ANALYSIS OF TRADE EFFECTS OF PARALLEL EXCHANGE RATE IN NIGERIA

ABSTRACT

Aims: The study examines the potency of parallel exchange rates in the movement of international trade in Nigeria. The monetary authorities have embarked on various exchange rate regimes basically because the supply of foreign exchange is not enough to meet the demand. Consequently, a parallel market for exchange rates exists and has become a strong and functional market in the country. But the reason for managing foreign exchange and by extension, introducing various exchange rate regimes was to correct the balance of trade disequilibrium. Yet the balance of trade deteriorates, particularly that of non-oil trade balance. Does the parallel exchange rate contribute to this or does it ameliorate it?
Study design: Descriptive, Correlation, and Regression analysis on time series data
Place and Duration of Study: Sample:Monthly data from January 2007 to December 2022 (2007:1-2022:12) were extracted from the online data repository of the Central Bank of Nigeria..
Methodology: The autoregressive distributed lag techniquewas employed on monthly data between January 2007 and December 2022 (2007:1-2022:12).
Results: The result indicates that the short-run dynamics of total exports (total imports) are negatively (positively) and significantly affected by parallel exchange rate. Generally, depreciation of the parallel exchange rate is detrimental to export particularly non-oil exports. Further, depreciation of parallel exchange rate encourages imports and highly persistent in influencing non-oil imports. The J-curve phenomenon breaks down for total balance of trade. However, the J-curve phenomenon cannot be confirmed in the case of oil trade balance because there is no information about the long run effect of parallel exchange rate on oil export due to the non-integration of the model. In the case of non-oil trade balance, the short-run outcome confirms the existence of the J-curve prediction.
Conclusion: Following these results, it is recommended among others that government should activate a single market (window) for foreign exchange. Also, the authorities should ensure that importation of non-oil products such as exotic cars by government officials be stemmed.

Keywords: Empirical studies on trade, foreign exchange, monetary policy, trade policy, Econometrics

1. INTRODUCTION

The relationship between exchange rates and trade has been examined variously in both theoretical and empirical studies. In principle, countries with chronic current account deficits, high rates of inflation, and some other weak economic fundamentals may devalue/depreciate the currency. With this, exports increase, and the trade deficit over time is improved. Conversely, a strong domestic currency (in terms of appreciation of currency) hampers exports and makesimports cheaper (Kramer, 2023).

The theoretical underpinning of parallel exchange rate and economic performance is established by the portfolio balance, real trade, and monetary approaches. The portfolio balance model considers foreign currency as a financial asset in the financial portfolio. Investors and producers use foreign currency as a hedging instrument due to a loss of confidence in the value of domestic currency owing to high inflation rates and low real interest rates (Bergman (2005). Not only that, the producers also use foreign currency as a means of hoarding imports and as a store of value (Black, 2014). Hence, in the process of changing the composition of investors' and producers' financial portfolios from domestic to foreign currencies, the existence and propagation of parallel exchange rates is established. The validity of this approach has been tested severally by studies like Evans and Lyons (2022); Kallianioti (2021); Adekoya (2020); Tarri and Gozen (2018);

The monetary approach follows from the portfolio approach by arguing that too much money in circulation triggers a higher inflation rate and consequently forces economic agents to demand more of foreign exchange (Mogaji, (2018). Owing to foreign exchange control, producers are forced to go to the parallel market to buy foreign currencies. Generally, too much money in circulation leads to excess demand for goods and services, which puts more pressure on the general price level to increase (Kurihara & Fukushima, 2015; Umoru, 2013). In the process, exchange rate will depreciate against the currency of the affected country (Mogaji, 2018).

Gray (2021); Ebaidalla (2019); CBN (2016); Siddiki (2008); Agenor (1992) argue that an expected depreciation of the parallel exchange rate will reduce demand for domestic currency, create excess supply, and further depreciate the parallel market exchange rate. Conversely, an expected appreciation in the parallel market exchange rate will lead to an increase in the demand for domestic currency, leading to an acute supply of money and further appreciation of the parallel market exchange rate.

The third approach, that is, the real trade model demonstrates that the emergence of parallel market exchange rates is not unconnected with foreign exchange control by the monetary authorities (Melvin &Norrbin, 2023; Onyiruiba, 2016). One such control is when the monetary authorities are trying to prevent external reserve depletion, thereby rationing the supply of foreign currencies (Moses-Ashike, 2023; Gray 2021; Abiola & Adedayo, 2013). The acute supply of foreign currencies will trigger excess demand and this will naturally create a parallel market for foreign exchange (Nwokorie &Nwachukwu 2015). Similarly, the introduction of import tariffs, export taxes, and quotas tend to facilitate smuggling and hence the emergence of a parallel exchange market (Degefa 2001; Kaufmann 1991). Conclusively, the model argues that a parallel market exchange rate occurs due to a mismatch between the demand for and supply of foreign currency. The parallel market exchange rate affects trade through five sources, namely, the smuggling of exported products, and under-invoicing of exports. These two sources will lead to a reduction in reported (official) exports (United Nations [UN], 2002). Other sources are over-invoicing of imports, which will artificially increase the value of official imports, and diversion of foreign currency from the official to the parallel market through corruption.

Crookes, Zhang, Stoddart (2022); Gray (2021), Zheng and Tao (2014); BIS (2013); Kiguel and O'Connell (1995), Aron and Elbadawi (1992) argue that the existence of a parallel market for exchange rates (dual foreign exchange) is legal if the purpose is to aid financial transactions, avoid short term effects of depreciation of domestic price while maintaining some degree of control over capital flows and foreign reserves. However, excessive controls on foreign exchange will penalize some intending users in the official exchange rate markets (official and parallel) and naturally encourage and propagate illegal (informal) parallel markets for exchange rates. The market becomes more important as the monetary

authorities try to fight the deteriorating balance of payments (BIS 2013; Kiguel and O'Connell, 1995). Consequently, the first channel through which the parallel market feeds into the economy is illegal trade because the parallel market for foreign exchange encourages export diversification from official to unofficial channels and more official imports than unofficial imports (Crookes et al. 2022)

The existence of a parallel market exchange rate is said to be dependent on the exchange rate regime practiced by a country in its foreign exchange management (Ajinaja, 2017; Musibau, 2017; Oyovwi, 2013; Adaramola, 2016; Bernadin, 2017 & Nkurunziza, 2002). Specifically, if a government embarks on a fixed or managed floating exchange rate at its official window, there is a high tendency for the parallel market window to open offering rates higher than the official (Oworu et al. 2016). Consequently, the existence of a parallel market where the local currency exchanges for other international currencies at prices different from the official will influence trade performance (Edeme et al. 2017; Ebaidalla 2017)

The exchange rate is determined by the supply and demand of foreign exchange. In Nigeria, the supply of exchange rate is mainly from oil proceeds, which in turn, depends on the price of oil (International Trade Administration [ITA] 2022). When oil price increases, foreign exchange also increases, leading to an increase in foreign reserve and hence more supply of foreign exchange. With more supply, pressure on demand for foreign exchange will reduce and there may likely be an appreciation of the local currency against other foreign currencies. Conversely, when the oil price falls, foreign reserves will reduce leading to an acute supply of foreign exchange. With the continuous increase in demand, the pressure on the limited foreign reserve will be high which will lead to the depreciation of the local currency (CBN 2016). Therefore, in a bid to manage foreign exchange, monetary authorities in Nigeria have practiced various types of exchange rate regimes and foreign exchange market systems.

In the 1970s through the early 1980s, the fixed exchange rate was practiced. The dual exchange rate system gave birth to the first-tier and second-tier trading platforms in the early 1980s. In 1987, the retail Dutch Auction System was adopted. The autonomous exchange rate system was used in 1988, the interbank exchange rate system in 1989, the floating exchange rate in 1992, the crawling peg in 1994, the guided deregulation in 1995, and much later in 2015 the investors and exporters window was adopted. Currently, in 2023, Nigeria has once again adopted the floating rate regime. In all of these regimes, the objective is to stem the demand for foreign exchange and ensure the appreciation of the local currency against foreign currencies (Nkurunziza 2002). However, it is interesting that each of these regimes was met with speculative attacks and illicit exchange rate arbitrageurs which made the parallel foreign exchange market soar (CBN, 2022).

