ESTIMATING THE LONG RUN EFFECTS OF EXCHANGE RATE DEVALUATION ON THE TRADE BALANCE OF NIGERIA

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Abstract

This paper attempts an empirical investigation of the impact of currency devaluation on Nigeria trade balance using the Johansen co-integration and variance decomposition analyses from 1970-2010; whether exchange rate devaluation improves or worsens trade balance has been at the centre of literature debate over time with varying empirical evidences for developed and developing nation. The empirical results indicate that there exist a long-run stationary relationship between trade balance and its determinant- domestic income, domestic and foreign money supply, domestic interest rate and nominal exchange rate; as employed in the study. Also, there exists an inelastic and significant relation between trade balance and its determinants. Our major findings include; exchange rate induce an inelastic and significant relation on trade balance in the long run, there exist no short run causality from exchange rate to trade balance and money supply volatility contributes more to variance in trade balance than exchange rate volatility. The paper concludes with important implications for policy makers because it provides evidence supporting that fact that level of money supply has a major impact on trade balance adjustment and that devaluation of the exchange rate worsens the trade balance of Nigeria in the long run.

Keywords: Nigeria, devaluation, Johansen co-integration, variance decomposition, trade balance

1.0 Introduction

Economic theory posits that devaluation will likely improve a nation's trade balance; however, there are different schools of thought with divergent explanations of how devaluation improves trade balance (Rawlins and Praveen 1993). Developing countries often face a major decision in

reducing large trade deficits and in order to achieve this, they are faced with challenging policy decision of whether to devalue exchange rate or embark on internal/external debt financing. Empirical literature on developing and transition economies have established that currency devaluation will lead to improvement in trade balance in the long-run (Agbola 2004, Rawlins and Praveen, 2000; Musila and Newark, 2003; Bahmani-Oskoee and Ratha, 2004). Evidences from existing literature examined the effect of currency devaluation (depreciation) on trade balance using the marshall-lerner (M-L) condition; this implies that devaluation will improve in the long-run given that the sum of the absolute values of export and import demand price elasticities exceeds unity. The aim of this paper is to examine whether a long-run relation exists between the trade balance and nominal effective exchange rate in Nigeria.

1.1 Snapshot of Exchange Rate Regime in Nigeria

The Nigerian government adopted the Nigerian pound since 1959 until 1973 where it was   changed to Naira. In 1971 the Nigerian authorities chose not to devalue its Nigerian pound during the devaluation process of the American dollar and this resulted in the appreciation of the Nigerian pound dollar exchange rate $2.80-$3.80 to the naira pound. In 1973 the naira replaced the Nigerian pound and then Nigeria devalued at the same rate with the US which caused the exchange rate to be $1.52. The year 1986 was a transformational year in the exchange rate policy of Nigeria it was characterized by the introduction of the structural adjustment program (1986) that was put in place to address the structural imbalance in the economy in order to attain a structural transformation in the economy, Omojimite (2010). By 1994, the federal government fixed the exchange rate at $22 to a US dollar which implies a shift from the flexible regime of 1986. The foreign exchange market was liberalized in 1995 and it saw the introduction of autonomous foreign exchange market (AFEM) for sale of foreign exchange dedicated to this market by government as well as purchase of foreign exchange by the Central Bank of Nigeria (CBN) from the oil companies, Alao (2010). An Inter-Bank foreign Exchange Market (IFEM) was introduced on October 25, 1999. The operation of the IFEM, however, experienced similar problems and setbacks as the AFEM. The CBN thus, re-introduced the Dutch Auction System (DAS) to replace the IFEM Sanusi (2004).

2.0 Theoretical Review of Literature

There have been several theories in the economic literature that examine the effect of depreciation/devaluation on the trade balance. The prominent theories considered in this study include: the elasticity approach, monetary approach and absorption approach.

