

The impact of the international institutions policies and the reform programs on the FDI inflow in Africa

By

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Abstract

The World Bank and IMF have advised developing countries to adopt floating exchange rate regime as a best choice in light of the global trade openness policies. The floating leads to the depreciation of most currencies, which are predominantly overvalued. Accordingly, the depreciation would reduce the export commodities prices which give these countries a comparative advantage to attract the FDI inflow. This would help the governments to address the macroeconomic distortions, the shortage in the domestic financial sources, the continuous raising in the government's budget burdens and achieve the development sustainability. Although many African countries adopted the floating regime which results in continues depreciation movements in their currencies, the statistics illustrated that their share from the global FDI inflow continuously decreases. This study aims to investigate the interaction effect of the depreciation movements and the export commodities prices on the FDI inflow in the African countries by employing the dynamic LSDVC estimator. Surprisingly, the results demonstrated that the depreciation movements on the FDI inflow when the export commodities prices mediating this relationship does not success to attract the FDI inflow.

Keywords: foreign direct investment, exchange rate movements, export commodities prices.

1. Introduction

The second half of the last century has witnessed a new world economic system through the Bretton Woods Agreement which paved the way for the economic globalization and the global trade liberalization (Williams, 1945). These opened the door towards more international integration between the countries, especially, through capital mobility. Capital mobility has become one of the main effective instruments that both developed and developing countries rely on to address their macroeconomic distortions with regard to the local market, wages, capital productivity, trade deficit, and unemployment and achieve more growth and development (Andreica & Maricescu, 2011). Moreover, the UNCTAD emphasized that the FDI will not only help to address the macroeconomic distortions but it also would contribute to achieving the sustainable development (Conference, 2014).

Accordingly, the FDI inflow has become one of the most known forms of capital mobility which has witnessed a significant increase in the last two decades. Based on the UNCTAD database, the FDI inflow has increased by around US\$592 billion dollars between 2005 to US\$1540 billion dollars in 2019.

According to the literature, specific macroeconomic factors and policies attract the FDI inflow, such as, large market size, high-interest rate, low exchange rate level, and low production cost (Ab et al., 2013; Cushman & De Vita, 2017). Consequently, the countries attempt to set their macroeconomic policies according to these requirements to attract and sustain the FDI.

The literature confirmed that the exchange rate changes have a significant positive interaction effect with the production cost influencing the FDI inflow (Cushman, 1985). It does not only influence the capital cost but also impact the output price of the products. Accordingly, the literature confirmed that the exchange rate depreciation is a positive factor in reducing the exports commodities prices, which significantly attracts the FDI inflow (Melku & Lin, 2012). A weak exchange rate substantially influences domestic and foreign investment, giving them a comparative advantage, primarily if the investors aim to export their products especially for the developing countries.

On the same note, it has been found that most developing countries put significant efforts to attract the FDI inflow and maintain by depreciating the exchange rate of their local currencies to maintaining their low levels of their commodity price indices. The UNCTAD statistics demonstrated that the developing countries acquired foreign investments of about US\$684,7 billion dollars in 2019, which represents 40% of the proportion of the international FDI inflow.

Contrastingly, it shows that Africa only acquired \$US45.4 billion which represented 2.9 % of the total global FDI inflow which ranked it as the lowest attracting distance for FDI inflow even though it is considered as one of the world's highest regions that possess natural resources, which is estimated by approximately 30% of the world's resources. Additionally, Africa has the cheapest skilled labor in the world. The World Bank describes the average income in the African countries as being consistently at the lowest end of the scale in global comparison. All these factors made the production costs in Africa the lowest in the world. Most African countries have suffered for decades from the inability to attract and sustain the FDI inflow and suffered from a sharp trade deficit and significant weakness of capital productivity.

Under the supervision of the World Bank and the IMF 27 African countries have adopted the floating exchange rate regime through the economic reform programs in the last decades. Due to the weakness in the production system in most of these countries, they do not possess comparative advantage for exports even with a weak currency value. On the contrary, it leads to increase the inflation. While foreign investors look for countries with depreciated local currencies, the stability of the depreciation is a primary condition for attracting them (Li & Rengifo, 2018). Based on that, it is easy to be understand why the empirical literature contained evidence that in many developing countries, the fixed exchange rate has been more able to attract and sustain the FDI than the floating regime, as it guarantees financial stability (Arya et al., 2020; Cushman & De Vita, 2017).

As a result, these 27 African countries have failed to sustain and increase their proportion of the global FDI inflow. Their share from the total international FDI inflow reduced from 3.18% in 2009 to 1.87 % in 2019.

Despite of the confirmations of the theoretical literature on the role of the interaction effect between the exchange rate movements and the export commodities prices on the FDI inflow, it has been found that most of the empirical studies concentrated on investigate the direct impact of the exchange rate in the FDI inflow. Moreover, the investigation for the

literature revealed that even though a lot of studies have investigated this direct relationship in both developed and developing countries, rare studies concerned with the African countries. However, this empirical literature has demonstrated mixed results. There for this paper aims to investigate the interaction effect between the exchange rate movements and the export commodities prices on the FDI inflow in the African countries which have adopted the floating exchange rate regime. The study will concentrate on 26 countries (Appendix A) from the 27 which have adopted the floating exchange rate regime because of the unavailability of the data for South Sudan.

