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Contents

Keynote Address

Godwin I. Emefiele (CON)*

Deputy Governors,
Departmental Directors,
Branch Controllers,
Distinguished Resource Persons,
Executive Staff of CBN,
Members of the Media,
Ladies and Gentlemen.

It is indeed my pleasure to be part of this year's Central Bank of Nigeria Executive Seminar, and most especially, to present the keynote address. As it were, today's Seminar is the first to be held since I assumed the headship of the Bank and I have been reliably informed that the event had to be shifted to Abuja to secure my presence at the occasion in recognition of my tight schedule. I, therefore, commend the organisers – the Research and Human Resources Departments of the Bank – for their thoughtfulness, not only for making it easier for me to personally grace the occasion but also, for providing the opportunity for participants to deliberate on key developments in the global and domestic economic environments that directly or indirectly touch on a core mandate of the Bank.

Permit me to also seize this opportunity to appreciate the Management and the Executives of the Bank for providing the requisite capacity and qualitative leadership necessary for steering the affairs of the CBN, especially in discharging our responsibilities with the high level of professionalism and commitment expected of an ideal central bank operating in a dynamic global environment and a challenging domestic economic condition. Indeed, the Seminar provides a dual platform for interaction and brainstorming among the CBN Executives, on one hand, and with resource persons and other stakeholders on the other, given their immense expertise and experience on the subject matter. In this respect, the Seminar affords the external stakeholders the opportunity to better understand the position and the thinking of the Bank on issues bothering on the strategies for pursing its core mandate.

The theme for this year's Seminar "Exchange Rate Policy and Economic Development: Is There Need for A Paradigm Shift?", as well as the complementing sub-themes, are not only

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appropriate at this moment in our economic history, but have been carefully chosen, given the recent developments in the foreign exchange market that have elicited serious concerns from policymakers and other stakeholders in the Nigerian economy. By and large, the theme of the seminar, which has a strong bearing with the major planks of my vision for the Bank on assumption of office - ensuring exchange rate stability; building external reserves position; and preserving the value of the naira - unequivocally underscores the importance of the choice of an appropriate exchange rate regime in the economic management, given its strong linkage to economic competitiveness, domestic industries performance and economic progress.

Distinguished audience, as we all know, exchange rate is the price of a country's currency expressed in terms of some other currencies. It determines the relative price of domestic and foreign goods, as well as the strength of a country's external sector participation in international trade. In addition, exchange rate policy describes the techniques for the management – generation, accretion and disbursement – of foreign exchange resources in order to reduce the destabilising effects of short-term capital flows (Rodrik, 2008).

In the light of the above, it is obvious that Economists have long realised that poorly managed exchange rates can be detrimental for economic growth. Thus, they posited that avoiding exchange rate misalignment is one of the viable ways to ensure economic growth, particularly in the emerging and developing economies. This assertion was borne out of the fact that overvaluation adversely affect the competitiveness of the domestic industries, and is often accompanied by the shortage of foreign currencies, balance of payment disequilibrium, boom and burst macroeconomic cycles, all of which are inimical to economic growth.

Therefore, it is imperative for policymakers to be circumspect of their foreign exchange management techniques given the fact that the valuation (over/under valuation) regime has implications for the competitiveness or otherwise of the economy. It is instructive to note that the experience of many of the Southeast Asian economies, including India and South Korea suggests that pragmatic exchange rate management strategies was one of the most important factors in their economic growth experience. As you are also aware, skillful exchange rate policy was central to the ascendance of China on the global economic stage given the fact that its economic take-off was largely induced by currency undervaluation, which boosted domestic industrial production and stimulated net export component. Specifically, the international competitiveness of Chinese domestic industries became evident, thereby spurring China's economic growth and industrial exports, the aftermath of which made it the world's second largest economy as at today.

Distinguished ladies and gentlemen, exchange rate planning and management in developing and emerging economies like Nigeria are often very sensitive and controversial. This is most especially due to the domestic adjustments/reforms required to engender an appropriate rate that would bolster economic growth. As such, more often

than not, adjustments are perceived by the citizens as damaging to the economies and most times are vehemently opposed by domestic public opinion.