The elasticity approach was propounded by Robinson (1947) and Metzler (1948) and popularized by Kreuger (1983) it says that transactions under contract completed during the period of devaluation/ depreciation may affect the trade balance negatively in the short run but over time export and import quantities adjust which give rise to elasticities of exports and imports to increase and quantities to adjust. As a result of this, the foreign price of the devaluing/depreciating country's export is reduced and increase the price of imported goods which directly reduces the demand for imports at the long run the trade balance improves. This theory clearly states that the effect of devaluation/depreciation is dependent on the elasticity of exports and imports. This approach, commonly known as the BRM model which is gotten from the proponents (Bickerdike, 1920; Robinson, 1947; Metzler, 1948), has been recognized in the literature as providing a sufficient condition (the BRM condition) for a trade balance improvement when exchange rates devalue/depreciate. The hypothesis that devaluation /depreciation can improve the trade balance has been also rooted in a particular solution of the BRM condition, known as the Marshall-Lerner condition (Marshall, 1923; Lerner, 1944). This condition states that for a positive effect of devaluation/devaluation on the trade balance, and implicitly for a stable exchange market, the absolute values of the sum of the demand elasticities for exports and imports must exceed unity.

Past data for developed and developing countries have shown that devaluation/depreciation may cause a negative effect on the trade balance in the short run but an improvement in the long run; that is, the trade balance followed a time path which looked like the letter "J". The main explanation for this J-curve has been that, while exchange rates adjust instantaneously, there is lag in the time consumers and producers take to adjust to changes in relative prices (Junz and Rhomberg, 1973; Magee, 1973; Meade, 1988). In terms of elasticities, domestically, there is large export supply elasticity and low short-run import demand elasticity. Williamson (1983) criticized the elasticity theory arguing that higher import prices that are caused by devaluation /depreciation could stimulate increase in the domestic prices of non traded goods. This leads to a rise in inflation and potentially reduces the advantages of devaluation/depreciation as manifested in the increase in trade balance. Laffer (1977) opined that the elasticity approach is not likely to hold in real life situation also Himarious (1989) shares similar view; that the effectiveness of devaluation/depreciation on real exchange rate and its effect on trade balance is of core importance.

Some of the initial criticisms of the elasticity approach are: (a) the import demand and export supply functions, defining the structural model, depend only on the nominal prices (measured in domestic currency units) rather than on relative prices and appropriate scale variables such as real

income, real expenditures, real money balances, or productive capacity; (b) there are markets or goods not accounted for explicitly. For example, a trade deficit implies that goods are paid for with an asset (e.g., money) or income that has not been explicitly included in the analysis Alexander (1952). (c) it relies overly on a partial approach for analyzing a problem that should use a general equilibrium framework.

The monetary approach, the main view of this approach is that balance of payment is a monetary phenomenon (Frenkel and Johnson 1977). Any excess demand for goods, services and assets, could lead to a deficit in the balance of payments; reflects an excess supply of or demand for the stock of money. Accordingly, the balance of payments behavior should be analyzed from the point of view of money supply and demand. The monetarist view is based on the argument that devaluation/depreciation reduces the real value of cash balances and changes in relative price of traded and non-traded goods, and causes the trade balance to improve (mills 1979). However, higher import prices after devaluation/depreciation may contribute to higher overall domestic prices of non-traded good and then impact negatively on the trade balance.

Upadhaya and Dhakal (2004) opined that devaluation/depreciation decreases the real supply of money which gives rise to the excess demand for money, the effect of this is hoarding and an increase in trade balance. From the point of view of the monetarist, the role of relative prices in the analysis of devaluation /depreciation is not important in explaining the effect of devaluation/depreciation on trade balance.

The monetarist approach could also be called global monetarist approach (polak 1957, Hahn 1959). This approach can be seen in this manner Since countries are "large" countries with elastic supplies, then under the assumption of constant domestic prices (in other words, strictly elastic export supply), a devaluation/depreciation will reduce the relative price of domestic exports in foreign currency (because the domestic export supply schedule shift down). The price of imports in foreign currency remains constant, or it can decrease if the foreign export supply is not perfectly elastic. The key condition for a worsening of the domestic term of trade is that the decrease in the price of exports is greater than the decrease of the price of imports.

