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Evaluating the Influence of Foreign Exchange Policy Regime on the Construction Sector in Nigeria

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Abstract

In developing economies, foreign exchange policy regime (FEPR) play a critical role in the viability of all sectors of the economy. In Nigeria, the economy is dependent on foreign inputs from contracting services, technology, materials, expatriates, etc. Therefore, this study investigated the impact of FEPR on the performance of the construction sector in Nigeria. To achieve this goal, time series data was extracted from United Nations Statistics Division (UNSD) on the construction sector, gross domestic product (GDP) and FEPR for 50 years spanning from 1970 to 2019. The study uses econometric approach including tests of stationarity and co-integration as well as the generalized method of moment (GMM) to model the relationships between the variables. The study reveals that the 1986 FEPR reform had significant and negative effect on the construction sector output in Nigeria. This implies that the performance of the construction sector is affected by the state of the economy and government policy. This study proves that the foreign exchange policy regime does not significantly influence the construction industry during the period of review. It also ascertained that the development of the construction sector depends more on previous construction outputs and only altered due to oil export shock. Hence, this study recommends that sustainable construction development strategies should be implemented to eliminate construction sector challenges and reduce the effect of foreign exchange rate volatility on the construction sector. Finally, monetary and fiscal policies that can engender sustainable growth and development of the construction sector should be implemented.

Keywords: Construction sector, econometric method, economy, foreign exchange policy regime, Nigeria

1.0 INTRODUCTION

Foreign exchange policy influences economic development which in turn affect the output growth of developing nations (Levy-Yeyati, 2019). Nigeria is a fast growing emerging economy, the largest economy and population in Africa with a gross domestic product (GDP) of US$514,076 million in 2020Q3; a population of 206,139.59 million in 2020 and a GDP per capita of US$2,432 making Nigeria a lower middle income economy. Nigeria is a rich resource economy and operates a mixed economic system though the potentials remained largely underdeveloped with very weak institutions and infrastructure. Thus, Nigeria ranks 161 among 189 nations in terms of human development index (HDI) of 0.539 in 2020, the life expectancy at birth is 54.7 years and the gross national income (GNI) per capita is US$4910 (International Monetary Fund, 2021; Ita, 2020; UNDP, 2020). However, Nigeria requires an internationally competitive economy for sustainable foreign exchange earnings, capital formation and growth. In developing economies, one of the critical issues in sustainable long run growth is the foreign exchange policy regime (FEPR). The FEPR has effect on international competitiveness, net exports, international capital flows (ICFs), balance of payments (BoPs), capital formation, unemployment rate, inflation rate, and economic growth. However, inappropriate FEPR often leads to financial and economic crises which has been the major challenge of many developing economies since the great depression of the 1930s (Amadeo, 2020; Obi et al., 2016; Ramskogler, 2015).

Through international trade and investment, any country is able to expand its economies and improve the living standard of their citizens. Also, the importance of foreign exchange market (FEM) in the overall economic performance of every nation and world economy has been the effect of rapid improvement in communication, transportation and trade barriers. Nevertheless, for an oil export driven and imports dependent economy like Nigeria, the demands for foreign exchange (FOREX) are most times higher than the supply. Nigeria's FEPR transformed from a regulated market before 1986 to a liberalized market following the adoption of structural adjustment programmes (SAPs) in 1986. The 1986 FEPR reforms were to facilitate macroeconomic stability and sustainable growth and, the monetary authorities have predominantly applied the managed float which allows for interventions regularly in the FEM to maintain a policy target. However, the FEPR in Nigeria faces a lot of challenges of policy, procedure, rule and regulation, depletion of the external reserves, misalignment, arbitrage and unfavourable BoPs position etc. Virtually, all past FEPRs have been associated with foreign exchange rate

(FER) misalignment, instability and uncertainty which were harmful to the economy (Anyanwu et al., 2017; NBS, 2020). The inconsistency of these interventions affects the stability of the FER and economic performance remained very unsatisfactory. Hence, Nigeria continues to experience macroeconomic challenges under inefficient FEPR (Bakare, 2011; Imoisi, 2015; Ismaila, 2016; Nwachukwu et al., 2016; Osadume, 2018). In addition, there is clear controversy on the choice of the optimal FEPR for a resourceful and imports dependent economy like Nigeria. To address these challenges, therefore, extant studies focused majorly on the effect of FEPR on the economy were scrutinised.

The economic development of a country is the causal effects of all the sectors of the economy. Additionally, the profitability of the tradable sectors of the economy is increased by the exchange rate and policy (Guzman et al., 2019). The construction sector is one of these sectors and it contributes significantly as well to the economic development globally. The construction sector in Nigeria is responsible for more than 10% of the gross domestic product (GDP). Since the inconsistencies in the FER has a far reaching effects on all sectors of the economy, there is tendency that the construction sector would be affected as well. Specifically, this raises question on what extent had past FEPR affected the construction sector and the GDP over the years. In other words, is there any significant impact of the FEPR on the construction sector. To assess how the policies on foreign exchange have affected the construction industry, few studies have explored the effect of foreign exchange on construction companies and organizations though the findings from these studies are contradicting (Aksuyek & Yilmaz, 2017; Ndamaiyu, 2015; Waitimu, 2018). The premise that the type and choice of foreign exchange policy differs from country to country (Ha & Hoang, 2020; Levy-Yeyati, 2019). However, In Nigeria, few studies conducted were limited in investigating only the effect of exchange rate fluctuations on construction material prices (Abina & Mogbeyiteren, 2021; Akinyemi et al., 2017; Ugochukwu et al., 2017). Hence, the need for this study to investigates the revenues of foreign exchange policy regime (FEPR), the outputs of construction sector through construction gross domestic product (GDP) and the impact of FEPR on construction sector moderated by economic growth under fixed and flexible FEPR. This assessment was intended to fill the gap in literature by ascertaining the impact of FEPR on the performance of the construction sector in Nigeria's economy.