You will recall that exchange rate management in Nigeria has undergone series of transformation/reforms over the years, influenced largely by domestic and external economic conditions, most especially, by issues surrounding federation revenue (government fiscal operations) as well as developments around crude oil (prices and volume of export), which is the mainstay of the country's foreign exchange earnings.

Specifically, Nigeria embraced the fixed exchange rate regime with its different variants in the immediate post independent period through the early 1970s and up until the mid-1980s. During this period, exchange rate regime transited from the domestic currency pegged at parity with British pound, later to pegging against a basket of convertible currencies and further to import-weighted basket approach. The oil price - induced external shock of the early 1980s exposed the overvaluation of the domestic currency, which resulted in economic meltdown and precipitated structural rigidities, financial repression, inflationary pressure as well as external imbalance.

Therefore, following Nigeria's economic crisis of the mid-1980s, which endured to the late 1990s, occasioned by the collapse of oil prices in the international market, it dawned on policy makers to address the problems of exchange rate misalignment. Consequently, the country embarked on the flexible/floating exchange rate regimes in 1986 with the adoption of the International Monetary Fund's (IMF) Structural Adjustment Programme (SAP); the country has kept faith with many of its variants up till today. Nonetheless, the main focus of the flexible/floating regimes has remained basically; to safeguard the value of the domestic currency, minimise speculative activities by reducing the premium between the official and other segments of the market, ensure unfettered financial intermediation and conserve the country's external reserves.

Ladies and gentlemen, the chronicle of the past events and efforts are imperative for us to understand the arduous task of exchange rate management. This is necessary in order to situate the task in proper perspective, particularly for the Nigerian economy, which is primary commodity resource based and heavily dependent on imports. Needless to say, the events of the past ten months, particularly with regard to the unbridled surge in demand for foreign exchange, the sharp drop in crude oil prices, low reserve accretion coupled with the attendant adverse effects on the exchange rate of naira, underscores the need for the assessment of our strategy.

A cursory examination of the facts would perhaps present a more vivid picture of the current situation with a view to appreciating the magnitude of the task ahead. For instance, the price of Bonny Light, Nigeria's premium crude, which sold for about US$114.07 per barrel in June 2014 consistently declined by 57.0 per cent to US$58.37 per barrel by February 2015.

In the same vein, sustained pent-up demand exerted pressure on the foreign exchange market resulting in significant depreciation of the exchange rate from an average of ₦162.82/US$ in June 2014 to ₦194.09/US$ at end-February 2015 at the inter-bank window, and from ₦167.14/US$ to ₦211.81/US$ at the Bureau de Change (BDC) segment of the market over the same period.

Ladies and gentlemen, we are all witnesses to the timely efforts taken by the Bank to restore confidence in the foreign exchange market and improve the general financial conditions. The deliberate adjustment of the exchange rate band was initiated to insulate the foreign exchange market from demand pressure bothering on speculative activities and at the same time stem the imminent depletion of the foreign reserves.

Similarly, the increasing usage of the US dollar in domestic transactions, which was observed to have fuelled the demand for foreign exchange, has attracted the attention of the CBN. In this respect, the Bank has taken corrective measures to address the concern. In addition, the utilisation of export proceeds has been restricted to eligible transactions only so as to block leakages. However, the persistent divergence between the inter-bank market and the bureau-de-change rates, which still provides avenue for arbitrage opportunities, is being seriously looked into.

Distinguish audience, let me remind us that the depressed outlook for crude oil price developments arising from the significant supplies of the US shale oil and the entrant of new producers into the crude oil market, the attendant low demand for Nigeria's crude oil by some of her trading partners, including the US has serious implications not only for reserves accretion but also for the sustenance of our foreign exchange market. Given this scenario, it is pertinent for this gathering to come up with useful policy ideas that would inform the Bank's future policy initiatives.

Distinguished audience, the Bank places a high expectation on the outcome of this Seminar given the array of erudite resource persons assembled to lead the discourse. Having set the stage for robust engagements by the participants, it is my fervent believe that with the array of resource persons, the Seminar will throw-up pragmatic ideas on the way forward based on dispassionate, realistic and factual analysis that would assist the Bank in navigating a terrain characterised by complex institutions, inadequate data and above all, the unpredictable behaviour of the market players.