Two monetary perspectives have been distinguished in literature: the monetary approach and the Keynesian monetary view, Frenkel and Johnson (1977). Some of the basic assumptions underlying each of these perspectives are the following. With respect to the monetary approach: (1) there is full employment; (2) there is perfect arbitrage in the world markets, (3) money and other assets may exist, which are close substitutes for domestic and foreign goods or assets. This approach has also been called the "global monetarist" (Whitman, 1975). The Keynesian view has the following

assumptions: (1) there is unemployment, (2) price sluggishness, (3) and money is a close substitute for other assets, (Whitman 1975). According to the Monetarist view, increases in the money supply propel real balances above levels considered optional by economic agents, resulting in increased expenditure out of a given income thus stimulating imports and causing the trade balance to deteriorate.

A different approach to the balance of payments emerged at the beginning of 1950s, called the absorption/switching approach. Authors such as Harberger (1950), Meade (1951), and Alexander (1952) came to be part of a new body of analysis known as the absorption approach to the balance of payments (Krueger, 1983). Johnson (1967) and popularized by Miles (1979), posits that the devaluation/depreciation of a country's currency may cause the terms of trade to deteriorate, switching expenditure away from foreign goods to domestically produced ones, and thereby improving the trade balance of that country – expenditure switching effect. According to Hernan Rincon (1998) this approach shifted focus of economic analysis to the balance of trade and solved most of the problems of the economic aggregate.

Hernan Rincon (1998) noted two main points; first of all, in a similar manner to that of the elasticity approach, in absorption approach the current account is reduced to the trade balance and the countries referred to are "large" countries.

Secondly, unlike the elasticity approach, income and money are introduced, though the latter is slightly discussed. As for the trade balance, it is necessary to clarify some points. The absorption approach takes implicitly the Keynesian income-expenditure assumption that export volumes are independent (autonomous) of national income, and that imports depend directly and positively on national income.

2.1 Methodological Review of Literature

Damoense and Agbola (2004) using the Johansen co-integration technique and VECM vector error correction model to determine the lag length and their study made use of the Akaike final prediction error (FPE) criteria indicate that domestic and foreign income, domestic money supply, domestic interest rates and exchange rates have a negative impact on the trade balance, while foreign money supply and interest rates have a positive impact on the trade balance. The evidence given by the authors' supports the view that devaluation/depreciation of the exchange rate worsens the trade balance of South Africa in the long run. Like empirical evidence from Agbola (2004) suggested that the negative relationship between depreciation/devaluation and the balance of trade may be attributable to the overall effects of trade liberalization on the South African economy. Some evidence has also suggested that overall trade liberalization tends to have a negative impact on the trade balance account. Thirlwall (2004).

Hernan Rincon (1998) examined the role of exchange rates in determining the short-and-long-run trade balance behavior for Colombia using the Bickerdike-Robinson-Metzler (BRM) and Marshall- Lerner (ML) conditions. He made use of a regression model formulation which includes income and money so that the monetary and absorption approaches to the balance of payments are also examined. The Johansen and Juselius' approach was used to estimate the multivariate co-integration systems.The main result of Hernan (1998) was that exchange rates do play a role in determining the short-and-long-run behavior of the Colombian trade balance. His results also showed that the long-run effect of exchange rate depreciation on the trade balance is enhanced if accompanied by reduction in the money stock and an increase in income.

