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Analysis of the Responsiveness of Non-Oil Exports to Fiscal and Monetary Policy Actions

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Abstract *The paper aims to examine the responsiveness of non-oil exports to monetary and fiscal policy actions and to ascertain if there is any significant difference in the response of non-oil exports to fiscal and monetary policy actions. Adopting the partial determination model, the paper found that there is monetary-fiscal policy interaction effect in the short-run but the effect became undefined in the long-run. It was also revealed that the response of non-oil exports is dominated by fiscal policy actions than the response to monetary policy. Monetary policy influences are temporary whereas the fiscal policy effect seems permanent. In this regard, it will be more appropriate to place greater reliance on fiscal policy form of stabilization action. The adoption of mixed monetary-fiscal policy is also recommended. This is because, mixed monetary-fiscal policy actions operates more quickly and expand non-oil exports within a short while. Though, the interaction effect is undefined in the long run, it is appropriate to stimulate non-oil export in the short-run.*

Key words Responsiveness, monetary policy, fiscal policy, non-oil exports

JEL Codes: C31, O23

1. Introduction

Empirical evidence has revealed that export is required to enhance revenue and economic growth and this has informed the idea of export-led growth thesis. For such empirical evidence, exports are seen as catalyst needed to spur the growth process of the economy (Maneschiöld, 2008; Mishra, 2011; Yelwa and Diyoke 2013). A well developed and functioning export sector will provide employment opportunity for the people as higher demand for exports will require more production with the attendant reduction in social cost of unemployment (Abogan *et al.*, 2014). A glance at the Nigeria economy from its export perspective shows that export is disaggregated into oil and non-oil. In 1960s and 1970s, the Nigerian economy was dominated by non-oil exports which include agricultural commodity exports such as cocoa, groundnut, cotton and palm produce and manufacturing and services. Notwithstanding, the agricultural sector performance is not to be ignored due to the fact that in the pre-oil boom era it for about 40 per cent of the GDP, about 80 per cent of non-oil exports and generated employment for over one third of the labour force in Nigeria (Adenugba and Dipo, 2013).

Most often, non-oil exports are commonly influenced by government macroeconomic policy which relies majorly on two policy instruments; monetary and fiscal policy instruments. Monetary policy is designed to control the value, supply and cost of money in an economy, and it works through interest rates, money supply, exchange rate, and so on. On the other hand, fiscal policy is used to determine public revenue and public expenditure. The major instruments of the fiscal policy are public expenditure, taxes and public debts (Anthony and Mustafa, 2011).

To stimulate and expand the nation's non-oil exports, in the post 1970s, fiscal and monetary policies shifted from expansionary to more of restraint and moderation. The shift in policy perhaps resulted to the greater volatility and low non-oil exports in the later periods from 1980s even in the 1990s when substantial structural and policy reforms had been implemented. Furthermore, in 1986, the Structural Adjustment Programme (SAP) was adopted and despite its adoption SAP, there has been very little change with respect to the pattern of the government fiscal policy in spite of concerted effort by the government to control spending in mid-1990s. The export promotion fiscal policies put in place to encourage non-oil exports among others include the Free Zone law for export processing zone, Export Expansion Grant (EEG) Scheme, Duty Drawback Scheme and Duty Drawback Facilities, which provided refunds of duties/surcharges of raw materials used for manufacturing of products. But fundamental change was witnessed for the case of monetary policy after SAP. Monetary policy shifted from a direct to an indirect monetary policy management system. These include interest rates policies such as interest rate deregulation; adoption of different monetary policy rates; liberalization of the economy; introduction and the adoption of flexible exchange rate regime, the implementation of Monetary Policy Rate (MPR) to replace the minimum Re-discount Rate (MRR); introduction of the second tier foreign exchange market (SFEM); various export expansion incentive schemes, establishment of the Nigeria Export- Import Bank among others (Abogan *et al.*, 2014, Nwachukwu, 2014).