Notwithstanding, with the downside risks associated with foreign exchange management, the CBN will continue to re-strategise its policy framework in line with international best practices to mitigate the inherent risks, strengthen the financial system and ensure macroeconomic stability.

Ladies and gentlemen, it is in the light of this that the gathering should be obliged to reappraise the subsisting exchange rate policy with a view to ascertaining if there is a genuine need for a shift in paradigm. It is my sincere hope that at the close of the Seminar

the Bank would have a lot of options to take along towards improving policy making for the benefit of the economy.

On this note, I wish to declare the Seminar open and wish all of you a very rewarding and fruitful deliberation.

Thank you for your attention.

Welcome Address

Ms. Chizoba Mojekwu*

The Special Guest of Honour,
Deputy Governors,
Departmental Directors,
Branch Controllers,
Distinguished Resource Persons
Esteemed Participants,
Ladies and Gentlemen

It is my pleasure to welcome the top Management of the Bank, Directors, Executives and resource persons present, to the 2015 CBN Executive Seminar, jointly organised by the Research and Human Resources departments. I am proud that the Bank has sustained this seminar series for the past 23 years, and this year's edition is unique, as it is the first under the leadership of the present Governor, Mr. Godwin I. Emefiele, CON. I specially, welcome you, Sir. We would, therefore, count on your unique support to take the seminar to the next level in the years ahead.

Ladies and gentlemen, I wish to remind us that this forum underscores the commitment of the Management to one of our core values which is, being a 'learning organisation'. Thus, it becomes incumbent on us to first position ourselves as learning individuals so that we can take maximum advantage of the discussions that will take place here over the next couple of days. The Seminar presents an opportunity for us to learn, challenge concepts, share ideas as well shape policy. We should count ourselves privileged to be part of this.

The theme of this year's seminar; **"Exchange Rate Policy and Economic Management in Nigeria: Is there Need for Paradigm Shift"?** could not have been more apt. The threat to the economy occasioned by falling oil prices and demand for Nigeria's crude in the global market is all too familiar. As a result, the external reserve has come under tremendous pressure, much more than during the global economic and financial crises. This development has tasked the Management, which has also responded with some proactive policy measures. The theme, therefore, presents an opportunity for a frank and open discussion on the propriety of the reform measures, emergent challenges and what the new direction of exchange rate policy should be. I enjoin all participants to take the discussions very seriously in order to justify the time and resources which have been deployed to organise this seminar.

* *Ms. Chizoba Mojekwu is the Director of the Human Resources Department of the Central Bank of Nigeria.*

"All work and no play makes Jack a dull boy" is a popular maxim. Thus, I enjoin you all to have a good balance of work and relaxation during this period, so that we can return to our beats, energised for the challenges that lay ahead. On this note ladies and gentlemen, let me once more, welcome you all very warmly to the 2015 edition of the CBN Executive Seminar.

Thank you and God bless Nigeria and the CBN.

Special Remarks

Dr. (Mrs.) Sarah O. Alade*

It is my honour and pleasure to make this Special Remarks at the opening ceremony of the 23rd edition of the Annual Executive Seminar jointly organised by the Research and Human Resources Departments. The theme of this year's Seminar, "Exchange Rate Policy and Economic Management in Nigeria – Is there Need for A Paradigm Shift?", could not have come at a more appropriate time than now as the Bank continues to grapple with the challenges of severe foreign exchange pressure, contraction in foreign exchange receipts and slow recovery of the global economy as well as the reversal of short-term capital flows.

Ladies and gentlemen, you will recall that recent global trends suggest that Asia, the euro zone and emerging markets economies are contending with threats of recession and austerity measures, while commodity prices, including oil prices, are falling with negative impact on oil producing countries like Nigeria. Arguably, these developments show clear signals of: a potential second-round global recession in less-than a decade since the last melt-down and the delaying global recovery; weakening global demand; and increasing volatility of capital flows to emerging markets. Thus, thinking out of the box will provide us with unconventional ways of dealing with the on-going economic difficulties. It is against this background that we must engage in constructive and productive discussions to generate ideas and viable options that will drive our exchange rate policy in the near-to-medium term.