For instance, when the Central Bank of Nigeria's official (fixed) exchange rate was N9.87 per dollar in 1991, the parallel market exchange rate was N16.5 per dollar. Also, in 1999, when the official exchange rate rose to N97.6 per dollar, the same dollar was sold for N102.2 at the parallel market. The situation has not been different over time. In fact, in 2015, when the authorities embarked on foreign exchange rationing, giving access to the critical sectors, the students and those seeking foreign medical attention to exchange dollars for N305.2, the price in the parallel market was N462. In 2022, when the official exchange rate was N460.8, the parallel market exchange rate was N690 par dollars. However, there was a harmonization of exchange rates in mid-2023 when both the official and parallel market exchange rates appeared to be at par, posting N770.88 to $US1.

In all, it is evident that deregulation of the official exchange rate leads to appreciation of the parallel market exchange ratethus, resulting in an exchange rate premium in Nigeria. Quite

several studies (Ijirshar et al. 2022; Ayomitunde et al. 2020; Dare & Elijah, 2020; Okonkwo, 2019; Onakoya& Johnson, 2018; Ibrahim et al. 2017; Igue& Ogunleye, 2014) have examined how official exchange rate affects trade and trade balance in Nigeria, however, the effect of the parallel market exchange rate on trade to a large extent is yet to be explored. The parallel exchange market enjoys a wider patronage from economic agents accounting for a higher percentage of the total foreign exchange transactions in developing countries (Gray 2021). As Nigeria adopts the floating exchange regime once again, it is imperative to know how this decision will affect international trade since trade is what brings foreign currency. This analysis is even more important with the reduction in government foreign exchange revenue due to dwindling oil prices (Nwachukwu 2023). Currently, Nigeria runs a deficit budget of about N765.61 billion as at the fourth quarter of 2022 (CBN 2022), with the depletion of foreign reserves from $39billion in 2015 to $3.7 billion in August 2023 (Nwachukwu, 2023). Although, the economy is beginning to show signs of recovery in the area of trade balance. A trade surplus of N908.9 billion was recorded towards the end of the first quarter of 2023 from a deficit of N617.1 billion recorded in the previous year, attributed to a reduction in imports by 59.8% in 2023. Nevertheless, international, regional, and national economic outlook project Nigeria as a major contributor in the global economic trajectory (Africa Export-Import Bank [AFREXIM BANK] 2023; ITA 2022; CBN 2022), and this is expected to come from the non-oil trading sector.

With the current focus of the Nigerian government on the non-oil sector, policymakers, foreign trading partners, investors, and local manufacturers would like to know what this new exchange rate regime offers to trade, especially the non-oil sector. This study offers a novel contribution to the exchange rate and trade literature in Nigeria by disaggregating the trade balance between oil and non-oil imports and exports. The aim is to examine the effects of parallel exchange rates on oil and non-oil imports and exports within the autoregressive distributed lag (ARDL) framework. For analysis, the following questions are asked. First, how does trade (exports and imports) respond to the exchange rate movement in the parallel market? Second, do changes in parallel market exchange rates matter for non-oil trade balance? Third, Can the J-curve phenomenon be validated in the parallel market rate in Nigeria? The rest of this paper is outlined as follows; section 2 is the literature review, section 3 is Data and Methodology, section 4 is the Result and discussion, and section 5 concludes the work.

2. METHODOLOGY

Following the real trade, portfolio, and monetary approach to the parallel market exchange rate effect on trade, export is a reducing function of the parallel market exchange rate while import is an increasing function (Evans and Lyons, 2022; Tarri and Gozen, 2018). Thus, the functional relationship between trade and parallel market exchange rate is specified in equations 1 and 2.

$$EXPORT_t = F(PARALLEL, Z_t) \quad (1)$$

$$IMPORT_t = F(PARALLEL, V_t) \quad (2)$$

Where, EXPORT, IMPORT, PARALLEL, Z, and V represent values of exports, imports, parallel market exchange rate, and other catchall variables that affect exports and imports respectively. The catchall variables considered in this work follow variables in the export and import models. These variables include commercial bank interest rate, foreign direct investment, import coverage, monetary policy rate, and external reserves. The basic regression model to be estimated after incorporating all variables are shown in equations 3 and 4,

171 $$\ln EXPORT_t = \beta_0 + \beta_1 \ln parallel_t + \beta_2 \ln FDI_t + \beta_3 comm\_rate_t + \beta_4 \ln CAP\_IMP_t + \beta_5 \ln IMP\_COVER_t + \beta_6 \ln RES_t + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

172

173 $$\ln IMPORT_t = \psi_0 + \psi_1 \ln parallel_t + \psi_2 \ln FDI_t + \psi_3 comm\_rate_t + \psi_4 \ln CAP\_IMP_t + \psi_5 \ln IMP\_COVER_t + \psi_6 \ln RES_t + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

174

175 Equations 3 and 4 are the logarithmic transformation of equations 1 and 2 after incorporating
176 other important variables dimmed to have affected trade but not always featured in previous
177 studies. FDI is the foreign direct investment, comm_rate is the commercial bank average
178 interest rate, CAP_IMP is capital importation, IMP_COVER is import cover and RES is the
179 foreign reserves. Others are parameters to be estimated while is the error term.

180 Expectedly, the parallel exchange rate should affect exports negatively (Ebaidalla 2017;
181 Munoz 2006). That is, when there is foreign exchange control, pressure on demand for
182 foreign currency will cause depreciation. The depreciation in parallel exchange rate will
183 discourage some intending exporters. Further, those who may likely benefit from the official
184 foreign exchange rationing may over-invoice their goods in order to collect more foreign
185 currency, whereas very few will be channeled towards exporting while the rest will be meant
186 for round-tripping (Degefa 2001; Kiguel 1995). Those who could not have enough domestic
187 currency backing will not benefit from such. In any of these cases, depreciation of parallel
188 exchange rate is expected to reduce officially reported exports.

189 The converse is the case for imports, that is, in equation 4, ψ_1 is expected to be positive,
190 increasing imports when parallel market exchange rate depreciates. This implies that trade
191 balance will worsen in the face of the parallel market exchange rate. Also, import cover
192 provides incentives to investors/producers when importing important capital goods that will
193 be useful for production, thus, provided importation of capital goods dominate imports, there
194 should be a positive effect (Gray 2021; Zhang & Tao 2014; BIS 2013). Albeit, if the structure
195 of imports is such that final goods dominate, capital goods may not have any significant
196 positive effect, worse still, may have negative effect. This may be positive or negative. In the
197 case of commercial bank interest rate, a negative effect on exports and positive effect on
198 imports is expected (Thi Thanh Tu Tran, 2019; Akpan et al. 2016; Odedokun, 2016).
199 Reserves is expected to increase importation but may not necessarily affect exports
200 (Schanz, 2019; Mansaray, 2018; Nteegah&Okpoi, 2017).

201 There are several methods for estimating equations 3 and 4, and this depends on the nature
202 of the data series and the objectives of the study. The objectives of this study are to examine
203 the effect of parallel market exchange rate on trade generally, on oil import/export, non-oil
204 import/export and to validate the J-curve phenomenon in the parallel exchange rate. This
205 study adopts the autoregressive distributed Lag dynamic model (ARDL). Amongst other
206 considerations, more importantly is the fact that ARDL is capable of dealing with
207 endogeneity problem common with financial and economic variables.The J-curve
208 phenomenon is built on the assumption of a short run to long run relationship which is
209 already embedded in the ARDL framework.

