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IMPACT OF EXCHANGE RATE ON THE MANUFACTURING SECTOR IN NIGERIA

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ABSTRACT

Various studies have been conducted on the impact of exchange rates on the performance of the manufacturing sector and how it influences growth in different climes of the world. These studies have examined; drawing out the relationship between exchange rate and macroeconomic performance, with respect to manufacturing output and its related variables. This study examined the impact of exchange rates on the performance of the Nigerian manufacturing sector using the independent variables of exchange rates, inflation rates, capacity utilization rate, the manufacturing sector's foreign direct investments, and imports over a period of 25 years (1990-2014). Unit Root test, Johansen co-integration test, Granger causality test and Error Correction Model were used to test for stationarity, long-run relationship, causal relationship, and the short and long run equilibrium relationship respectively. The empirical results of the study shows that a devaluation of the Naira has a negative impact on the performance of the Nigerian manufacturing sector as it was found that exchange rates has a negative significant relationship, long run relationship and causal relationship with the performance of the sector. It was also ascertained from the results that inflation rates(INF), and capacity utilization rates(CUR) have a positive significant relationship with the performance of the sector, while exchange rates, imports(IMP) and manufacturing foreign direct investment(MFDI) have a negative significant relationship with the performance of the Nigerian manufacturing sector. The results of the analysis showed that the independent variables have a significant relationship with the R2 at 64.5%.

JEL Code: G18, Government Policy and Regulation

Key words: exchange rate; manufacturing; financial sector; real sector; and inflation

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1. INTRODUCTION

Various studies have been conducted on the impact of exchange rates on the performance of the manufacturing sector and how it influences growth in various countries. Those studies have tried to find out the nature and extent of the relationship that existed between exchange rates and manufacturing. Similar studies have been conducted in the Nigerian context.

Moreover, this study aimed to present a clear picture of the nature of relationship that exists between the two variables with respect to exposing the economic relevance of continuously devaluing the Nigerian Naira. That is, it purposed to verify if the value of the nation's currency is enhanced whenever the exchange rate is influenced.

2. METHODS

Approach

Model specification

MGDP = f(EXR, INF,MFDI,CUR,IMP) (1)

The model used is adopted from the work of Odior (2013). However the model has being adjusted with imports (IMP) to satisfactorily capture the effect of exchange rate on Nigeria's manufacturing sector.

Where:

MGDP =Manufacturing Gross Domestic Product (manufacturing output).

EXR=Exchange Rate

INF=Inflation Rate

CUR= Manufacturing Capacity Utilization Rate

MFDI= Manufacturing Foreign Direct Investment

IMP= Imports

Transforming this functional representation into a linear equation or explicit form:

$$MGDP=\beta_0+ \beta_{1EXR}+ \beta_{2INF}+ \beta_{3MFDI}+\beta_{4CUR}+ \beta_{5IMP} +\mu_t \quad (2)$$

Where: μ_t is the error term that is assumed to be normally distributed with the mean of zero and constant variance; β_0 = intercept parameter of the model; β_0– β_5 = coefficient of the independent variables.

In Log Form we have;

$$LogMGDP= \beta_0+ \beta_{1LogEXR}+ \beta_{2LogINF}+ \beta_{3LogMFDI}+\beta_{4LogCUR}+ \beta_{5LogIMP} +\mu \quad (3)$$

LogMGDP= Log of Manufacturing Gross Domestic Product

LogEXR = Log of Exchange Rates

INF = Inflation Rates

CUR = Capacity Utilization Rate

LogMFDI = Log of Manufacturing Foreign Investment

LogIMP= Log of Imports.

The essence of Log is to unify the various units and measurements of the various variables to avoid heteroscedasticity in analysis.

3. MODEL FOR GRANGER CAUSALITY TEST

Causal relationship between exchange rates (EXR) and the manufacturing sector (MGDP)

MGDP and EXR

$$MGDP_t = \sum_{i=0}^{n} \boldsymbol{\alpha}_1\, MGDP_{t-1} + \sum_{i=0}^{n} \boldsymbol{\beta}_1 + EXR_{t-1} + \mu_1 t \quad (4)$$

$EXR_t = \sum_{i=0}^{n} \lambda_1 MGDP_{t-1} + \sum_{i=0}^{n} \partial_1 EXR_{t-1} + \mu_2 t$ (5)

$\beta_1 = 0$; $\lambda_1 \neq 0$ ……………. Unidirectional

$\beta_1 \neq 0$; $\lambda_1 = 0$………………Unidirectional

$\beta_1 \neq 0$; $\lambda_1 \neq 0$……………….Bi-directional

$\beta_1 = 0$; $\lambda_1 = 0$………………..Independence

Method of data analysis

The estimation technique used for analysis was the Vector Error Correction Model in conjunction with the primary tests that were carried out for the purpose of this study. They include the unit root test, co-integration and granger causality test.