Historically, a number of emerging market economies that integrated into the international capital markets with soft peg regimes had experienced severe currency crisis and economic disruption in the 1990s. Consequently, an increasing number of countries are moving toward floating exchange rate regimes. Notwithstanding, it has been widely argued that some form of soft peg regimes would be more viable and more appropriate for poorer developing economies due to their limited involvement in international capital markets. However, as these economies develop over the longer-term and open their capital accounts, they move away from soft pegs towards more flexibility.

Ladies and gentlemen, permit me to make some distinctions between the common forms of exchange rate regimes adopted globally. First is the free float regime, which is purely market determined and the monetary authority does not intervene in the foreign exchange market. Monetary policy is, therefore, independent of the exchange rate

* *Dr. (Mrs.) Sarah Alade is the Deputy Governor, Economic Policy of the Central Bank of Nigeria.*

regime and can be used freely to steer the domestic economy. Its main advantages include, but are not limited to: the ability to absorb adverse shocks; not prone to currency crises; and does not require high international reserves accumulation. Its disadvantages are: high short-term volatility; and large medium-term swings.

Second, is the managed float, where the monetary authority intervenes actively in the foreign exchange market without committing to a preannounced path for the exchange rate. Monetary policy under such circumstance is relatively independent and freely used to steer the domestic economy. The limited flexibility of managed float permits partial absorption of adverse shocks. It can also maintain stability and competitiveness, if the regime is credible, and is less vulnerable to currency crisis. The CBN has maintained this regime since the liberalisation of the foreign exchange market in 1986, because over the years, our exchange rate management policies have focused largely on the objective of maintaining stability.

Third, is the fixed or pegged regime, where the exchange rate is fixed to a major currency or a basket of currencies or Special Drawing Right (SDR). The peg is adjusted when the misalignment becomes unsustainable. The monetary authority stands ready to defend the peg through direct intervention and monetary policy. This regime can maintain stability and competitiveness if the peg is credible. However, the regime is prone to currency crisis if the country is open to international capital market because of the limited shock absorptive capacity. This regime was abandoned in Nigeria in 1986 following the liberalisation of the foreign exchange market with the adoption of the Structural Adjustment Programme (SAP).

In the developing world, the choice of an exchange rate regime stands as, perhaps, the most contentious aspect of macroeconomic policy. In Nigeria, the main objectives of exchange rate policy are to preserve the value of the domestic currency, maintain a favourable external reserves position and ensure external balance without compromising the need for internal balance and the overall goal of macroeconomic stability. According to the treatise on the impossible trinity, a country cannot have simultaneously a fixed exchange rate, free capital mobility, and an independent monetary policy. Only two of these objectives can be achieved at a time. Therefore, which objective should be given up depends on the country's macroeconomic policy and stage of development.

Different mechanisms had been implemented to manage the foreign exchange market in Nigeria. From the pre-1986 fixed exchange regime to a flexible and market determined regime in 1986. Since then, the Bank had operated different variants of the managed float regime to date, dictated by the prevailing economic conditions and market dynamics. However, on February 18, 2015, the Bank took the bold step to close the official window of the foreign exchange market. Furthermore, to deepen the market and enhance the efficacy of the demand management, the Bank gave specific directives on the effective monitoring and repatriation of both oil and non-oil export proceeds. In addition, the

utilisation of export proceeds was restricted to eligible transactions only, to minimise leakages.

It is important to note that the foreign exchange market has witnessed significant demand pressure and speculative attack from market participants, which led to volatility in exchange rates in the three segments of the market namely the official, inter-bank and Bureau-de-change (BDC). The declining oil price in the international market has challenged the Bank's capacity to accumulate reserves and defend the local currency in a bid to stabilise the exchange rate. There is therefore, need to come up with a robust exchange rate policy that will ensure stability at all times and guarantee sustainable and long-term growth and development. Definitely, overcoming this challenge is a possibility, but we must remain proactive in assessing risks and their associated costs, as well as, fashioning out ways to deal with the challenges.