210 The test for unit root is carried out using the Augmented Dickey-Fuller (ADF) and Phillips-
211 Perron (PP) method while the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) method is
212 employed for the stationarity test. More often than not, when series in equations 3 and 4 are
213 performed under each of the stated approach, results obtained are almost the same.

Consequently, the ADF is specified and reported in this study. The ADF specification is provided in equation 5.

$$\Delta y_t = \beta_t + T_t + \sigma y_{t-1} + \sum_{i-1}^{n} \beta_i \Delta y_{t-1} + \varepsilon_t \text{.....5}$$

Where y_t is the series to be tested, β is constant, T_t is trend, and $\sum_{i-1}^{n} \beta_i \Delta y_{t-1}$ is the augmentation. Its purpose is to allow for any possible data emanating from the autoregressive data-generating process in any order greater than 1. This augmentation is also useful for correcting serial autocorrelation in the stochastic disturbance term, that is, the parameter of interest is; σ_i. The null hypothesis is that σ=0 in which case, the series is stationary and the alternative hypothesis is that σ<0, which means the series is nonstationary.

The study utilizes monthly data on variables which are; total exports, total imports, oil exports, oil imports, non-oil exports, non-oil imports, parallel market exchange rate, foreign direct investment, import cover, capital import, commercial bank average interest rate, and foreign reserves. Monthly data on all the variables, covers January 2007 to December 2022. The period was guided by the availability of monthly data on the variables considered for the work.

3. RESULTS AND DISCUSSION

Table 1 highlights the descriptive statistics of the series. On average, export and import posted 17566.28 and 11,438.25 million naira respectively. For non-oil export and non-oil import, the average value was 1095.69 and 8614.83 million naira. The oil export and import recorded a respective average of 14566.92 and 3227.7 million naira. This implies that on average, Nigeria earned 1.09 from non-oil exports while it earned 14.6 billion naira from oil imports. Similarly, the country recorded an average of 8.6 billion non-oil imports and 3.2 billion oil imports. Clearly, more foreign exchange was earned from oil exports than non-oil exports while more foreign exchange was spent on non-oil imports than oil imports. Consequently, Nigeria experienced a monthly average of oil trade surplus and non-oil trade deficit. The trade deficit recorded from non-oil could be traced, in part, to the existence of a parallel market exchange rate that may reduce officially reported exports and increase officially reported imports.

Parallel exchange rate, capital import, commercial bank interest rate, import cover, FDI, MPR, and external reserves recorded respective average values of 233.47/$, ₦53,389,837 million, 16.80%, ₦10.46,146 million, ₦146,000,000 million, 11.29% and ₦39,072.81 million. Maximum values for export, import, non-oil export, non-oil import, oil import and oil export posted ₦28,236.51; ₦19,856.03; ₦11,315.84; ₦12,826.31; ₦15,113.28; ₦24,235.31 (all million) which corresponds with 2008M07, 2011M08, 2019M11, 2019M03, 2019M10, 2008M07 respectively. This means Nigeria had the highest export in July 2008 which is largely informed by oil exports. The maximum values for the parallel exchange rate, capital import, commercial rate, import cover, FDI, MPR and reserve are ₦169.04, 380 million; 19.66%, ₦20.83, 653 million, 14.00%, ₦62,081.86 million respectively.

Within the sample period, exports, imports, non-oil exports, non-oil imports, oil exports, oil imports, parallel exchange rate, capital imports, commercial bank interest rate, import cover,

FDI, MPR and external reserves reached their respective minimum values shown in Table 1 in 2016M02, 2019M10, 2015M09, 2017M01, 2019M10, 2019M09, 2008M06, 2015M03, 2008M11, 2011M11, 2009M08, 2009M07, 2016M10.

Table 1: Descriptive properties of the variables

Series	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	J- B	p-value	Obs
EXPORT	17566.28	28236.51	7442.26	5700.05	-0.051	1.76	9.29	0.0096	180
IMPORT	11438.25	19856.03	1348.17	3031.19	-0.007	3.135	0.11	0.946	180
NON_OIL_EXP	1095.69	11315.84	347.72	1494.51	6.004	39.776	8980.25	0.0000	180
NON_OIL_IMP	8614.83	12826.31	5125.03	2142.32	0.107	1.793	9.02	0.0109	180
OIL_EXP	14566.92	24235.31	1604.71	5318.17	-0.087	1.809	8.69	0.0129	180
OIL_IMP	3227.71	15113.28	634.18	2137.28	3.577	19.389	1918.54	0.0000	180
CAP_IMP	53589837	380,000,000	130000.0	66,865,386	2.837	12.022	681.54	0.0000	180
COMM_RATE	16.79	19.66	14.58	1.105	0.529	3.241	7.08	0.0289	180
FDI	146,000,000	653,000,000	995422.0	149,000,000	1.517	4.432	67.56	0.0000	180
IMP_COVER	10.46	20.83	4.43	3.86	0.828	2.955	16.48	0.0003	180
PARALLEL	233.47	494.70	118.70	103.56	0.749	2.049	18.88	0.0000	180
MPR	11.29	14.00	6.00	2.66	-0.88	2.52	20.21	0.0000	180
RES	39072.81	62081.86	23689.87	8729.63	0.585	3.037	8.23	0.0163	180

Note: OIL_EXP, OIL_IMP, CAP_IMP, COM_RATE, FDI, IMP_COVERAGE, PARALLEL, MPR, and RES stand for values of oil export, oil import, capital import, commercial bank interest rate, foreign direct investment, import coverage, parallel market exchange rate, monetary policy rate, and foreign reserves respectively. Values for exports, imports, capital importation, foreign direct investment and foreign reserves are measured in million naira while other variables are measured in percentage, except for the parallel exchange rate which is measured as the quantity of naira per unit of dollar; J-B is the value of Jarque-Bera while p-value is the probability values associated with J-B and Obs is several observations.

The relative stability and volatility in the variables are indicated by the standard deviation statistic which implies a value closer to 0 is stable and less volatile while a value farther away from 0 is less stable and more volatile. Table 1 reveals that all the series are not stable and relatively volatile, albeit, at varied degrees. For instance, commercial bank rate has the lowest volatility followed by import cover as indicated by their respective values of 1.10 and 3.86.

The skewness and kurtosis statistic which provides first-hand information about the normality of the series shows that the non-oil export, non-oil import, parallel exchange rate, capital import, commercial rate, import cover, FDI, MPR and external reserves are positively skewed since their respective value is greater than zero. However, total exports, oil exports and monetary policy rate are negatively skewed with values -0.05, -0.007, -0.087, and -0.88 respectively. The kurtosis statistic with a threshold of 3 shows that import, non-oil export, oil export, capital import, commercial rate, FDI, and reserve are leptokurtic (highly peaked) since their values are greater than 3, while export, non-oil import, oil export, import cover, parallel exchange rate are platykurtic. However, inference cannot be made based on single consideration of skewness and kurtosis for stability purposes, however, the Jarque-Bera

statistic is more useful as it pools the properties of both skewness and kurtosis. The null hypothesis of the Jarque- Bera test is that the series are normally distributed. Since the probability value of all the series are less than 10% except import, then it can be said that virtually all series are not normally distributed. The implication of this is that there are possible outliers in the dataset. Since the assumption of no outlier is not met owing to the nature of normal distribution, the basic ordinary least square cannot be the appropriate estimation method.