The structure of this paper will be as the following: overview for the most important literature review will be discussed in the next section. As for section 3 it will focus in describe the data and the methodology. Given the empirical results it will be presented in section 4. Finally, section 5 will elaborate the discussion and conclusion.

2. Literature review

The debate about the role of the production cost and the export commodities prices on influencing the relationship between the exchange rate and foreign direct investment has significantly broken out in the seventeens of the last century. Where the braking of Bretton woods agreement in 1972 and the signing of Jamaica Accords in 1976 which gave the right to each country to choose the appropriate exchange rate regime to itself open a global debate about the suitable regime for the micro and macroeconomic stability.

On this context, the investigation for the literature revealed that there are many theoretical and empirical studies which attempted to illustrate the best exchange rate regime for the host countries and the impact of the exchange rate movements and levels on attracting the FDI inflow. Even though, these studies have introduced many valuable hypotheses, observations and interpretations which significantly contributed to the body of knowledge, the vision about the relationship between these variables is still ambiguous and inconsistent.

In 1977 Kohlhagen published his theoretical framework which indicated that while the depreciation has a positive impact on the exported goods prices either it has been produced by domestic or foreign investors, the appreciation more able to enhance the foreign investors who relied on intermediate imported goods. Based on that the expectations for the exchange rate movements significantly direct the FDI decisions. Itagaki, (1981) constructed a model which investigated the influence of the exchange rate risk on the FDI inflow through its influence on the production level. The positive movements in the exchange rate of the local currency reduce the domestic export by increasing the export commodities prices which negatively restricted the FDI inflow. On the other hand, the negative exchange rate movements have a reversed impact on the export commodities and the FDI inflow.

Furthermore, Pieces of the literature demonstrated the importance of inflation and risk in changes in price level on the relationship between the exchange rate and the FDI inflow. Wihlborg, (1978) point out how those changes in the exchange rate and the inflation may affect the FDI inflow through the changes on the purchasing power parity which significantly influence the returns from capital assets. Moreover, the changes in price level may result in a significant loss for FDI, especially if it occurs between the production process and the selling process.

Cushman, (1985) demonstrated that the impact of the exchange rate level and stability, inflation and risk all these variables occur through their influence on the capital cost and the

output of the commodities prices. Accordingly, the study built new theoretical framework which examined the interaction effects between the exchange rate and production cost on the FDI by evaluating the changes production cost through the capital and labor input levels. Moreover, contrasts to all the previous literature the study relied on the real exchange rate rather than the nominal which takes into account the real purchase power of the local currency. The theory confirmed that the stability of depreciated exchange rate is not only more able to maintain the sustainability of the current foreign investment but also it attracts new FDI inflow through its positive impacts on the capital cost, input and output prices levels compared to the global market. Furthermore, O.Svensson and Winjnbergen, (1987) extended Cushman idea by emphasizing that the exchange rate regime and the output goods prices in both home and host counties direct the investors decisions.

On this context, Aizenman, (1992) clarified that the production flexibility consider the main indicator which control the policymaker designs about the appropriate exchange rate policies to attract the FDI inflow. Moreover, Aizenman confirmed the idea of the IMF that most of the FDI inflow and outflow decisions in this period of time are centerlized around the investors export and import motivations and policies.

Beyond that, Goldberg and Kolstad, (1995) structured their theoretical framework which illustrated how the correlation between the exchange rate variability and the exports demand directed the parent multinational companies designs for the production location. The study demonstrated if it were assumed that parent multinational companies are risk averse and have fixed production factors, the stability of the exchange rate which promotes the constancy of the production cost would be the main comparative advantage which determines their production locations, especially for the investors aim to re-export their products.

Even though the confirmation of the theoretical literature about how exchange rate depreciation is considered an attractive factor for FDI inflow through its impacts on the production cost and the export commodities prices, the empirical literature reflected that the practical reality does not always subject to interpretation of the theoretical frameworks. The conflicts in the empirical results might be interpreted through the destination of produced goods. In situations where FDI targets to sell its goods in the host country market, the appreciation of the host currency will attract FDI inflow. The high purchasing power of local consumers tempts the foreign investors to gain higher profits (Caves, 1988). On the other hand, Schmidt and Broll (2009) argued that if the FDI aims to re-export its products, it is assumed that the FDI will look for a host country with a depreciating exchange rate. This is because depreciation reduces the capital investment cost. This hypothesis does not deny the important role of capital market imperfections in motivating capital mobility as incentives for firms to invest abroad.

Moreover, it has been found that the interaction between depreciation or the appreciation of the exchange rate and export commodities prices cannot alone interpret the FDI inflow conduct. The size of the market, the quality of the production base, infrastructure, and the level of the labour skills all these variables control the prospective of the foreign investor for the level of the exchange rate which could promote their profits in the hosts countries (Kyereboah-Coleman & Agyire-Tettey, 2008). This demonstrated why the literature indicated that the FDI's response to the exchange rate varies for different sectors according to these other variables which control the investors decisions (W. Liu, 2010).