Let me emphasise, that the selection of an exchange rate regime that is most likely to suit a country's economic interest would depend on country specific peculiarities namely: the size structure of the economy, openness of the country and the quantum of financial flows, structure of production, inflationary trend and the nature and source(s) of shocks among others. For any country to maintain a stable and competitive real exchange rate, it requires a supportive policy environment, which include: efficient and effective macroeconomic policies, strong financial sector and credible institutions. Monetary policy should be consistent with exchange rate objectives. Better managed and supervised financial system, adequate accounting standards and disclosure requirements, as well as, efficient legal and judicial systems.

Ladies and gentlemen, in the light of the foregoing, we have carefully selected subject area experts to make presentation around the topical theme of the Seminar. I therefore, urge you all to make use of this opportunity by devoting maximum time and attention to all the presentations and actively participate in all discussions in order to come up with an appropriate exchange rate framework that will guide future policy directions.

I wish all of you a very stimulating Seminar and fruitful deliberations.

Thank you for listening.

Exchange Rate Policy and Economic Management: A Theoretical Nexus

Ayodele Jimoh *

I. Introduction

The basic objectives of economic management are centered on ensuring economic prosperity for the greatest majority of the citizenry with sustainable external balance. This is often associated with significant expansion in the level of economic activities (growth in national output); reduction in unemployment; improved income distribution; significant improvement in the technology of production and its widespread diffusion in the society; improved access to modern and quality education and health care; stable external balance indicators, among others.

Economic management involves formulating and implementing economic strategies and policies that would ensure continuous economic prosperity (internal balance) and sustainable external balance. The first choice in economic management is between market-based economic system and an economic system based on administrative controls. In between the two polar ends are varied degrees of market-based economic systems. With the collapse of the Soviet Union in the 1990s, there appears to be a *de facto* consensus that market-based economic system is the inevitable choice for all.

Among the set of economic policies that are in the tool box of economic managers are exchange rate policies, tariff, exchange and administrative controls; and fiscal and monetary policies. Economic management, therefore, involves the use of exchange rate policies, tariff, exchange and administrative controls, fiscal and monetary policies. An economy that is overall market-based may choose an exchange rate policy that is not market based. Thus, the choice of the exchange rate policy could be made independent of the type of the mode of production and distribution chosen.

It is generally believed that an exchange rate is an important variable that has a significant impact on the overall outcome of macro-economic performance as it concerns internal and external balances. First, it is an important variable because of its impact on aggregate demand. Second, it is an important allocator of resources between the traded and non-traded sectors of the economy. Third, it is also an important variable that wealth holders consider in the allocation of their wealth between investment in physical assets and monetary assets and further among different categories of monetary

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assets. Fourth, it is generally believed to be an important determinant of the general price level, especially in an open economy where consumers have imports as a significant component of their consumption basket. It is for these, and other related reasons that the exchange rate is viewed as an important economic variable and is of importance to governments and monetary authorities the world over.

Furthermore, while an exchange rate change constitutes an expenditure-switching policy, a change in either fiscal or/and monetary policy stance is an expenditure-changing policy. To a limited extent, tariff is an expenditure-switching; limited because of the administrative discretion involved in its implementation.

Nigeria had witnessed a number of economic adversities and has a record of implementing different strands of exchange rate policies with varied outcomes. It is therefore desirable to examine this rich experience to determine how successful its exchange rate policy experience had been with an eye on the future. The objective of the current effort is to examine the record of the Nigerian exchange rate policies in the context of the prevailing conventional wisdom on the subject matter. Specifically, the current effort aims at determining the prevailing conventional wisdom over the period under review and comparing this with Nigerian exchange rate policy records to draw some lessons.

Towards this end, Section 2 discusses the conventional wisdom on the optimal exchange rate regime; Section 3 discusses the Nigerian experience, while Section 4 concludes the current effort.

II. Exchange Rate Regimes

The choice and formulation of exchange rate policies are often discussed and evaluated in the context of the alternative exchange rate regimes from which a choice could be made. In the continuum of conceptually possible exchange rate regimes from which a choice is to be made are the polar cases of flexible (floating) and the fixed exchange rate regimes. In between these two polar cases, you have the managed (or dirty) float closer to floating rate and the crawling peg closer to the fixed rate. Also, it is conceivable to have a multiple-tier exchange rate regime with the limiting case being the dual exchange rate regime like the well-known second-tier exchange rate regime that was practiced in Nigeria in 1986.