The correlation matrix which provides information about the association between a pair of variables and possible multicollinearity is presented in Table 2. As illustrated, there is a strong positive association between total exports and oil exports on one hand and total imports and non-oil imports on the other hand. This is clear indication that while oil exports drive total exports, non-oil imports drive total imports. Another interesting revelation from Table 2 is that while non-oil export had a negative, albeit weak association with total exports, oil imports had positive association with total imports. Similarly, there is a relatively strong association between oil imports and non-oil exports. Such association is may not be unexpected since increase in non-oil export can provide more foreign exchange to finance the importation of oil. The association between parallel exchange rate and total export is negative and relatively strong. The similar association exists between parallel exchange rates and oil export. This is a signal to the fact that first, oil export appears to be crucial to the dynamics of exchange rate in Nigeria. Second, the negative association implies that more oil exports which increases the supply of foreign exchange could depreciate parallel exchange rate or that a depreciation in the parallel market exchange rate could encourage oil exports. The most important thing to note is that there is a strong and negative association between parallel market exchange rate and oil exports in Nigeria. For the other pair of variables, there is no strong association however, it is important to note that there is a positive association between foreign direct investment and total export and oil export, but negative association between foreign direct investment and total imports, non-oil imports, and oil imports and also foreign direct investment and non-oil export. Thus, oil exploration appears to still dominate the purpose for FDI in Nigeria.

Table 2: Pairwise Correlation Matrix of the variables

	EXPORT	IMPORT	NON_OILEXP	NON_OILIMP	OIL EXPT	OIL IMP.	CAP IMP	COMM RATE	FDI	IMP COVER	MPR	PARALLEL	RES
EXPORT	1												

IMPORT	0.53	1											
NON_OIL EXP	-0.06	-0.25	1										
NON_OIL IMP	0.33	**0.80**	0.13	1									
OIL EXP	**0.97**	0.56	-0.24	0.26	1								
OIL_ MP	0.36	0.13	**0.77**	0.23	0.19	1							
CAP IMP	-0.01	-0.05	0.29	0.16	-0.09	0.22	1						
COMM RATE	-0.28	-0.26	-0.29	-0.36	-0.21	-0.33	0.01	1					
FDI	0.12	-0.11	-0.12	-0.14	0.14	-0.09	0.03	-0.12	1				
IMP COVER	-0.15	-0.61	-0.11	-0.64	-0.12	-0.34	-0.09	0.15	0.38	1			
MPR	-0.33	-0.06	0.23	0.04	-0.39	0.07	0.05	-0.25	-0.14	-0.09	1		
PARALLEL	**-0.67**	-0.39	0.26	-0.26	**-0.71**	-0.06	0.09	0.03	-0.32	0.02	0.48	1	
RES	0.41	-0.11	0.01	-0.15	0.40	-0.01	0.04	-0.19	0.46	0.57	-0.18	-0.39	1

Note: OIL_EXP, OIL_IMP, CAP_IMP, COM_RATE, FDI, IMP_COVERAGE, PARALLEL, MPR, and RES stand for oil export, oil import, capital import, commercial bank interest rate, foreign direct investment, import coverage, parallel market exchange rate, monetary .policy rate, and foreign reserves respectively.

Table 3 shows the result of unit root tests conducted through the augmented Dickey-Fuller test. The series exhibits diverse levels at which they are stationary. As can be observed, oil and non-oil exports, commercial banks interest rate, monetary policy interest rate and parallel exchange rate are stationary at first difference while other series are stationary at levels. This confirms the justification for employing autoregressive distributed lag (ARDL) for the models since the series exhibit a combination of levels of integrations, that is, I0) and I(1).

Table 3: ADF Unit root test of the variables

Variables	LEVEL			FIRST DIFFERENCE			I(d)
	Intercept	Trend & Intercept	No Trend & Intercept	Intercept	Trend& Intercept	No Trend &Intercept	
LNEXPORT	-2.5995*	==	==	==	==	==	I(0)
LNIMPORT	-4.7222***	==	==	==	==	==	I(0)
LNNON_OIL_EXP	-1.0125	-2.2736	0.8886	-9.3144***	==	==	1(1)
LNNON_OIL_IMP	-3.0697**	==	==	==	==	==	I(0)
LNOIL_EXP	-1.7723	-2.3255	0.7439	-9.9329***	==	==	I(1)
LNOIL_IMP	-3.7476***	==	==	==	==	==	I(0)
LNCAP_IMP	-9.7016***	==	==	==	==	==	I(0)
COMM_RATE	-2.1449	-2.2642	-0.2533	-15.2899***	==	==	I(1)
LNFDI	-10.056***	==	==	==	==	==	I(0)
LNIMP_COVER	-2.7382*	==	==	==	==	==	I(0)

MPR	-0.9248	-1.7677	0.5272	-11.3012***	==	==	I(1)
LN_PARALLEL	-0.9355	-1.7626	1.5769	-8.4406***	==	==	I(1)
LNRES	-2.8840**	-1.8421	-0.7274	==	==	==	I(0)

*Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP,LNCAP_IMP, COM_RATE, LNFDI, LN IMP_COVER, PARALLEL, MP, , R and RES stand for log of total export, log of total imports, log of non-oil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary policy rate, and log of foreign reserves respectively. *, **, *** represents 10%, 5%, 1% level of significance respectively*

Consequently, upon the results indicated in Table 3, it is important to examine whether the model converges to its long-run state or not. The results of the Johansen co-integration test for each model, that is, a model for total exports and imports, oil exports and imports, and non-oil exports and import are presented in Table 4. A cursory look at Table 4 reveals that long run convergence for total export, total import, and oil imports models are confirmed as the critical values for the respective models are greater than the upper bound. However, long-run convergence cannot be confirmed for non-oil exports, non-oil imports and oil exports models since their respective critical values are less than the lower bound. Consequently, both short-run dynamics and long run co-integrating equation are estimated for total exports, total imports and oil imports while only short-run dynamics are estimated for nonoil exports and imports alongside oil exports.

Table 4: Johansen Co-integration Bounds test

MODELS	F-statistics			
Total Export	**2.96**			
Total import	**4.51**			
Oil export	1.62			
Oil import	**4.81**			
Nonoil export	1.64			
Nonoil import	1.54			
Critical value bounds				
Significance	10%	5%	2.5%	1%
I(0)-Lower bound	1.99	2.27	2.55	2.88
I(1)-Upper bound	2.94	3.28	3.61	3.99

Table 5 shows the short run dynamic and long-run co-integration results for total exports. The short-run model indicates that current export values are positively affected by their first and second lag values. Other variables that show positive effects include commercial banks' interest rate, foreign reserves, and lag of monetary policy rate. However, current export is negatively affected by current values of capital importation, foreign direct investment, and monetary policy rate. It must however be noted that capital importation, current foreign direct

investment, foreign reserves, and current monetary policy rate have no significant effect on export. Exports are negatively and significantly affected by the lag value of foreign direct investment and the lag value of the monetary policy rate. Further, current interest rate of the commercial bank also has a negative and significant effect on exports. Specifically, a 1% increase in the current commercial banks interest rate reduces exports by 0.02% while the same percentage increase in previous monetary policy rate reduces exports by 0.03%. Hence, although the effect of interest rate on export is negative and mild, monetary policy interest rate tends to have a higher effect than commercial bank interest rate. Similar to the magnitude of the effect of interest rate, the effect of previous foreign direct investment on export is also mild, posting a 0.01% decrease for a 1% increase in previous foreign direct investment. In the long run, only commercial banks and monetary policy interest rates significantly affect exports. In particular, a 1% increase in commercial banks interest rate leads to a 0.3% decrease in exports while a 1% increase in monetary policy rate reduces exports by 0.2%. Hence, the commercial interest rate becomes more detrimental to exports in the long run than the monetary policy interest rate.

