, higher level of capital can be achieved by foreign firms given their wealth being unchanged (Froot and Stein 1989: 21). The effect of exchange rate movements on foreign firm's wealth is known as the relative wealth channel. Under the existence of imperfect capital markets, relative wealth is said to have an impact on FDI. In other words, when the host country's currency depreciates, foreign firms become wealthier although their wealth did not change (Klein and Rosengren 1992: 23-25).

In addition, it is said that the effect of exchange rate levels and FDI differs with regards to the short run and long run. For instance, it is found that in the short run, there is insignificant relation between exchange rate levels and FDI. While in the long run, this relation is found to exist and to be significant. This relation in the long run is as follows; appreciation

of the host country's currency leads to lower FDI to the host country. This relates as well to the wealth channel concept (Cambazoglu and Gunes 2016: 291). Therefore, when the host country's currency appreciates, its FDI inflows decrease. This is evident in many countries such as Turkey and the United States (Cambazoglu and Gunes 2016: 291; Froot and Stein 1989: 21). Furthermore, it is argued that FDI and exports are substitutes. Therefore, when the domestic currency depreciates, this attracts higher FDI (Cushman 1985: 306).

On the other hand, it is argued that host country's currency appreciation using real exchange rates encourages higher FDI to the host country. This was evident in certain countries in the European Union as Germany, Portugal, Netherlands and Italy (Kosteletou and Liargovas 2000: 145; Lafrance and Tessier 2001: 245). This is because the expected returns on an investment in a country would increase as this country's currency appreciates (Campa 1993: 621).

The relation between FDI and exchange rate levels or movements is said to be complex. It is argued that the type of operations conducted by the firm in the host country determines its reaction to exchange rate movements. For instance, if the foreign firm has the intentions of producing and selling its products in the host country, then appreciation of the host country's currency will induce more FDI. This is under the condition that the firm will import its inputs when operating in the host country. Therefore, whether it is the expected or current appreciation of the host country's currency, this leads to cheaper inputs and attracts higher FDI. However, if the foreign firm intends to produce in the host country and then export its products to another country, then appreciation of the host country's currency will deter FDI. This is because the foreign firm's products will be more expensive when sold abroad due to the host country's currency appreciation (Pain and Van Welsun 2003: 826; Cushman 1985: 306).

#### Exchange Rate Volatility and FDI

In this section of the paper a very important variable needs to be discussed, which is exchange rate volatility. Exchange rate volatility is defined as the temporary variations of the exchange rate from its trend. These temporary variations can be an increase or a decrease in the exchange rate. In this way, exchange rate volatility acts as a risk faced by foreign firms when they decide to operate in the host country (Kyereboah-Coleman and Agyire-Tettey 2008: 53).

The relation between exchange rate volatility and FDI is viewed from two perspectives; risk aversion and real options. The first perspective indicates that uncertainty of the expected profits increases with an increase in the exchange rate volatility. This perspective deals with the theory that foreign firms are risk averse and want to avoid risk. Therefore, when the risk associated with expected profits increases, they will not invest. An increase in exchange rate volatility (risk) tends to increase uncertainty of the value of expected profits. Thus, FDI in the host country decreases as exchange rate volatility increases (Abbott et al. 2012: 96; Cushman 1985: 306; Phillips and Ahmadi-Esfahani 2008: 508).

The second perspective (real options) views the same idea but explains it differently. The Dixit and Pindyck's model thoroughly explained this concept. First, it assumes that foreign firms are risk neutral meaning that they do not consider risk when taking their decisions. Second, foreign firms tend to postpone their decision to invest in the host country because of the expected profits uncertainty. In other words, foreign firms would prefer to gather more information on the exchange rate before taking the decision to invest in the host country. This is based on the Dixit and Pindyck's model (Campa 1993: 621). In other words, this model shows that firms face a dynamic problem. The decision whether to invest abroad now or wait till the following period is faced by firms. This shows that there is a tradeoff between whether to invest now or in the future (Campa 1993: 615; Lin, Chen and Rau 2010: 467). Illustrating more the Dixit and Pindyck (1994) model, in case of irreversible capital investment, the value gained from postponing the decision to invest abroad is higher than any forgone expected profits. This is true provided that there is high exchange rate volatility (Phillips and Ahmadi-Esfahani 2008: 507; Pain and Van Welsun 2003: 829).

It is viewed that an increase in the exchange rate volatility in the home country leads to an increase in FDI outflows in the home country. Therefore, firms would have the option to produce in a location (country) with lower exchange rate volatility (Goldberg and Kolstad 1994: 20; Cushman 1985: 306). Furthermore, when impact of real exchange rate volatility on FDI is tested with regards to developing countries, a

negative relation was revealed. This means that an increase in real exchange rate volatility decreases FDI inflows to the host country (Kyereboah-Coleman and Agyire- Tettey 2008: 66). The same negative relation between exchange rate volatility and FDI is revealed in developed countries as the UK and other European countries (De Vita and Abbott 2007: 2562; Brzozowski 2006: 21).