Frank Agbola (2004) also examined the impact of depreciation/devaluation on trade balance of Ghana and he made use of data spanning the period 1970 and 2002 in his analyses. The Johansen multivariate co-integration procedure revealed that Ghana's trade balance and key determinants are co-integrated, and thus share a long-run equilibrium relationship. The Stock-Watson dynamic OLS model (DOLS), shown an empirical evidence of significant long run relationship between Ghana's trade balance and real domestic and foreign income, domestic and foreign interest rates and exchange rates. Also empirical result supported the fact that depreciation/devaluation does not improve the trade balance of Ghana in the long run. The response in trade balance to movements in the exchange rate appears to be characterized by an M-curve phenomenon.

Rawlins and Praveen (1993) conducted a research to find out whether devaluations/depreciation as deliberate policy initiatives serve to bolster the trade balance, and if so, whether the transmission mechanism is more consistent with the elasticities or the Monetarist view of devaluation/depreciation. Their research conducted an econometric analysis of annual data for nineteen Sub-Sahara African countries (Burkina Faso, Cameroon, Central African Republic, Côted'Ivoire, Gabon, The Gambia, Ghana, Kenya, Madagascar, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Togo, Zaire and Zambia). They came out with the result that depreciation/devaluation in the real exchange rate does improve a country's trade balance in the year of devaluation/depreciation that there are persistent effects of such devaluations/depreciations but with smaller changes over time, and that expansionary fiscal policies work to negate the beneficial effects of a devaluation/depreciation on a country's trade balance.

3.0 Theoretical framework

Several literature and studies have examined the relationship between exchange rate devaluation and trade balance with diverse suggested economic policy implications. The literature has witnessed vast studies on

the nexus between exchange rate devaluation and trade balance in the developed economy (Rosenweig and kock, 1998; Rose and Yellen, 1989; kim, 2001; Bahmani-Oskoee and Ratha, 2004).

Also, there has been a growing research in the developing countries (Bahmani-Oskoee, 1985; Upadhyaya and Dhkal, 1997; Senhadji, 1998; Rawlins and Praveen, 2000; Singh, 2002; Musila and wewark 2003; Narayan and Narayan, 2004; Agbola, 2004). In addition to existing researches, this study investigated the trade relationship in Nigeria

The work that modelled the relationship between trade balance and exchange rates first appeared in the seminal paper of Bickerdike (1920) and subsequent works of Robinson (1947) and Metzler (1948); the outcomes of these papers has become what is known as elasticity approach to balance of payments. The elasticity approach point that a devaluation or depreciation of country causes the trade balance to deteriorate in the short-run but as the elasticities of export and import rises, the increase in the volume of export and falling quantities of import (substitution effect) results in an improvement in the trade balance of the devaluing economy, a situation known as j-curve phenomenon. Though several studies have to examine the existence of the J-curve phenomenon but this study estimated the long run effect of devaluation (depreciation) on Nigeria trade balance.

The monetary approach is based on the premise that devaluation (depreciation) reduces the real value of cash balances. It claims that the balance of payment is essentially a monetary phenomenon (frenkel and Johnson, 1977). It analysis the balance of payment behaviour from the point of view of the supply and demand of money, that is, excess demand (supply) for foreign goods would require a more demand (supply) of the stock of money. (polak, 1957; Hahn 1959; Pearce 1951; Prais, 1961; Mundell, 1968, 1971; Hernan R.C 1998).

An increase import prices following devaluation would cause a rise in domestic prices of non-traded goods which would impact negatively on trade balance (Williams 1983, Upadyaya and Dhakal 2003; Hernan R.C 1998). In addition, an alternative monetarist view considered as increase in money supply to degenerate trade balance; as such increase, raises real income and further stimulate import demand, a phenomenon known as income absorption effect

The absorption approach focuses its analysis on economic aggregates (Keynesian analysis) contrary to the elasticity approach which consider the effect of exchange rate changes on individual microeconomic behaviour (Marshallian supply and demand analysis). This approach takes trade balance improvement originating from the increase of income over total domestic expenditures (Harberger 1950; Meade 1951 and Alexander 1952, 1959). According to the works of Johnson 1967 and Miles 1979; devaluation

(depreciation) may cause the terms of trade to deteriorate but switching expenditure away from foreign goods to domestically produced ones (reduction in consumption and emphasising increase national income) would thereby improve the trade balance of the country; a situation known as expenditure switching effect.