Table 5: Short-run dynamic and long run effect of parallel exchange rate on total export

Short-run dynamic model

Variable	Coefficient	Prob.
D(LNEXPORT(-1))	0.3828***	0.0000
D(LNEXPORT(-2))	0.1107	0.1915
D(LNEXPORT(-3))	-0.5185***	0.0000
D(COMM_RATE)	-0.0155***	0.0053
D(LNCAP_IMP)	-0.0025	0.5462
D(LNFDI)	-0.0035	0.4430
D(LNFDI(-1))	-0.0109**	0.0169
D(LNPARALLEL)	-0.1878*	0.0660
D(LNRES)	0.2253	0.1212
D(MPR)	-0.0129	0.2664
D(MPR(-1))	-0.0254**	0.0264
CointEq(-1)	-0.0487***	0.0027

Long run Model

COMM_RATE	-0.3184*	0.0751
LNCAP_IMP	0.0528	0.5435

LNFDI	-0.1711	0.2925
LNPARALLEL	-1.9297**	0.0189
LNGRES	0.1890	0.7389
MPR	-0.2073*	0.0787
C	23.3450**	0.0191
R^2	0.9793	
Adj R^2	0.9767	
DW	1.69	
F-Statistics	364.7727***	(0.000)

Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP, LNCAP_IMP, COM_RATE, LNFDI, LN IMP_COVER, PARALLEL, MPR and RES stand for a log of total export, log of total imports, log of nonoil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary .policy rate, and log of foreign reserves respective. ****, **, *** represents 10%, 5%, 1% level of significance respectively***

Now to the variable of interest, that is, the parallel exchange rate. The result indicates that the parallel exchange rate significantly drags export proceeds both in the short run and the long run (Table 5). In the short run, If the parallel exchange rate increases (depreciates) by 1%, exports fall by 0.2% while in the long run, a one percentage depreciation in the parallel exchange rate precipitates exports to the tune of 1.9%. This outcome supports the notion that the parallel market exchange rate tends to reduce official values of exports by under-reporting the actual export that takes place. But perhaps exports would have fallen more if there was no parallel market for exchange rate because converting naira to dollar in the parallel market will be relatively cheaper than going through a bank. Thus, the main source of reduction in exports will be through underreporting of exports. It is also noted that the parallel market exchange rate has a notable inhibiting effect on exports in the long run. This implies that foreign exchange rationing or regulation which gives way to a parallel market for exchange rates will have a long-term dwarfing effect on Nigeria's exports.

The error correction coefficient indicates that the speed of adjustment from the short-run dynamics to long-run equilibrium is 0.05%. In other words, if the system experiences a 10% shock, a 0.4% adjustment towards the long-run equilibrium will take place in the current month. Therefore, it will take more than 15 years for the adjustment to be fully accomplished. The lesson from this outcome an economic policy that will affect exports may take a very long time before it fully adjusts. Maybe this is the reason why the exports of Nigeria are still not fully adjusted to policy changes. The value of R2 0.97 indicates that 97% variation in export is explained by the explanatory variables considered. The adjusted R2 is less than R2, which means it is the model is good. The F-Statistic which is less than 0.05 confirms that the estimated model is significant and valid.

Table 6 shows the short-run dynamic and long-run co-integrating result of the effect of parallel exchange rate on total imports. The result shows that short-run movement in imports is positively and significantly affected by its lag. However, the third lag had negative and significant effect. This indicates that it takes three months before previous imports will reduce present imports. The short-run movement in total imports has the potential to be positively affected by commercial bank interest rate, monetary policy rates, and foreign direct

investment. Besides the magnitude of impact would have been mild had the effect been significant. Also, external reserves have a positive and significant effect on the short-run movement of total imports in Nigeria. In this regard, a 1% increase in external reserve will engender a 0.5% increase in the short run movement of total imports. This result confirms the importance of reserve to importation through the supply of foreign exchange necessary to offset import bills. Meanwhile, import cover has a significant and negative effect on imports. In this regard, the short-run movement of total import will be adversely affected by 0.3% for a 1% increase in capital import cover. This outcome could signal the fact that Nigeria's import structure is dominated not by capital goods but by final consumption goods.

The variable of interest is the parallel exchange rate. The result reveals that the short-run movement of imports is positively and significantly affected by the parallel exchange rate. For a 1% depreciation in the parallel exchange rate, the short-run movement of total imports will rise by 0.08%. This outcome also confirms the expected proposition. Parallel market exchange rate, caused by further stiffening of foreign exchange in the official market causes importers to explore the official rate for imports. Unfortunately, such foreign exchange accessed in the banks at the official rate appears not to be mostly for the purpose of capital importation as revealed in the result (Table 6) where a negative effect was discovered. Demand for foreign exchange in the official market will further exert pressure on foreign exchange, causing to depreciate further. Thus, this result suggests that the parallel exchange rate is a drag to the short-run balance of trade in Nigeria. However, a cursory inspection of the short-run magnitude of the effect of the parallel exchange rate on both exports and import suggests that the parallel exchange rate inhibits exports (-0.19) more than enhances imports (0.08). Thus, on the one hand, the J-curve that suggests a worsening trade balance in the short run is confirmed, that is, it appears depreciation of the parallel exchange rate also confirms the J-curve phenomenon. But crucially, it also indicates imports sluggishly respond to changes in parallel exchange rates. To see the picture, if the parallel exchange rate depreciates by 100%, imports will increase by 8% while exports will reduce by 19%! Hence, the source of foreign exchange issues in Nigeria is importation, and the presence of a parallel exchange rate worsens the situation. When the presence of foreign exchange racketeers who purchase foreign exchange at a cheaper rate and sell it in the parallel market is added to the scene, exports will be further affected and there may be a vicious circle of foreign exchange crisis in the country.

Table 6: Short-run dynamic and long-run effect of parallel exchange rate on total import

Short run Dynamics

Variable	Coefficient	Prob.
D(LNIMPORT(-1))	0.2626**	0.0375
D(LNIMPORT(-2))	0.2442*	0.0649
D(LNIMPORT(-3))	-0.3801*	0.0690
D(COMM_RATE)	0.0142	0.4701
D(LNFDI)	0.0022	0.8918
D(LNIMP_COVER)	-0.2269**	0.0159

D(LNPARALLEL)	0.0788**	0.0379
D(LNRES)	0.5133***	0.0023
D(MPR)	0.0074	0.5242
CointEq(-1)	-0.7098***	0.0000

Long run Model

COMM_RATE	0.0201	0.4845
LNFDI	0.0032	0.8920
LNIMP_COVER	-0.8148***	0.0000
LNPARALLEL	0.1110**	0.0371
LNRES	0.7232***	0.0042
MPR	0.0105	0.5077
C	3.6259	0.2378
R^2	0.6311	
Adj R^2	0.5993	
DW	2.02	
Statistics	19.9032***	(0.0000)

Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP,LNCAP_IMP, COM_RATE, LNFDI,LN IMP_COVER, PARALLEL, MPR, and RES stand for a log of total export, log of total imports, log of nonoil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary .policy rate, and log of foreign reserves respective. ****, **, *** represents 10%, 5%, 1% level of significance respectively***

The error correction coefficient indicates the speed of adjustment from the short-run dynamics to long-run equilibrium is 0.71 (Table 6). This implies that 0.71% of the long-run disequilibrium in the previous months is adjusted in the first month for any 1 percentage shock to the system. The remaining 0.29% will be captured in the following month. What this implies is that total imports will adjust to a shock in less than 2 months unlike that of exports that takes years. This again, is another reason why government policies that will affect trade should be taken with care because the shock will have way long-range effect on exports short effect on imports.

In the long run, the movement of total imports has the potential to be affected positively by commercial banks' interest rate, foreign direct investment, and monetary policy rates. Import cover has a negative and significant effect on the long run movement of imports. Specifically, the long-run movement of imports will reduce by 0.8% for a 1% increase in import cover. Thus, both in the short and long run, import cover precipitates imports. In the case of a parallel exchange rate, the long run movement of total imports is positively affected by this variable (Table 6). As can be read off, if the parallel exchange rate depreciates by

1%, the long-run movement of imports will increase by 0.11%. Thus, both in the short and long run, not only is parallel exchange rate significant to imports but also that it encourages importation. Similar to the case of the short run, the trade balance worsens in the long run. Since the magnitude of the parallel exchange rate effect on exports is negative and relatively notable (-1.93) while the magnitude of the effect on imports is positive and moderate, it turns out that the J-curve phenomenon breaks down. According to the J-curve phenomenon, trade balance may deteriorate in the short run following exchange rate depreciation but it will eventually improve in the long run. However, the result shows that both in the short run and long run, the trade balance worsens in the face of parallel exchange rate depreciation.