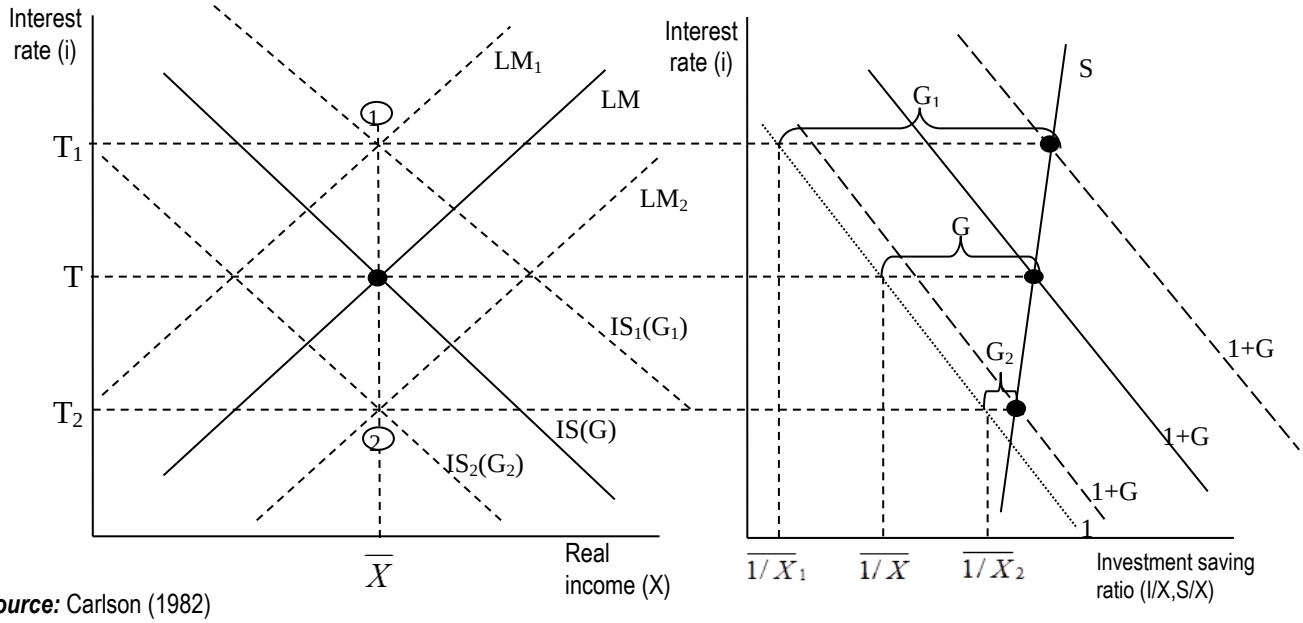
Even though non-oil exports according to the Bureau of Statistics Trade Report (2012) increased from as low as 8.5% in 2008 to 30.8% in 2012, the performance and contribution of the non-oil exports sector compared to the oil export is still very low in spite of the efforts of the government. Accordingly, Ogbonna *et al.* (2013) posits that in 1970, non-oil exports as proportion of total export was 42.4 % but fell drastically to 6.2% in 1989 and increased to 8.5 % in 2008. Annual average total export fell from 10.6% in the control period of 1970-1985 to 3.3% in the 1986-2011 pro-deregulation eras. Contrary to

the expectation of increased non-oil exports, there was an overall decline in non-oil exports below its full potential. The various separate monetary and fiscal policies in Nigeria seem not to produce the expected improvement in non-oil exports. Thus, scholars as well as policy makers' diverse attention to the adoption of monetary-fiscal policy mix to expand non-oil exports in a bid to diversify the export base; and make non-oil exports a major source of foreign earnings. Even, the gravity of the current economic situation requires that the issue of policy mix be given a precise attention and interpretation. An empirical examination of the monetary-fiscal policy mix effect on non-oil export is therefore apt and to ascertain if the response of non-oil exports to fiscal policy actions are more predictable than the response to monetary policy influence. It has become obvious that empirical studies regarding the relative effectiveness of monetary and fiscal policy are on the increase in Nigeria. Yet, there exist very scanty studies on monetary-fiscal policy mix. There is need to determine the interactive effect of monetary and fiscal policies on non-oil exports and ascertain if there is any significant difference in the response of non-oil exports to fiscal and monetary policy actions.

2. Theoretical and empirical literature

The link between monetary and fiscal policy mix and non-oil exports is based on the fact that a change in monetary policy, for instance the domestic interest rate leads to a change in the exchange rate if the foreign interest rate and the future exchange rate remain constant at least in the short-run. If this is so, a nominal change in exchange rate implies that the real exchange rate also changes in the same direction. This makes domestic products either more or less expensive relative to foreign goods, resulting in lower or higher net exports. This implies that there is a (negative) relationship between interest rate and net exports. Also a change in monetary policy, say expansionary monetary policy (a lower monetary policy rate) stimulates investment. This effect is reinforced by a currency depreciation that stimulates net exports while a change in fiscal policy increases or reduces income if the central bank holds the interest rate constant.