Even though all of these efforts to improve the theoretical framework of the interaction effect between the exchange rate and the export commodities prices on the FDI inflow. The

investigation for the literature revealed that most of the empirical studies concentrated on investigating the direct relationship between the exchange rate and the FDI inflow while rare empirical studies concerned with identifying this interaction effect.

Furthermore, the literature also showed that contrast to the conventional wisdom, which confirms that the exchange rate usually impacts the FDI inflow significantly. Multiple empirical studies demonstrated that this wisdom is not applicable. Other studies confirmed that the exchange rate showed an insignificant influence on FDI inflow (Wang, 2013). Some literature proved that the exchange rate has completely no influence on the FDI inflow (Lebbe and Rauf, 2016).

Beyond that, it has also been observed that much empirical literature have carried out in the same regions but produced conflicting results despite it have been carried out in the same period. For example, while Rasheed and Khan, (2019) confirmed that the exchange rate has a significant impact on the FDI inflow in Pakistan, Mansoor and Bibi, (2018) revealed through their study that there is no strong relationship between the exchange rate conduct and the inflow of FDI in Pakistan. As for Sri Lanka, contrast to the results of Jayasekara, (2013) which demonstrated that exchange rate movements has a significant influence on the FDI inflow, Lebbe and Rauf, (2016) demonstrated that there is no relationship between the exchange rate and the foreign individual purchase, foreign company purchase, foreign company sales, total purchase foreign individual sales and total sales in Sri Lanka. Based on that the study rejected the literature hypotheses which assumed that the exchange rate has a significant influence on the FDI. In Turkey, Even though, Polat and Payashloğlu, (2016) indicated that there is no empirical evidence supports the conventional arguments which confirms that there is a strong relationship between the exchange rate movements and the conduct of the inflow of FDI inflow, ARTANTAŞ and SİPAHİ, (2020) revealed that there is a significant impact for the exchange rate movements, inflation rates, interest rates and government deficit on the FDI inflow.

Given the investigation of the impact of the exchange rate movements of the host countries to attract the Chinese outward FDI, Liu and Deseatnicov, (2016) confirmed through the results of their study that the exchange rates of the host countries' currencies have a significant role on determine and direct the Chinese outward FDI where the volatility negatively influence it. Moreover, Latief and Lefen, (2018) confirmed that the exchange rate movements has a negative influence on the international trade and the Chinese FDI outflow in seven selected developing countries which are part of the (One Belt and One Road) Chinese government project.

Despite all these results, Li and Rengifo, (2018) revealed that the influence of the exchange rate volatility does not have a significant consideration on the Chinese outward FDI decisions. Furthermore, the results revealed that contrast to the conventional theoretical view the Chinese outward FDI preferred to invest in the countries which have weak macroeconomic stability and poor institutional quality.

On the other hand, Vidhya and Inayath Ahamed, (2019) argued that in China the exchange rate does not have a significant influence on the FDI inflow compared to the influence of the interest rate, and the GDP. Contrastingly, Lee and Brahmasrene, (2020) indicated that in China the exchange rate changes has a significant negative influence on the inflow of the FDI on the long run while there is no evidence that the changes on the exchange rate has a significant influence on the short run.

On another context, when Schmidt & Broll, (2009) investigated the influence of the exchange rate of the local currency for the host countries on attracting the outflow of the US FDI outflow, the results confirmed that there is bidirectional relationship between the exchange rate appreciation of the host country currency and the US FDI outflow.

Given the literature which investigated the relationship between the exchange rate and the FDI inflow in Malaysia, it has been found that there is a conflict in the results. While Ahmad et al., (2017) revealed that the depreciation exchange rate has a positive impact on the FDI inflow, Lily et al., (2014) demonstrated that the appreciation exchange rate more able to attract the FDI inflow. Moreover, N. A. Ahmad et al., (2015) argued that the exchange rate is not considered one of the main factors which influence the FDI inflow in Malaysia.

Accordingly, the conflict of all these results and the ignoring of the role of the export commodities prices on influencing the relationship between the exchange rate movements and the FDI inflow as the theoretical literature confirmed call urgently for the need to reinvestigate this ambiguous relationship.

3. Methodology

3.1. Data

This study relies on panel data of 26 African countries which have adopted the floating exchange rate regime under the supervision of the World Bank and the IMF through the economic reform programs. The study uses data for the period between 1990 to 2020. The data for the FDI inflow has been collected from the World Bank Development Indicator database, 2020. The study measures the FDI inflow by the foreign direct investment net inflow as a percentage of the GDP which could reflect the real changes of the FDI size compared to the GDP. As for the exchange rate movements, the study relied on annule data which has been obtained from the Lane and Milesi-Ferretti database (2020). Given the export commodities prices, the study will rely on (commodity exports price index- individual commodities weighted by ratio of exports to total commodity exports). The index measures the changes across the years in the selected 45 commodities can clearly reflect the changes in the prices in the exports products over the time in these listed countries. This index has been introduced by the IMF through the working paper which has been prepared by Gruss and Kebhaj, (2019). The paper covered database of country-specific commodity price indices for 182 economies covering the period 1962–2018 which has been updated till 2020 on the database partition on the official IMF's website.