3.1 Model

The paper attempted to examine the impact of devaluation on trade balance. The model to be used shall follow a straightforward formulation from the works of Buluswar et al 1996 and Agbola 2004. Some key variables having significant effects on import, exports and trade balance of an economy shall be considered as determined by economic theory. Here, the trade balance of an economy shall be taken as the difference between export revenue (x) and import revenue (M); therefore, the trade balance of Nigeria is expressed as follows

$$TB = X - M = P_x Q_x \left(\frac{P_x}{e}, Y^*\right) - e P_m^x Q_m \left(e P_m^x, \qquad Y\right) \dots\dots\dots\dots\dots\dots\dots\dots i$$

Where TB represents trade balance, X is exports revenue, M is export expenditure, P_x is the naira price of exports, Q_x is the quantity of exports, P_m is foreign currency price of imports, Q_m is the quantity of imports, e is the value of foreign currency in terms of Nigeria naira, Y is the domestic national income, Y^* is foreign income.

Following Buluswar et al 1996 and Agbola 2004, a monetary model based on Nigeria economy is represented below; this model is built on the premise of money market equilibrium

$$\frac{M_s}{P} = L(Y,e) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots ii$$

Where M_s is the nominal supply, P is the domestic price level, L represents the demand for money, e is the value of foreign currency in naira, and Y is domestic real income.

The second equation (ii) is drawn on the premise that money market is in equilibrium, which makes real money supply determined by the demand for money and exchange rate. Also, a higher volume of foreign currency in naira (e) would worsen the purchasing power of naira and thus increase demand for money needed to maintain imports; likewise an increase in domestic money supply (M_s) would encourage domestic spending hereby depleting cash balances and consequently cause a worsening trade balance (Johnson 1972, Dornbush 1973,1975). However, Buluswar et al (1996) considered an alternative view of the effect of an increase in the stock of money (M_s); that is, an increase in money supply would raise price, lower the exchange rate, hereby improving trade balance in the long run.

According to Dornbush 1973; a higher price could result in lower real money supply M_s/P, a situation known as hoarding likewise a higher domestic

income could necessitate excess money demand and hoarding.

The effect of interest rates on trade balance can be view into two channels: one is through its effect on money and other monetary assets. Here, changes in interest rate influence savings and consumption and subsequently imports. "interest rate generates excess money supply and thereby causing trade balance to deteriorate" (Agbola, 2004).

Secondly, an excess demand for bonds could be created by an incessant increase in domestic interest rate; hereby improving trade balance, on the assumption that the demand for imports is falling. The impact of interest changes on trade balance depends on the magnitude of income and substitution effects; there would result an increase in interest rate if income effect dominates the substitution effect, hereby causing trade balance to deteriorate but alternatively the trade balance will improve if the substitution effects dominates the income effects (Himarious 1985, Agbola, 2004).

The empirical model used in this study is drawn from the existing literature as contained in the works of Himarious (1980, 1989), Bahmani-Oskoee (1985, 1989), Buluswar et al (1996), Agbola (2004):

$$TB = \alpha_0 + \alpha_1 Y_D + \alpha_3 M_D + \alpha_4 M_W + \alpha_5 IR_D + \alpha_6 NEER + \varepsilon_t \dots \dots \dots iii$$

Where TB is trade balance, $Y_D(Y_W)$ is real domestic (foreign) income, $M_D(M_W)$ is domestic (foreign) money supply, $IR_D(IR_W)$ represents domestic (foreign) interest rate, $NEER$ is nominal exchange rate and ε_t is the error term.