The concept of policy mix is usually explained, using the Hicksian IS-LM framework. The framework states that the level of economic activity and the level of interest rates are determined by the conjunction of conditions in the aggregate market for goods and services and the market for money. The Hicksian IS-LM model is conceives of a general equilibrium defined as the interest rate and income level that generates simultaneous equilibrium in both the product and money markets. Fiscal policy influences the economy through the market for goods and services, while monetary policy works through the money markets (Carlson, 1982 and Polito and Brendon, 2014). Figure 1 below summarizes the IS-LM framework.



Source: Carlson (1982)

Figure 1: Policy Mix and IS-LM Framework

(1) Tight monetary policy (M1<M) and easy fiscal Policy (G1>G)
(2) Easy monetary policy (M2>M) and tight fiscal Policy (G2<G)

Real income and interest rates are determined simultaneously by the interactions of the IS and LM curves. This combination of interest rate and real income is consistent with equilibrium in both the goods and services and money markets. Fiscal policy actions affect equilibrium by shifting the IS curve, while monetary policy actions impact on the LM

curve. As a result, a given level of real income can be achieved with different monetary and fiscal policy mix. The level of real income and interest rates could be moved over time by a combination of policies in such a way that interest rates are rising or at least being sustained at the high level. The combination of IS_1 and LM_1 represents easy fiscal policy and tight monetary policy, and the achievement of an income level with higher interest rate than at the original equilibrium level. In like manner, the IS_2 and LM_2 interaction indicates tight fiscal policy and easy monetary policy. High interest rate could reduce the rate of private investment (shown in the right hand panel) and therefore reflects slower rate of economic growth in the long run than a set of economic policies that produces low interest rates.
The equilibrium level of output and the interest rate can be shown as follows:

$$Y^* = \left[\left[\frac{1}{\partial_2}(C_O - C_1\bar{T} + \bar{I} + \bar{G}.\right]\right] - \frac{1}{\beta_2}\left(h_0 - \frac{M}{P}\right)\left[\left[\frac{\beta_2\partial_2}{\beta_1\partial_2+\beta_2(1-C_1(1-\infty_1)-\partial_1)}\right]\right] \quad (1)$$

Where:
Y* = equilibrium output level; G = government expenditure;
$\bar{G}$ = fixed component of government expenditure, M = level of nominal money supply chosen by the central bank;
C_0 = level of consumption affected by factors other than disposable income, such as borrowing;
C_1 = marginal propensity to consume (the increase in consumption resulting from one unit increase in disposable income);
$\bar{I}$ = constant that computes the effect on investment of any variable other than income and the interest rate;
$\bar{T}$ = tax revenue raised through lump-sum taxes; $\frac{M}{P}$ = real balances.
h_0 = level of demand for money independent of income and the interest rate;

Equation (1) shows that the policy variables G and *M* both increase the equilibrium level of income. Tax policy affects *Y** negatively through $C_1\bar{T}$ and $C_1 \infty_1$. Therefore, expansionary fiscal and monetary policies increase the equilibrium level of income. In other words, fiscal and monetary contractions reduce the equilibrium level of income.
However, in computing the equilibrium level of the interest rate, the following equation is obtained:

$$i^* = \left[\left[\frac{1}{\partial_2}(C_O - C_1\bar{T} + \bar{I} + \bar{G}.\right]\right] + \frac{1-C_1(1-\infty_1)-\partial_1}{\beta_1}\left(h_0 - \frac{M}{P}\right)\left[\left[\frac{\beta_1}{\beta_1\partial_2+\beta_2(1-C_1(1-\infty_1)-\partial_1)}\right]\right] \quad (2)$$

Where:
i* is equilibrium nominal rate and other variables remained as defined above indicating that, fiscal expansions and monetary contractions increase the interest rate whereas fiscal contractions and monetary expansions reduce the interest rate.

