Effect of Currency Devaluation on Macro-Economic Variables: The Nigerian Experience

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Abstract
This paper investigates past exchange rate management regimes adopted by the Central Bank of Nigeria since 1959, and attempts to find out whether devaluation can be used to restore equilibrium and significantly achieve national economic growth and development. The Multiple Least Squares method was used to estimate coefficients of the identified relationships following one period lag and autoregressive models formulated to correct errors detected in the data of macroeconomic variables. Significantly, a negative and statistically significant relationship was found between exchange rate and non-oil exports. Devaluation had a negative cause-effect relationship with inflation. It was also negative and significant with national output in the one-year lag specification. Accordingly the paper recommends that devaluation should not be relied upon as a primary tool for restoration of macroeconomic balance. Instead, a system of managed float supported with strong trade and exchange controls should be used. Complementary fiscal policy measures should also be adopted.

Keywords: devaluation, exchange rate, gross domestic product, non-oil exports, balance of payment equilibrium

Introduction

The currency of any nation represents more than its function as legal tender and denominator for exchange of goods and services. The measure of the price of a currency in terms of another is known as exchange rate. It measures the underlying strength of performance of an economy against another and the intensity of international transaction between residents of a country and those of another country. It carries with it the image and pride of a nation and also the totality of value created or destroyed in a period of time. Accordingly, a healthy currency is directly related to a healthy nation and vice versa, and it is a legitimate priority of governments to fashion out policies that seek to sustain the health of this important piece of national asset. In Nigeria, the mandate to manage both internal and external value of the Naira was given to the Central Bank of Nigeria under the Central Bank of Nigeria Act No. 24 of 1991. Achievement of internal and external stability of a currency would appear to be a pre-condition for increase in investment, production, trade, employment and hence national welfare and happiness. It is therefore not surprising that exchange rate of a currency is one of the most watched and manipulated variables as modern governments try to achieve their macro-economic objectives. Since 1958 when the Central Bank of Nigeria was established to, among others, take up the mandate of managing the nation's exchange rate, the country has been experimenting with different rate regimes in what would seem like a never ending chase for equilibrium exchange rate. Exchange rates appeared to be consistently inconsistent with economic realities that prevailed. Obadan (2006) held that even with the adoption of market based exchange rate policy since 1986, features of continuing rate instability remained. Of no less concern is the continuing arbitrage premium that persists

between official and un-official market rates. This inevitability leads us to pose some salient questions namely:

a. Is there a link between exchange rate and real economic variables?
b. What are the root causes and consequences of disequilibrium in the price of the naira?
c. Is devaluation an appropriate long term solution to structural disequilibrium in the balance of payment?

The author intends to argue in this paper that devaluation has not been and is not the remedy for correcting the structural imbalances in the country's internal and external positions. Perhaps, this is always going to be so as devaluation would appear to be a simple and easy solution to otherwise more structural macro-economic problems.

The rest of the paper is organized as follows: section 2 encompasses the review of some key theories of exchange rate determination and empirical evidence including brief review of exchange rate regimes in Nigeria since 1959. Section 3 contains design and methodology employed to make this investigation. In section 4, this paper looks at descriptive analysis of data used and result of model regression to explain research phenomena. Section 5 contains the summary and conclusions of the paper.

Review of Literature

Conceptual Framework: The Exchange Rate Transmission Mechanism

The link between exchange rate and real economic variables presents important basis for how concerned analysts and policy makers would be with the subject of appropriate valuation of currency units. From the traditional theory of output determination in an open economy, exchange rate exerts influence on national income through the net export variable. As Iyoha (2003) put it, Exchange rate is a channel through which monetary policy impacts key macroeconomic aggregates like output and employment. Accordingly, an increase in exchange rate or reduction in value of local currency is thought to increase the economy's global competitiveness resulting in increased foreign investment and exports, demand for domestic good, employment and national output. This is clearly in consonance with mechanism for attainment of classical equilibrium. However, a stretch to extreme of theory implies that this will be followed by decline in exchange rate or strengthening of local currency value as result of higher exports and foreign exchange earnings. This will tend to upset earlier equilibrium giving rise to boom-burst cycles and swing in external balance. Strict reliance on the market for sustainable equilibrium would appear to be untenable. In fact, as Kim and Roubini (2000) put it within the model theoretic framework, the exchange rate appreciates in response to a monetary shock; after a few months, it depreciates over time in accordance with certain market parity conditions. Here the complex interaction of such macroeconomic variables as inflation rate, interest rate, oil and non-oil exports, balance of payments as they are transmitted to output through exchange rate is explored in this paper.