2.0 LITERATURE REVIEW

2.1 Foreign Exchange Policy Regime (FEPR)

The foreign exchange policy regime is the particular arrangement adopted by the monetary authorities for the administration of the foreign exchange market (FEM) and the foreign exchange rate (FER). There are a number approaches available to the monetary authorities to manage the FER, these include fixed FER, floating or flexible FER, and some other hybrid systems. Stone et al. (2008) classify FEPR into hard peg, soft peg and floating system. The International Monetary Fund (2019) categorizes FEPR into hard pegs no separate legal tender and currency board, soft pegs conventional peg, pegged exchange rate within horizontal bands, stabilized arrangement, crawling peg and crawl–like arrangement etc., floating regimes floating & free floating and residual other managed arrangements. According to Sanusi (2004), the choice of a particular policy regime is a function of internal and external economic fundamental, and dynamism of external shocks on the economy. Recently, Ha and Hoang (2020) submitted that the type of exchange regime adopted differ from country to country depending on the demand and supply of related currencies. Few of the foreign exchange policy regime are reviewed in this study. In a system of pure fixed FEPR, market forces do not affect the FER and operates with a zero bound. Similarly, a fixed FEPR is a non-market base system whereby the monetary authorities exchange its currency for another currency convertibility at a predetermined FER. The fixed FEPR is determined by policy and defended by intervention and monetary policy. In a fixed FEPR, the FER is static but the forex reserve may fluctuate (Obadan, 2017). Many times, the central bank is forced to intervene in the FEM to save the currency from moving out of the fixed FER band. Another FEPR is pure floating which involves a system where market forces are given full power to determine the FER with infinite bound and without the intervention of the monetary authorities. There is hardly any government that adopt a pure fixed or floating policy regime in the world. This is because it is not ideal or necessary in a rapid changing and globalizing world economy and at some point, the monetary authorities may be forced to intervene. The merits of floating FER policy regime includes domestic monetary policy autonomy and automatic trade balance adjustments; mitigate against speculation and the retention of seigniorage and the capability of lender-of-last-resort etc while the demerits include high volatility; high inflation rate; transaction cost; speculation and uncertainty including large scale sudden jump which negatively affects trade, investment and growth, instability, no constraints on government policy and speculation (Calvo & Mishkin, 2003; Frankel, 2003; Levy-Yeyati, 2019).

In the case of hybrid systems or managed float system of FEPR, this type of policy regimes has elements of both the flexible/floating and fixed systems. Under this policy regime, the monetary authorities sometimes trade currencies to manage the FER but some other times the FER is subject to the forces of the market. This policy regime in adopted in most developing economies to maximize the merit of the two FEPR systems. In this approach, if authority observed misalignment in the FER, the system is switched to flexible FER system to determine the realistic FER. In other times when it is observed that the FER is falling out of speculation or adjustment and the adjustment is deleterious to the Balance of Payments (BoPs) target objective, the system is switched to the fixed FER policy system. The hybrid system includes the dirty float, wider band and crawling peg etc. (Eun & Resnick, 2001; Hayes, 2021). Similar to this FEPR is the managed float FEPR which is a combination of fixed and floating forex systems i.e the managed float policy regimes are hybrids of the floating and fixed FEPR. However, the difference is that the monetary authorities influence the FER directly through the demand and supply of the foreign currencies or indirectly through monetary policy regime on interest rates. Many monetary authorities around the world especially developing economies deploy some form of managed float policy regime to manage their respective FER (see Levy-Yeyati & Sturzenegger, 2005). Also, most world currencies are managed to some extent by the managed float FEPR. The International Monetary Fund (2019) classifies 46.4 percent of the 189 member countries as using managed float policy regime. This FEPR aimed to avoid the risk of large variation in the FER, disruption in international trade and payment, improving the BoT, reduce risk of deflationary recession and rebalance the economy, curb demand pull inflation, reduce the price of imported capital and technology for growth (Kantox, n.d.; tutor2u, 2021). Some of the merits of managed float include stronger and resilient monetary policy, protection of the domestic economy while the demerits include competitive devaluations of currency, as well as weaker financial systems, etc.

Under the currency boards system of FEPR, the monetary authorities can only issue domestic currency at fixed FER only if it has at least 100% backing of FOREX reserves. The currency board system impose restriction on the issuance of domestic currency and the interest rate adjust itself. One of the merits of currency boards is that to manage inflation, the prices of domestic tradable goods are tied to the anchor country thus making inflation expectation to be the same or close to that of the anchor country. However, currency board system is disadvantageous by the loss of flexibility in monetary policy; loss of seigniorage; the central bank can no longer be lender of last resort; and the exposure to external and internal real shocks (Mishkin & Savastano, 2001; Ozyildirim & Muslumov, 2003). In the pegged system of FEPR, a small nation fixed its FER to that of a bigger nation like USA, UK, etc. such that the currency rise and fall in unison in the FEM. Through the instrumentality of the pegged system, small nations are forced to improve their monetary policy discipline. However, it is almost impossible to succeed if the small nation suffers significant capital flights and speculative attacks. The FER may be pegged to a fixed par-value to a single foreign currency, single currency peg or a basket of currencies. The composite basket is normally created from the currencies of leading trading partners (Ghosh et al., 2002).