The adjusted R-squared indicates that 59.9% variation in import is explained by the explanatory variables considered. The F-Statistic which is less than 0.05 and Durbin Watson value of 2 confirm that the estimated model is significant and valid. Further diagnostic statistics are presented later in the study.

Table 7 presents the short-run and long-run co-integrating equation results for oil import. The short-run model shows that oil import is positively related to its first and second lags. Commercial banks interest rates, foreign direct investment, and monetary policy rates have the potential to negatively influence the short-run movement of oil imports. It is not surprising that these variables posted no significant effect because of the nature of the product and the government policy on oil. First, Nigeria is one of the outstanding producers of oil in the world so, there should not be any need for those variables to significantly influence the importation of the product. Second, the importation of oil is done solely by an agent of the government and consequently, those variables tend to be exogenous in the decision to import oil. Import cover has a negative and significant effect, indicating specifically that a 1% increase in the import cover will reduce the short-run movement of oil imports by 0.6%. The external reserve is significantly positively effective for oil importation. If external reserve increases by 1%, oil importation will rise by 1.4%. Hence, oil importation is highly sensitive to changes in external reserves. It must be recalled that the management of external reserves is part of the functions of the Central Bank of Nigeria, which invariably is a government agency. Thus, it is not surprising to observe a significant and positive effect (since the government is the arm that oversees the oil supply in Nigeria). What is curious is the magnitude of the effect that is, observing that the external reserve elasticity of oil import is elastic. This is a worrisome situation because it means that one source of reserve depletion in Nigeria is oil importation, which is not supposed to be given the position of Nigeria in the comity of world oil producers.

Parallel market expectedly has insignificant, albeit, positive effect on oil importation. This is not unexpected because the Nigerian National Petroleum Cooperation (NNPC) that is saddled with the responsibility of oil operations (both exports and imports) in Nigeria. Thus, the corporation need not patronize the parallel market for accessing foreign exchange. However, in the course of importing oil, more foreign exchange will be demanded in the official market, thereby mounting more pressure on the demand thereby making the parallel market for the exchange rate to strive. The positive sign indicates that there is a sign that more and larger demand for oil importation can be influenced by the parallel exchange rate.

Table 7: Short run dynamic and long-run effect of the effect of parallel market exchange rate on total oil import

Short run dynamics

Variable	Coefficient	Prob.

D(LNOIL_IMP(-1))	0.1646	0.1105
D(LNOIL_IMP(-2))	0.1142	0.2419
D(LNOIL_IMP(-3))	-0.3379**	0.0139
D(COMM_RATE)	-0.0217	0.4288
D(LNFDI)	-0.0013	0.9575
D(LNIMP_COVER)	-0.5761***	0.0000
D(LNPARALLEL)	0.0971	0.4652
D(LNRES)	1.3933*	0.0786
D(LNRES(-1))	1.4043*	0.0712
D(MPR)	-0.0151	0.3874
CointEq(-1)	-0.4656***	0.0000
Long run Model		
COMM_RATE	-0.0466	0.4179
LNFDI	-0.0028	0.9575
LNIMP_COVER	-1.2374***	0.0002
LNPARALLEL	0.2086	0.5037
LNRES	1.3689***	0.0080
MPR	-0.0324	0.4313
C	-3.5706	0.5676
R^2	0.6714	
Adj R^2	0.6404	
DW	2.04	
F-statistics	21.6262	(0.0000)

Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP, LNCAP_IMP, COM_RATE, LNFDI, LN IMP_COVER, PARALLEL, MPR, and RES stand for a log of total export, log of total imports, log of nonoil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary .policy rate, and log of foreign reserves respective. ****, **, *** represents 10%, 5%, 1% level of significance respectively***

The error correction coefficient indicates the speed of adjustment from the short-run dynamics to long-run equilibrium is 0.47 (Table 7). In this case, 46.56% of the long-run disequilibrium in the previous months is adjusted in the first month following a 100% distortion to the system while the rest 53.44% is accounted for by the following months. Specifically, the system will adjust to the long-run equilibrium in less than 3 months following a disturbance to the system (including the month when the disturbance takes place)

In the long run commercial banks' interest rates, foreign direct investment, and monetary policy rates have negative and insignificant effects on oil imports. This implies that both in the short and long run, these show signs of negatively affecting oil imports (Table 7). Like the case of the short-run dynamic, import cover has a negative and significant effect on oil imports while external reserves have a positive and significant effect. However, the magnitude of the effect of external reserve is relatively more pronounced in the short run (1.40) than in the long run (1.37). Similarly, the parallel market has no significant influence on the long-run movement of oil imports. Hence, either in the short run or long run, the parallel market exchange rate does not significant, albeit, positive role in the movement of oil imports. The statistical value of the adjusted R-squared is 0.64, indicating that 64% variation in export is explained by the explanatory variables (Table 7), meaning that the model is good. The probability value for the F-Statistic is less than 0.05 and Durbin Watson value is around 2 and all these statistical indicators confirm that the estimated model is valid.

On the ground that models of oil export, non-oil exports, and imports do not co-integrate to the long-run equilibrium, short-run dynamics are estimated and reported. Starting with the results of the non-oil exports, short-run movement in non-oil export is positively and significantly related to the previous value of non-oil export. In this regard, the short-run movement in non-oil export is driven to the tune of 0.2% for a 1% movement in the previous value of the variable. However, the third lag shows a negative and significant effect. What this implies is that there is positive inertia built into the non-oil export. This inertia can be informed by the preference for Nigerian products either by foreigners or by Nigerian emigrants. Studies have confirmed that Nigerian emigrants demand their locally produced goods and, in some countries such as Iceland, Ireland, Sweden, and the US, there are big stalls where Nigerian products are sold (IOM, 2014). Commercial bank's interest rates, monetary policy interest rates, and foreign direct investment have negative but insignificant impacts on the short run movement of non-oil export. It is worrisome that foreign direct investment not only insignificantly affects non-oil exports but also that the direction of effect is negative. Meanwhile, the main reason this could be so is that most foreign direct investment is either in the oil sector or in firms that serve the domestic economy. The potential negative effect indicated by the commercial bank's interest rate suggests that the cost of funding exports through banks still discourages intending exporters.

Parallel exchange rate exerts a negative and significant effect on the short-run movement of non-oil export. In this regard, if the parallel exchange rate depreciates by 1%, nonoil exports will fall by 0.13% in the short run. This confirms how detrimental the parallel exchange rate is to non-oil exports. Owing to the existence of a parallel exchange rate, some non-oil export products will be carried out through a clandestine channel to avoid low returns (of local currency) from their exports. However, inspecting the magnitude of the effect, the reduction in non-oil export following parallel exchange rate is mild. Barring asymmetry in the exchange rate movement, an appreciation of parallel exchange rate will encourage exports by 0.13%. Thus, short-run movement in non-oil export tends not to be highly sensitive to changes in parallel market exchanger rate.

Table 8: Short-run dynamic of the effect of parallel market exchange rate on total non-oil export

Variable	Coefficient	Prob.
D(LNNON_OIL_EXP(-1))	0.1943**	0.0354
D(LNNON_OIL_EXP(-2))	0.0969	0.3101

D(LNNON_OIL_EXP(-3))	-0.4824***	0.0003
D(COMM_RATE)	-0.0312	0.1500
D(LNCAP_IMP)	0.0352**	0.0476
D(LNFDI)	-0.0134	0.4912
D(LNPARALLEL)	-0.1274***	0.001231
D(LNRES)	0.1217	0.2791
D(MPR)	-0.0014	0.9150
CointEq(-1)	-0.1449	0.1338
R^2	0.8249	
Adj R^2	0.8114	
DW	1.97	
F-statistics	60.8061	(0.0000)

Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP, LNCAP_IMP, COM_RATE, LNFDI, LN IMP_COVER, PARALLEL, MPR, and RES stand for a log of total export, log of total imports, log of nonoil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary .policy rate, and log of foreign reserves respective. ****, **, *** represents 10%, 5%, 1% level of significance respectively***

The error correction coefficient in the table is insignificant, albeit, exhibiting the right sign. This confirms the nonexistence of long-run co-integration of the variables. The adjusted R-squared is 0.81, which indicates that more than 80% of the variation in non-oil export is explained by the considered explanatory variables. Similarly, the probability value associated with the F-statistics is less than 0.05 while the Durbin-Watson statistic is 1.97. These statistical indicators suggest that the estimated model is significant and efficient and hence valid for policy prescription.