The nominal exchange rate is the value of Nigeria naira adjusted by changes in the domestic consumer price and index of foreign price. Some researchers have identified the inclusion of nominal exchange rate in trade balance model but economic theory is not specified on whether to use a nominal or real exchange rate. Empirical studies from the works of Hacker and Hatemi-J, 2004; Holmes, 2004; suggested a strong relationship between nominal and real exchange rate. Also researches have established that nominal devaluation leads to real devaluation in the long run (Holmes, 2004; Agbola, 2004). Likewise economic agents in developing country are more concerned about changes in nominal exchange rate than real exchange rate (Agbola, 2004); therefore, this study adopted nominal exchange rate for the purpose of its empirical analysis.

Data source and empirical result

The study drawn its basically World Development Indicators (WDI) database, spanning from 1970 to 2010. This data is used in econometric analysis to ascertain the effect of exchange rate on trade balance.

Variable	Description	Source
LNTB	Log of monetary Value of difference between total volume of export and import of Nigeria.	CBN, Statistical Bulletin
LNYD	Log of the monetary value of goods and services produced in Nigeria in a specific period	World Development Indicators (WDI) database
LNYW	Log of the monetary value of goods and services produced in the world in a specific period in time. (U.S GDP being used as a proxy).	World Development Indicators (WDI) database
LNMSD	Log of the value of total money in circulation in Nigeria economy at a period.	World Development Indicators (WDI) database
LNMSW	Log of the value of total money in circulation in the world at a period. (U.S M2 being used as a proxy)	World Development Indicators (WDI) database
LNIRD	Log of the value of prevailing level of interest rate in Nigeria.	World Development Indicators (WDI) database
LNNEXR	Log of the value of nominal exchange rate in Nigeria.	CBN, Statistical Bulletin

4.0 Estimation Procedure

The section starts by examining the time series properties of the data set employed. This is achieved by examining the stationarity properties of the data series using the Augmented Dickey-fuller (ADF) and Phillip Perron unit root test procedure. The data series are found to contain a unit root at level; that is the null hypothesis is not rejected. All variables become stationarity at first difference except the world money supply (LNMSW). In spite of this obvious limitation, the analyses proceeded and concluded that an attempted linear combination of the variables would be stationarity, this is similar to evidence by Engel and Granger (1987).

UNIT ROOT TEST				
Variables	Level		First Difference	
	ADF	PP	ADF	PP
LNTB	-1.082963	-1.047406	-5.847771	-6.368652
LNYD	0.668716	0.434204	-6.007880	-6.078186
LNMSD	-1.260827	0.648325	-3.966865	-2.942275
LNMSW	-1.823003	-2.920678	-0.654541	-0.654541
LNIRD	-1.216672	-1.255197	-5.867290	-5.880441
LNNEXR	0.027174	-0.078406	-5.107153	-5.103914
Critical 1%	-3.653730	-3.605593	-3.689194	-3.610453
Values 5%	-2.957110	-2.936942	-2.971853	-2.938987
10%	-2.617434	-2.606857	-2.625121	-2.607932

Source: Compiled by author using e-views 5.0

The study proceeds to test for the existence of co-integration among the variables in the model; this is based on the representation of the approach specified by Johansen and Juselius (1990). The Johansen test for co-

integration provides an analytical statistical framework for ascertaining the long-run relationship between the economic variable (Agbola, 2004). The table compare unrestricted co-integration rank test available from the trace and maximum eigenvalue test with the corresponding critical values due to Mackinnon-Haug-Michelis (1999); the procedure similarly adopted by Agbola, 2004. The results show that the trace test statistics indicates an existence of a long-run equilibrium stationary relationship among the observed variables in logarithm; this therefore, lead to the rejection of the null hypothesis of no co-integration in favour of a unique co-integration at 10 percent level of significance.