In real life, hardly do we see either of the two polar cases in its pure form rather real world exchange rate regimes are classified in accordance with their degrees of exchange rate flexibility. Thus, we hear of fixed rate and more flexible exchange rate regimes as the alternative empirical counterparts of the polar cases.

II.1 The Choice of Exchange Rate Regime

The major case often made for fixed rate is that it promotes international trade and investments and allocative efficiency. Furthermore, it is said that it disciplines monetary authorities to pursue sound monetary policies and it avoids competitive devaluation among countries, thereby promoting orderly foreign exchange market transactions.

On the other hand, flexible rate, being governed by market forces, is said to ensure external balance always and consequently, promotes competitive drives that result in larger national output. It is also said to contain in-built mechanisms via the activities of private speculators, by ensuring that short-run exchange rates are smoothened to their long-run (desirable) levels. Furthermore, flexible rates make exchange rate adjustments less of political decision unlike under fixed rate. Similarly, floating rates are said to perform shock-absorber role as it is said to insulate the domestic economy from external shocks.

The view that stable rates promote international trade and investment and allocative efficiency has been around for a while. For instance, Tower and Willett (1976: 6) quoting Johnson (1970) wrote:

> "... a common money simplifies the profit maximising computations of producers and traders, facilitates competition among producers located in different parts of the country and promotes the integration of markets including both the markets for products and markets for the factors of production (Capital and Labour)."

An application of Johnson's (1970) logic to international trade implies that stable rates would simplify profit-maximising computations and facilitate competition among producers and traders located in different countries thereby promoting efficient allocation in of the world resources. This perhaps lies behind Tower and Willet's (1976) argument that fixed exchange rates would eliminate uncertainty thereby promoting growth of larger and more efficient markets in capital, goods and services, and free resources that would otherwise be engaged in currency conversions thereby raising the level of real income. Similarly, the view that stable rates promote discipline in the use of stabilisation policies and promote orderliness in the foreign exchange market was upheld by the International Monetary Fund (IMF, 1970).

But as early as the 1960s, it was increasingly felt that economies differ in their structural characteristics and that the adoption of either flexible exchange rate regime (FLER) or fixed exchange rate regime (FXER) is with some costs and benefits (Mundell, 1961; Purvis, 1979; Sachs, 1980; Martson, 1982; Harkness, 1982; etc.).

The view that the optimality of the alternative exchange rate market depends on the structural characteristics of the economies concerned has received serious attention since the introduction of the concept of "optimum currency area" by Mundell (1961). Mundell's (1961) principal contribution was to identify factor mobility (especially labour mobility) as

the single factor that determines the optimality of a currency area. Mundell (1961) suggested fixed rates between two countries with high labour mobility. The reason for this view is that if labour is highly mobile between the countries concerned, then, exchange rate changes, as an instrument for righting balance-of-payment disequilibrium would be unnecessary since labour can always move from the deficit region to surplus region, bringing about the required fall in money income in the deficit country relatively to that of the surplus region.

Researches along the line of Mundell (1961) have identified other important factors in the determination of the optimal exchange rate regime. These factors are: wage and price indexing process; source of disturbances; net foreign currency-denominated asset positions; degree of openness; diversification and financial and fiscal institutional set up (Johnson, 1970; Purvis, 1979; Sachs, 1980; Martson, 1982; Harkess, 1982; Jimoh, 1984; Tower and Willett, 1976; Corden 1972; etc). Let us examine these factors in their turns.

II.1.1 Openness and Diversification

Some writers have emphasised the level of economic diversification, the degree of openness and the size of domestic economy as the most relevant factors in the selection of the optimal exchange rate regime. Notable authors of this tradition are Kenen (1969), Johnson (1970) and Purvis (1979).