The short-run movement of non-oil imports is positively related to the lag of non-oil imports by the first and second periods, commercial banks rate, external reserves, foreign direct investment, monetary policy rate (including the third lags), and parallel exchange rate (Table 9). The short run movement in non-oil import is negatively related to the third lag of non-oil import, the import cover, and the first lag of monetary policy rate. While the first and third lags of non-oil imports significantly affect the movement of non-oil import, the second lag was not significant. But what should be noted is that it appears non-oil import is highly pronounced in Nigeria. Another point to note is that with time, Nigeria tends to be producing import substituting products so that less and less imports of non-oil products are purchased. Foreign direct investment, first and second lags of monetary policy rates, show potential influence on the short run movement of non-oil imports but they are insignificant. Both commercial banks interest rate and external reserves have significant impact. In particular, an increase in commercial banks interest rate to the tune of 1% will engender a 0.01% increase in non-oil imports. Of course, this result appears to be counterintuitive but it might indicate that the interest rates charged by the commercial banks have not reached a point where it will be discouraging for importers of non-oil products. A similar situation is observed in the case of the third lag of the monetary policy rate. But what should be noted crucially is

the magnitude of the effect (Table 9). For both commercial banks and monetary policy interest rates, the magnitudes are meager, almost negligible. The significant effect of reserve on the short-run movement of non-oil import is not surprising. Besides, the magnitude of the effect is modest, because, for a 1% increase in external reserve, non-oil imports will rise by 0.13 percentage points. Import cover has a significant effect, posting a 0.12% negative effect on the short-run movement of non-oil imports for a 1 percentage increase (Table 9).

The parallel exchange rate is pronounced in the short-run movement of non-oil imports (Table 9). Both the current and immediate previous values of parallel exchange rate matter for the importation of non-oil products. Previous depreciation of the parallel exchange rate by 1% enhances non-oil imports by 0.4% while current depreciation engenders approximately 0.1%. Referring to non-oil export's response to the parallel market exchange rate, depreciation influences imports more than exports. However, looking at the period of effect, the current change rate in the parallel market affects non-oil exports (0.13) (Table 8) than non-oil imports (0.1) (Table 9). It is the case that non-oil imports tend not to respond significantly to current changes in parallel exchange rates. However, the previous change in the parallel exchange rate is what matters most for non-oil imports. Thus, the parallel exchange rate affects non-oil export and non-oil import differently in terms of magnitude, direction, and period. However, it is possible to inspect whether the condition for J-curve exists in the short run for non-oil trade. Depreciation of the parallel exchange rate reduces exports and increases imports, hence non-oil trade balance is in deficit. Therefore, the condition for J-curve exists in the short run. However, since no long-run estimation owing to the non-cointegration of the model, the validity of the J-curve as informed by the depreciation of the parallel exchange rate is inconclusive. Nevertheless, it is important to note that the parallel market exchange rate is detrimental to the short-run non-oil trade and the detrimental effect comes mostly from importation (0.4) (Table 9).

Similar to the case of non-oil exports, the error correction coefficient for non-oil imports is also not significant, albeit, exhibiting the right sign. This confirms the nonexistence of long-run co-integration of the variables. The adjusted R-squared is approximately 0.72, which indicates that more than 70% variation in non-oil imports is explained by the considered explanatory variables. Similarly, the probability value associated with the F-statistics is less than 0.05 while the Durbin-Watson statistic is around 2. These statistical indicators suggest that the estimated model is significant and efficient and hence valid for policy prescription.

Table 9: Short run dynamic showing the effect of effect of parallel exchange rate on non-oil import

Variable	Coefficient	Prob.
D(LNNON_OIL_IMP(-1))	0.2848***	0.0000
D(LNNON_OIL_IMP(-2))	0.0136	0.8597
D(LNNON_OIL_IMP(-3))	-0.5907***	0.0000
D(COMM_RATE)	0.0124*	0.0990
D(LNFDI)	0.0004	0.9483
D(LNIMP_COVER)	-0.1187**	0.0062

D(LNPARALLEL)	0.0977	0.6030
D(LNPARALLEL(-1))	0.3912**	0.0305
D(GRES)	0.1383*	0.0665
D(MPR)	0.0206	0.1921
(MPR(-1))	-0.0095	0.6459
D(MPR(-2))	0.0289*	0.0601
CointEq(-1)	-0.0434	0.4550
C	-29.3531	0.5500
R^2	0.7278	
Adj R^2	0.7184	
DW	1.57	
Statistics	98.8016	(0.0000)

Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP, LNCAP_IMP, COM_RATE, LNFDI, LN IMP_COVER, PARALLEL, MPR, and RES stand for a log of total export, log of total imports, log of nonoil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary .policy rate, and log of foreign reserves respective. ****, **, *** represents 10%, 5%, 1% level of significance respectively***

The result of the oil exports effects of parallel exchange rate alongside other catchall variables is presented in Table 10. The result reveals that the short-run movement in oil export is negatively and significantly related to its first and second lags. The first lag suggests that the short-run movement in oil export is reduced by 0.3% for a 1% increase in the previous oil exports. In the same vein, the movement in the oil export is reduced by 0.33% for a 1% increase in the second lag of oil export. Similar to the results obtained earlier, commercial banks' interest rate, monetary policy interest rate, and capital import (import cover) insignificantly influence the short-run movement in oil exports. Unlike results obtained earlier, foreign direct investment has a significant and positive influence on the short-run movement in oil export. In this regard, a 1% increase in foreign direct investment raises short-run oil imports by 0.002%. The magnitude of the effect is mild, suggesting that changes in foreign direct investment in the oil sector will have a slight effect on the exportation of Nigerian oil.

Parallel exchange rate negatively and significantly affects oil exports. If the parallel exchange rate depreciates by 1%, oil exports will fall by 0.95%. This result first indicates that oil exportation is sensitive to changes in parallel exchange rates. Second, it is the case that a huge underground oil exportation takes place in Nigeria thereby hampering officially recorded oil exports. There have been cases of illegal oil exploration in the oil-rich region of Nigeria and most of these illegal oil exploration finds its way out of the country illegally. What role does parallel exchange play in this arrangement and how does that lead to a negative effect on oil export? Those engaging in illegal activity will access a parallel market to aid production, making access to foreign exchange in the official market more difficult and stringent. The returns from the sales of illegal oil exports may not be officially reported and

so, not officially available in the market. Owing to the illegality and the fear of being caught in the process, some exporters of illegal oil may decide to accept domestic currency. In any of these cases, foreign exchange becomes officially scarce, thereby leading to a reduction in official oil exports.