The effect of fiscal policy, on output and the interest rate, is symmetric for the basis that an expansionary fiscal policy increases both output and the interest rate, while a contractionary fiscal policy reduces both variables. Whereas, monetary policy has an asymmetric effect on national output and the interest rate: an expansionary monetary policy increases national output while reducing the interest rate, on the contrast a contractionary monetary policy reduces output while increasing the interest rate. The *IS–LM* model reveals the possibility of the use of fiscal and monetary policies either in isolation, or simultaneously, to influence key macroeconomic variables, such as the interest rate and national output. Since output and export are positively correlated, that is export increases (decreases) when output increases (decreases) fiscal and monetary policy also influence exports (Polito and Brendon, 2014).
Although Mundell-Fleming developed a similar IS-LM framework, the difference is that the Mundell-Fleming model assumes an open economy with perfect capital mobility. The model explains the effects of economic policy on a small open economy, and shows how these effects depend on whether the exchange rate is floating or fixed. The model assumes foreign variables and Prices to be exogenous. Thus any differences between real and nominal variables can be ignored. It is therefore assumed that real and nominal interest rates are equal, r = i, and real and nominal exchange rates are also equal, Ɛ = e. According to the Mundell-Fleming model, an open economy can be described by four separate equations shown below:

$$Y = C\left(\underset{+}{Y-T}\right) + I\left(\underset{-}{i}\right) + G + NX\left(\underset{-}{e}\right) \quad (3)$$

$$e = \frac{(1+i)Ee'}{(1+i^*)} \quad (4)$$

$$\varepsilon = eP\frac{eP}{P^*} \quad (5)$$

$$r = i - E\pi \quad (6)$$

The first lemma describes equilibrium in the goods market while the second equation is the interest rate parity condition which describes equilibrium in the market for foreign exchange, and the third equation represents the definition of the real exchange rate. Equation (6) is the Fisher equation stating the relation between the real interest rate, the nominal interest rate, and expected inflation. The exogenous variables are the interest rate *i*, the fiscal-policy variables, the foreign interest rate *i**, the expected exchange rate *Ee*, domestic and foreign price levels *P* and *P**, and inflation expectations *E*π. The four equations above explain the equilibrium values for the four endogenous variables which are output *Y*, the nominal exchange rate *e*, the real exchange rate ε, and the real interest rate *r (*Flodén, 2010).

On empirical front, functional relationship has been established between fiscal policy and non-oil exports. In line with this, Aliyev and Nadirov (2016) investigated the short and long-run effects of budget expenditures and tax related budget revenues on non-oil exports using quarterly data covering 2000Q1-2015Q2. With autoregressive Distributed Lag Bounds Testing (ARDLBT) Approach to cointegration, the study found significant long-run effects of both budget expenditures and tax-related budget revenues but in the short-run, the effect was not significant. The study by Hasanov (2013a) investigated the role of fiscal policy in the development of Azerbaijan's non-oil sector with special focus on budget expenditures using single equation-based, Autoregressive Distributed Lags Bounds Testing (ADLBT) approach and system-based cointegration approach for the period 1998Q4-2012Q3. In terms of elasticity, a positive long run relationship was found between budget expenditure and non-oil exports. This finding collaborate Hasanov (2013a) and Hasanov and Alirzayev (2012) for Azerbaijan.

On the role of monetary policy on non-oil exports, studies such as Imoughele and Ismaila (2015), Oriavwote and Eshenake (2015), Akinlo and Adejumh (2014), Shehu (2012) have also been conducted using different fiscal policy variables. Imoughele and Ismaila (2015) used real exchange rate and money supply as proxy for monetary policy alongside other control variables to show that effective exchange rate, money supply, and credit to the private sector has a significant impact on non-oil exports in the Nigerian economy. Oriavwote and Eshenake (2015) also used real exchange rate as proxy for monetary policy variable and found a long run relationship among the variables. The parsimonious ECM result also shows that real exchange rate has positive and significant impact on non-oil exports in Nigeria. Akinlo and Adejumo (2014) studied the relationship between monetary policy and non-oil exports in Nigeria using exchange rate as a monetary policy variable. Their finding is that exchange rate has an insignificant impact on non-oil exports. Shehu (2012) examined the impact of monetary policy on non-oil exports in Nigeria. Another study in this category is Shehu (2012) who employing quarterly data for twenty years. The vector co-integration estimate result of the study shows that naira exchange rate decreased non-oil exports. The study by Nakibullah and Islam (2007) used the equilibrium approach to fiscal policy to study the effects of government spending on non-oil using Bahrain and US annual data for the period 1977-2004 and noted that the positive multiplier effect of permanent domestic government consumption was substantially neutralized by the negative impact of temporary government spending on non-oil.