The main thesis here is that a small economy cannot diversify its production in the presence of economies of scale because it would be costly to do so, but by human nature, consumption is necessarily diversified and diversified consumption with undiversified production implies that a small economy would be highly "open". In such an open economy, a large proportion of domestic income would be spent on foreign products; stabilising the value of domestic currency requires a stable exchange rate, since small changes in exchange rate would effect significant changes in the domestic real income and the value of domestic currency. However, a reasonably stable value of money is generally presumed to be a policy objective since that ensures that money would perform its roles satisfactorily. Hence, for small, open and undiversified economy, the fixed exchange rate regime would be optimal. This was perhaps the rationale behind Johnson's (1970: 97-98) suggestion when he wrote:

> "One is accustomed to thinking of national monies in terms of the currencies of the major countries, which currencies derive their usefulness from the great diversity of goods, services, and assets they can be directly converted. But in the contemporary world, there are many small and relatively narrowly specialised countries whose national currencies lack usefulness in this sense, but instead derive their usefulness from their rigid convertibility at a fixed price into the currency of some major countries with which the small country trades extensively or on which it depends for capital investment. For such countries, the advantages of rigid convertibility in giving the currency usefulness and facilitating international trade and

> investment out-weigh the relatively small advantages that might be derived from exchange rate flexibility. In a banana republic, for example, the currency will be more useful if it is stable in terms of command over foreign goods than if it was stable in terms of command over bananas; and exchange rate flexibility would give little scope for autonomous domestic policy."

Johnson's (1970) comments quoted above, seem to presume that there is money illusion among the residents of the domestic economy. These residents should be concerned with the purchasing power of the domestic currency held and not just with the rigid convertibility of the domestic currency into a key currency. Stability of the purchasing power of the domestic currency is only achieved, in face of exchange rate peg, if foreign prices of major trading partners are stable. When exchange rates fluctuate to reflect the relative strength of currencies due perhaps to different rates of inflation the domestic residents should be indifferent in absence of money illusion.

If one considers the possibility that foreign prices may fluctuate and even widely, then, there is wisdom in Diaz-Alejandro's (1975: 13) statement that:

> "Those arguing that less developed countries should, for their own good, lock their monetary tools with a species of chastity belt and throw away the key appear to assume a relatively tranquil world environment, offering and anchor of price-level stability. Such a view was valid for the late 1950s, and early 1960s, but certainly did not apply during the 1930s and early 1940s and is debatable for the 1970."

Indeed, Diaz-Alejandro's (1975) observation on prices is perhaps valid for today.

II.1.2 Sources of Economic Disturbances

Stein (1963), Black (1976) and Tower and Willet (1976), listed the origin of economic disturbances as relevant factors in the determination of the optimal exchange rate regime. In the words of Tower and Willet (1976):

> "It is rather widely accepted that a country has the strongest case for freely floating exchange rates when the disturbances to its balance of payments typically come from outside its borders and the weakest case when they come from inside".

The reason for this view, as Black (1976) demonstrated, is that FLER is generally believed to insulate an economy from foreign disturbances, while FXER allows an economy to export some of the effects of disturbances of domestic origin. Consequently, FXER would result in smaller variation in prices and output in response to domestic disturbances. Hence, if the above argument is true, an economy experiencing foreign disturbances most of the time should adopt a FLER, otherwise, it should operate a FXER.

However, since the early 1980s, the insulation property of the flexible exchange rates has been questioned by Purvis (1979), Jimoh (1984), and Martson (1982). The central thesis is

that if wages and prices are responsive to changes in exchange rate due to wage indexation and the significant use of imported input in the production process and there is significant net position in foreign currency denominated assets, then FLER has a slim chance of being partially insulating and could possibly be shock exacerbating. Hence, the "Shock-absorber" power of the FLER is more certain when domestic wages and prices are not indexed to foreign prices and the economy has no significant net asset position in foreign currency denominated assets.

In the Nigerian circumstances, it seems that the shocks to external balance originate predominantly in foreign economies, but import-substitution industrialisation ensures that there is a significant level of imported input in the industrial production process, hence, supply prices of industrial products are expected to be highly indexed to foreign prices and exchange rates. This suggests that insulation property of a FLER would be in doubt in Nigeria.

II.1.3 Institutional Set Up

Some authors have identified the financial and fiscal institutions setting as factors relevant to the determination of the optimal foreign exchange market (Lewis, 1979; Black, 1976 and Mundell, 1961). It is generally believed that when the instruments of monetary policy are fragile due to fragmented and underdeveloped nature of money markets and forward markets are non-existent, then the fixed rates would be optimal. Also when the size of the foreign exchange market is thin, a floating exchange rate might not be recommended.