Given the Net exports, this variable is measured by discounting the total value of the import goods and services from the total value of the export goods and services. As for inflation the study uses the Consumer price index (CPI) as a measure for the inflation rate. In connection with the trade openness is measuring the sum of imports and exports measured by a total percentage of trade to GDP. With regard to the GDP, it is defined and measured as the value of the final goods and services produced within a financial year in a specific country. For the real interest rate, it is the interest rate that has been adjusted to avoid and remove the effects of inflation which reflect the real cost of funds. The data for all these variables has been collected from the World Bank Development Indicator database, 2020.

3.2. model specification

However, the functional representation of the exchange rate FDI inflow relationship is given below;

$$FDI = f(EXM, Xs)$$

Where:

FDI denotes FDI inflows, *EXM* represents exchange rate movements, *Xs* is the vector of controlled variables. *f* indicates functional form. According to facts and theory, the controlled variables include but are not limited to; export commodities prices, net exports, inflation, trade openness, gross domestic product, real interest rate. The econometric specification/model of the above functional representation is given as thus below;

$$FDI = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 EXM_{it} + \beta_3 ECP + \beta_4 EXP_{it} + \beta_5 INF_{it} + \beta_6 OPEN_{it} + \beta_7 GDPG_{it} + \beta_8 INR_{it} + \varepsilon_{it}$$

Where;

FDI= foreign direct investment

EXM= exchange rate movements

ECP= export commodities prices

EXP= net exports (control variable)

INF= inflation (control variable)

OPEN= trade openness (control variable)

GDPG= gross domestic product (control variable)

INR= real interest rate (control variable)

ε = stochastic error term

It denotes panel specification, where *t* is time, and *i* is individual units' identifiers. (β_0 : β_8) are parameter coefficient, with β_0 being the intercept while (β_1 : β_8) are slope coefficients.

We argue that the relationship between exchange rate movements and FDI inflow is significantly affected by the export commodities prices changes. Based on that, we create an interaction term by multiplying exchange rate movements and export commodities prices, which means that the changes in the export commodities prices level must be taken into account to interpret the effect of exchange rate movements on FDI inflows correctly. Therefore, the model for the interaction term presented below as;

$$FDI = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 EXM_{it} + \beta_3 ECP_{it} + \beta_4 (EXM * ECP)_{it} + \beta_5 EXP_{it} + \beta_6 INF_{it} + \beta_7 OPEN_{it} + \beta_8 GDPG_{it} + \beta_9 INR_{it} + \varepsilon_{it}$$

Where;

FDI, *EXM*, *ECP*, *EXP*, *INF*, *OPEN*, *GDPG*, and *INR* are as defined above. ($EXM * ECP$)_{it} Denotes the interaction term as it refers to the interaction effect between the exchange rate movements and the export commodities prices. Through this model, measuring the direct effects of the exchange rate movements then estimating its effects by taking into account the changes in the export commodities prices will help to understand the exact role of the export commodities prices in altering and affecting this EXM-FDI relationship. Therefore, we must calculate the marginal effect as thus below;

$$\frac{\delta FDI}{\delta EXM} = \beta_2 + \beta_4 * ECP$$

Where;

$\frac{\delta FDI}{\delta EXM}$ Means partial change in FDI given a change in exchange rate movements.

It should be mentioned that β_1 reflected the lagged effect of the dependent variable (FDI), where the literature illustrated that this lag effect extends beyond its time occurred. Based on that, the cumulative effects should be taken into account. As for the sign of β_2 which

refer to the direct influence of the exchange rate movements of the FDI inflow; the literature revealed that it is ambiguous. Given the sign of β_3 which reflects the direct effects of the export commodities prices on the FDI inflow; the literature demonstrated that it supposes to be negative. Where the increase in export commodities prices reduces the FDI inflow. For the sign of the β_4 which denotes the direct effects of the interaction coefficient term, the literature demonstrated that is ambiguous. The main reason for that is that one of its components (EXM) is uncertain. On the other hand, the sign of β_5 supposed to be positive where the increase in the net exports attracts and encourages the FDI inflow. In regards to β_6 which refers to the sign of the inflation effects on the FDI inflow; the literature revealed that it is negative where the increase in the inflation rate decreases the FDI inflow. As for the sign of β_7 which indicates the influence of trade openness on the FDI inflow. The literature referred that the expected sign is positive where the increase in the openness supposes to enhance and raise the FDI inflow. Given the sign of the GDPG, it's expected to be positive as it reflects the economic growth which demonstrates the size of the increase in the production of goods and services of the whole economy. So, the increase in the GDPG is expected to attract the FDI inflow. Finally, the sign of the real interest rate is expected to be positive, where the increase in the real interest rate is supposed to attract the FDI inflow.