From another standpoint, exchange rate volatility might encourage FDI inflows. This holds under the condition that the cost of postponing the decision to invest abroad (host country) is very high. In other words, there is very high opportunity cost associated with postponing the decision. This is because the impact that an increase in exchange rate volatility has is relatively small compared with the expected revenues from this investment (Darby, Hallett, Ireland and Piscitelli 1999: 65-67). Furthermore, exchange rate volatility is examined as well through its effect on horizontal and vertical FDI. Concerning horizontal FDI, exchange rate volatility is viewed to positively impact horizontal FDI. This because horizontal FDI is undergone in economies with similar characteristics mainly developed economies. While exchange rate volatility is viewed to negatively impact vertical FDI (Aizeman and Marion 2001: 22).

#### Exchange Rate Regime and FDI

It is necessary to mention exchange rate volatility when studying the effect of exchange rate regime on FDI. Each exchange rate regime contributes to volatility in a different way. On one hand, it is crucial to distinguish between exchange rate volatility and exchange rate regime. The central bank of any country decides on the exchange rate regime. However, exchange rate volatility is not decided by the central bank or any other institution (Abbott et al. 2012: 96). With regards to the relation between exchange rate regime and FDI, studies are split into two sides as well. One side views that a fixed exchange regime attracts higher FDI (Aizeman 1992: 912-913; Pain and Van Welsun 2003: 842; Abbott et al. 2012: 104). The other side views the opposite (Sung and Lapan 2000: 422; Brzozowski 2006: 6-7; (Lafrance and Tessier 2001: 262; Abbott and De Vita 2011: 269).

It is argued that FDI is encouraged through a fixed exchange rate regime. However, this relation is said to be indirect. Fixed exchange regime influences the investment climate; and not exchange rate volatility, which enhances FDI inflows. Implementing a fixed exchange rate regime is associated with a very important decision which is determining the entry exchange rate. Proper attention need to be given to this issue as there are long term effects on the economy if an inappropriate entry rate is chosen (Pain and Van Welsun 2003: 842). Furthermore, in case of shocks either monetary or productivity shocks, fixed exchange regime proved to encourage higher FDI than a more flexible regime (Aizeman 1992: 912-913). With regards to developing countries, a less flexible de facto exchange rate regime is found to be better in increasing FDI inflows to these countries compared to a floating regime (Abbott et al. 2012: 104).

On the contrary, other studies showed that a more flexible exchange regime improves FDI inflows. A floating exchange rate regime allows more variations in the exchange rates. These variations mean higher exchange rate volatility in a floating regime compared to a fixed one. It has been mentioned earlier that increase in the exchange rate volatility in the host country can lead to lower FDI inflows to the host country. However, it is still argued that having a floating exchange rate regime does not certainly lead to lower FDI inflows (Sung and Lapan 2000: 422; Pain and Van Welsun 2003: 830; Brzozowski 2006: 6-7).

In addition, it is argued that more flexible exchange rate regimes in the host country tend to attract FDI inflows. This is from the perspective that a country with a free market of exchange rate can adjust its relative prices. Thus, the cost of investing in this country can be realistically compared to the cost of capital abroad and this is what foreign firms base their decisions on when deciding to invest in a country (Lafrance and Tessier 2001: 262). From a different perspective, the relation between exchange rate regime and FDI has been investigated. This perspective involves studying the FDI flows between two countries respective to their exchange rate regime. When a country is a member of a currency union as the European Monetary Union (EMU) and the other country has a floating exchange regime, it is found that FDI flows between these two countries is high. This higher FDI flows is in comparison to another two countries with both fixing their exchange rates (Abbott and De Vita 2011: 269).

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## Empirical Evidence

### Research Methodology

#### Research Question

FDI is significant in developing any economy, as well as, the impact that foreign exchange has on FDI. The lack of clear agreement in the literature on the effect of exchange rate levels on FDI provides the motivation to further research this area. In addition, research focused on either developed countries or Africa. There are no studies researching this aspect with respect to Arab countries especially Egypt. That is why the research question is: What is the effect of exchange rate levels on FDI in Egypt? The study is conducted on Egypt as it is one of the biggest countries in the MENA region and testing this research question on Egypt might provide useful insights to other countries in the region.

#### Model Specification

The eclectic paradigm is a theoretical framework developed by Dunning, which provided an explanation behind international production undertaken by firms or why firms might decide to operate outside their home country (Dunning 2001: 186). This theoretical framework reached three main reasons, which are to take advantage of ownership, location and internalization. These three reasons are grouped together to form the eclectic paradigm or the OLI framework (Anyanwu and Yameogo 2015: 202; Dunning 2001: 173-190).