2.2 State of the Nigerian Construction Sector in FEPR

Formally, the construction sector in Nigeria started with the colonial government in the nineteenth century with the construction of basic social and economic infrastructure. The sector grew rapidly in the 1970s due to massive re-construction programme following the Nigerian civil war 1967-70, second National development plan and enhanced revenue from oil export. However, the decline in the fortunes of the sector in the 1980s was due to the collapse of the international commodity market and world economic depression. This reflects the overdependence on oil exports for revenue and FOREX earnings. The economic crisis was further compounded with the introduction of structural adjustment programmes (SAPs) in 1986 which introduced more public expenditure cuts and a painful devaluation of the Naira. This public expenditure cut for construction development resulted in heavy debt owed by construction contractors. Construction activities by private companies were curtailed by unfriendly fiscal, monetary and foreign exchange policy regime (FEPR). Thus, the construction sector went into comatose with more than two third of its labour force disengaged and a significant number of clients and contractors went into liquidation. The crisis of the sector continues through the 1990s with lots of pre-democracy upheavals until 1999 when Nigeria became a democracy.

The democratic government introduced open and transparent project procurement system for public project administration, set up the Federal Roads Maintenance Agency (FERMA) to improve the quality of highways, established the Infrastructure Concession Regulatory Commission (ICRC) to regulate the growing trend of private participation in public infrastructure development and launched the national housing policy and programme for mass housing (Corporate Digest, 2021; Oghifo, 2009). However, due to the economic crisis and irregularities in the foreign exchange policy, the construction sector was faced with numerous challenges which include the unstable demand for construction products, large and growing informal subsector, low and declining GDP contribution, the misallocation and wastage of resources leading to delays, cost/time overrun and abandonment. Moreover, due to overdependence on the oil sector and the dominance of the public sector, the construction sector experienced growing overdependence on foreign manpower and materials, technology and contractors; unfavourable investment climate; weak local content; weak financial management and financial system; low research and development (Alintah-Abel & Nnadi, 2015; Boadu et al., 2020; Iheme & Chiagorom, 2018; Ugochukwu & Onyekwena, 2014).

3.0 ECONOMETRIC METHODS

This study examined the relationship between FEPR and the outputs of the construction sector in Nigeria through the econometric methodology in analyzing time series data. Time series data is described as a data observed over a period of time either at fixed interval (discrete) or continuously at some interval (Brockwell & Davis, 2002). The time series data for this study were extracted from the United Nations Statistics Division (UNSD) database on construction sector, the gross domestic product (GDP) and nominal exchange rate (NER) etc, for 50 years spanning from 1970 through 2019. The data extracted is part of national statistics and annualized. The econometric procedure used in this study involves the tests of stationarity and co-integration as well as generalized method of moments (GMM) for modelling the relationships among the time series data. Firstly, the test of stationarity was conducted because the stationarity of a time series data has significant effects on its properties, application, behaviours and forecasting. If the time series data is non-stationary, the modelling could lead to spurious result and as such, testing for stationarity and co-integration analysis are very important (Li & Chau, 2016; Vijay, 2021). However, it is necessary to undertake unit root tests before the co-integration analysis (Arltová & Fedorová, 2016; Liao et al., 2022) and the formal method to test the stationarity of the series is the unit root test. To test the time series data using unit root, Augmented Dickey Fuller (ADF) test, Philips-Perron (PP) tests, etc can be applied though this current study adopted the ADF. Secondly, the co-integration test was conducted on the time series data obtained and to test for the co-integration, regression estimates was used though it could be spurious (Mills, 2017). Co-integration test is used to test the validity of long run relationships among time series data and the 2 procedures postulated decades ago for testing co-integration are Engle-Granger test, Johansen test and Philips–Ouliaris test (Engle & Granger, 1987). In this case, this current study adopted the Johansen test to assess the long run relationships between non-stationary time series data. This test has generated significant interest with its suggestion and adoption by previous studies (Li & Chau, 2016; Mazzi et al., 2016). In contract to the assertion by Eloriaga (2020) that Soren Johansen methodology is the most widely used test for co-integration, Shan et al. (2021) used the Waterlund co-integration test to establish the interaction among carbon emissions and fiscal decentralization in

Organisation for Economic Co-operation and Development (OECD) nations. In recent times, the second generation co-integration methods have been suggested over the traditional stationary tests since they have the tendency to produce unambiguous results and adequately estimate cross-sectional data sets (Khan et al., 2021; Li et al., 2021).

In modelling time series data, there are number of approaches to statistical or econometric modelling ranging from parametric to semiparametric and of course the non-parametric models. However, a growing number of studies on FEPR used the generalized method of moments (GMM) modelling approach for empirical estimation (Akpan & Atan, 2011; Barguellil et al., 2018; Obi et al., 2016). The GMM is the most important semiparametric modelling that is built on general or simple assumptions about the characteristics of the population than the classical likelihood based framework. The GMM essentially combines information on economic data and population moment conditions to estimate unknown parameters, from which inference can then be drawn (Zsohar, 2012). The GMM has been most successfully used to model financial time series (Barguellil et al., 2018; Hall, 2010). Following this trend, this study adopted the GMM to estimate and model the relationships between foreign exchange policy regime (FEPR) and the construction sector with the control of the economic growth variables such gross domestic product (GDP), nominal exchange rate (NER), etc. Besides, the GMM technique was chosen for this study due to the fact that it is a generalized technique capable of producing coefficients that are unbiased estimators and unbiased result. These coefficient estimates are consistent, asymptotic normality and asymptotic efficiency (Akpan & Atan, 2011; Obi et al., 2016).