3.3. Method of estimation

Finally, as for the method of estimation, it is understandable that the inclusion of lagged dependent regressor in a dynamic panel, as in this model, means that the parameter estimates are susceptible to type 1 error, problem of endogeneity, and asymptotically poor estimates (Nankervis & Savin, 1987). Accordingly, the ordinary least square (OLS) and all the traditional panel data methods wither the fixed effect, and the random effect will result in an inconsistent and bias estimate. Furthermore, the differences in country size, geographic characteristics, economic system, and institutional environment and so on, the effects of the explanatory variables on the outcome variable can vary across the country. Omitting these country-specific factors in the analysis leads to omitted variable bias due to country heterogeneity.

One way to correct these problems is to apply GMM. Arellano and Bond (1991) introduced the GMM-DIF estimator as an appropriate method to address the endogeneity of the lagged dependent variable, Blundell and Bond (1998) developed the GMM-SYS estimator, by introducing the DF estimator, which is more suitable to deal with the high persistency of the dependent variable. The main problem is that this method is not suitable to the sample under study where the cross-sectional units are small as in our case. The GMM is designed for panels with large cross-sectional units (N) and small-time period (T), hence using them with small N will lead to inconsistent and bias estimates (Sbia & Hamdi, 2020).

Due to these problems, Kiviet (1995), as extended by Judson and Owen (1999), Kiviet (1999), Bun and Kiviet (2003), and Bruno (2005), suggest the Bias Corrected Least Square Dummy Variable procedure (LSDVC). This method has a number of econometric appeals. For instance, Dang et al. (2015), Kiviet (1995), Judson and Owen (1999), and Bun and Kiviet (2003) report that the LSDVC method has smaller variance and gives more accurate results relative to other mean squared error estimators, including the asymptotically efficient GMM estimators, and therefore emphasized the superiority of the method in any finite sample. The bias-corrected least square dummy variable method uses bootstrapping procedure, which has been found to give more accurate parameter estimates relative to the standard dynamic panel models based on the asymptotic. Moreover, Bruno (2005a) invented new Stata routine `xtlsdvc` which able to compute the LSDVC to deal with the unbalanced panels and samples with missing data like the data of this study. Bruno (2005a) applied Monte Carlo analysis to compare the results of the LSDVC to the results of the original LSDV, Arellano–Bond, Anderson–Hsiao

and Blundell–Bond. Furthermore, as the most actual datasets generally have missing data Flannery and Hankins, (2012) expanded the experiment to examine the LSDVC, Arellano–Bond, Anderson–Hsiao, Blundell–Bond, POLS, FE, LD4, and LD to investigate the most accurate method among these eight which able to analyze datasets contains missing data. Flannery and Hankins, (2012) randomly delete 10% of a balanced sample panel data which has been analyzed previously. The results demonstrated that the LSDVC was the best method which estimated the most accurate coefficients with smallest RMSE. Therefore; this study will adopt the LSDVC method.

3. Results

First, the results begin by summarizing the descriptive analysis of FDI, EXM, INF, GDP, OPEN, INR, ECP and EXP in Table (1). The results indicate that the mean values of the FDI and EXM are 3.866357 and 577.6022 respectively. Looking at the minimum and maximum values of FDI and the regressors, the GDPG has the lowest value among the variables with -47.5032 while the EXM has the largest value with 1322.04. For the standard deviation values of the variables are 2.49641 for FDI, 364.8432 for EXM, 196.8977 for INF, 5.05529 for GDPG, 8.141809 for OPEN, 3.693483 for INR, 26.99053 for ECP, and 3.345261 for EXP. With regards to the standards deviation of the variables under this study, most of them reflect slight variance except the EXM and the INF. This gives robustness and stability to the study model and eliminates the problem of inconsistencies and variability in the data results.

Table (1) Summary of Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
FDI	780	3.866357	2.49641	0.4652016	11.16467
EXM	806	577.6022	364.8432	81.53943	1322.04
INF	806	75.90025	196.8977	7.271666	1098.711
GDPG	795	1.401012	5.05529	-47.5032	37.5355
OPEN	806	64.36755	8.141809	49.61592	77.58281
INR	806	7.921303	3.693483	-3.67242	12.30027
ECP	806	73.33493	26.99053	16.34	162.3
Exp	806	26.72938	3.345261	21.09963	32.38914

Next, table (2) shows the correlation coefficients among the variables of the study, the output represents that most of the variables are positively correlated with each other where 21 of the 28 correlations are positive while 7 are negative. Also, the results show that the correlation coefficient between foreign direct investment and exchange rate as well as other explanatory of foreign direct investment in the dataset ranged from -0.3388 to 0.7456. This suggests that foreign direct investment is correlated with other variables in the dataset.