Theoretical Review

Determination of appropriate exchange rate that sustains equilibrium in internal and external balance has long attracted substantial interest. Based on the price-specie flow analysis associated with classical theorists such as David Richardo (1772-1823), David Hume (1711-1776), J Stuart Mill and Adam Smith (1723-1790), free flows of given monetary unit in the market in response

to demand and supply will always work whenever disequilibrium occurs to restore equilibrium through adjustment of prices and income (Filippo, 1998; Robert, 1989 and Ricardo, 1811). For instance, under gold standard, gold will flow out of a deficit country leading to contraction in money supply and possibly recession; and consequently decline in prices and income. This will make export cheaper; import, more expensive and the domestic economy more competitive. Hence in a liberalized trade and exchange regime, it is claimed that these adjustments will lead to increased exports and decline in imports thereby restoring balance of payment equilibrium. However, it has been argued that adopting free float may not restore equilibrium in certain macro-economic environments. According to Ezike (2009), the increasing use of destabilizing short term capital flows stokes continuing volatility in foreign exchange markets. Of greater significance is that existence of inflexibility in wages and prices will typically work to frustrate attainment of classical equilibrium. Interestingly as Calvo and Reinhart (2002) opined, "floating rates do not really float, rather governments that claim to allow market forces to determine value of their currencies actually act to minimize exchange rate fluctuations". On the other hand, Obstield and Rogoff (1995) held that "literally only a handful of countries in the world today have continuously maintained tightly fixed exchange rates against any currency for five years or more. In most modern economies, there are powerful cartels, unions and forces that exert influence on wages and prices in a manner that constitute static interference to the transmission mechanism of the market. Related to this is the asymmetry in price response to exchange rate changes in importing and exporting countries which often places greater burden on the 'smaller' country in a trade partnership. Here, lack of production capacity, high transaction costs and tariffs are some remarkable culprits. All these could lead to existence of demand inelasticity of import and supply inelasticity of exports which may not allow adjustment in exchange rate to have desired impact on targeted macro-economic variables (output, employment and prices).

Another key framework of exchange rate determination is the purchasing power parity theory (PPP). Associated with the views of John Wheatley and Gustav Cassel, the PPP Theory holds that equilibrium exchange rate between two currencies is determined by the ratio of their respective purchasing powers measured in terms of basket of goods that can be bought by each of the currency units (Denis, 2013; Thomas, 1994; and Wheatley, 1807). This theory implicitly considers domestic price level in the two countries such that higher inflation will lead to downward adjustment in value of a country's currency relative to the other. Accordingly, changes in exchange rate happen only to cancel inflation differentials. However certain defects are identifiable with this framework: namely lack of distinction between international and non-tradable goods in price level measures as well as certain transactions or items in the balance of payments account, e.g. dividend remittances, debt repayments and other capital flows. Perhaps, it is the attempt to fill the gap in the PPP theory that interest Rate parity approach was used to account for impact of capital flow on variation of exchange rates. The movement of short term capital for purpose of interest rate arbitrage, in the absence of capital controls, determines changes in exchange rates as capital flows from low interest to high interest economies.

How has theory measured against cross section of experience of exchange rate regimes? Kim and Roubini (2000) testified that effects of policy shocks on exchange rates and macroeconomic variables have largely been found to be consistent with the predictions of a broad set of theoretical models.