For the GMM estimation procedure, ten models were developed to explain the influence of foreign exchange policy regime on the performance of the construction sector. Model 2 shows the direct effect of FEPR on the construction sector while the other models were specified to estimate the controlled effect of other economic parameters on the impact of FEPR on construction sector. In explaining the models, the analysis of variance is adopted as a special regression analysis of the dependent and independent variables. Analysis of variance is basically used for ascertaining the difference in means of samples (Asamaoh & Offei-Nyako, 2013) and relationships in modelling (Zhu et al., 2022). For the time series data obtained for this study, the analysis of variance (ANOVA) and analysis of covariance (ANCOVA) was used for the regression estimations. In the case where the variables are qualitative, the ANOVA was used while the ANCOVA was used where the variables are qualitative and quantitative. The models specified include:

Model 1 GMM-ANOVA: $LNER_t = \alpha + \beta DFEPR_t + \varepsilon_t$

Model 2 GMM-ANOVA: $LCNS_t = \alpha + \beta DFEPR_t + \varepsilon_t$

Model 3 GMM-ANOVA: $CNSGR_t = \alpha + \beta DFEPR_t + \varepsilon_t$

Model 4 GMM-ANOVA: $LCGFCF_t = \alpha + \beta DFEPR_t + \varepsilon_t$

Model 5 GMM-ANOVA: $LCGDP_t = \alpha + \beta DFEPR_t + \varepsilon_t$

Model 6 GMM-ANCOVA : $LCNS_t = \alpha + \beta DFEPR_t + \delta LCNS_{t-1} + \varepsilon_t$

Model 7 GMM-ANCOVA: $LCNS_t = \alpha + \beta DFEPR_t + \delta LNER_{t-1} + \varepsilon_t$

Model 8 GMM-ANCOVA with an AR term: $LCNS_t = \alpha + \beta DFEPR_t + \delta LCNS_{t-1} + \varphi LNER_t + \varepsilon_t$

Model 9 ARDL with a AR term: $LCNS_t = \alpha + \beta DFEPR_t + \delta_i \sum_{i=1}^{2} LCNS_{t-i} + \varphi_j \sum_{j=1}^{2} LNER_{t-j} + \varepsilon_t$

Model 10 ARDL with an AR term**:**

$$LCNS_t = \alpha + \beta DFEPR_t + \delta_i \sum_{i=1}^{2} LCNS_{t-i} + \varphi_j \sum_{j=1}^{2} LNER_{t-j} + \gamma_k \sum_{k=1}^{2} LGDP_{t-k} + \lambda_l \sum_{l=1}^{2} LPCGDP_{t-l} + \varepsilon_t$$

First, the analysis of variance (ANOVA) in Models 1 to 5 describes the regression model with exclusively or only one qualitative or dummy variable regressor. Here, the dummy variables operationalized include the nominal exchange rate (NER), construction sector output (CNS), construction sector growth rate (CNSGR), construction sector to the gross fixed capital formation (CGFCF) which is the ratio of the CNS to the gross fixed capital formation (GFCF and the construction to the gross domestic product (CGDP) which is ratio of the CNS to the GDP. Secondly, the analysis of covariance (ANCOVA) for Models 6 to 8 describes the regression model with both quantitative and qualitative variables or regressors. In this case, the lagged CNS and NER (LCNS and LNER) were operationalised as regressors on the current CNS. The ANCOVA is an extension of ANOVA with the addition of quantitative or covariate. Lastly, the autoregressive distributed lags (ARDL) in Models 9 and 10 specifies a regression model with lags of the regressors (explanatory variables) and lags of the regressand (dependent variable). Here, the regression was slightly different from models 6 to 8 by operationalizing the regressors for the foreign exchange policy regime (FEPR) of more than one year. Aside model 2, all the other nine models were specified to control the effect of FEPR on the current CNS through the lagged CNS and the economy. The premise that the construction industry is being driven by the economy.

4.0 RESULTS OF EMPIRICAL ESTIMATION

4.1 Descriptive Statistics

The study estimated the relationships between the FEPR and the construction sector growth based on generalized method of moments (GMM). The FEPR in Nigeria have undergone fundamental transformation since 1959 establishment of the Central Bank of Nigeria (CBN). The FEPR in Nigeria indicates three distinct periods which include fixed system (1960s), Pegged FEPR (1970-1986) and the flexible and managed float FEPR (1987-2019) which was actually adopted on the 26th of September 1986. Hence, the result of the descriptive statistics of the time series data presented in Table 1 shows the mean values of GDP, construction sector, PCGP and nominal exchange rate (NER) as 2.28E+11, 6.59E+09, 189.104 and 73.573 respectively. Also, their standard deviations are 1.34E+11, 4.93E+09, 425.580 and 90.623 respectively. This implies that the GDP is the largest while NER is the smallest.

Table 1 Descriptive statistics for construction sector (CNS), GDP, PCGDP and NER

	GDP	**CNS**	PCGDP	NER
Mean	**2.28E+11**	**6.59E+09**	1898.104	73.57300
Median	**1.60E+11**	**4.49E+09**	1836.176	21.89000
Maximum	**5.11E+11**	**1.80E+10**	2731.227	306.9200
Minimum	**8.7E+10**	**2.26E+09**	1410.724	0.550000
Standard Deviation	**1.34E+11**	**4.93E+09**	425.5801	90.62293
Skewness	**1.029194**	**1.381977**	0.565974	1.124053
Kurtosis	**2.539949**	**3.444603**	2,007075	3.394815
Jarque-Bera	**9.267935**	**16.32732**	4.723349	10.85388
Probability	**0.009716**	**0.000285**	0.094262	0.004397
Sum	**1.14E+13**	**3.29E+11**	94905.19	3678.650
Sum of Squared Deviation	**8.79E+23**	**1.19E+21**	8874802	402413.2
Observation	**50**	**50**	50	50

The line graph of the time series data is captured in Figure 1.