Dunning developed his theory based on several hypotheses. First, assuming there is a US firm which wants to expand in the UK. The ownership factor can be explained if the US firm in the UK was at least as productive as its parent company in the US, as well as, outperforming its competitors in the UK. In other words, the ownership-specific factor can be attributed to the transferable talent management and other intangible assets of the parent company. However, assuming that the US firm in the UK was not as productive as its parent company in the US, and did not outperform its UK competitors. Then from this assumption, Dunning discovered the second factor for international production, which is location. The location-specific factor can be attributed to the unique characteristics of the US economy that cannot be transferred to the UK (Dunning 2001: 174).

Dunning wanted to provide a complete explanation of why firms decide to expand internationally. From here, the Ownership and Location advantages were extended to include a third factor. This factor is the internalization factor, which is related to how a firm exploits the resources and skills that it owns and how the firm exploits the resources available in a certain location (country). Therefore, Ownership, Location and Internalization (OLI) became the paradigm that fully explains international production undergone by firms (Dunning 2001: 175). As a result of Dunning's eclectic paradigm discovery, many researchers started to study this area in particular. The Location factor in the OLI framework is what mainly concerns economic research with regards to what countries can do or should have to attract foreign firms to invest in their country.

Many studies explored the determinants of FDI from the perspective of the OLI framework. All of these studies agreed on 7 main determinants of FDI which are; economic stability reflected in the inflation rate, trade openness, market size, human capital, natural resources, infrastructure and political stability (Ghoneim 2018: 42-50; Abbott, Cushman and De Vita 2012: 95-107; Anyanwu and Yameogo 2015: 199-215; Cleeve 2008: 135-153; Sekkat and Vezanones-Vearoudakis 2007: 607-620; Anyanwu 2011: 1-31; Kyereboah-Coleman and Agyire-Tettey 2008: 52-70; Al Nasser and Soydemir 2011: 7-25; Brzozowski 2006: 5-24). Although there were other determinants used in these papers' models, they were relevant to the specific objective of the study itself. Due to the fact that the main purpose of our paper is to test the effect of exchange rate levels on FDI in Egypt, another factor is added to these determinants which is exchange rate. Studies by Anyanwu (2011: 1-31), Kyereboah-Coleman and Agyire-Tettey (2008: 52-70) and Brzozowski (2006: 5-24) incorporated the exchange rate factor as one of the FDI determinants.

#### Data and Variable Explanation

##### **Variables Explanation**

**FDI (FDI):** It is the dependent variable measured in terms of FDI inflows as percentage of GDP.

##### **Explanatory Variables**

**Inflation Rate (INFL):** It reflects the economic stability in a country. Inflation rate is expected to have a negative relation with FDI as shown in several studies (Ghoneim 2018: 42-50; Anyanwu 2011: 17; Al Nasser

and Soydemir 2011: 9; Brzozowski 2006: 13). Lower investment risk is reflected in higher economic stability, which in turn encourages FDI.

**Trade Openness (*OPEN*):** Total trade as a percentage of GDP is used as the measure of trade openness, where total trade is the sum of exports and imports in US dollars. The literature showed that this is the standard measure of trade openness. This variable is expected to have a positive sign in relation to FDI. In other words, the more open a country is to trade, the higher FDI inflows it attracts

(Ghoneim 2018: 42-50; Abbott, Cushman and De Vita 2012: 100; Anyanwu and

Yameogo 2015: 206; Cleeve 2008: 144; Sekkat and Veganzones-Vearoudakis 2007:

612; Anyanwu 2011: 16; Kyereboah-Coleman and Agyire-Tettey 2008: 59).

**Market Size:** GDP per capita growth which is the percentage change in the GDP per capita (*GDPPC\_GR*), as well as, the urban population (*URB\_POP*) as a percentage of total population are used as proxies for the market size. Both are expected to have a positive sign in relation to FDI. The very high level of consumption of the urban population is usually what attracts foreign investors in a country (Ghoneim 2018: 42-50; Anyanwu and Yameogo 2015: 206; Anyanwu 2011: 16).

**Human Capital (*EDUC*):** This variable is measured by the gross (for all ages) secondary enrollment ratio as a percentage of the total population. This is used to reflect the managerial and technical skills of the labor in a country, which is one of the FDI determinant in the literature. The secondary enrollment ratio is expected to have a positive relation to FDI (Abbott, Cushman and De Vita 2012: 100; Cleeve 2008: 145; Sekkat and Veganzones-Vearoudakis 2007: 612).