Foreign Exchange Regime in Nigeria Since 1958

The Apex Monetary Authority in Nigeria, the Central Bank of Nigeria (CBN) was established through the legal instrument, Central Bank Ordinance of 1958, but commenced full operation in 1959. Among its key mandates is the maintenance of internal and external value of the national currency. Although focus of policy changed frequently in response to situational demands, the stated objectives consistently revolved around preservation of domestic currency value, conservation of foreign exchange reserves and attainment of macro-economic stability (Ajayi, 2000). Between 1959 and 1986 when the Structural Adjustment Programme (SAP) was introduced, Nigeria adopted a predominantly fixed exchange rate management regime with value of domestic currency fixed administratively by the CBN. By 1959, the Nigerian pound was fixed and maintained to have parity with the pound sterling. This meant that monetary and exchange policy actions were not exercised independent of development in the London market. However the quest for greater independence and sense of nationalism of a new nation-state meant that in 1962, the CBN weaned the domestic economy of strong dependence on foreign markets and chose to peg the Nigeria Currency with gold in the spirit of the Bretton Woods Agreements. With the collapse of the gold standard, the pegging of Nigerian pound with value of gold was discontinued in 1973 and instead was tied to the US Dollar. This coincided with conversion of the currency metric from pound to Naira and what may be referred to as increasing dollarization of the global economy. For Nigeria, this move on the one hand made even greater sense because the greenback happened to be a currency of global oil trade. On the other hand, the naira became susceptible to adverse developments in the US economy such that when later in the year the dollar had to be de-valued; Nigeria decided to detach naira from the currency. This allowed the naira to appreciate gradually afterwards on the face of continued weakness of the US economy and new found mega dollar earnings from the burgeoning oil export trade. In order to protect the foreign reserves accumulated from the oil boom from creeping volatility, the CBN decided in 1978 to peg naira value to a basket of seven currencies of the country's biggest trading partners. With the advent of civilian regime in the late seventies and early eighties, government fiscal operations increased but unfortunately global oil market witnessed volatility and put enormous pressure on foreign exchange reserves and balance of payments. The regime resisted pressures to devalue the naira but instead resorted to a series of exchange control measures including import licensing. Other measures included restriction on remittance of allowances, dividend, and fees, reduction on tours and travel allowances, introduction of comprehensive import supervision scheme, Form M, and pre-shipment checks (Obadan, 2006). Extreme measures included ban on importation of rice, maize, and external borrowing in 1985. Deliberate measures were also taken to promote exports and diversify export base through incentives and export free zones. It is however difficult to assess the full impact of these measures as implementation or lack of it smacked of debilitating corruption. But what appeared visible was that oscillating fortunes of the oil market associated strongly with foreign exchange reserve movements and balance of payment positions. With apparent failure or lack of success of these measures, policy response from 1986 was a shift away from fixed exchange regime with accompanying strict controls of the 1959-1985 years to a market based exchange rate management regime under the institutional framework of the Structural Adjustment Programme. A key element of this framework is the Second tier Foreign Exchange Market (SFEM), a relatively more liberal, auction based management mechanism designed to entrust naira in a voyage of true price discovery, ensure efficient allocation of scarce foreign exchange reserves, eliminate parallel market premium and various corrupt practices that existed (Obadan, 2006). Since the advent of SFEM, different forms

of auctioning system have been practiced and they include the Dutch-Auction System (DAS), Retail Dutch Auction System (RDAS), and Wholesale Dutch Auction System. Sanni (2006) opined that the auction based systems had met with remarkable success in the area of reducing parallel market premium, discipline at both the end-user and administrative ends of the market, access to foreign exchange by genuine users and reducing disruptive influence of speculators. Notwithstanding the relative successes achieved, it is generally believed that a lot of challenges still remain (at monetary and fiscal dimensions) and which need to be confronted by policy makers for sustainable stability to be attained (Elumelu, 2002). These include:

a) Structural rigidities that cause import and export inelasticities, including the culture of import dependence, poor infrastructure and local capacity
b) Cumbersome procedures in the official market vis a vis mal-practices in the parallel markets.
c) Fiscal recklessness that continually put pressure on the foreign exchange market.
d) Excessive dependence on a single commodity (Oil) for foreign exchange revenue.