TRACE TEST				
Eigenvalue	Trace static	10 per cent critical value	Prob**	Hypothesized No. of CE(s)
0.831672	142.2111	127.7086	0.0006	None**
0.761572	92.31962	97.59724	0.0272	At most 1
0.566791	52.17635	71.47921	0.3224	At most 2
0.462222	28.75336	49.36275	0.5768	At most 3
0.320270	11.38470	31.15385	0.8524	At most 4
0.020327	0.575023	16.55386	1.0000	At most 5
MAXIMUM EIGENVALUE				
Eigenvalue	Trace static	10 per cent critical value	Prob**	Hypothesized No. of CE(s)
0.831672	49.89148	50.47307	0.0118	None**
0.761572	40.14327	44.01643	0.0306	At most 1
0.566791	23.42299	37.48696	0.3880	At most 2
0.462222	17.36866	30.83396	0.4272	At most 3
0.320270	10.80967	23.97534	0.5331	At most 4
0.020327	0.575023	16.55386	1.0000	At most 5

Source: Compiled by authors using e-views 5.0

Table presents the long-run estimates for trade balance model in Nigeria. The explanatory variables LNYD, LNMSD, LNMSW, LNIRD, LNNEXR all exerts an inelastic variation on the explained variable. This implies that a proportionate change in the explanatory variables would induce a less than proportionate change in trade balance; likewise, all the explanatory variables exert a significant variation on trade balance at 10% significance level except domestic interest rate (LNIRD).

The coefficient of the domestic income variable (LNYD) was found to induce an inelastic and significant relation at 1% level; this implies that an increase in domestic income would raise import demand and in turn cause trade balance to deteriorate.

The coefficient of the domestic money supply (LNMSD) was found to induce an inelastic relation and significant at 5% level; it implies that the trade balance of Nigeria worsen as money supply increases. This can be viewed in such that an increase money supply increases consumption

expenditure and demand for imported goods (Agbola, 2004; Wolgom, 2003; Smal and de Jager, 2001). Likewise from the works of Johnson 1977 as cited in Agbola 2004; ".... a preliminary test of the monetary approach can be conducted by testing whether the coefficient of real money balance is negative and statistically significant". Given that this is achieved in this study, it confirms the claim that monetary approach is a major channel through which monetary transmission adjustment takes place in Nigeria.

The coefficient of foreign money supply (LNMSW) was found to induce an inelastic variation and significant at 10% level; it implies that an increase in foreign income would raise demand for imports and in turn cause Nigeria trade balance to improve. An alternative view in such that an increase in foreign income could increase the level of remittances to Nigeria; since remittance are mostly used for consumption, this would raise local consumption/import expenditure and further worsen trade balance.

Co-integrating coefficient normalized on trade balance					
LNTB	LNYD	LNMSD	LNMSW	LNIRD	LNNEXR
1.000000	18.19558	3.204438	9.630566	0.919249	2.423321
	(3.83304)	(1.39531)	(5.42534)	(1.61608)	(0.84488)

Source: Compiled by author using e-views 5.0

The major focus of the study considers whether exchange rate devaluation has worsened or improved Nigeria trade balance hitherto; we shall be considering the exchange rate variable to determine the direction of relations between exchange rate and trade balance.

The coefficient of exchange rate (LNNEXR) was found to induce an inelastic variation and significant at 1% level; it implies that the devaluation of Naira would cause Nigeria's trade balance to deteriorate in the long-run; this finding is similar to earlier studies conducted by Damoense M.Y and Agbola F.W, 2007; Agbola, 2004; Upadhaya and Dhakal, 1996; Himaros 1989; Miler 1985; Bahmani-Oskoee, 1985).