**Infrastructure (*INFRA\_FIX*):** This is measured as the number of fixed telephone subscriptions (per 100 people). Foreign investors consider the availability of good infrastructure as a requirement before investing in a country. That is why it is expected that infrastructure will have a positive sign (Abbott, Cushman and De Vita 2012: 100; Cleeve 2008: 145; Sekkat and Veganzones-Vearoudakis 2007: 612; Anyanwu 2011: 17; Nasser and Soydemir 2011: 10; Brzozowski 2006: 13).

**Exchange rate (*EXR*):** This is measured in terms of official exchange rates (local currency per US dollar). It is expected that exchange rate will have a positive effect on FDI, meaning that as the domestic currency

depreciates, FDI increases (Froot and Stein 1989: 21; Klein and Rosengren 1992: 23-25).

**Political Risk (*POLI*):** This is measured by the index of political rights provided by the Freedom House. This index assigns a number from 1 to 7 to each country, where 1 represents highest degree of political freedom and 7 represents lowest degree of political freedom. A country with high degree of political freedom is expected to encourage higher FDI inflows as this reflects political stability (Ghoneim 2018: 42- 50; Cleeve 2008: 144; Anyanwu 2011: 18).

**Natural Resources Endowment (*NATUR*):** It is proxied by the amount of fuel exports as a percentage of exports (merchandise exports). It is expected that the availability of natural resources will have a positive effect on FDI inflows.

#### Data Sources

All data on Egypt is provided by the World Bank data indicators except for political risk proxy. For the political risk data used is provided by the Freedom House. The data gathered is from 1990 to 2015 on Egypt.

#### Data Analysis, Regression, and Interpretation

##### - Regression Model

Based on the variables that should be included in the model and their expected results discussed in the previous section; the following is the regression model equation:

$$\text{FDI} = \beta_0 + \beta_1 (\text{EDUC}) + \beta_2 (\text{EXR}) + \beta_3 (\text{GDPPC\_GR}) + \beta_3 (\text{INFL}) + \beta_4 (\text{INFRA\_FIX}) + \beta_5 (\text{NATUR}) + \beta_6 (\text{OPEN}) + \beta_7 (\text{POLI}) + \beta_8 (\text{URB\_POP}) + e$$

Before running the regression model presented above, a correlation matrix is done to eliminate the problem of multicollinearity. Table 4.1 shows the correlation coefficient between all independent variables.

Table 4.1: Correlation Matrix

|           | EDUC   | EXR   | GDPPC_GR | INFL  | INFRA_FIX | NATUR  | OPEN   | POLI  | URB_POP |
|-----------|--------|-------|----------|-------|-----------|--------|--------|-------|---------|
| EDUC      | 1      | 0.569 | -0.48    | -0.40 | 0.402     | -0.404 | -0.644 | 0.103 | -0.06   |
| EXR       | 0.569  | 1     | -0.467   | -0.16 | 0.73      | -0.513 | -0.303 | 0.319 | -0.0811 |
| GDPPC_GR  | -0.48  | -0.46 | 1        | -0.23 | -0.088    | 0.067  | -0.053 | 0.234 | -0.414  |
| INFL      | -0.406 | -0.16 | -0.236   | 1     | -0.414    | 0.05   | 0.77   | -0.52 | 0.747   |
| INFRA_FIX | 0.402  | 0.73  | -0.088   | -0.41 | 1         | -0.39  | -0.28  | 0.398 | -0.234  |
| NATUR     | -0.404 | -0.51 | 0.067    | 0.05  | -0.391    | 1      | 0.468  | -0.11 | -0.124  |
| OPEN      | -0.644 | -0.30 | -0.0534  | 0.77  | -0.28     | 0.468  | 1      | -0.42 | 0.570   |
| POLI      | 0.103  | 0.31  | 0.234    | -0.52 | 0.398     | -0.11  | -0.424 | 1     | -0.70   |
| URB_POP   | -0.06  | -0.08 | -0.404   | 0.747 | -0.234    | -0.124 | 0.570  | -0.70 | 1       |

Based on the correlation matrix in table (4.1) presented above, any correlation coefficient between two variables that is above 0.6 or below -0.6 is excluded from the regression model trials so as to avoid multicollinearity. Furthermore, the main focus of this paper to test the effect of exchange rate on FDI, thus, the variable INFRA\_FIX is excluded from the model due to its high correlation with EXR (above 0.6). Running the regression with the remaining variables is not possible too. This is due to the high correlation coefficient between EDUC and OPEN, INFL and OPEN, INFL and URB\_POP, as well as, POLI and URB\_POP. Thus, all the independent variables used in the regression trials have a correlation coefficient below  $\pm 0.6$ .