Devaluation and chase for Equilibrium

Devaluation means downward adjustment in the price of a currency with respect to another currency. Unlike depreciation which is allowed through the mechanism of the market, devaluation is effected with administrative fiat as a policy response to perceived or actual overvaluation of the currency. When a currency is overvalued, there are dire economic consequences some of which in line with proponents of market mechanism (Filippo, 1998; Robert, 1989 and Ricardo, 1811) are:

a) Dis-incentive for exports because goods produced in the country becomes less competitive globally. This is in line with views in favour market mechanism. Arguing against this however, Osundina and Osundina (2014) held that naira should not be devalued further until nigeria improve on the quality of goods being exported through industrialization for global competitiveness.
b) Increased demand for imported goods as consumption of such goods are said to enjoy implicit subsidy. On the contrary however, Akindiyo and Olawole (2015) believe that the most obvious impact of currency devaluation is an increase in the cost of importing raw materials and finished goods.
c) Discouragement of domestic production with attendant unemployment. In support of this point, Akindiyo and Olawole (2015) indeed held that for Nigeia, devaluation does more harm than good and also posited that devaluation undermines the banks and consequently domestic ownership of private assets and investment.
d) Low accretion or gradual depletion of foreign exchange reserves
e) The economy becomes increasingly exposed to possibility of imported inflation (Husain and Rogoff, 2005)
f) Discouragement of foreign investment as investors consider assets to be relatively expensive and indeed higher than discounted value of future cashflows from owning such assets.
g) Encouragement of the phenomenon of capital flight

Accordingly, when an economy is faced with an environment characterized by the above conditions, it only appears logical for a section of economists and operators alike to call for devaluation in order to move quickly to achieve a “realistic exchange rate” that will work to

restore equilibrium. It is therefore not a surprise that following the plunge in oil price from about $120 per barrel in 2014 to about $55 in early 2015 and consequential pressure on the naira, the CBN came under intense pressure to 'continue' to devalue the naira. In November 2014, the CBN made initial move to respond by an adjustment of the central rate from N155 to the dollar to N168, and also within a symmetrical band around the central rate from +/- 3% to +/- 5%; an effective devaluation of 8.4%. As the pressure continued, the CBN decided to close the Retail Dutch Auction window leaving only the inter-bank market as the official window by February 2015. Subsequently it allowed the naira to decline in value by adopting the inter-bank rate of $198 as against $168 in the closed Retail Dutch Auction System resulting in effective devaluation of about 18% which translated to some 26.4% devaluation of the naira within 4 months. Yet the Smithsonian economists appear not satisfied as some felt that a parallel market rate of about ₦231 to the green back was more realistic and that CBN should move quickly to devalue the naira to eliminate that premium (BusinessDay, 2015). In fact earlier analysis by Financial Times and BOA Merrill Lynch had claimed that naira was overvalued to the extent of 71% and 10% respectively. But what appeared missing from views of these economists is what the 26.4% devaluation, and indeed the earlier ones had achieved; and what would happen if a devaluation of the currency, to say N231, results in the parallel market moving up to ₦350. Would this again be seen as evidence of overvaluation for which further devaluation must be effected?

Methodology

The ex-post research design is adopted here to answer research questions and this involved collection of secondary data of dependent and independent variables for the period 1981 to 2014. This includes time series data of Gross Domestic Product (GDP), Exchange Rates (EXR), Overall Balance of Payments (BOP), Exports (E), Non-Oil Exports (EN), Oil Exports (EO), Imports (M), Inflation Rate (INF), Monetary Policy Rate (MPR) and Devaluation Dummy. The choice of study period was made to incorporate the two key foreign exchange regimes adopted by Nigeria over the last 34 years. The management approach to rate determination adopted for the period 1981 to 1986 may be classified as largely fixed and administrative while the approach adapted from 1986 to 2014 was substantially flexible and market determined. Data on these variables were collected from instruments sourced from the CBN Library and Online database of National Bureau of Statistics (NBS). Specifically, the various editions of CBN Statistical Bulletin and Annual Reports and Accounts were used. As stated earlier in the text, devaluation and depreciation theoretically have the same effects on the macro-dependent variables save for the manner of implementation and pace of adjustment. Accordingly we use variation in exchange rates to proxy for general effects and incorporate a devaluation dummy (DEV) to isolate periods when outright devaluation took place. To conceptualize the empirical relationships between the variables in such a manner to answer the research questions, the following linear models were specified in functional form:

GDP = f(EXR, BOP,E, EO,EN, INF, MPR, OILP, DEV) ---------- (1)
BOP = f(EXR, GDP, EN, INF, MPR,OILP, DEV, M) ---------- (2)
EXR = f(BOP, GDP, EN, INF, MPR, OILP, DEV, M) ---------- (3)
M = f(EXR, GDP, MPR, OILP, DEV) ---------- (4)
EN = f(EXR, GDP, INF, MPR, OILP, DEV) ---------- (5)
INF = f(EXR, BOP, M, MPR, OILP, DEV) ---------- (6)