The impact of both monetary and fiscal policies on non-oil exports in Nigeria was the focus of the study by Iyoboyi and Na-Allah (2015). Employing the autoregressive distributed lag framework, the study found that non-oil exports has a long-run equilibrium relationship with economic policies and institutional variables. In specific terms, money supply and exchange rate were found to be positively associated with the determinants of non-oil exports in both the long and short run. Fiscal deficit, interest rate and openness were found to be inversely related to non-oil exports in both the short and long run. The findings also revealed that inflation is negatively related to non -oil exports in the short run, but the reverse was the case in the long run. In Poland, Alfred *et al.* (2013) examined the transmission channels of monetary and fiscal policy combining both monetary structural vector-autoregression (SVAR) with a fiscal SVAR for small open economy. It was found that a major transmission channel in which non-oil sector can be enhanced are real GDP and real exchange rate. On the contrary, Aliya (2012) found that in an in an emerging open economy, government consumption was unproductive and increases fiscal debt as opposed to government investment, while foreign exchange intervention positively affects net exports but does not stimulate an economy causing inflation. In Nigeria, Chukuigwe and Abili (2008) examined the impact of monetary and fiscal policies on non-oil export from 1974-2003. Using Ordinary Least Squares (OLS) estimation, the study found that interest rate and exchange rate, being proxies for monetary policy, negatively affected non-oil exports. Also budget deficit being proxy fiscal policy has a negative effect on non-oil exports.

3. Methodology of research

The major concern in this study is whether non-oil exports can be enhanced with different mixes of monetary and fiscal policies. Moreover, this study includes two control variables; degree of openness, and inflation rate in order to provide more

control factors. Following Ismaila and Imoughele (2015), with some modifications, the functional form of the model is stated as follows:

$$NOX_t = f(MPR_t, EXR_t, GX_t, TX_t, DOP_t, IR_t) \quad (7)$$

Where:
NOX = non-oil export; MPR = monetary policy rate; EXR = exchange rate; GX = government total expenditure; TX = government tax; DOP = degree of trade openness measured by the ratio of total trade to GDP; IR = inflation rate; t = time period.

In its linear equation form, the model is stated as shown below:

$$NOX = \alpha_0 + \alpha_1 MPR + \alpha_2 EXR + \alpha_3 GX + \alpha_4 TX + \alpha_5 DOP + \alpha_6 IR + u_t \quad (8)$$

$\pi_1<0$, $\pi_2<0$, $\pi_3>0$, $\pi_4<0$, $\pi_5>0$ and $\pi_6<0$

Since lag effects contribute to the adjustment process, there is the need to include lagged variables. This allows for greater variety and dynamism in the model. In addition, there is a possible reverse causality that could lead to bias estimates. Just as government expenditure, interest rate, exchange rate etc. affect non-oil exports, non-oil exports could also affect them. One way out is to introduce such endogenous independent variables in lags. In this regard, equation (3 and 4) can be re-specified as:

$$NOX = a_0 + a_1 NOX_{t-1} + a_2 MPR + a_3 MPR_{t-1} + a_4 EXR + a_5 EXR_{t-1} + a_6 GX + a_7 GX_{t-1} + a_8 TX + a_9 TX_{t-1} + a_{10} DOP + a_{11} DOP_{t-1} + a_{12} IR + a_{13} IR_{t-1} + u_t \quad (9)$$

The study uses partial determination model adopted by Andersen and Jordan (1986), and Carlson (1982). Coefficients of partial determination statistics are measures of percent of variation of the dependent variable remaining after the variation accounted for by all other variables in the regression has being subtracted from the total variation. In order words, it is a measure of the marginal reduction in the variability in the dependent variable (non-oil export) by individual independent variable, when all other variables are in the model. The partial determination model for this study is presented below:

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(MPR|EXR,GX,TX,IR)}{SSR(EXR,GX,TX,IR)} \quad (10a)$$

$$r^2_{NOX\ EXR.\ mpr\ gx\ tx} = \frac{SSE(EXR|MPR,GX,TX,IR)}{SSR(MPR,GX,TX,IR)} \quad (10b)$$

$$r^2_{NOX\ GE.\ exr\ mpr\ tx} = \frac{SSE(GX|EXR,MPR,TX,IR)}{SSR(EXR,MPR,TX,IR)} \quad (10c)$$

$$r^2_{NOX\ TX.\ exr\ gx\ mpr} = \frac{SSE(TX|EXR,GX,MPR,IR)}{SSR(EXR,GX,MPR,IR)} \quad (10d)$$

$$r^2_{NOX\ IR,\ \ TX.\ exr\ gx\ mpr} = \frac{SSE(IR|EXR,GX,MPR,TX)}{SSR(EXR,GX,MPR,TX)} \quad (10e)$$