- Regression Equation, Tables and Interpretation

The final regression models used in this paper are presented below in Equation 1 and 2. These 2 models were selected based on performing 58 regression trials, while considering the following in each regression trial; the correlation coefficient between the independent variables, significance of independent variables using p-values and F- statistic, high explanatory power represented by the  $R^2$ , absence of autocorrelation using the Durbin Watson test. In these 58 regression trials, different

combinations of variables are used to try to reach a model having a high explanatory power, high variable significance and no auto correlation or multicollinearity.

Equation (1):

$$FDI = \beta_0 + \beta_2 (EXR) + \beta_3 (GDPPC\_GR) + \beta_6 (OPEN) + e$$

*Table 4.2: Regression results for equation (1)*

| Dependent Variable: FDI                     |             |                       |             |          |
|---------------------------------------------|-------------|-----------------------|-------------|----------|
| Method: Least Squares                       |             |                       |             |          |
| Date: 04/14/17 Time: 13:09                  |             |                       |             |          |
| Sample (adjusted): 1 26                     |             |                       |             |          |
| Included observations: 26 after adjustments |             |                       |             |          |
| Variable                                    | Coefficient | Std. Error            | t-Statistic | Prob.    |
| C                                           | -8.295641   | 1.564030              | -5.304017   | 0.0000   |
| EXR                                         | 0.680055    | 0.167240              | 4.066336    | 0.0005   |
| GDPPC_GR                                    | 0.787102    | 0.157847              | 4.986486    | 0.0001   |
| OPEN                                        | 0.113049    | 0.027051              | 4.179029    | 0.0004   |
| R-squared                                   | 0.768657    | Mean dependent var    |             | 2.280689 |
| Adjusted R-squared                          | 0.737110    | S.D. dependent var    |             | 2.486505 |
| S.E. of regression                          | 1.274900    | Akaike info criterion |             | 3.464251 |
| Sum squared resid                           | 35.75816    | Schwarz criterion     |             | 3.657805 |
| Log likelihood                              | -41.03527   | Hannan-Quinn criter.  |             | 3.519988 |
| F-statistic                                 | 24.36562    | Durbin-Watson stat    |             | 1.673479 |
| Prob(F-statistic)                           | 0.000000    |                       |             |          |

*\*Note: regression computed on Eviews*

Regarding the explanatory power of this model which is indicated by the R-squared. This model has an R-squared of 0.768, indicating that 76.8% of the variation in the FDI variable is explained by the variation in the independent variables. Regarding the statistical significance of the joint effect of the independent variables on FDI, this is represented using the F-statistics, shows that it is significant at 1%. To ensure the absence of autocorrelation in this model, the Durbin Watson Test is used. From the Durbin Watson statistics (1.673) in the regression table, it can be inferred that there is no auto correlation in this model  $\{(d_u < d\text{-statistic} < 4 - d_u) = (1.652 < \underline{1.673} < 2.348)\}$ .

All coefficients of this equation are significant at 1 percent significance level with p- values less than 0.01. From the equation results, it is shown that the coefficient of exchange rate has a significantly positive effect on FDI, which means that as the exchange rate (EXR) increases (domestic currency devaluates), FDI will also increase indicating a positive relation. This positive effect can be justified by the fact that foreign investors favor a country with a devaluating currency because the cost of capital and production decreases as the currency devaluates.

Regarding the market size proxied by the GDP per capita growth, the coefficient of the GDP per capita growth (GDPPC\_GR) is significantly positive with FDI, indicating that as the GDP per capita growth increases, FDI also rise. Therefore, foreign investors consider the size of the market before conducting their investments in Egypt. This is because market size represents the strength of the demand on any product, which is likely to be a factor affecting foreign investors' decision to invest in Egypt.

The coefficient of openness (OPEN) is also positive and significant, meaning that as the level of openness increases, the FDI will increase. This can be based on the justification that any foreign investment might need to import its raw materials, as well as, export a part of its final production abroad. Therefore, it becomes an important factor for investors to consider the level of openness in Egypt before deciding to invest. From equation (1), it can be inferred that foreign investors consider the exchange rate, market size proxied by GDP per capita growth and openness when deciding to invest in Egypt.