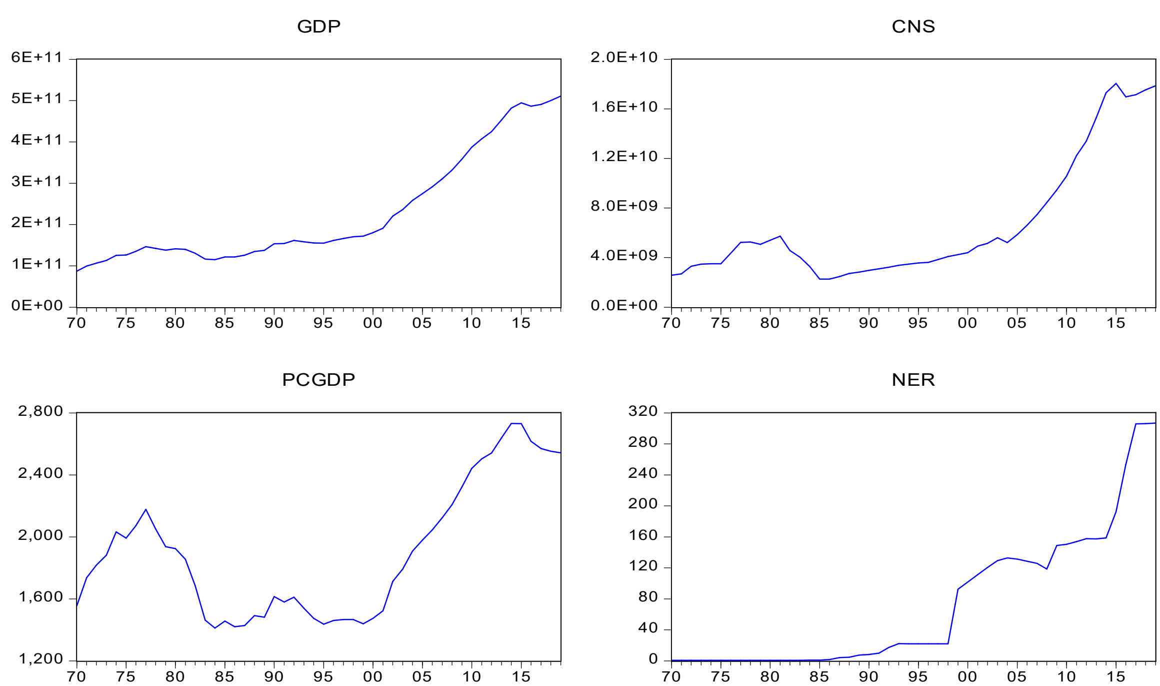

Figure 1 Line graph for construction sector (CNS), GDP, AMANER and IMFNER

4.2 Test for Stationarity

Based on the test for stationarity, Table 2 showed the 4 time series data i.e. CNS, GDP, PCGDP and NER which are all I(1) series. This implies that they are different stationary time series after logarithmic transformation.

Table 2 Stationarity test for construction sector (CNS), GDP, NER and PCGDP

	Adf test at level		**Adf test at 1st diff**		**Pp test at level**		**Pp test 1st diff**		**Concl.**
	No trend	With trend	No trend	With trend	No trend	With trend	No trend	With trend	
LNER	0.9462	0.8014	0.0000	0.0002	0.9581	0.6825	0.0000	0.0002	I(1)
LCNS	0.9526	0.8170	0.0006	0.1809	0.9795	0.8991	0.0006	0.0184	I(1)
LGDP	0.9946	0.8045	0.0137	0.0043	0.9997	0.8734	0.0009	0.0049	I(1)
LPCGDP	0.8311	0.8053	0.0019	0.0074	0.8168	0.8892	0.0023	0.0083	I(1)

4.3 Test for Co-integration

Testing for cointegration is important to avoid spurious regression. The estimate of the Johansen cointegration test for the series (DFERP, LCNS, LNER, LGDP and LPCGGDP) for both Trace and Max-eigenvalue tests at 0.05 level (Adeleke et al., 2017; Ssekuma, 2011). The result on Table 3 shows a significant cointegration among the series with trace statistics = 77.53324, 0.005 critical value = 69.81889 and p-value = 0.0106. Also, the Max-eigenvalue test result shows that Max-eigen statistic = +37.74874, 0.05 critical value = 33.87687 and p-value = 0.0164. The indicates and suggests a long run contemporaneous relationships among the series. Additionally, the estimate indicates one co-integration equation.

Table 3 Cointegration among DFEPR LCNS LNER LGDP LPCGDP

Hypothesized No. of CEs	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.544533	77.53324	69.81889	0.0106	37.74874	33.87687	0.0164
At most 1	0.288813	39.78450	47.85613	0.2303	16.35936	27.58434	0.6351
At most 2	0.260351	23.42514	29.79707	0.2258	14.47579	21.13162	0.3273
At most 3	0.130496	8.949346	15.49471	0.3701	6.711938	14.26460	0.5237
At most 4	0.045543	2.237408	3.841466	0.1347	2.237408	3.841466	0.1347

*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.4 Test for Lag Selection

Before modelling relationship in a VAR context, it is important to determine the optimum lags of the independent variables in the expected model. The estimate of the VAR lag selection test indicates that three (3) criteria including likelihood ratio (LR), final prediction error (FPE), and Akaike information criterion (AIC) select 2 lags. Whereas, the remaining 2 including Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) return one lag. This study therefore adopted the most frequent two lags among the criteria for the subsequent model estimation (see Table 4).