Where:
$SSR(MPR|EXR, GX, TX)$ = additional variation explained by MPR when added to a model already containing EXR, GX, TX, and IR;
$SSR(EXR|MPR, GX, TX)$ = additional variation explained by EXR when added to a model already containing MPR, GX, TX and IR;
$SSR(GX|EXR, MPR, TX)$ = additional variation explained by GX when added to a model already containing EXR, MPR, TX, and IR;
$SSR(TX|EXR, GX, MPR)$ = additional variation explained by TX when added to a model already containing EXR, MPR, GX, and IR.

Note: Variables after (|) represent variables already in the model while ESS represents the part of the SSE that is explained by an added group of variables that was not previously explained by the rest. $SSE = TSS - SSR$.

Equation (10a) measures the coefficient of partial determination between NOX and MPR, given that EXR, GX and TX are in the model. It is therefore the proportionate reduction in the variation in non-oil export that is gained after EXR, GX and TX by also including MPR. Similarly, Equation (10b) measures the coefficient of partial determination between NOX and EXR, given that MPR, GX and TX are in the model. Also, Equation (10c) measures the proportionate reduction in the variation in non-oil export remaining after EXR, GX and TX are included in the model that is gained by also including GX. Equation (10d) measures the proportionate reduction in the variation in non-oil exports remaining after EXR, GX and MPR are included in the model that is gained by also including TX. Equation (10e) would be adopted to ascertain if there is any significant difference in the response of non-oil exports to fiscal and monetary policy actions. The greater the t-values, the more confidence there is in the estimated regression coefficients, and hence the greater the reliability of the estimated change in non-oil exports resulting from a change in the fiscal policy variable. The data for this study is a quarterly time series sourced from Central bank of Nigeria (CBN) statistical bulletins, 2009 and 2014. The Econometric software for estimation is STATA 12.

4. Results

4.1. Descriptive Statistics of the Variables

Firstly, the descriptive statistics of the variables was examined and the result is presented in Table 1 below.

Table1. Summary Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
NOX	138176.1	286957.4	203.2	1130171
EXR	49.9264	60.80556	0.5464	160.7228
IR	18.85167	16.42639	0.2	76.8
MPR	10.78797	5.017758	3.2	26
GX	957721	1512834	635.121	5185318
TX	472544.5	815115.5	421.5	3275121
DOP	7.363778	10.66566	0.07	58.55

Source: Author's Computation (2016)

The mean values of NOX, EXR, IR, MPR and GX are respectively 138176.1, 49.9264, 18.85167, 10.78797, and 957721. While the mean values of TX and DOP are respectively 472544.5 and 7.363778. It is revealed that the values of IR and MPR are close and cantered around their respective mean values, as indicated by the small standard deviation values (less than the mean values). On the other hand, the values of NOX, EXR, GX, TX, and DOP are farther away from their respective mean values. All the minimum values of the variables are less than the mean values respectively while the maximum values are all greater than their respective mean values.

4.2. Unit Root Test

Time series data are in many cases possess unit root at it level form and regression results from such data could be misleading. This justifies the need for test for unit root at the level form. Thus, unit root test was carried out using the Augmented Dickey-Fuller and Philips Perron tests and the results are reported in Tables 2 below.

Table 2. Augmented Dickey – Fuller and Philips–Perron Unit Root Test Result

Variable	ADF Result		P-P Result		Lag order	~I(d)
	Level	1st Difference	Level	1st Difference		
NOX	-0.536	-5.941*	-1.950	-5.270*	2	I(1)
EXR	- 0.138	-5.652*	- 0.921	-5.217*	2	I(1)
IR	-1.286	-7.024*	-2.771	-6.078*	2	I(1)
MPR	-1.615	-7.206*	-1.862	-6.389*	2	I(1)
GX	- 0.641	-4.809*	-2.565	-4.444*	2	I(1)
TX	-0.013	-5.308*	-1.615	-4.930*	2	I(1)
DOP	-1.631	-9.219*	-1.384	-7.074*	2	I(1)

Note: * denotes significance at 5% and the rejection of the null hypothesis of presence of unit root. The optimal lag lengths were chosen according to Akaike's final Prediction Error (FPE), and Akaike's information criterions. The ADF critical value at levels is -1.654 while at 1st difference is -1.654. The Philips–Perron critical value at levels and 1st difference on the other hand is 2.885