On apriori basis;

a) BOP, E, EO, EN, OILP and INF are expected to have positive relationship with GDP (Note that increase in EXR as expressed here implies a weakening of naira) while EXR, MPR and DEV are expected to be negatively related to the variable.
b) GDP, EN, INF and OILP are expected to be positively related to BOP, while EXR, MPR, DEV and M should be negatively related.
c) DEV and M are positive on EXR (as expressed) while EN, INF and OILP are negative on the variable
d) GDP and INF are expected to positively related to M, while EXR, MPR, OILP and DEV should be positively related to the variable
e) EXR, MPR, OILP and Dev. Should be positively related to EN while GDP and INF should be positively related to the variable
f) EXR, GDP, M, and DEV should expectedly be positively related to INF just as BOP, MPR and OILP should be negatively related.

Before estimating these models, we ran diagnostic checks of data which included a view of correlation coefficient, serial correlation test of residuals (Q test), unit root test using Augmented Dicky Fuller – Fischer Test of stationarity and Granger Causality Test. Our diagnostic tests showed data stationarity as we could not reject the null hypothesis of absence of unit roots in the cross section using the Augmented Dicky Fuller –Fischer Test. An investigation of the residuals also reveals the presence of serial correlation using the Ljung-Box Q test in the 11 series investigated. Colinearity among explanatory variables was found in export, oil export, non-oil export, oil price and exchange rate series. In view of the presence of errors in the series, we introduce Error Correction Model (ECM) method by re-specifying the models to incorporate first order lag terms of the variables or the first order auto-regressive scheme whichever presents the best fit. Evaluation of the coefficients are based on the criteria of adjusted coefficient of determination and standard error tests at 5% level of significance

Regression Results

Exchange Rate and the Real Economy

a) Exchange rate was found (see appendix 1) to have a positive relationship with Gross Domestic Product which is interpreted (according to the way exchange rate is expressed here) to mean that the higher the value of the national currency, the lower the measure of national output. This is consistent with classical thinking that lower currency value is required for growth of the economy, however it lacked statistical significance. Ordinarily the transmission mechanism of exchange rate to the real economy is thought to result from increased demand for net exports. Our research went further to find a negative but insignificant relationship between exchange rate and non-oil exports which is in line with the GDP result (see appendices 2 & 4) But it was also revealed that exchange rate had a positive relationship with imports, which, given our exchange rate expression, is interpreted to mean that lower value of national currency is associated with higher import. This would appear to be anomalous and inconsistent with theory but underlies a disturbing inelasticity of imports and seeming insatiable appetite of Nigerians for foreign goods. Complementing the above result, we also found oil price to be positively associated with national output in level regression but negative and significant in the lag model regression.

b) Exchange rate was found to have negative relationship with inflation rate. Ordinarily this implies that when the naira got weaker, inflation rate increased, and vice-versa. Could this be a result of the positive relationship between exchange rate and import? Surprisingly no significant relationship was found that could lead us to conclusively state that this is a case of imported inflation, although the lag model suggests exactly that greater moves towards balance of payment equilibrium helped to moderate the general price level.

Devaluation and Macro- economic Variables

Theoretically, devaluation and depreciation of exchange rate are said to have identical impact on macro-economic variables but with greater short term devaluation effects. This was found to be true in our GDP model, while the overall exchange rate movement showed a coefficient of 8.3, devaluation dummy revealed a substantially higher impact factor of 1,049.5. Accordingly it is to be understood that devaluation magnifies the impact of exchange rate on macroeconomic variables in a manner that can be far-reaching. Interestingly devaluation resulted in a positive but insignificant national output relationship, but more importantly, we found it negative and significant with GDP in the one period lag specification. We however found conflicting results on the equilibrating effects of devaluation on external sector variables. It had a negative effect on exports, and indeed a negative and statistically significant effect on non-oil exports. This would appear to suggest a comprehensive evidence that reduction in exchange rate, either by way of administrative devaluation or market mechanism has not impacted positively on non-oil exports in a significant manner. The effect is however positive but statistically insignificant in the lag specifications. Again, as expected, devaluation was found to have inflationary effect in both the level and one period lag regressions. Ordinarily, it would appear that high domestic and relative prices are required in the instant through devaluation to stimulate local production and make demand for imports un-attractive. The evidence here does not support these presumed transmission effects.