Vector Error Correction Model for Trade Balance						
Variable	D(LNTB)	D(LNYD)	D(LNMSD)	D(LNMSW)	D(LNIRD)	D(LNNEXR)
ECT_1	0.009009	-0.000925	0.032116	-0.007702	-0.007247	-0.080718
	(0.09060)	(0.00423)	(0.02012)	(0.00465)	(0.01567)	(0.01528)
	[0.09944]	[-0.21852]	[1.59638]	[-1.65677]	[-0.46244]	[-5.28105]

Source: Compiled by author using e-views 5.0

The table below indicates that estimated lagged error correction term of trade balance from the VECM estimates is positive and insignificant; its implies that in case of an external shock in the model, the trade balance model would diverge in the long-run. The result suggests that there is short run causality from trade balance to domestic income, domestic money

supply, foreign money supply, domestic interest rate, exchange rate. But there is no short run causality from exchange rate to trade balance.

Variance Decomposition of LNTB						
Period	S.E.	LNTB	LNYD	LNMSD	LNMSW	LNIRD	LNNEXR
1	0.767597	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	1.014492	82.62062	6.243939	5.876551	0.006005	4.697465	0.555418
3	1.248553	64.12217	6.489045	21.99854	0.693747	5.109359	1.587139
4	1.589618	42.19843	8.193393	41.76908	3.135005	3.153013	1.551081
5	1.952238	28.38108	8.287400	54.62749	5.423349	2.100240	1.180436
6	2.362215	19.38846	7.553347	63.16671	7.272234	1.527117	1.092130
7	2.815842	13.72601	7.003890	68.25452	8.692889	1.344051	0.978645
8	3.274548	10.40270	6.510713	71.21388	9.712419	1.296643	0.863649
9	3.732956	8.391735	6.068351	72.98236	10.43683	1.322463	0.798257
10	4.185323	7.143943	5.734827	74.01687	10.96291	1.394885	0.746560

Source: Compiled by author using e-views 5.0

From the table above, in period 1, the results show that 100% of variance in trade balance (LNTB) is explained by the shock from the variable itself. This implies that there was no shock from other variables. In period 2, 82% of the variance in trade balance (LNTB) was explained by the shock from the variable itself; 6% from domestic income (LNYD), 5% from domestic money supply (LNMSD) and 4% from domestic interest rate (LNIRD).

Inferences from period 2 to 10 show that apart from the variance due to the shock from the variance of the trade balance itself, domestic money supply (LNMSD) is the variable with the highest percentage of induced variance on trade balance (LNTB), of about 74% in period 10 while domestic income (LNYD) and foreign money supply (LNMSW) induce 7% and 10% respectively. It is also necessary to note that the percentage of variance in trade balance (LNTB) due to shock from exchange rate (LNNEXR) increase at a constant rate from period 3 to 6; and decrease at an increasing rate during 7 to 10. Likewise, foreign money supply (LNMSW) and domestic income (LNYD) demonstrate similar trend.

5.0 Recommendation and Conclusion

The paper investigated the impact of currency devaluation on Nigeria trade balance in Nigeria using the Johansen co-integration and variance decomposition analyses. Evidence from the empirical analyses spanning from 1970-2010 show that exchange rate devaluation has a negative effect on Nigeria trade balance. It is therefore worthy to note that an exchange rate policy of devaluation or depreciation cannot be solely undertaken to influence Nigeria's trade balance. The observed relation between exchange rate and trade balance has important policy implication for Nigeria; as

continuous and sole devaluation/depreciation of the currency would further worsen the trade balance. This implies that policy makers need to take cognisance of the impact of exchange rate changes on trade balance in an environment where market liberalization is a topical issue in policy debates.

The empirical results from the variance decomposition analysis indicates that domestic money supply volatility contributes more to variance in trade balance than exchange rate; it implies that monetary approach is the mechanism by which adjustment takes place in Nigeria economy. Our finding is similar to the claim by Damoense M.Y and Agbola F.W, 2007; that a monetary expansion stimulates domestic demand and increases export demand, and thus worsen trade balance; this would not be unconnected with the consuming nature of the Nigeria economy, the government should concentrate on policy that would standardized and raise money supply to the real sector which has the tendency to increase volume of goods available for exports and reduce demand for imported goods.

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