Source: Author's Computation (2016)

The Augmented Dickey Fuller test result revealed that none of the variables is stationary at its level form. Therefore, the variables were differenced once and tested again in a model with drift and lag length of 2. The test result at first difference shows that all the variables are significant. The respective Augmented Dickey Fuller statistics at the 1st difference are all greater than the 5 percent critical value. Thus, we say that the variables are all integrated of order one. Similarly, the Philips Perron test also revealed that the variables are not stationary at the level form at 5 percent. The null hypothesis that the variables have unit root is for this reason rejected at the 5 percent significant level. This result supports the result of the Augmented Dickey Fuller test that the variables are all stationary at 1st difference.

4.3. Regression Result

Table 3. Impact of monetary and fiscal policies on non-oil exports

NOX	Lag	Coefficients	Standard Errors	t-statistics	P-value
NOX	1	0.890	0.035	25.25	0.000
EXR					
	0	-2590.277	167.878	-15.43	0.000
	1	2473.306	184.198	13.43	0.000
IR					
	0	59.677	96.730	0.62	0.538
	1	-18.868	97.159	-0.19	0.846
MPR					
	0	-150.017	602.549	-0.25	0.804
	1	44.899	594.055	0.08	0.940
Sum of Monetary Policy coefficients		-180.389	1742.605	23.51	
GX					
	0	0.296	0.010	29.46	0.000
	1	-0.255	0.015	-16.59	0.000
TX					
	0	-0.193	0.012	-15.57	0.000
	1	0.184	0.013	13.96	0.000
Sum of Fiscal Policy coefficients		0.032	0.051	11.26	
DOP					
	0	-954.5939	217.0829	-4.40	0.000
	1	949.1801	223.7814	4.24	0.000
Constant		-88.40299	348.487	-0.25	0.800
R-squared			0.9630		
Adjusted R-squared			0.9601		
F-statistics		F(13, 164)	328.34 (0.0000)		
Durbin-Watson statistics d-statistic		(14, 178)	1.9700		
Breusch-Godfrey LM Chi-square Statistics			0.043 (0.8357)		

Source: Author's Computation (2016)

From the above result and based on equations (10a) – (10e), the monetary-fiscal policy interaction effect on non-oil exports, the partial coefficients of determination are computed as follows.

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(MPR|EXR, GX, TX, IR)}{SSR(EXR, GX, TX, IR)} = \frac{0.02}{1.49} = 0.01$$

$$r^2_{NOX\ EXR.\ mpr\ gx\ tx} = \frac{SSE(EXR|MPR, GX, TX, IR)}{SSR(MPR, GX, TX, IR)} \frac{0.58}{2.05} = 0.28$$

$$r^2_{NOX\ GE.\ exr\ mpr\ tx} = \frac{SSE(GX|EXR, MPR, TX, IR)}{SSR(EXR, MPR, TX, IR)} \frac{0.59}{1.91} = 0.31$$

$$r^2_{NOX\ TX.\ exr\ gx\ mpr} = \frac{SSE(TX|EXR, GX, MPR, IR)}{SSR(EXR, GX, MPR, IR)} \frac{0.14}{1.61} = 0.09$$

$$r^2_{NOX\ IR,\ \ TX.\ exr\ gx\ mpr} = \frac{SSE(IR|EXR, GX, MPR, TX)}{SSR(EXR, GX, MPR, TX)} \frac{0.02}{1.49} = 0.01$$

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(MPR_{t-1}|EXR, GX, TX, IR, MPR)}{SSR(EXR, GX, TX, IR, MPR)} = \frac{0.00}{1.47} = 0.00$$

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(EXR_{t-1}|EXR, GX, TX, IR, MPR)}{SSR(EXR, GX, TX, IR, MPR)} = \frac{0.03}{1.47} = 0.02$$

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(IR_{t-1}|EXR, GX, TX, IR, MPR)}{SSR(EXR, GX, TX, IR, MPR)} = \frac{0.00}{1.47} = 0.00$$

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(GX_{t-1}|EXR, GX, TX, IR, MPR)}{SSR(EXR, GX, TX, IR, MPR)} = \frac{0.02}{1.47} = 0.01$$

$$r^2_{NOX\ MPR.\ exr\ gx\ tx} = \frac{SSE(TX_{t-1}|EXR, GX, TX, IR, MPR)}{SSR(EXR, GX, TX, IR, MPR)} = \frac{0.08}{1.47} = 0.05$$

From the coefficients, the policy mix effects of monetary and fiscal policy are presented in Table 5 below.