Table (2) Correlation Matrix for the data

	FDI	EXM	ECP	OPEN	INR	INF	EXP	GDPG
FDI	1							
EXM	0.5396	1						
ECP	0.5569	0.5303	1					
OPEN	0.7456	0.656	0.5805	1				
INR	0.3935	0.4667	0.183	0.4098	1			
INF	-0.3388	-0.3709	-0.1776	-0.3301	-0.2954	1		
EXP	0.7323	0.4868	0.4895	0.9327	0.389	-0.2942	1	
GDPG	0.1968	0.1158	0.189	0.2558	0.1107	-0.2311	0.2627	1

As for, table (3) reports the estimation results of the independent variables effects on the foreign direct investment by using the Least Squares Dummy Variable Corrected (LSDVC). The study initialized the LSDVC estimations based on Anderson and Hsiao (columns 1 and 2), Arellano and Bond (Columns 3 and 4), and Blundell and Bond (Columns 5 and 6). The Arellano and Bond and the Blundell and Bond are consistent with IV-GMM, DIF-GMM and SYS-GMM respectively.

Table (3) *the interaction effects of the exchange rate movements and export commodities price on the FDI inflow based on LSDVC methods initialized based on Anderson–Hsiao IV-GMM, Arellano and Bond GMM-DIF, and Blundell and Bond SYS-GMM estimators*

Variable	Model (AH1) Without interaction	Model (AH2) With interaction	Model (AB1) Without interaction	Model (AB2) With interaction	Model (BB1) Without interaction	Model (BB2) With interaction
L1.FDI	0.565*** (.0348859)	0.554*** (.0358884)	0.605*** (.0251797)	0.595*** (.0268839)	0.629*** (.0232297)	0.616*** (.0253969)
EXM	-0.000241 (.0003266)	-0.00137*** (.0001513)	-0.000527* (.0003192)	-0.00169*** (.0001304)	-0.000570* (.0003249)	-0.00163*** (.0001608)
ECP	0.0239*** (.0004866)	0.0168*** (.0003577)	0.0223*** (.0005394)	0.0149*** (.0007498)	0.0236*** (.0003967)	0.0169*** (.0006339)
GDPG	-0.00635 (.0186326)	-0.00675 (.0190947)	-0.00618 (.0101016)	-0.00653 (.0100383)	-0.00596 (.0103947)	-0.00650 (.0103058)
INF	0.000962** * (.0000858)	-0.000987*** (.0000723)	0.000934** * (7.44e-06)	-0.000958*** (4.83e-06)	0.000926** * (.00002)	-0.000957*** (.0000147)
INR	0.0315*** (.0007332)	0.0371*** (.0016261)	0.0282*** (.0017614)	0.0337*** (.0007149)	0.0261*** (.0018835)	0.0315*** (.0008693)
OPEN	-0.0707 (.0390308)	-0.0644 (.0393748)	-0.0686*** (.0207055)	-0.0628** (.0192023)	-0.0690*** (.0224004)	-0.0642** (.0211223)
EXP	0.291*** (.0613751)	0.288*** (.0630738)	0.291*** (.0352694)	0.289*** (.0338067)	0.286*** (.0370966)	0.285*** (.0358841)
INTER	-	0.0000134** * (2.13e-06)	-	0.0000141** * (2.27e-06)	-	0.0000129** * (1.96e-06)
Low	-	0.0011476** * (.0001861)	-	-.0014608*** (.0001676)	-	-.0014237*** (.0001928)
Medium	-	-0.0003833 (.0003075)	-	-.0006553** (.0002972)	-	-.000691** (.0003043)
High	-	0.0008097 (.000497)	-	.000602 (.0004995)	-	.0004527 (.0004783)
Observations	806	806	806	806	806	806
N_g	26	26	26	26	26	26

Given the non-interaction models, the results in column 1, 3, and 5 revealed that the FDI inflow lag, export commodity price, net exports, and real interest rate have a significant positive impact on the FDI inflow. On the other hand, it has been found that while the exchange

rate movements, inflation, and trade openness have a negative significant impact, the GDPG has insignificant negative impact on the FDI inflow.

The results in columns 2, 4, and 6 (interaction models) revealed that the first lag of the foreign direct investment has a significant positive impact on itself which indicates the presence of the dynamic effect in the model. The lagged value of the FDI inflow in the previous year influence the current FDI inflow by about 0.595 percent (ranging from 0.554 lowest to 0.616 highest) at 1 percent significant level. This highly illustrated that the previous experience and the reputation of the country in the last year significantly influence the investors' decisions in the New Year.

Given the exchange rate movements, the findings demonstrated that the depreciation has a significant negative impact on the FDI inflow at 1 percent significant level. For instant, the increase in the exchange rate depreciation by 1 percent would decrease the foreign direct investment by -0.00163 percent (ranging from -0.00137 lowest to -0.00169 highest). This result consistent with (Lee & Brahmastre, 2020; Lily et al., 2014; Wang, 2013) which emphasized the negative impact of the continuous depreciation movements on the FDI inflow. Moreover, the results contributes to understanding the disputed problem of the appropriate exchange rate regime for the developing countries to attract the FDI inflow. Contrary to the world bank and IMF arguments which confirmed the floating exchange rate is the best choice for the developing countries to attract the FDI inflow (Combes et al., 2011; Eregha, 2017; Go & Mitra, 1999; Latief & Lefen, 2018). The results revealed that their policies do not always success and cannot be generalized. where abandoning the fixed exchange rate regime might create continuous depreciation movements which negatively influence the FDI inflow (Arya et al., 2020; Cushman & De Vita, 2017).