Conclusion and Policy Implications

The classical view of negative relationship between strength of a currency and economic growth cannot be rejected by empirical evidence in this paper. However the finding of its statistical insignificance implies that perhaps certain extraneous factors may be working to cause static interference on the exchange rate transmission mechanism in the market, and these factors need to be addressed before the process of classical equilibrium can work. It is strongly suggested that these factors lie within the realm of fiscal regime. Accordingly it may be safe to conclude that measures taken in isolation from the monetary end to lower exchange rate will not lead to growth of the economy.

Closely related to the above is that devaluation as a tool cannot be relied upon to grow the economy. Given the prevailing economic structure and inelasticities, devaluation cannot stimulate local production and hence supply of tradable goods for export. It cannot douse in any significant manner the demand for imports without attaining levels that would cause a dislocation to the system; and any devaluation now will create condition for calls for further devaluation in future especially given the state of constant tension between official and parallel markets.

Devaluation may only serve some non-core purposes in the meantime being consequential price and income effects, namely: reflate the naira revenue and fund the skewed budget system to feed

into fiscal exuberance which only has nominal effect on the economy. Devaluation will serve to devalue the Nigerian brand and assets and given prevailing structures of the economy, it is doubtful if desired influence on investment decisions would be elicited. Nigerians may need to work harder to settle indebtedness, pay bills to foreigners and sustain production and employment overseas. Accordingly the costs to devaluation would appear to overwhelm the benefits.

The finding of slightly improved measure of significance of the lag variables only leads us to tentatively conclude that expectations and speculations are reasons for the foreign exchange pressures.

Recommendations

In the light of materials reviewed from literature and empirical findings, the following recommendations are considered helpful in policy formulation and execution:

Devaluation should not be used as a primary policy tool for attainment of macroeconomic equilibrium. Alternative methods should be explored or strengthened.

Monetary authorities should adopt an exchange rate targeting approach which calls for the use of defined fundamental factors to determine equilibrium exchange rate. Thereafter, administrative mechanism may be used to support the market to sustain such a rate by way of occasional intervention. We may call this a managed float system. This would mean non-reliance on the moves of speculators in the determination of exchange rate.

The Central Bank should strengthen the use of trade and exchange control measures to curb illicit and un-productive imports, and encourage diversification in the production of domestic and tradable goods. Such measures include imposition of tariffs and outright ban on a select group of goods in such a manner that protects local businesses without hurting global trade. Accordingly, this protection and incentives should be extended to producers of goods for which the country has comparative advantage and those of high national priority.

Complimentary monetary policy measures to deny liquidity to speculators in the foreign exchange market should be strengthened.

Even more importantly is fiscal-monetary policy convergence in adoption of measures to attain macroeconomic balance without necessarily compromising independence of the monetary authority. In the past, it would appear that the scenario was for ‘the Ministries, Departments and Agencies (MDAs) to create the mess and expect the CBN to clear the mess’. Indeed, given the state of the foreign exchange market today, it can be argued that the fiscal authorities have far reaching role to play in achieving and sustaining equilibrium

Management of expectations must start with monetary and fiscal authorities moving fast to build trust and confidence among market operators. This involves coming up with clear policies, providing leadership, discipline, and integrity. A state of doubt, uncertainty, and opaqueness creates crisis of confidence and expectations and breeds distortion in the market place.