Table 10: Short-run dynamic results of the effect of parallel exchange rate on total oil export

Variable	Coefficient	Prob.
D(LNOIL_EXP(-1))	-0.273574**	0.0267
D(LNOIL_EXP(-2))	-0.325125**	0.0179
D(COMM_RATE)	0.026132	0.1895
D(LNCAP_IMP)	-0.019527	0.2156
D(LNFDI)	0.002930*	0.08616
D(LNPARALLEL)	-0.948637*	0.0517
D(LNRES)	1.050333**	0.0482
D(MPR)	-0.007193	0.5117
CointEq(-1)	-0.1128	0.2209
C	9.9094	0.3482
R2	0.7934	
Adj R2	0.7758	
DW	2.05	
Statistics	45.0325	(0.0000)

Note: LNEXPORT, LN IMPORT, LNNONOIL EXP, LNNONOIL IMP, LNOIL EXP, LNOIL_IMP, LNCAP_IMP, COM_RATE, LNFDI, LN IMP_COVER, PARALLEL, MPR, and RES stand for a log of total export, log of total imports, log of nonoil export, log of nonoil imports, log of oil export, log of oil import, log of capital import, commercial bank interest rate, log of foreign direct investment, log of import coverage, parallel market exchange rate, monetary .policy rate, and log of foreign reserves respective. ****, **, *** represents 10%, 5%, 1% level of significance respectively***

The error correction coefficient for oil exports is also insignificant, albeit, exhibiting the right sign. This confirms the nonexistence of long-run co-integration of the variables. The adjusted R-squared is approximately 0.78, which indicates close to 80% variation in non-oil imports is explained by the considered explanatory variables. Similarly, the probability value associated with the F-statistics is less than 0.05 while the Durbin-Watson statistic is around 2. These statistical indicators suggest that the estimated model is significant and efficient and hence valid for policy prescription.

3.1 Diagnostic test

The Breusch-Godfrey test -for the test of auto-correlation, the ARCH (for the test of heteroscedasticity), Ramsey-RESET test (for the test of linearity) for all the variables above are indicated in Table 11. The result indicates that the hypothesis of no autocorrelation is rejected for all the models.

Table 11: Diagnostic tests of the models

	Breuch-Godfrey (Probability)	ARCH (Probability)	Ramsey-RESET (Probability)
Export model	0.3327(1.004)	0.777(0.7808)	1.3200(0.2046)
Import model	0.2098(0.8110)	0.0104(0.9850)	2.1158(0.1483)
Non-oil export	0.4259(0.6541)	0.1323(0.7166)	2.6388(0.0411)
Non-oil import	0.8664(0.1315)	8.4406(0.0045)	0.0714(0.7898)
Oil export	1.8775(0.1320)	1.3752(0.2399)	2.7366(0.1400)
Oil import	0.1404(0.8548)	5.1578(0.0247)	1.3912(0.4679)

Note: Probabilities values are in Parentheses

This suggests that there is a presence of serial correlation in any of the ARDL models. The ARCH test which indicates the presence of heteroscedasticity, has probability values greater than 5% for all the models. This explains that there is no presence of heteroscedasticity in these models. Ramsey- RESET test results also have a probability value greater than 5%, which means no issue of functional misspecification in any of the models. Consequently from the diagnostic results, the results arising from the estimation are reliable, valid, and in order for understanding the role parallel market for exchange rate plays in international trade in Nigeria. The result can therefore be useful for policy prescription.

4. CONCLUSION

The study analyses the influence of the parallel exchange rate on the international trade in Nigeria. The motivation for this study is borne out of the fact that almost all readily available and accessible studies on the exchange rate and trade in Nigeria employs the official exchange rate whereas there exists multiple windows for foreign exchange thereby prompting the existence of a functional parallel market for exchange rate. Therefore, it is imperative to establish whether the parallel market for exchange rates inhibits or enhances international trade. Besides, in the face of multiple exchange rates, when there is a change in the official exchange rate, even though the parallel exchange rate will react in the same manner, in some cases, parallel markets can also trigger or cause policymakers to reset the official exchange rate. Thus, the effect of parallel exchange rates on trade requires close attention.

To be more comprehensive, after analyzing the effect on total export and total import separately, the authors further unravel the influence of parallel exchange rate on the major components of exports and imports, that is, oil and non-oil exports and imports respectively. If total trade responds to the exchange rate, it is not clear whether the same result will be obtained when trade is disaggregated. Thus, lumping up all products into one could result in aggregation bias, a very serious issue in quantitative research. Disaggregating trade into oil and non-oil trade in the case of Nigeria will further shed light on the particular sector (oil or non-oil) that is affected by the parallel exchange rate. Monthly data from January 2007 to December 2022 (2007:1-2022:12) were extracted from the online data repository of the Central Bank of Nigeria. Employing the autoregressive distributed lag (ARDL) estimation method, it was observed that total exports, total imports, and oil imports exhibit co-integration to the long-run equilibrium while the same cannot be confirmed for other models. Consequently, only short-run dynamics were analyzed for the movement in nonoil exports and imports and oil exports. The result indicates that the short-run dynamic of total exports is negatively and significantly affected by the parallel exchange rate while the short-run dynamic of imports is positively and significantly influenced by the parallel exchange rate. In the same vein, the parallel exchange rate affects short-run movement in non-oil exports negatively and significantly. The effect of the parallel exchange rate on the short-run dynamics of non-oil imports is persistent since both the current and previous changes in the parallel market have positive and significant effect on non-oil imports. It is also of note that short-run movement in oil export is negatively and significantly affected by the parallel exchange rate. In the long run, a parallel exchange rate inhibits total export but total import and oil imports exert a positive effect. However, the effect of a parallel exchange rate on the long-run movement of oil imports is insignificant. Therefore, it can be concluded that the depreciation of the parallel exchange rate is detrimental to exports particularly non-oil exports. Further, the depreciation of the parallel exchange rate encourages imports and is highly persistent in influencing non-oil imports.

The J-curve phenomenon breaks down for the total balance of trade because although in the short run, the trade balance worsens following the parallel exchange rate, it worsens further in the long run, contrary to the prediction of the J-curve that the trade balance will improve. However, the J-curve phenomenon cannot be confirmed in the case of the oil trade balance because in the short run, the oil trade balance worsens following parallel exchange rate deprecation but in the long run oil import shows a positive and insignificant effect while there is no information about the long run effect of parallel exchange rate on oil export. Meanwhile, since oil import shows a positive effect, the J-curve phenomenon may break down. In the case of non-oil trade balance, the short-run outcome conforms to the existence of J-curve prediction because the non-oil trade balance deteriorates following parallel exchange rate depreciation.

Following the conclusion, the policy implication as long as a parallel market for exchange rates exists, the official trade balance will deteriorate and there can be vicious us circle of trade deterioration. Of importance is the detrimental effect that the parallel market has on the non-oil trade. Now that the country is trying to focus more on the non-oil sector and possibly be able to earn more foreign exchange through the production and export of non-oil products, policymakers need to find a solution to the multiple windows for foreign exchange. The policy of a floating exchange rate may not work out if flairs for imports are not addressed. Our result indicates that non-oil import is persistent in their response to the depreciation of the parallel exchange rate. Thus, non-oil importation, particularly products that will require the payment of huge amounts of foreign exchange should be discouraged. Some of the non-oil imported products that consume foreign exchange are expensive (bulletproof) sport utility vehicles by government officials, and highly expensive imported furniture and fittings to mention a few. This set of non-oil imported products drains foreign

exchange and it makes foreign exchange less available for productive use in the non-oil sector.

Accumulation of reserve is very important to be able to accommodate non-oil import outlay. Hence, prudency in the spending of reserves is very important. In this case, the reserve can be preserved during the boom period. Also, foreign reserves can be spent on non-oil imports such as capital goods that will help grow the economy. Import cover inhibits non-oil import, oil import, and non-oil export. Hence, the authorities should look into the nature of import cover to unravel why it negatively affects trade.

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COMPETING INTERESTS

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

AUTHORS' CONTRIBUTIONS

O.J Oyetayo conceived the presented idea and developed the theory. Together with E.A Olubiyi and F.G Olaifa, data collection was done. O.J Oyetayo suggested the econometric methods which was verified by E.A Olubiyi. Data collection was done by O.J Oyetayo and F.G Olaifa prepared data ready for analysis. E.A Olubiyi analyzed and O.J Oyetayo interpreted the analysis. F.G Olaifa compiled the body of the work with citations. E.A Olubiyi vetted the work. Referencing was done by O.J Oyetayo and F.G Olaifa.

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APPENDIX