Table 4 VAR lag order selection criteria endogenous variables

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2921.391	NA	1.02e+48	121.8913	122.0472	121.9502
1	-2591.226	591.5455	2.10e+42	108.8011	109.5807*	109.0957*
2	-2571.168	32.59342*	1.80e+42*	108.6320*	110.0354	109.1624

*indicates lag order selected by the criterion

4.5 Estimates for the Models

The models developed from the system estimation using generalized method of moment (GMM) are shown in Tables 5.
In model 1,

$$LNER_t = \alpha + \beta DFEPR_t + \varepsilon_t$$

The estimates of GMM based-ANOVA model indicates that the FEPR of 1986 had significant effect on the NER t= 3.322556; & p=0.0017. the model is low with R2 of 31.14 percent which implies only 31 percent of the NER is explained by the model. Additionally, the J-statistic is low = 4.048824; with Prob J-statistic of 0.044202.

In the Model 2,

$$LCNS_t = \alpha + \beta DFEPR_t + \varepsilon_t$$

The GMM-ANOVA model estimates the relationships between the FEPR and the CNS. The estimate indicates an insignificant effect of the FEPR on the CNS t=1.180533; p=0.2436. The model fit is very low with R^2 of 15.53 percent which implies that only 15.53% of the CNS can be described by the model. Additionally, the J-statistic is high = 48.00000; with Prob J-statistic of 0.00000.

For model 3,

$$CNSGR_t = \alpha + \beta DFEPR_t + \varepsilon_t$$

The GMM based-ANOVA model estimate indicates that the FEPR has no significant effect on the CNSGR t=1.083061; p=0.2843. This clearly shows that the effect of NER policy may be significant but not robust on the LCNS. The model fit abysmally low at R^2 of 8.56 percent. this implies that the estimate may not be valid. Additionally, the J-statistic is 0.141426 with a Prob J-statistic of 0.706868 which indicates that the model is not valid or cannot be accepted.

In model 4,

$$LCGFCF_t = \alpha + \beta DFEPR_t + \varepsilon_t$$

The GMM based-ANOVA model estimate indicates that the FEPR of 1986 significantly affected the CGFCF t=3.046037; p-value=0.0038. The model fit is low with R^2 of 29.35 percent. thus the model is able to describe 29.35 percent of the CGFCF. In addition, The J-statistic is 4.639198 and prob J-statistic = 0.031250.

In model 5,

$$LCGDP_t = \alpha + \beta DFEPR_t + \varepsilon_t$$

The estimates of the GMM-ANOVA model indicate that the FEPR of 1986 significantly impacted on the CGDP -3.132081; p-value=0.0030. The model fit is abysmally low with R2 = 11.13 percent which implies that only 11.13% of the CGDP can be explained by the model. Furthermore, the J-statistic is 6.635823 with associated Prob J-statistic of 0.009995. The sum total deduction from Models 1 through 5 implied that though FEPR may be significant, the models are all weak with a respective R^2 ranging from 8.56 percent to 31.14 percent.

Model 6,

$$LCNS_t = \alpha + \beta DFEPR_t + \delta LCNS_{t-1} + \varepsilon_t$$

This shows the estimate of the GMM-ANCOVA model indicates that the lagged LCNS is significant on the current LCNS t=30.43145; p value=0.0000 whereas the FEPR is not significant on the current LCNS. The model fit is excellent with R^2 of 98.53 percent, and J-statistic=5.502047; Prob J-statistic = 0.018994. Almost 100 percent of the dependent LCNS -1 variable can be described by the model.

In model 7,

$$LCNS_t = \alpha + \beta DFEPR_t + \delta LNER_{t-1} + \varepsilon_t$$

The GMM-ANCOVA with NER estimate indicates that the NER and FEPR are significant on the current LCNS t=14.27992; p-value=0.0000 and t=-2.479215; p-value=0.0168 respectively. The model fit is excellent with R^2 of 79.81 percent, and J- statistic= 3.968913; Prob J-statistic = 0.046348.

Model 8,

$$LCNS_t = \alpha + \beta DFEPR_t + \delta LCNS_{t-1} + \varphi LNER_t + \varepsilon_t$$

This model shows the estimate of the ANCOVA model with an AR term and indicates that only the lagged LCNS was significant t=18.00866; p-value=0.0000. The model fit is excellent with R^2 of 98.5 percent and J-statistic=5.812485; Prob J-statistic=0.015913. The model fit indicates that almost 100 percent of the dependent variable can be described by the model.

In model 9,

$$LCNS_t = \alpha + \beta DFEPR_t + \delta_i \sum_i LCNS_{t-i} + \varphi_i \sum_i LNER_{t-i} + \varepsilon_t$$

The estimate of the GMM-ARDL model with a dummy indicates that only the lags of the LCNS are significant on the current LCNS. The LCNS -1 is positive and significant t=13.70336; p-value=0.0000 whereas the LCNS -2 is negative and significant t=-5.166234; p-value=0.0000. The FEPR and the lags of the NER are not significant. The model fit is excellent with R^2 of 99.05 percent and J-statistic=6.728805; Prob J-statistic= 0.009487. Almost 100 percent of the dependent variable can be described by the model.