The quantitative analysis involves the use of unit root test to guard against spurious regression results. Co-integration test aim at finding out if there exists equilibrium long run relationship between exchange rates and the manufacturing sector's output.

The Granger causality test was used for causality test to determine the causal relationship between exchange rates and manufacturing output. All these tests were conducted with the E-Views statistical package.

Data analysis

Data were sourced from the annual reports of CBN and the publication of Manufacturing Association of Nigeria. Various tests were conducted from the time series data. Study highlights the tabulated results of the various tests conducted, extracting the relevant figures from the analysis generated from the results.

It shows the pattern of trend in exchange rates and the manufacturing sector's gross domestic product. This measures the performance of the Nigerian manufacturing sector.

The empirical results presented in a table which shows the estimated parameters, their t-statistics and other diagnostic tests of equation. The results obtained from the estimation techniques are presented in *table i*.

The *table i* present the results of Augmented Dickey Fuller (ADF) and Phillip Peron (PP) unit root statistic tests in the table above. The variables were non stationary, but after the second differencing at 5%, all the variables became integrated. From the ADF, all except Log (IMP) were integrated at first difference, but according to the PP test, all the variables were integrated at first difference. Therefore, all the variables were integrated at first difference except imports which were integrated at second difference.

As a result of the unit root test which indicated that the variables used in this study are non-stationary.

The *table ii* shows the result of Johansen Co-integration test of two likelihood test statistics. These are the trace statistic and the Maximum Eigen Value commonly used to determine the number of co-integration vectors in a study.

The Johansen co-integration test reveals the presence of six (6) co-integrating vectors in the series according to the trace test and six (6) co-integrating vectors according to Maximum Eigen Value test due to the fact the trace statistic and the Maximum Eigen value is higher than the critical values at 5%. This suggests an evidence of equilibrium long run relationship between exchange rates and the explanatory variables used in the model. Specifically, there is a long run relationship between exchange rates and the manufacturing sector. This implies that the null hypothesis is rejected.

The criterion being that there must be at least one co-integrating equation for a long run relationship to exist between the concerned variables. Due to the existence of long run relationship between the two variables, null hypothesis is rejected. There is a long-run relationship between exchange rate and the Nigerian manufacturing sector. Hence, study accepts the alternative hypothesis.

Due to the fact that the variables were co-integrated, Vector error correction model was adopted for this study. From the above result, the coefficient of determination (R^2) is 0.645195 while adjusted R^2 is 0.479620. It shows that 64.5% of systematic variation in the dependent variable can be explained by changes in all independent variables. This is considered a good fit. The 35.5% systematic variation in MGDP is left unexplained by the model, which may be attributed to the error term.

The result of the VECM in *table iii* shows about 48.0%. This represents the speed at which the system will adjust back to equilibrium as shown by the ECM value of -0.480318. The VECM suggests the validity of the equilibrium relationship, representing the ability of the economy to be restored to a state of equilibrium. The coefficient of the ECM is -0.480318 and its corresponding t-statistics of-2.87182 shows that the ECM is correctly signed (negative) and significant because its t-statistics is above 2.

The result indicates that there is a direct positive relationship between INF (inflation rate), CUR (capacity utilization rate) and the manufacturing sector performance in Nigeria. With respect to capacity utilization rate, this suggests that a proper and efficient use of the local raw materials in the manufacturing sector would contribute positively to the performance of the sector; if it can be sustained and improved upon.

Inflation rate, capacity utilization rate, manufacturing, foreign direct investments, imports, and exchange rates proved significant as reflected by their t-statistics outcome on the table. That is, exchange rates, foreign direct investments, and imports have negative significant relationship on the Nigerian manufacturing sector's performance.

Due to the negative relationship between (IMP) and (MGDP), importation of foreign inputs is detrimental. It does not boost the performance of the manufacturing sector or that of the economy as a whole. The results agree with theoretical and empirical expectations.

Foreign direct investment (MFDI) has a negative and significant impact on the sector. The negative t-statistics of MFDI suggests that investments by multinational firms had negative impact on the performance of local manufacturing firms. This manifests in terms of technological backwardness, exploitation of raw materials to be used by home countries and others.

One should consider the positive significant relationship that exists between inflation rate (INF) and manufacturing sector's performance (MGDP), persistent rise in cost inputs. This supposed to serve as a dis-incentive to investment; and output.

Moreover, economic theory suggests that a reasonable level of inflation (not beyond 5% or one digit inflation rate) could support output growth in the manufacturing sector (Kamin and Rogers, 1997). In Nigeria, CBN statistics shows that a number of periods recorded one digit inflation rate; this might be responsible for the observed positive long-run relationship between INF and MGDP in the long run.

Furthermore, exchange rates have a negative and significant relationship with the performance of the manufacturing sector. This is indicated by its t-statistic value of -8.65060. This implies that devaluing the Naira will adversely affect the performance of the manufacturing sector (MGDP).