Table 5. Policy Mix Effect

	Monetary Policy Variables			Fiscal Policy Variables		Policy interaction Effect	
Period	EXR	IR	MPR	GX	TX		
t	0.28	0.01	0.01	0.31	0.09	0.10	Interaction effect defined
t-1	0.02	0.00	0.00	0.01	0.05	-	Interaction effect undefined
Sum	0.3	0.01	0.01	0.32	0.14	0.14	Interaction effect defined

Source: Author's Computation

For the quarter, the partial determination coefficient for government expenditure is greater than that of exchange rate, interest rate and monetary policy rate. With regards to government tax revenue, the coefficient is less than the exchange rate but greater than interest rate and monetary policy rate. Since the fiscal policy partial coefficients of determination are larger than monetary policy actions, then, there is monetary-fiscal policy mixed effect on non-oil exports which is found to be 10.0%. However for the subsequent quarter, the coefficient for exchange rate is 0.02 while those of interest rate and monetary policy rate are 0.00 and 0.00 respectively. Since the partial coefficients of determination of the fiscal policy variables (IR and MPR) of the first one quarter are less than 0.005, then the test for the first one quarter is said to be undefined. That is, the presence or absence of interaction effect of monetary and fiscal policies on non-oil exports in Nigeria cannot be determined in the first lag. In general, it can be inferred that monetary-fiscal policy interaction effect of monetary and fiscal policies on non-oil exports exists in the short-run but the presence or absence of interaction effect cannot really be determined in the long run. To ascertain if there is any significant difference in the response of non-oil exports to fiscal and monetary policy actions, the result is presented in Table 6 below.

Table 6. Measurement of the Response of Non-oil Exports to Monetary and Fiscal Policy actions

	Monetary Policy Variables			Fiscal Policy Variables	
Period	EXR	IR	MPR	GX	TX
T	-15.43	0.62	-0.25	29.46	-15.57
t-1	13.43	-0.19	0.08	-16.59	13.96
Sum	-2.00	0.43	-0.17	12.87	-1.61

Source: Author's Computation

An examination of Table 5 indicates greater t-values for the regression coefficients of the two fiscal policy variables than for the monetary policy variables in absolute terms, even for the first quarter after a change. Also, the t-value for the sum of the regression coefficient for GX is larger while those for IR and MPR are not statistically significantly different from zero. Since the regression coefficients relative to their standard errors (t-values), relating changes in fiscal policy to changes in non-oil exports, are greater than the corresponding measures for changes in monetary policy, the hypothesis is confirmed. We therefore reject the null hypothesis of no significant difference in the response of non-oil exports to fiscal policy actions and response to monetary policy influence. The response of non-oil exports to fiscal policy actions is more predictable than the response to monetary policy influence in Nigeria.

5. Conclusions

The analysis of this paper have based on the Hicksian IS-LM framework. A proper investigation has revealed that the issue of appropriate monetary-fiscal policy mix is not as clear-cut as the simple Hicksian IS-LM framework implies. The lag effects of monetary-fiscal policy influences must be taken into account, alongside the empirical realities of economic relationships. Empirical analysis reveals that there is a short and long run impact of fiscal policy on non-oil exports, but there is no long run impact of monetary policy. Furthermore, the significant monetary policy instrument for non-oil exports is the exchange rate while both government expenditure and government tax are significant fiscal policy instruments to influence non-oil exports. Also the response of non-oil exports is dominated by fiscal policy actions than the response to monetary policy influence. Also, monetary policy influences are temporary, whereas the fiscal policy effect is permanent. There is monetary-fiscal policy interaction effect in Nigeria. In addition, monetary-fiscal policy interaction actions operate more quickly but the effect dissipates after a year.

The finding that the response of non-oil exports to fiscal policy actions is more predictable than the response to monetary policy influence in Nigeria strongly suggests that it will be more appropriate to place greater reliance on the latter form of stabilization action. Considering the current economic recession and the agenda of the federal government to diversify the economy and to boost non-oil exports, the study recommends the adoption of mixed monetary-fiscal policy. This is because, monetary-fiscal policy actions operates more quickly; and could possibly take us out of the recession and expand non-oil exports within a short while. Though, the interaction effect is undefined in the long run, but it is appropriate for the current economic situation.

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