As for the coefficients of the export commodities prices it represents the existence of a positive impact on foreign direct investment at 1 percent significant level. Consequently, the increase in the export commodities prices by 1 percent will increase the FDI by 0.0168 percent (ranging from 0.0149 lowest to 0.0169 highest). This result showed that the increase in the export commodities prices might not be the main factors which obstruct the African countries to attract the FDI inflow.

Given the impact of the exchange rate depreciation movements on the FDI inflow when the export commodities prices mediated this relationship. The results revealed that the negative impact of the exchange rate movements increased from a percentage range between -.0005275 to -.0005696 for the model without interaction to -.0014237 percent ranging from -0.0011476 to -.0014608 for the low level of the export commodities prices and to a percentage ranged from -.0006553 to -.000691 for the medium level of the export commodities prices. Moreover, even though these negative impacts of the interaction effect turn to impact positively in the light of the high levels of the export commodities prices these positive effects are insignificant.

The first idea which could be concluded from these results is that the interaction effect between the exchange rate depreciation movements and the exports commodities prices could not benefit to attract the FDI inflow.

These results contradict the theoretical framework which emphasized that the exchange rate depreciation always success to attract foreign direct investment by reducing the cost of production and the final products price (Cushman, 1985; Itagaki, 1981; Kohlhagen, 1977). The interpretation of these results might be that the continues depreciation movements in the light of the low and medium export commodities prices levels could lead to unexpected opposite results if the investors rely on imported intermediate and semi-finished Goods or if it is related

as often to assembly industries. The continues depreciation movements in these cases would contradictorily increase the production cost invoice as most of these activities are relying on the import. Again, it is understandable why the depreciation in this case would not result in comparative advantage for the production in this country which attract the FDI inflow. The negative effects of macroeconomic distortions such as the deterioration of the production base, the decay of the infrastructure and the logistics, unskilled labors and market size do not give these countries always the chance to gain benefits from the depreciation (Ab et al., 2013; N. A. Ahmad et al., 2015). Finally, these distortions under floating exchange rate regime might result in more depreciation movements which reflected negatively on the performance of most of macroeconomic indicators especially local and foreign investment.

Additionally, the results illustrated that the net export has a positive impact on the foreign direct investment at 1percent significant level. Consequently, the increase in the net exports by 1 percent will increase the FDI inflow by 0.288 percent ranging from 0.285 to 0.289. This result is so logical as the degree of the increase in net exports reflects to what extent the country has the constituents of the FDI attraction. The volume of exports compared to the imports demonstrates the strength of the production base, the skilled labor, technology, and strong infrastructure, the comparative advantage of the production cost and all other production factors which significantly direct the FDI decisions.

As for the real interest rate, the results indicated that it has a significant positive impact on the FDI inflow at 1 percent significant level. The increase in the real interest rate by one percent increases the FDI inflow by 0.0337 percent ranging from 0.0315 to 0.0371. These results consisted with many theoretical and empirical studies which confirmed that the higher interest rate would attract the FDI inflow. However, this result contradict with some empirical studies have been done in Africa proved the opposite. Kiptanui, (2017) claims that as well as the higher real interest rate could mean an increase in the borrowing interest rate which might attract the hot money, it also means that the lending interest rate would increase the capital cost which is considered a repellent factor for the FDI. This also agree with the economic theory which confirmed that the foreign investors usually prefer to invest in countries with higher return on the investment not in countries with higher interest rate (Casson & Buckley, 1976). On this context, Kiptanui, (2017) argued that the countries could be a distance for the FDI only if they offer lower interest rate and better business environment. Furthermore, Faroh and Shen, (2015) proved through their empirical study that in the African countries high interest rate has no significant impact on FDI inflow. The study suggested that the governments should support the private sector instead of increase the interest rate. Anyway, it should be mentioned that the high interest rate could benefit the FDI if the foreign investors rely on their own capital or borrow from the country of the parent company or from abroad at general by lower interest rate compared to the interest rate in the hostel country as it could give them a comparative advantage in front of the domestic investors (Latief & Lefen, 2018; Mokuolu, 2018).

Moreover, the results indicate that the inflation negatively influences the FDI inflow at 1 percent significant level. The increase in the inflation by 1 percent decrease the FDI inflow by -0.000958 percent ranging from -0.000957 lowest to -0.000987 highest. It is understandable how the inflation influences the FDI inflow from many aspects. Firstly, the increase the inflation rate directly decreases the real interest rate which in many cases considered a repellent factor for the FDI inflow as what has been interpreted above (Efiong *et al.*, 2018). In another context, the high levels of inflation could lead to a downturn in the FDI inflow, as the inflation could result in an exchange rate depreciation, risking reductions in the assets' values which are denominated in the local currencies relative to the foreign exchange rate (Lily *et al.*, 2014; Mansoor & Bibi, 2018). Furthermore, the unpredictable and rapid changes in the price level

may increase friction within the business' operations, as the business would need to frequently update the production cost and the final prices (Wijaya *et al.*, 2020; Yavas & Malladi, 2020).