From the co-integration test, there is a negative long–run relationship between exchange rates and the manufacturing sector (MGDP). This explains the impact of exchange rates on the manufacturing sector, as exchange rates have a negative effect on the manufacturing sector. Hence, study rejects the null hypothesis of no relationship between the exchange rates and the manufacturing sector.

Granger Causality Test

Analysing how exchange rates or variations in exchange rates could cause growth in the manufacturing sector, one would like to know whether changes in Log (EXR) variable will help predict the changes in manufacturing sector growth Log (MGDP). The granger causality test assumes that the information relevant to the prediction of the respective variables is contained in the time series data on these variables.

In table iv, the Granger causality test was conducted. The probability values and the F statistics are given on the right side of the table. From the result, it shows that the null hypothesis that EXR does not Granger cause MGDP cannot be rejected (i.e. null hypothesis is accepted) and the alternative hypothesis that MGDP does not Granger cause EXR will be rejected.

This means that within the period of this study, there is no Granger causality/causal relationship between the performance and output of the manufacturing sector (MGDP) and Exchange rates (EXR), MGDP does not granger cause EXR and EXR does not granger cause MGDP. This suggests independence among the variables indicating that exchange rate did not granger cause manufacturing gross domestic product and manufacturing gross domestic product did not granger cause exchange rate. ($\beta_1 = 0$; $\lambda_1 = 0$); with reference to chapter three.

Null Hypotheses

$H_01_:$ Foreign exchange rates have no significant effect on manufacturing sector output in Nigeria.

$H_02_:$ There is no long-run relationship between exchange rate and the Nigerian manufacturing sector

$H_03_:$ There is no causal relationship between exchange rates and the performance of the Nigerian manufacturing sector

Study rejects the first null hypothesis. This implies that there is a negative and significant relationship between exchange rates and the manufacturing sector's performance.

In the same vein, study rejects the second null hypothesis. Hence, the alternative hypothesis is accepted. That is, there is a long run relationship between the variables.

Conclusively, the third null hypothesis is accepted. This means there is no causal relationship between exchange rates and the performance of the manufacturing sector.

4. RESULTS

4.1. Data Analysis and Interpretation of Results

Unit Root and Co-integration Tests

Stationarity of data is one of the conditions that must be satisfied in the usage of standard regression analysis; using ordinary least square method. A time series is stationary if its mean and variance do not vary systematically overtime (Gujarati & Porter, 2009). However, in the words of Fleeger (2006), most macroeconomic time series variables often trend up and down over time (i.e. random walk or unit root). Hence, the regression result obtained using ordinary least square method from non-stationary data would be spurious (Granger, 1996).

Test for unit root was conducted using both Augmented Dickey-Fuller (ADF) and Phillips-Peron tests. The results as shown in Table 1 below reveal that all the variables are stationary at first difference. Hence, there is a presence of unit root in all the variables at level. This denotes short run disequilibrium among the variables.

The concept of co-integration denotes long –run relationship between two or more variables. Granger (1986) opined that two or more time series variables are co-integrated if they share a common stochastic drift. Although two different time series may not themselves be stationary, some linear combination of the two may indeed be stationary with the generalization of two or more series (Komolafe, 1996).

The test for long run relationship among the variables was carried out using Johansen Co-integration test. The stationarity of the entire variables under study at first difference is a sufficient condition for the adoption of Johansen Co-integration test. The result of the co-integration test as shown in Table 1A of the Appendix reveals that at 10 percent level of significance, there are 5 co-integrating equations. Therefore, we could infer that there is a long-run relationship among the variables.

Granger Causality Test

Model Specification

$$\ln(RMGDP)_t = \beta_0+\beta_1 CUR_t+ \beta_2\ln(IMPORTS)_t + \beta_3\ln(MFDI)_t + \beta_4 REXR_t + \beta_5 INF_t + U_t$$

5. DISCUSSION

Prior work

Foreign exchange rate is the relative value between two currencies. It is the rate at which the amount of one currency can exchange for another (Kathleen Crislip, 2018).Foreign exchange rate is the price of one currency quoted in terms of another currency (Pandey, 2010). It is the price at which one nation’s currency is exchanged for some other nation’s currency. It could be at par, high or relatively low. Thus, exchange rate fluctuates relative to the comparative usage and need of the currencies concerned. According to Kimberly (2018), most exchange rates are determined by the foreign exchange market, or forex. That is called a flexible exchange rate. For this reason, exchange rates fluctuate on a moment-by-moment basis.