Equation (2):

$$FDI = \beta_0 + \beta_2 (EXR) + \beta_3 (GDPPC\_GR) + \beta_5 (NATUR) + \beta_8 (URB\_POP) + e$$

Table 4.3: Regression results for equation (2)

| Dependent Variable: FDI                     |             |                       |             |          |
|---------------------------------------------|-------------|-----------------------|-------------|----------|
| Method: Least Squares                       |             |                       |             |          |
| Date: 04/14/17 Time: 21:17                  |             |                       |             |          |
| Sample (adjusted): 1 26                     |             |                       |             |          |
| Included observations: 26 after adjustments |             |                       |             |          |
| Variable                                    | Coefficient | Std. Error            | t-Statistic | Prob.    |
| C                                           | -178.4195   | 56.22431              | -3.173351   | 0.0046   |
| EXR                                         | 0.773960    | 0.167748              | 4.613815    | 0.0001   |
| GDPPC_GR                                    | 0.960084    | 0.151771              | 6.325852    | 0.0000   |
| NATUR                                       | 0.088362    | 0.027132              | 3.256767    | 0.0038   |
| URB_POP                                     | 3.989440    | 1.309159              | 3.047331    | 0.0061   |
| R-squared                                   | 0.794904    | Mean dependent var    |             | 2.280689 |
| Adjusted R-squared                          | 0.755838    | S.D. dependent var    |             | 2.486505 |
| S.E. of regression                          | 1.228651    | Akaike info criterion |             | 3.420752 |
| Sum squared resid                           | 31.70126    | Schwarz criterion     |             | 3.662694 |
| Log likelihood                              | -39.46978   | Hannan-Quinn criter.  |             | 3.490423 |
| F-statistic                                 | 20.34773    | Durbin-Watson stat    |             | 1.934013 |
| Prob(F-statistic)                           | 0.000001    |                       |             |          |

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*\*Note: regression computed on Eviews*

Regarding the explanatory power of this model which is indicated by the R-squared. This model has an R-squared of 0.794, indicating that 79.4% of the variation in the FDI variable is explained by the variation in the independent variables. Regarding the statistical significance of the joint effect of the independent variables on FDI, this is represented using the F-statistics, shows that it is significant at 1%. To ensure the absence of autocorrelation in this model, the Durbin Watson Test is used. From the Durbin Watson statistics (1.934) in the regression table, it can be inferred that there is no auto correlation in this model as well  $\{(d_u < d\text{-statistic} < 4 - d_u) = (1.759 < \underline{1.934} < 2.241)\}$ .

All coefficients of this equation are significant at 1 percent significance level with p- values less than 0.01. From the equation results, it is shown that the coefficient of exchange rate has a significantly positive effect on FDI, which means that as the exchange rate (EXR) increases (domestic currency devaluates), FDI will also increase indicating a positive relation. Regarding the market size proxied by the GDP per capita growth, the coefficient of the GDP per capita growth (GDPPC\_GR) is significantly positive with FDI, indicating that as the GDP per capita growth increases, FDI also rise.

The coefficient of natural resources endowment (NATUR) is also positive and significant, meaning that as the amount of natural resources endowment increase, the FDI will increase. Market size is also proxied by the urban population in Egypt, the coefficient of urban population (URB\_POP) is significant and positive, indicating that as the urban population increases, FDI will increase. From equation (2), it can be inferred that foreign investors consider the exchange rate, market size proxied by GDP per capita growth and urban population, as well as, natural resources when deciding to invest in Egypt.

The results of equation (1) and (2) are very close that is why both are presented in the paper. The important inference from both equations is that the coefficient of the exchange rate (EXR) variable is significant and positive in equation (1) and (2), as well as, the value of the coefficient in both equations is very close. Furthermore, regarding the coefficient of the GDP per capita growth (GDPPC\_GR) is significantly positive in both equations.

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## Recommendations and Limitations

### Policy Implications and Recommendations

The findings of the paper have noteworthy policy implications for Egypt. First, regarding the exchange rate, it is important to consider exchange rate when implementing any economic policy. In other words, the government should consider targeting a depreciating domestic currency rather than targeting an appreciating currency. However, this has to be done cautiously with regards to how this depreciating currency would affect other economic variables as inflation, employment and economic growth that are mentioned in the literature.

Second, it is crucial to direct the government expenditure towards increasing the Egyptian market size. This can be done from two perspectives. The first one is by government spending on the establishment of new urban cities to encourage the increase of the urban population through migration from the rural areas to the urban cities. The second one is by increasing the GDP per capita. Third, economic policy should encourage higher levels of openness by reducing tariffs and quotas on imports and thus encouraging FDI. Fourth, the increase of natural resource endowment by encouraging higher amount of fuel exports as a percentage of exports, this should also be part of the economic policy that is directed towards increasing FDI.

On the other hand, it is vital to consider the correlations between exchange rate and the other independent variables. From the correlation matrix ([table](#)), it shows that there is negative correlation between exchange rate and the following variables; GDP per capita growth, natural resources endowments, openness, and urban population. This implies that although all independent variables have a positive effect on FDI, the independent variables themselves are negatively correlated. For instance, as exchange rate increases (currency depreciates), the GDP per capita growth and openness decrease, which can be based on the justification that currency devaluation decreases the income per capita. Moreover, in Egypt especially as the currency devaluates, there might be higher tariffs imposed, thus, justifying the negative relation with openness.