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APPENDICES

Appendix 1: The National Output model Regression Result

Dependent Variable: GDP

Variable	Coefficient	Std.Error	tStatistic	Prob.
C	4432.489	2278.74	1.945149	0.0721
EXR	8.267458	27.07486	0.305355	0.7646
BOP	0.001624	0.000816	1.989269	0.0666
E	-0.53185	0.236965	-2.24444	0.0415
EO	0.531324	0.236604	2.245622	0.0414
EN	0.585596	0.244835	2.391798	0.0314
INF	9.4555 98	19.06111	0.496067	0.6275
MPR	-151.153	111.2793	-1.35832	0.1958
OILP	48.94956	53.09237	0.92197	0.3722
DEV	1049.524	1061.992	0.98826	0.3398
EXR(-1)	3.26975	28.77821	0.113619	0.9112
BOP(-1)	-0.00155	0.00154	-1.00344	0.3327
E(-1)	0.593059	0.092782	6.3 91948	0
EO(-1)	-0.59114	0.092818	-6.3688	0
EN(-1)	-0.57301	0.099234	-5.77436	0
INF(-1)	2.689761	20.08198	0.133939	0.8954
MPR(-1)	-17.5523	94.61089	-0.18552	0.8555
OILP(-1)	-150.345	62.50196	-2.40545	0.0305
DEV(-1)	-22.6976	892.701	-0.02543	0.9801

R-squared	0.998811	Mean dependent var	16030.34
Adjusted R -squared	0.997281	S.D. dependent var	25339.57
S.E. of regression	1321.221	Akaike info criterion	17.50457
Log likelihood	-269.825		
F-statistic	653.1422	Durbin -Watson stat	2.151166
Prob(F -st atistic)	0		

Appendix 2 Exchange Rate Regression

Dependent Variable: EXR

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	12.47957	26.75894	0.46637	0.6477
BOP	-7.65E-06	7.38E-06	-1.03627	0.3165
GDP	0.000118	0.001219	0.096921	0.9241
EN	-9.09E-05	7.77E-05	-1.17078	0.26
INF	-0.105132	0.187497	-0.56071	0.5833
MPR	-0.315665	1.0632	-0.2969	0.7706
OILP	0.347123	0.532425	0.651966	0.5243
DEV	19.26889	9.387826	2.05254	0.058
M	-7.63E-06	8.44E-06	-0.90411	0.3802
EXR(-1)	0.965646	0.146402	6.595858	0
BOP(-1)	-8.43E-06	1.31E-05	-0.64393	0.5293
GDP(-1)	0.003191	0.002862	1.115008	0.2824
M(-1)	1.87E-05	7.66E-06	2.437424	0.0277
EN(-1)	-0.000235	0.000212	-1.10723	0.2856
INF(-1)	-0.073367	0.19722	-0.37201	0.7151
MPR(-1)	0.293753	0.915269	0.320947	0.7527
OILP(-1)	-0.733512	0.542399	-1.35235	0.1963
DEV(-1)	-6.698285	8.303253	-0.80671	0.4324

R-squared	0.980636	Mean dependent var	70.00584
Adjusted R sq	0.95869	S.D. dependent var	63.61271
S.E. of regression	12.92914	Akaike info criterion	8.259296
Sum squarresid	2507.44	Schwarz criterion	9.075573
Log likelihood	-118.2784	Hannan-Quinn criter.	8.533949
F-statistic	44.68455	Durbin-Watson stat	2.418403
Prob(F-statistic)	0		

Appendix 3: Inflation Regression Result

Dependent Variable: INF

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	26.46716	13.8037	1.917396	0.0677
EXR	-0.137075	0.08367	-1.63828	0.115
BOP	-3.63E-07	4.96E-06	-0.07324	0.9423
M	1.44E-06	3.42E-06	0.419597	0.6787
MPR	0.340113	0.811386	0.419175	0.679
OILP	-0.130373	0.335365	-0.38875	0.701
DEV	7.11027	7.137915	0.996127	0.3296
AR(1)	0.713401	0.194143	3.674622	0.0013
AR(2)	-0.467094	0.197555	-2.36437	0.0269

R-squared	0.534019	Mean dependent var	20.09375
Adjusted R-squar	0.371939	S.D. dependent var	17.547
S.E. of regression	13.90605	Akaike info criterion	8.334783
Sum square resid	4447.7	Schwarz criterion	8.747022
Log likelihood	-124.3565	Hannan-Quinn criter.	8.471429
F-statistic	3.294786	Durbin-Watson stat	1.770261
Prob(F-statistic)	0.011807		