Meanwhile, in the words of Falaye (2017), manufacturing connotes transformation of substance through a defined process into a finished or semi-finished product; using factors. It has to do with the industrial consumption of assorted raw materials, digesting same, and churning them through a process of transformation. Merriam Webster dictionary (1828) defines manufacturing as the process of making wares by hand or by machinery especially when carried on systematically with division of labour. As at today, the dwindling fortune of the US manufacturing sector is of great concern to the Americans, considering the grace of employment opportunities the sector generates.

Exchange Rate Theories

Purchasing power parity

Purchasing Power Parity is an economic theory that compares different countries' currencies through a basket of goods approach. It is an approach that takes cognisance of differences in countries’ rates of inflation relative to the purchasing power of their currencies. That is, a persistent high inflation rate would make the prices of locally produced commodities more costly relative to foreign substitutes. As a result of this, there would be increased flair for foreign products; hence, foreign currencies to purchase them.

Consequently, the surge for foreign currencies would raise the value of the foreign currencies at the expense of the domestic currency; leading to reduction in value of the nation’s currency. The lower the value of the nation’s currency, the higher and more expensive would be the value of the foreign currencies; leading to increased costs of exchange. The more the costs of exchange increase, the less would the production lines consume foreign inputs.

The tendency is that increased costs of production would lead to increase in prices of products, reduced outputs, labour retrenchments, loss of profits, or total closure of operations at the lowest ebb of the strata. At the highest ebb of the strata, influencing the rate of exchange could boost production, enhance employment, increase profit margin or creation of a new production line. Summarily, the purchasing power of nations' currencies, upon which inflation weighs great influence, plays a key role in determining the side of the pendulum that foreign exchange rate swings.

Balance of Payments

In the words of Herbert Stein, The balance-of-payments accounts of a country record the payments and receipts of the residents of the country in their transactions with residents of other countries. If all transactions are included, the payments and receipts of each country must be equal. Any apparent inequality simply leaves one country acquiring assets in the others. The balance of payment position of a country equally weighs great influence on the nation's currency. While balance of payments deficit necessitates payments in foreign currency, its surplus ensures foreign currency receipts. More receipts of foreign currencies impact positively on enhancing the value of the national currency, while persistent balance of payments deficit impacts negatively and often leads to devaluing the nation's currency.

The more the nation's currency losses its value, the more expensive it becomes for firms and industries to import necessary factors of production that are not available locally. Tendency is that an industry that majorly depends on foreign inputs may suffer loss. This is simply due to the fact that exports generally would become comparatively costlier and may not be fully able to increase sales to cover anticipated profit margins.

To correct balance of payments deficits, the right approach would be to increase dominance in foreign trade so that more foreign earnings could be engendered. Such an increase may necessitate a push from the public sector. Directions and standards have to be pre-determined and enforced by the government that knows of the nation's state of accounts. In line with this, the tenets of endogenous growth theory ought to be keenly promoted (Aghion and Howitt, 1992).

Empirical evidence

Azid et al (2005) conducted a study on the impact of exchange rate volatility on the growth and economic performance of Pakistan between 1973 and 2003. The study used real money, real exchange rate, real exchange rate volatility, exports, imports, and manufacturing production indexes as the dependent variable to investigate the relationship. The study shows the results were positive but insignificant, and does not support the position that excessive volatility of exchange rate regimes has pronounced impact on manufacturing in Pakistan.

With the use of co-integration and error correction models, Habibur and Ismail (2003) quantitatively examined the existence of a long-run relationship between the real exchange rates and the manufacturing private investment sector in Bangladesh. The study concluded that the appreciation of exchange rates had negative effect on the level of manufacturing private investment sector; both in the long-run and short run. It found that interest rates do not have any impact on long and short run investments.

In like manner, Ayinde (2014) examined the impact of exchange rates fluctuations on the Nigerian manufacturing via the sector's contribution to GDP. As variables, study used the exchange rate, inflation rates, labour force and lending rates to establish the relationship. The results revealed that exchange rate has negative and significant relationship with the manufacturing sector. It also found that inflation rate has a positive relationship with the manufacturing sector.

Ehinomen and Oladipo (2012) also investigated the impact of exchange rate management on the growth of the manufacturing sector in Nigeria. The study used the ordinary least squares multiple regression analysis. The empirical result shows that exchange rate appreciation has a significant relationship with domestic output. Besides, study shows that exchange rate appreciation will promote growth in the manufacturing sector.

Solely, Odior (2013) studied the impact of macroeconomic factors on manufacturing sector in Nigeria over a period of 36 years. The factors used included exchange rates, credit to the manufacturing sector, broad money supply, interest rate, inflation rate and deficit government financing. The analysis involved the use of ADF test and error correction model. He concluded that credit to the manufacturing sector in the form of loans; advances; and foreign direct investments have the capacity to sharply increase the level of productivity in the sector, while money supply has less impact. The findings were reinforced by the presence of a long run equilibrium relationship by the co-integrating equation of the Vector Error Correction Model.