For model 10,

$$LCNS_t = \alpha + \beta DFEPR_t + \delta_i \sum LCNS_{t-i} + \varphi_i \sum LNER_{t-i} + \gamma_k \sum LGDP_{t-k} + \lambda_l \sum LPCGDP_{t-l} + \varepsilon_t$$

An expanded model 9 with two year lags of the variables including the GDP and PCGDP also confirms that only the one year lagged LCNS is significant on the current LCNS t=6.845832; p-value=0.0000, all other variables are not significant. The model fit is excellent with R^2 of 99.48 percent and J-statistic=8.035899; and Prob J-statistic=0.004586. The model fit indicates that almost 100 percent of the dependent variable is describable by the model.

Table 5 Estimates of models 1 to 10

Models	Variable	Coefficient	Std. Error	t-Statistic	Prob.
MODEL 1: GMM ANOVA MODEL					
Dependent Variable: LNER	C	0.716777	0.080012	8.958404	0.0000
Method: Generalized Method of Moments	DFEPR	91.82118	27.63571	3.322556	0.0017
	R-squared	0.311355	J-statistic		4.048824
	Adjusted R-squared	0.297008	Prob J-statistic		0.044202
MODEL 2: ANOVA MODEL					
Dependent Variable: LCNS	C	3.91E+09	1.11E+09	3.523917	0.0009
Method: Generalized Method of Moments	DFEPR	4.06E+09	1.37E+09	2.970374	0.0046
	R-squared	0.155273	J-statistic		48.00000
	Adjusted R-squared	0.137675	Prob J-statistic		0.000000
MODEL 3: ANOVA MODEL					
Dependent Variable: CNSGR	C	0.581468	5.247323	0.110812	0.9122
Method: Generalized Method of Moments	DFEPR	5.747318	5.306552	1.083061	0.2843
	R-squared	0.085618	J-statistic		0.141426
	Adjusted R-squared	0.066163	Prob J-statistic		0.706868
MODEL 4: ANOVA MODEL					
Dependent Variable: LCGFCF	C	-2.856485	0.034775	-82.14161	0.0000
Method: Generalized Method of Moments	DFEPR	0.520595	0.170909	3.046037	0.0038
	R-squared	0.293475	J-statistic		4.639198
	Adjusted R-squared	0.278755	Prob J-statistic		0.031250
MODEL 5: ANOVA MODEL					
Dependent Variable: LCGDP	C	-3.434087	0.075391	-45.55005	0.0000
Method: Generalized Method of Moments	DFEPR	-0.284635	0.090877	-3.132081	0.0030
	R-squared	0.111335	J-statistic		6.635823
	Adjusted R-squared	0.092821	Prob J-statistic		0.009995
MODEL 6: GMM-ANCOVA MODEL					
Dependent Variable: LCNS	C	-1.08E+08	2.51E+08	-0.428868	0.6700
Method: Generalized Method of Moments	DFEPR	2.14E+08	2.23E+08	0.959228	0.3425
	LCNS-1	1.040029	0.034176	30.43145	0.0000
	R-squared	0.985351	J-statistic		5.502047
	Adjusted R-squared	0.984714	Prob J-statistic		0.018994
MODEL 7: GMM-ANCOVA MODEL					
Dependent Variable: LCNS	C	3.86E+09	4.57E+08	8.444322	0.0000
Method: Generalized Method of Moments	DFEPR	-1.74E+09	7.01E+08	-2.479215	0.0168
	LNER	48554074	3400164.	14.27992	0.0000
	R-squared	0.798102	J-statistic		3.968913
	Adjusted R-squared	0.789510	Prob J-statistic		0.046348
MODEL 8: GMM-ANCOVA with AR term					
Dependent Variable: LCNS	C	-35954551	2.99E+08	-0.120370	0.9047
Method: Generalized Method of Moments	DFEPR	1.23E+08	2.68E+08	0.459756	0.6479
	LCNS-1	1.024136	0.056869	18.00866	0.0000
	LNER	1348235.	2577518.	0.523075	0.6035
	R-squared	0.985010	J-statistic		5.812485
	Adjusted R-squared	0.984011	Prob J-statistic		0.015913

Table 5 Estimates of models 1 to 10 (cont'd)

MODEL 9: GMM-ARDL with a Dummy					
Dependent Variable: LCNS	C	2.46E+08	2.05E+08	1.200419	0.2369
Method: Generalized Method of Moments	DFEPR	-66459237	1.64E+08	-0.405071	0.6875
	LCNS-1	1.551115	0.113192	13.70336	0.0000
	LCNS-2	-0.598273	0.115805	-5.166234	0.0000
	LNER	-705357.8	6533846.	-0.107954	0.9146
	LNER-1	671348.2	5977025.	0.112321	0.9111
	LNER-2	3989708.	3248280.	1.228252	0.2264
	R-squared	0.990471	J-statistic		6.728805
	Adjusted R-squared	0.989077	Prob J-statistic		0.009487
MODEL 10: GMM-ARDL with a Dummy					
Dependent Variable: LCNS	C	-1.69E+09	9.38E+08	-1.804363	0.0798
Method: Generalized Method of Moments	DFEPR	1.78E+08	3.55E+08	0.503290	0.6179
	LCNS-1	0.985109	0.143899	6.845832	0.0000
	LCNS-2	-0.090031	0.184028	-0.489225	0.6277
	LNER	-6395982.	6632665.	-0.964316	0.3415
	LNER-1	1766369.	5216732.	0.338597	0.7369
	LNER-2	698022.4	2763444.	0.252592	0.8021
	LGDP	0.049284	0.039278	1.254749	0.2179
	LGDP-1	-0.074735	0.063211	-1.182321	0.2450
	LGDP-2	0.030778	0.025509	1.206557	0.2357
	LPCGDP	-1796602.	3646048.	-0.492753	0.6253
	LPCGDP-1	5413080.	5899624.	0.917530	0.3651
	LPCGDP-2	-2831487.	2682772.	-1.055433	0.2985
	R-squared	0.994808	J-statistic		8.035899
	Adjusted R-squared	0.993027	Prob J-statistic		0.004586