As a result, the economic policy should focus on achieving all the objectives mentioned above simultaneously and avoid conducting only one of the objectives. For instance, if the government only focused on keeping a devalued currency while the GDP per capita growth continues

to deteriorate, then there might be an offsetting effect resulting in no change in FDI or even a decrease in FDI depending on which variable has a higher magnitude.

Furthermore, it should be noted that in order to encourage higher levels of FDI, there must be economic growth, which is reflected in the GDP per capita growth, accompanied by the rest of the factors as openness and currency devaluation.

#### Limitations

Regarding the limitations of this paper, it is important to consider that during the period of the data analysis, a major political event has taken place which was not considered. This is the revolution that took place in Egypt in January 2011. This event might have had influence on the data, however, this is not considered in the analysis.

#### Conclusion

The aim of this paper is to examine the relation between FDI and exchange rates. In order to understand this relation, each variable had to be first examined on its own. This was done through providing an overview on FDI and exchange rates, then discussing their impact on different economic variables as employment and economic growth. After thoroughly examining each variable on its own, the effect of exchange rates on FDI is illustrated. This relation between foreign exchange rate and FDI is examined with regards to three aspects. These aspects are exchange rate levels, exchange rate volatility and exchange rate regimes. From the perspective of exchange rate levels effect on FDI, there was no consensus on whether an appreciation or depreciation of the domestic currency leads to higher FDI (Klein and Rosengren 1992: 23-25; Cambazoglu and Gunes 2016: 291; Kosteletou and Liargovas 2000: 145).

From the perspective of exchange rate volatility effect on FDI, it is agreed upon that higher volatility leads to lower FDI except for some studies which provided a different conclusion (Cushman 1985: 306; Phillips and Ahmadi-Esfahani 2008: 508; Kyereboah- Coleman and Agyire-Tettey 2008: 66). Finally, from the perspective of exchange rate regimes effect on FDI, arguments are split into one side that favors a fixed exchange regime for higher levels of FDI and the other favors a more flexible regime (Pain and Van Welsun 2003: 842; Abbott et al. 2012: 104; Sung and Lapan 2000: 422; Brzozowski 2006: 6-7). From the

literature gathered, a research gap has been reached, which is to further examine the effect of exchange rate levels on FDI in developing countries; namely Egypt.

Regression analysis is conducted, where two models are developed both capturing the effect of exchange rate on FDI. The results showed that exchange rate has a significantly positive effect on FDI, meaning that as the domestic currency depreciates, FDI level rises. This result is reached along with the significant and positive effect on FDI of the following variables; openness, GDP per capita growth, urban population, and natural resource endowment. From these results, it can be concluded that government policy should focus on achieving a depreciating currency, along with encouraging trade openness, as well as, GDP per capita growth, urban population and natural resource endowments.

#### References

- Abbott, A. A., Cushman, D. O., & De Vita, G. (2012). Exchange rate regimes and foreign direct investment flows to developing countries. *Review of International Economics*, 20(1), 95-107.
- Abbott, A. J., & De Vita, G. (2011). Evidence on the impact of exchange rate regimes on the bilateral FDI flows. *Journal of Economic Studies*, 38(3), 253-274.
- Aizeman, J., & Marion, N. (2001). The merits of horizontal versus vertical FDI in the presence of uncertainty. (NBER Working Papers: 8631: 1-38) Cambridge, MA: *National Bureau of Economic Research*.
- Aizenman, J. (1992). Exchange Rate Flexibility, Volatility and Patterns of Domestic and Foreign Direct Investment. (IMF Staff Papers No. 39, 890–922) Washington, DC: *International Monetary Fund*.
- Al Nasser, O. M., & Soydemir, G. (2011). Domestic and international determinants of foreign direct investment in Latin America. *Journal of Emerging Markets*, 16(2/3), 7-25.
- Anyanwu, J. C. (2006). Promoting of Investment in Africa. *African Development Review*, 18(1), 42-71.
- Anyanwu, J. C. (2011). Determinants of foreign direct investment inflows to Africa, 1980- 2007. (Paper no. 136) Tunis Belvedere: *African Development Bank Working*.
- Anyanwu, J. C., & Yameogo, N. D. (2015). What drives foreign direct investments into West Africa? An empirical investigation. *African Development Review*, 27(3), 199-215.