In conclusion, Enekwe et al (2013) also examined the effect of exchange rates fluctuations on the Nigerian manufacturing sector over a period of 25 years. The study employed the use of descriptive statistics and multiple regressions to examine the impact of exchange rates in Nigeria. The results of the study showed that all the independent variables as stated above have significant and positive relationship with the dependent variable (MGDP). Conclusively, it can be stated that empirical literature supports the claim that exchange rates have positive effects on the sector’s productivity.

6. INTERPRETATION OF RESULTS AND DISCUSSION OF FINDINGS

Error Correction Model (ECM)

According to Engel and Granger (1987 and 1989), co-integration test is a necessary condition for error correction model to hold. The result of the co-integration test in Table 1A of the Appendix confirms the existence of long-run relationship among the variables. The error correction model is given as below.

$$\Delta \ln(RMGDP)_t = \beta_0+\beta_1\Delta CURt+ \beta_2\Delta \ln(IMPORTS)_t + \beta_3\Delta \ln(MFDI)_t + \beta_4\Delta REXR_t + \beta_5\Delta INF_t + \beta_6\Delta \ln(RMGDP)_{t-1} +\beta_7\Delta CUR_{t-1}+ \beta_8\Delta \ln(IMPORTS)_{t-1} + \beta_9\Delta \ln(MFDI)_{t-1} + \beta_{10}\Delta REXR_{t-1} + \beta_{11}\Delta INF_{t-1} + ECT_{t-1}$$

The validity of the result of an error correction model holds if the co-efficient of the error correction term is negative and significant. The result presented in Table viii is valid because of the statistical significance of the negatively signed co-efficient of error correction term.

Given the co-efficient of error correction term at -1.137, the speed of adjustment to long rum equilibrium from short run discrepancies is very high. Therefore, almost all the errors arising from the short-run disequilibrium is adjusted every year. Also, the R^2 from the result indicates that about 99 percent of factors capable of influencing sustainable growth in the Nigerian manufacturing sector are captured in the model.

Meanwhile, just less than 1 percent of the factors are not captured. In the same vein, the overall model is statistically significant as shown by F-statistics value from the result table. The Durbin- Watson statistics reveal that there is absence of first order serial correction from the model. This further substantiates the reliability of the result of the Error Correction Model.

The result of the empirical analysis shows that contemporaneous effect of the rate of capacity utilization in the manufacturing sector on the growth in that sector is negative. This outcome somehow negates the a priori theoretical expectation. It implies that most capacity utilized in the sector does not translate in to sustainable output. Apparently, there is high rate of economic wastage in this sector. In Nigeria, the veritable infrastructure base that is capable of synergizing the capacity utilized into real output in the sector is not sufficient or absent.

Furthermore, the contemporaneous effect of the real exchange rate on the growth of the manufacturing sector is found to be positive. This also goes contrary to the expected a priori sign between the two variables. By this, it implies that a rise in the real exchange rate of the current period boosts the manufacturing sector's output in that period.

However, the lag effect of real exchange rate on economic growth the manufacturing sector is found to be negative. This means that, it is the rise in real exchange rate on the past period that causes a decline in the manufacturing output of the current period in Nigeria. Obviously, a substantial volume of the inputs into the Nigerian manufacturing sectors are imported.

A rise in real exchange rate is expected to increase production cost profile of the sector. Since a large percentage of inputs in this sector are imported, an increased exchange rate is like to constitute more burdens to the running costs in this sector. Therefore, output is reduced in a situation where the cost of machineries and hiring of expatriates becomes too exorbitant to borne. This leak could be linked to the time lag between the time of input procurement and final production.

Both the volume of importation and inflation rate is also found to have negative relationship with economic growth of the manufacturing sector in Nigeria. High inflation rate increases running cost including cost of importation as well. Since high inflation rate reduces real import volume, a high inflation rate of the past period and places more burden on the operation cost profile of the current period. This will constitute a decline in the growth of the current period.

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APPENDIX

VARIABLE	ADF t-STATISTICS	ORDER OF INTEGRATION	PHILLIP-PERON t-STATISTICS	ORDER OF INTEGRATION
Log(RMGDP)	-4.726955	I(1)***	-4.741968	I(1)***
Log(MFDI)	-4.19503	I(1)***	-4.189238	I(1)***
CUR	-2.883025	I(1)*	-2.883025	I(1)*
Log(IMPORTS)	-6.939161	I(1)***	-7.080533	I(1)***
REXR	-5.305505	I(1)***	-5.522661	I(1)***
INF	-3.592605	I(1)**	-3.773306	I(1)***

Table 1: Result of Unit Root Test

******* Statistically significant at 1 percent level of significance

****** Statistically significant at 5 percent level of significance

***** Statistically significant at 10 percent level of significance.

Source: Authors' computation with E-views 7.2 (2018)

Table 2: Regression Result of Ordinary Least Square (OLS)