5.0 DISCUSSION OF RESULTS

The finding in this study depicts that foreign exchange policy regime (FEPR) significantly affected the outputs of construction sector (CNS), construction gross fixed capital formation (CGFCF) and construction gross domestic product (CGDP) but had no significant effect on the construction growth rate (CNSGR) (see models 2 to 5). Similarly, the indices of other sectors such as banking, pension and the Nigerian economy are being affected by the foreign exchange exposure (Adebiyi & Abeng, 2019). The summary of the estimates for generalized method of moments analysis of variance (GMM-ANOVA) models 1 to 5 indicate abysmally low model fit R2 and J-statistics. The R2 were between 8.56% and 31.14% which invariably implies that the models cannot be valid assessment of the relationships. However, the addition of the lags of CNS, nominal exchange rate (NER), gross domestic product (GDP) and per capital GDP (PCGDP) improved the models fit significantly with R2 overshooting 99%. The models 6 to 10 are variants of the analysis of covariance (ANCOVA) and autoregression distributed lag (ARDL) based on GMM and the summary of the result indicates that FEPR is only negative and significant in model 7. This is a confirmation that the FEPR has no significant effects on the construction sector during the period under review. This is largely due to the premise that foreign exchange, exchange rate and the construction sector are in isolation. This finding of insignificant effect of FEPR on the construction sector is supported in the body of literature (see Adeniran et al., 2014; Fapetu & Oloyede, 2014; Okechukwu, 2017). However, Aksuyek and Yilmaz (2017) submitted that in recent times, the extreme change in foreign exchange rate have substantially affected construction organizations in their operations. Most of the models indicate that the FEPR has a positive relationship with the LCNS (model 6, 8 and 10). This agrees with a growing number of studies that finds a positive effect of floating FEPR on economic growth (Obi et al., 2016; Oleka & Okolie, 2016). However, model 7 indicate negative effect of FEPR on the construction sector outputs which is supported in the extant literature that floating FEPR negatively and significantly affect private domestic investment and growth (Bakare, 2011; Ezenwakwelu et al., 2019; Ufoeze et al., 2018).

The FEPR of 1986 introduced flexible FEPR in the Nigerian FEM. The first major effect was a free fall of the Nigerian naira (NGN) which led to a significant decline of the Nigerian import dependent construction sector. The model 7 estimate indicates that FEPR is negative and significant. This may not be unconnected to at least three important factors based on the great recession of 1981 through 1984 which are the high foreign content of the CNS, the free fall of the NGN following the 1986 FEPR and the intermittent boom and burst of the international oil market leading to recessions in 1993, 1994, 1995 and 2016. According to the law of demand and supply, when the value of naira falls against the US dollar, imports generally becomes more expensive which adversely affects the import dependent Nigerian construction sector. Thus, the natural relationships between construction and 1986 FEPR that introduced limited flexible/floating FOREX system is negative inverse. The continuous fall of the NGN since the 1986's FEPR has put the import dependent construction equipment and materials cost on the continuous upward trend thereby lowering construction demand (Anyanwu et al., 1997). Ilina et al.

(2017) stated similar challenges in the Russian construction industry as a result of devaluation of the national currency and suggested import substitution as the possible way forward.

6.0 CONCLUSION AND POLICY RECOMMENDATIONS

The study contributes to literature by investigating the impact of foreign exchange policy regime (FEPR) on the performance of construction industry in contrast to extant studies on the relationship between FEPR and the economy. The estimation of the time series data obtained from the United Nations Statistics Division (UNSD) revealed that the FEPR of 1986 which introduced flexible FEPR had significant negative effect on the construction sector output in Nigeria. This is largely due to the continuous decline in the value of the Nigerian Naira and the corresponding increase in the cost of construction and fall in construction demand. However, this effect disappears when other regressors such as lagged construction sector outputs (LCNS) and lagged gross domestic product (LGDP) were introduced. Thus, the effects of FEPR on the construction sector (CNS) was significant but not robust determinant implying that the performance of the construction sector is more dependent on inertia i.e. previous construction output and can only change with the introduction of a significant external shock e.g. fall (slump) or rise (boom) in oil export performance.

Since the construction in Nigeria is highly foreign input dependent, this study therefore recommends innovative and construction enhancing FEPR such as managed float, hybrid floats, etc that may give certain concession to construction-related imports and investments (using fixed policy regime) so as to facilitate the development of construction infrastructure and firms. Also, monetary and fiscal policies that are economic growth-enhancing and favourable to construction development may be implemented. In addition, it is important to lay emphasis on sustainable construction development strategies sufficient to eliminate the weaknesses of the sector in terms of the overdependence on foreign inputs, technology obsolescences, local content development, etc in order to grow and develop the Nigerian construction sector. Finally, policies to address the development of the sector should be implemented through the creation of public institution like the Construction Industry Development Board (CIDB) similar to Malaysia and South Africa. The current study has successfully ascertained the effect of FEPR on the performance of the construction sector in Nigeria using the semiparametric modelling (that is, the generalized method of moments). However, other econometric modelling approaches such as Vector Error Correction Model, Hodrick-Prescott (HP), Probit model, etc can be adopted by future studies in the construction sector and other economic sectors. Also, it is important to conduct a comparative study to determine the performance of the construction sector in developing countries with similar foreign exchange policy regime to facilitate a global generalisation of the finding.

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