- Brzozowski, M. (2006). Exchange rate variability and foreign direct investment: Consequences of EMU Enlargement. *Eastern European Economics*, 44(1), 5-24.
- Cambazoglu, B., & Gunes, S. (2016). The relationship between foreign rate and foreign direct investment in Turkey. *Economics, Management, and Financial Markets*, 11(1), 284- 293.
- Campa, M. J. (1993). Entry by foreign firms in the United States under exchange rate uncertainty. *Review of Economics and Statistics*, 75(4), 614-22.
- Chen, C., Sheng, Y., & Findlay, C. (2013). Export spillovers of FDI on China's Domestic firms. *Review of International Economics*, 21(5), 841-856.
- Chen, Y. F., & Funke, M. (2011). Institutional uncertainty, economic integration, and vertical foreign direct investment decisions. *Open Economies Review*, 22(4), 593-612.
- Cleeve, E. (2008). How effective are fiscal incentives to attract FDI to Sub-Saharan Africa? *Journal of Developing Areas*, 42(1), 135-153.
- Cushman, D. O. (1985). Real exchange rate risk, expectations, and the level of foreign direct investment. *The Review of Economics and Statistics*, 67(2), 297-308.
- Darby, J., Hallett, A. H., Ireland, J., & Piscitelli, L. (1998). The impact of exchange rate uncertainty on the level of investment. *The Economic Journal*, 109, 55-67.
- De Vita, G., & Abbott, A. (2007). Do exchange rates have any impact upon UK inward foreign direct investment? *Applied Economics*, 39(19/21), 2553-2564.
- Dunning, J. H. (2001). The eclectic (OLI) paradigm of international production: Past, present and future. *International Journal of the Economics of Business*, 8(2), 173-190.
- Frenkel, Roberto, and Martin Rapetti. (2010) "A concise history of exchange rate regimes in Latin America." *Economics Department Working Paper Series* (2010): 97. Retrieved from [https://scholarworks.umass.edu/econ\\_workingpaper/97](https://scholarworks.umass.edu/econ_workingpaper/97)
- Froot, K. A., & Stein, J. C. (1989). Exchange rates and foreign direct investment: An imperfect capital markets approach. (NBER Working Papers 2914: 1-25) Cambridge, MA: *National Bureau of Economic Research*.

Ghoneim, H. (2018). Does Energy Subsidy Affect FDI: The Case of Egypt. *Cyrus Chronicle Journal (CCJ): Contemporary Economic and Management Studies in Asia and Africa*, 3, 42-50.

Goldberg, L. S., & Kolstad, C. D. (1994). Foreign direct investment, exchange rate variability and demand uncertainty. (NBER Working Papers 4815: 1-26) Cambridge, MA: *National Bureau of Economic Research*.

IMF (2009). Revised system for the classification of exchange rate arrangements.

Washington, DC: *International Monetary Fund*.

IMF (2014). Annual report on exchange rate arrangements and exchange rate restrictions 2014. Washington, DC: *International Monetary Fund*.

Klein, M. W., & Rosengren, E. (1992). The real exchange rate and foreign direct investment in the United States: Relative Wealth vs. Relative Wages. (NBER Working Papers 4192: 1-26) Cambridge, MA: *National Bureau of Economic Research*.

Kosteletou, N., & Liargovas, P. (2000). Foreign direct investment and real exchange interlinkages. *Open Economies Review*, 11, 135-48.

Kyereboah-Coleman, A. & Agyire-Tettey, K. F. (2008). Effect of exchange-rate volatility on foreign direct investment in Sub-Saharan Africa: The case of Ghana. *Journal of Risk Finance*, 9(1), 52-70.

Lafrance, R., & Tessier, D. (2001). Exchange rate variability and investment in Canada. Revisiting The Case For Flexible Exchange Rates. Bank of Canada Conference Proceedings. Ottawa: *Bank of Canada*.

Lin, C. C., Chen, K. M., & Rau, H. H. (2010). Exchange rate volatility and the timing of foreign direct investment: Market-seeking versus export-substituting. *Review of Development Economics*, 14(3), 466-486.

OECD (2008). OECD Benchmark Definition of Foreign Direct Investment. 4th Ed: OECD Publishing. Paris: *Organization for Economic Cooperation and Development*.

Pain, N., & Van Welsun, D. (2003). Untying the Gordian knot: The multiple links between exchange rates and foreign direct investment. *Journal of Common Market Studies*, 41(5), 823-846.

Phillips, S., & Ahmadi-Esfahani, F. Z. (2008). Exchange rates and foreign direct investment: theoretical models and empirical evidence. *The Australian Journal of Agricultural and Resource Economics*, 52(4), 505-525.

Roca, S., & Priale, R. (1987). Devaluation, Inflationary Expectations and Stabilisation in Peru. *Journal of Economic Studies*, 14(1), 5-33.

Sekkat, K., & Veganzones-Vearoudakis, M. (2007). Openness, investment climate, and FDI in developing countries. *Review of Development Economics*, 11(4), 607-620.

Sung, H., & Lapan, H. E. (2000). Strategic foreign direct investment and exchange rate

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