Dependent Variable: $ln(RMGDP)_t$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CUR_t***	-0.025474	0.004797	-5.310087	0.0000
$ln(IMPORTS)_t$	-0.136461	0.120402	-1.133375	0.2712
$ln(MFDI)_t$	0.049035	0.097187	0.504539	0.6197
$REXR_t$***	0.069853	0.008184	8.534840	0.0000
INF_t***	-0.019794	0.002394	-8.268504	0.0000
C	2.421327	0.369999	6.544151	0.0000

R-squared	0.946322		
F-statistic	66.99255	Durbin-Watson stat	2.521886
Prob(F-statistic)	0.000000		

*** Statistically significant at 1 percent level of significance

Source: Authors' computation with E-views 7.2 (2018)

Table 3: Regression result of error correction model

Dependent Variable: $\Delta ln(RMGDP)_t$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.023833	0.042592	-0.559566	0.5881
ΔCUR_t***	-0.021515	0.006761	-3.182193	0.0098
$\Delta ln(IMPORTS)_t$	-0.128124	0.129786	-0.987196	0.3468
$\Delta REXR_t$***	0.071163	0.006891	10.32766	0.0000
ΔINF_t***	-0.017100	0.002089	-8.184083	0.0000
$\Delta ln(RMGDP)_{t-1}$*	0.327412	0.168833	1.939268	0.0812
$\Delta ln(MFDI)_{t-1}$	0.131168	0.092251	1.421852	0.1855
ΔCUR_{t-1}	0.002181	0.009165	0.238031	0.8167
$\Delta ln(IMPORTS)_{t-1}$**	-0.243043	0.094060	-2.583920	0.0272
$\Delta ln(REXR)_{t-1}$**	-0.033026	0.013933	-2.370355	0.0393
ΔINF_{t-1}	-0.000342	0.003491	-0.097913	0.9239
ECT_{t-1}***	-1.137649	0.271832	-4.185126	0.0019

R^2	0.987386		
F-Statistics***	65.23028		0.000000

F-statistic	65.23028	Durbin-Watson stat	1.915343
Prob(F-statistic)	0.000000		

******* Statistically significant at 1 percent level of significance

****** Statistically significant at 5 percent level of significance

*****Statistically significant at 10 percent level of significance

Source: Authors' computation with E-views 7.2 (2018)

Table A1: Co-Integration Test Result

Date: 03/28/18 Time: 00:29
Sample (adjusted): 1992 2014
Included observations: 23 after adjustments
Trend assumption: Linear deterministic trend
Series: LRMGDP LMFDI CUR LIMPORTS REXR INF
Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.*^**
None ***	0.982048	206.5904	95.75366	0.0000
At most 1 ***	0.873457	114.1290	69.81889	0.0000
At most 2 ***	0.762194	66.58406	47.85613	0.0004
At most 3 **	0.562214	33.54916	29.79707	0.0176
At most 4*	0.434951	14.55060	15.49471	0.0690
At most 5	0.059922	1.421232	3.841466	0.2332

Trace test indicates 4 co-integrating eqn(s) at the 0.05 level
***denotes rejection of the hypothesis at the 0.01 level
**denotes rejection of the hypothesis at the 0.05 level
*denotes rejection of the hypothesis at the 0.1 level
*^MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None ***	0.982048	92.46141	40.07757	0.0000
At most 1 ***	0.873457	47.54498	33.87687	0.0007
At most 2 ***	0.762194	33.03490	27.58434	0.0090
At most 3*	0.562214	18.99856	21.13162	0.0969
At most 4*	0.434951	13.12937	14.26460	0.0750
At most 5	0.059922	1.421232	3.841466	0.2332

Max-eigenvalue test indicates 3 co-integrating eqn(s) at the 0.05 level
***denotes rejection of the hypothesis at the 0.01 level
**denotes rejection of the hypothesis at the 0.05 level
*denotes rejection of the hypothesis at the 0.1 level

Unrestricted Co-integrating Coefficients (normalized by b'*S11*b=I):

LRMGDP	LMFDI	CUR	LIMPORTS	REXR	INF
-0.546494	-1.697492	-0.112816	3.453425	-0.045070	0.013215
-4.187151	1.350522	-0.038120	-2.066458	0.208799	-0.030404
7.458821	0.013106	0.171338	0.129650	-0.275517	0.221210
10.77620	-1.836200	0.395837	2.929439	-0.854349	0.235109
-4.587815	-2.291574	-0.037838	1.730554	0.585693	-0.032960
-5.484543	1.966588	-0.126642	-2.353102	0.397315	-0.115070

Unrestricted Adjustment Coefficients (alpha):