Beyond that, the results show that the trade openness have a significant negative impact on the foreign direct investment. The increase in the inflation by 1 percent at 5 percent significant level increases the FDI inflow by percentage ranging from -0.0628 to -0.0642. However, as it has been mentioned above the deterioration of the production base, the decay of the infrastructure and unskilled labors could interpret how the trade openness might enhance the increase of import and repellent the FDI inflow especially the productive investments.

Finally, the findings of the two models revealed that the GDPG has an insignificant negative impact in the FDI inflow in this region. This results consistent with (Wijaya *et al.*, 2020) which by somehow revealed the type of the investors who target this region. Where many studies in the literature illustrated how the foreign investors could prefer to invest in the countries with low economic growth and development, weak institution quality, and high rates of corruption. In light of this environment, the investors might be able to achieve more success and gain more profits.

4. Discussion and conclusions

Even though the conventional theoretical framework and the world bank and the IMF claims confirmed the importance of the interaction effect between the exchange rate movements and the export commodities prices on the FDI inflow which help to achieve the development sustainability, most of the empirical studies concentrated on investigating the direct impact of the exchange rate movements on the FDI inflow. Accordingly, this study attempted to fill this gap.

The study investigated this relationship relying on the dynamic LSDVC estimator to analyze the collected data. The study used data for the period between 1990 to 2020 for the 26 African countries which have adopted the floating exchange rate regime in light of the economic reform programs under the supervision of the World Bank and the IMF.

The empirical findings illustrated that in this region the impact of the exchange rate movements on the FDI inflow when the export commodities prices mediated this relationship is not always positive where the level of the export commodity price on determining the sign of these impacts. These findings consistent with (Lee & Brahmairene, 2020; Lily *et al.*, 2014; Wang, 2013).

As for the disputed problem of the appropriate exchange rate regime for the developing countries to attract the FDI inflow, the results of this study contribute to the body of the knowledge as it demonstrated that the conventional theoretical framework and the world bank and the IMF arguments do not always success and cannot be generalized (Combes *et al.*, 2011; Eregha, 2017; Go & Mitra, 1999; Latief & Lefen, 2018). Where the adopting of the floating exchange rate regime could result in continuous depreciation movements which could negatively influence the FDI inflow (Arya *et al.*, 2020; Cushman & De Vita, 2017).

Moreover, surprisingly, the findings illustrated that the export commodities prices positively impact on foreign direct investment. This result demonstrated that the increase in the export commodities prices might not be the main factors which obstruct the African countries to attract the FDI inflow. It might prove that most of the exchange rate movements influences might not influence the FDI through its interaction with export commodities prices changes but through other variables in this region. For example, the instability of the exchange rate movements might influence the design of the parent companies from the beginning to decide to invest in this country

or not. Furthermore, if the local currency of the host country lost some of its value after the selling process this could directly affect the profits. Beyond that, the exchange rate movements could influence the FDI inflow through the mediation role of the inflation.

This result limits the possibility of generalizing the theoretical framework which confirmed the ability of the exchange rate depreciation to attract the FDI by reducing the prices of exported commodities. (Cushman, 1985; Itagaki, 1981; Kohlhagen, 1977). The results showed that while the exchange rate depreciation movements in light of the low and medium export commodities price level could negatively influence the FDI inflow, it turns to be positive with an insignificant impact in light of the high levels of the export commodity prices. Therefore, the study suggests that the governments of these countries could reevaluate the appropriate exchange rate regime according to the results of the practical reality regardless their policies would agree or disagree with the international institutions' vision. At least they have to wisely monitor the movements of the exchange rate and control it if need be. Where the results demonstrated that the interaction between depreciation movements and the export commodity prices could not succeed to attract the FDI inflow. The impacts of macroeconomic distortions such as the decay of the logistics and the infrastructure, the production base deterioration, unskilled labors and market size which did not give these countries a chance to gain any benefits from the exchange rate depreciation (Ab et al., 2013; N. A. Ahmad et al., 2015). Beyond that, in light of the floating exchange rate regime these distortions could lead to a vicious circle. It might result in continuous depreciation movements which negatively reflected on the performance of macroeconomic indicators especially local and foreign direct investment.

Overall, our results raise controversy about the validation of the traditional theories and the view of the World Bank and the IMF. Where the results proved the inability of the depreciation exchange rate to be generalized as an answer for the weakness of the foreign direct investment in the developing countries. The study strongly recommended the importance of reinvestigation of the effective determinants of the FDI inflow in the African countries especially the appropriate exchange rate regime.

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Appendix A

Appendix (A): *The selected countries under study*

Egypt	South Africa	Sudan	Ethiopia	Mauritania	Tunisia	Guinea
Tanzania	Liberia	Zambia	The Gambia	Mozambique	South Sudan	Angola
Uganda	Malawi	Algeria	Ghana	Nigeria	Seychelles	The Democratic Republic of the Congo
Sierra Leone	Madagascar	Burundi	Kenya	Rwanda	Mauritius	

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