Inverted AR Roots	.36+.58i	.36-.58i

Appendix 4: Non Oil Export Regression

Dependent Variable: EN

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18079.49	65215.59	-0.27723	0.7846
GDP	16.19482	2.415427	6.704745	0
EXR	786.4207	797.021	0.9867	0.3362
INF	480.3515	708.0411	0.678423	0.5057
MPR	3170.879	3743.107	0.847125	0.4075
OILP	810.9309	1056.217	0.767769	0.4521
DEV	-70512.16	33888.2	-2.08073	0.0512
EXR(-1)	-1570.91	923.4932	-1.70105	0.1052
GDP(-1)	1.489401	5.575357	0.26714	0.7922
EN(-1)	-0.360571	0.343226	-1.05054	0.3066
INF(-1)	-412.3447	739.3733	-0.5577	0.5836
MPR(-1)	-2257.754	3422.705	-0.65964	0.5174
OILP(-1)	-466.3464	1105.293	-0.42192	0.6778
DEV(-1)	5393.412	31626.97	0.170532	0.8664

R-squared	0.984132	Mean dependent var	178649.1
Adj R-squared	0.973276	S.D. dependent var	314478
S.E. of regression	51409.71	Akaike info criterion	24.82946
Sum sq.resid	5.02E+10	Schwarz criterion	25.46434
Log likelihood	-395.6861	Hannan-Quinn criter.	25.04308
F-statistic	90.6464	Durbin-Watson stat	1.897663
Prob(F-statistic)	0		

Appendix 5: Import Regression
Dependent Variable: M

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	113535.5	796314.4	0.142576	0.888
EXR	2758.892	9501.812	0.290354	0.7744
GDP	80.31328	30.36159	2.645226	0.0151
MPR	-35955.07	42133.51	-0.85336	0.4031
OILP	31991.08	11820.29	2.706455	0.0132
DEV	344981.2	401235.5	0.859797	0.3996
EXR(-1)	198.2326	11027.58	0.017976	0.9858
GDP(-1)	-56.49458	31.8864	-1.77175	0.0909
MPR(-1)	-4763.019	37207.82	-0.12801	0.8994
OILP(-1)	-14402.96	14850.28	-0.96988	0.3431
DEV(-1)	-9965.667	353473.5	-0.02819	0.9778
M(-1)	0.591375	0.237241	2.492718	0.0211

R-squared	0.982857	Mean dependent var	2344142
Adj R-squared	0.973878	S.D. dependent var	3540300
S.E. of regression	572195.9	Akaike info criterion	29.62764
Sum sq. resid	6.88E+12	Schwarz criterion	30.17182
Log likelihood	-476.856	Hannan-Quinn criter.	29.81074
F-statistic	109.4557	Durbin-Watson stat	1.955291
Prob(F-statistic)	0		

Appendix 6: Balance of Payment Regression
Dependent Variable: BOP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	919591.3	879226.1	1.04591	0.3122
EXR	-8733.783	8428.126	-1.03627	0.3165
GDP	-12.24735	41.07793	-0.29815	0.7697
EN	-2.158544	2.684089	-0.8042	0.4338
INF	-3901.143	6321.873	-0.61709	0.5464
MPR	-31418.07	35106.1	-0.89495	0.385
OILP	25319.37	17032.36	1.486545	0.1579
DEV	292160	350995.7	0.832375	0.4183
M	-0.142818	0.290567	-0.49151	0.6302
BOP(-1)	0.780732	0.400762	1.948119	0.0704
EXR(-1)	16777.59	8756.992	1.915908	0.0746
M(-1)	0.32733	0.293918	1.113676	0.2829
GDP(-1)	-137.7581	94.13596	-1.4634	0.164
EN(-1)	12.4605	6.720164	1.854196	0.0835
INF(-1)	2244.808	6669.632	0.336572	0.7411
MPR(-1)	-4546.371	31010.95	-0.14661	0.8854
OILP(-1)	-44353.53	15675.26	-2.82953	0.0127
DEV(-1)	11761.01	286574.2	0.04104	0.9678

R-squared	0.824319	Mean dependent var	92577.44
Adj R-squared	0.625213	S.D. dependent var	713622.6
S.E. of regression	436878.5	Akaike info criterion	29.11515
Sum sq.resid	2.86E+12	Schwarz criterion	29.93143
Log likelihood	-462.4	Hannan-Quinn criter.	29.3898

F-statistic	4.140112	Durbin-Watson stat	2.161346
Prob(F-statistic)	0.004113		