D(LRMGDP)	0.336259	0.089790	-0.156524	0.111247	-0.018198
D(LMFDI)	-0.041059	-0.031509	0.007277	-0.027596	0.141893
D(CUR)	0.974658	-1.679116	0.267831	-1.845069	0.620477
D(LIMPORTS)	-0.135858	0.086574	0.105482	-0.073348	0.079044
D(REXR)	2.370613	-0.127627	-1.681717	1.004101	-0.754652
D(INF)	-10.18107	-1.652865	-1.871320	-1.959948	-0.101590

1 Co-integrating Equation(s): Log likelihood -134.9314

Normalized co-integrating coefficients (standard error in parentheses)

LRMGDP	LMFDI	CUR	LIMPORTS	REXR	INF
1.000000	3.106151	0.206436	-6.319239	0.082472	-0.024182
	(0.24461)	(0.01194)	(0.32058)	(0.02515)	(0.00705)

Adjustment coefficients (standard error in parentheses)

D(LRMGDP)	-0.183764
	(0.04739)
D(LMFDI)	0.022439
	(0.04129)
D(CUR)	-0.532645
	(0.45246)
D(LIMPORTS)	0.074245
	(0.03460)
D(REXR)	-1.295525
	(0.52352)
D(INF)	5.563891
	(0.57460)

2 Co-integrating Equation(s): Log likelihood -111.1589

Normalized co-integrating coefficients (standard error in parentheses)

LRMGDP	LMFDI	CUR	LIMPORTS	REXR	INF
1.000000	0.000000	0.027667	-0.147358	-0.037417	0.004303
		(0.00411)	(0.03754)	(0.00842)	(0.00234)
0.000000	1.000000	0.057553	-1.986987	0.038597	-0.009171
		(0.00369)	(0.03372)	(0.00756)	(0.00210)

Adjustment coefficients (standard error in parentheses)

D(LRMGDP)	-0.559729	-0.449534
	(0.35281)	(0.18124)

D(LMFDI)	0.154370	0.027144
	(0.31718)	(0.16293)
D(CUR)	6.498070	-3.922158
	(2.97841)	(1.53002)
D(LIMPORTS)	-0.288252	0.347537
	(0.25012)	(0.12849)
D(REXR)	-0.761131	-4.196458
	(4.04279)	(2.07679)
D(INF)	12.48469	15.05005
	(4.05770)	(2.08445)

3 Co-integrating Equation(s): Log likelihood -94.64150

Normalized co-integrating coefficients (standard error in parentheses)

LRMGDP	LMFDI	CUR	LIMPORTS	REXR	INF
1.000000	0.000000	0.000000	0.822895	-0.035045	0.150624
			(0.20284)	(0.05828)	(0.01550)
0.000000	1.000000	0.000000	0.031326	0.043532	0.295204
			(0.46799)	(0.13447)	(0.03577)
0.000000	0.000000	1.000000	-35.06862	-0.085739	-5.288579
			(8.09296)	(2.32539)	(0.61860)

Adjustment coefficients (standard error in parentheses)

D(LRMGDP)	-1.727217	-0.451585	-0.068177
	(0.62679)	(0.15863)	(0.01526)
D(LMFDI)	0.208645	0.027240	0.007080
	(0.64360)	(0.16289)	(0.01567)
D(CUR)	8.495772	-3.918648	-5.94E-05
	(6.01646)	(1.52267)	(0.14646)
D(LIMPORTS)	0.498515	0.348920	0.030100
	(0.45084)	(0.11410)	(0.01098)
D(REXR)	-13.30476	-4.218499	-0.550720
	(7.31356)	(1.85095)	(0.17804)
D(INF)	-1.473154	15.02553	0.890968
	(7.11942)	(1.80182)	(0.17331)

4 Co-integrating Equation(s): Log likelihood -85.14221

Normalized co-integrating coefficients (standard error in parentheses)

LRMGDP	LMFDI	CUR	LIMPORTS	REXR	INF
1.000000	0.000000	0.000000	0.000000	0.002272	0.022323
				(0.01042)	(0.00397)
0.000000	1.000000	0.000000	0.000000	0.044952	0.290320
				(0.09207)	(0.03506)
0.000000	0.000000	1.000000	0.000000	-1.676051	0.179107
				(0.32625)	(0.12422)
0.000000	0.000000	0.000000	1.000000	-0.045349	0.155914
				(0.04801)	(0.01828)

Adjustment coefficients (standard error in parentheses)

D(LRMGDP)	-0.528397	-0.655857	-0.024141	1.281297
	(0.92598)	(0.19113)	(0.03009)	(0.33487)
D(LMFDI)	-0.088734	0.077911	-0.003843	-0.156580
	(1.02925)	(0.21244)	(0.03345)	(0.37221)
D(CUR)	-11.38705	-0.530733	-0.730405	1.465442
	(7.09842)	(1.46515)	(0.23068)	(2.56704)
D(LIMPORTS)	-0.291894	0.483601	0.001066	-0.849268
	(0.67568)	(0.13946)	(0.02196)	(0.24435)
D(REXR)	-2.484365	-6.062229	-0.153260	11.17389

	(11.1935)	(2.31039)	(0.36376)	(4.04796)
D(INF)	-22.59394	18.62438	0.115149	-37.72814
	(9.06935)	(1.87196)	(0.29473)	(3.27980)

5 Co-integrating Equation(s): Log likelihood -78.57753

Normalized co-integrating coefficients (standard error in parentheses)

LRMGDP	LMFDI	CUR	LIMPORTS	REXR	INF
1.000000	0.000000	0.000000	0.000000	0.000000	0.020823
					(0.00281)
0.000000	1.000000	0.000000	0.000000	0.000000	0.260630
					(0.02306)
0.000000	0.000000	1.000000	0.000000	0.000000	1.286100
					(0.12599)
0.000000	0.000000	0.000000	1.000000	0.000000	0.185866
					(0.01556)
0.000000	0.000000	0.000000	0.000000	1.000000	0.660477
					(0.06421)

Adjustment coefficients (standard error in parentheses)

D(LRMGDP)	-0.444906	-0.614154	-0.023453	1.249804	-0.058984
	(0.97365)	(0.24492)	(0.03013)	(0.35365)	(0.07332)
D(LMFDI)	-0.739711	-0.247246	-0.009212	0.088973	0.099949
	(0.94564)	(0.23787)	(0.02926)	(0.34348)	(0.07121)
D(CUR)	-14.23369	-1.952602	-0.753883	2.539211	1.471423
	(7.11163)	(1.78892)	(0.22004)	(2.58310)	(0.53554)
D(LIMPORTS)	-0.654535	0.302465	-0.001925	-0.712477	0.104098
	(0.64768)	(0.16292)	(0.02004)	(0.23525)	(0.04877)
D(REXR)	0.977840	-4.332888	-0.124706	9.867919	-0.969998
	(11.4545)	(2.88137)	(0.35442)	(4.16053)	(0.86258)
D(INF)	-22.12786	18.85719	0.118993	-37.90395	2.244304
	(9.55195)	(2.40277)	(0.29555)	(3.46947)	(0.71930)

******* *Statistically significant at 1 percent level of significance; **statistically significant at 5 percent level of significance; *statistically significant at 10 percent level of significance.*

Source: Authors' computation with E-views 7.2 (2018)

Table A2: Granger Causality Test Result

Pairwise Granger Causality Tests
Date: 03/28/18 Time: 00:30
Sample: 1990 2014
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LMFDI does not Granger Cause LRMGDP	23	1.35322	0.2835
LRMGDP does not Granger Cause LMFDI		0.13433	0.8752
CUR does not Granger Cause LRMGDP	23	0.28170	0.7578
LRMGDP does not Granger Cause CUR**		3.68482	0.0456
LIMPORTS does not Granger Cause LRMGDP*	23	2.67267	0.0963

LRMGDP does not Granger Cause LIMPORTS		0.06292	0.9392
REXR does not Granger Cause LRMGDP	23	0.08741	0.9167
LRMGDP does not Granger Cause REXR		0.01500	0.9851
INF does not Granger Cause LRMGDP	23	2.41717	0.1175
LRMGDP does not Granger Cause INF		0.21493	0.8086
CUR does not Granger Cause LMFDI*	23	2.65652	0.0975
LMFDI does not Granger Cause CUR		1.49977	0.2498
LIMPORTS does not Granger Cause LMFDI	23	0.04352	0.9575
LMFDI does not Granger Cause LIMPORTS		2.31192	0.1277
REXR does not Granger Cause LMFDI	23	0.25292	0.7792
LMFDI does not Granger Cause REXR		2.52374	0.1081
INF does not Granger Cause LMFDI	23	0.49941	0.6151
LMFDI does not Granger Cause INF**		4.44654	0.0270
LIMPORTS does not Granger Cause CUR*	23	3.05112	0.0723
CUR does not Granger Cause LIMPORTS		0.96909	0.3984
REXR does not Granger Cause CUR***	23	6.70227	0.0067
CUR does not Granger Cause REXR		0.46154	0.6376
INF does not Granger Cause CUR	23	1.66742	0.2166
CUR does not Granger Cause INF		1.05519	0.3687
REXR does not Granger Cause LIMPORTS	23	0.20233	0.8187
LIMPORTS does not Granger Cause REXR**		3.81445	0.0416
INF does not Granger Cause LIMPORTS	23	0.27749	0.7609
LIMPORTS does not Granger Cause INF***		8.94792	0.0020
INF does not Granger Cause REXR	23	0.97473	0.3963
REXR does not Granger Cause INF		1.24718	0.3110

******* Statistically significant at 1 percent level of significance

**statistically significant at 5 percent level of significance

*statistically significant at 10 percent level of significance

Source: Authors' computation with E-views 7.2 (2018)