For instance, Lewis (1979: 18-19) listed four reasons why the less developed countries (LDCs) were advised to operate stable rates; and these reasons included the non-existence of forward markets and the fragility of monetary instruments in the LDCs. The fragility of monetary instruments in the LDCs is a tenable reason for recommending the FXER, while the non-existence of forward markets may not be an equally good reason. This is because it is generally believed (especially since the pioneering works of Mundell, 1963; Fleming, 1962; Krueger, 1965; and Sohmen, 1967) that the potency of the monetary policies is higher under floating rates than under fixed while the opposite is the case with fiscal policies (Tower and Willett, 1976: 21). If instruments of monetary policy are fragile in the LDCs, as is generally believed, then an adoption of FLER would imply that only the fragile monetary instruments are available for stabilisation purposes since fiscal policies would be less effective; and they will be better advised to stay on stable rates. But if forward markets are essential for the efficient operation of FLER, and they are so recognised, then, a LDC that wants to adopt a FLER would only have to weigh the costs of establishing the required forward markets against the benefits expected from the operation of FLER. This is because while it might take some efforts to establish forward markets, it would take much more efforts to develop and integrate the fragmented and under-developed money markets in the LDCs. Furthermore, Mundell (1961), Tower and Willett (1976) and others have identified, the size of the foreign exchange markets as a relevant factor to the determination of optimal exchange rate regime. For instance, Tower and Willett (1976: 7) (4) said:

> "...exchange market for currency of a small country might be so thin that a small number of speculators could affect the market price (of foreign currencies under floating rates), increasing the potential for large fluctuations in the external value of the currency ...fostering exchange rate instability..."

This is generally believed and we are not in doubt that in situations where the foreign exchange market is thin, extra measures might be needed to regulate the activities of speculators but this does not entirely rule out the adoption of the FLER in a small country. Hence, the underdeveloped nature of financial markets in the LDCs is more of a relevant factor than the size of foreign exchange markets and the non-existence of forward markets.

The Nigerian financial market could be said to be shallow, fragile and fragmented until the early 1970s, while the same could not be said of it since 1980s. As we have shown elsewhere, empirical evidence suggested that by late 1970's demand for money in Nigeria has become significantly interest-rate sensitive suggesting that its financial market was maturing and monetary policy was becoming effective (Jimoh, 1990: 102).

II.1.4 Net Foreign-Currency Denominated Assets

Purvis (1979), Jimoh (1984), Boyer (1978), Marion (1981) and others have emphasised the role of "wealth effects" of exchange rate changes in the determination of optimal exchange market. In Purvis (1979) and Jimoh (1984), the incorporation of "Wealth effects" ensured that an equal, but opposite change in foreign prices and exchange rates is not neutral. Hence, changes in foreign prices and exchange rates have no equal effects on the domestic economy, resulting in a less favourable result for the insulations properties of the FLER.

The incorporation of "wealth effects" in Boyer (1978) ensured that money market equilibrium conditions were not independent of the exchange rate level if the country had a non-zero net position in foreign currency-denominated assets. This is because changes in the exchange rate result in capital gains or losses thereby changing the size of total wealth. The result is that the domestic economy is integrated to the rest of the world through the foreign exchange cum money markets. This narrows down the difference between the insulation powers of the alternative exchange regimes.

Similarly, in Marion's (1981: 63) model, wealth effects of exchange rate changes "play a crucial role in the transmission of foreign disturbance to the small economy". This is because changes in exchange rate affects the level of wealth, which also affects demands for all goods and assets. Therefore, the general result from studies that incorporate the wealth effects of exchange rate changes is that the difference between the alternative exchange rate regimes, with respect to insulation power, is somewhat small.

Overall, the conventional wisdom has identified the degree of openness, position in foreign-currency denominated assets, factor mobility, wage and price indexation process, sources of economic disturbances and institutional set up as the most important factors in the determination of the optimal exchange market. The consideration of these factors has led many experts in the 1970s to have suggested fixed rates for the LDCs. This conventional wisdom led Lewis ((1979: 18) to say:

> "It is now the conventional wisdom that the currencies of the developed countries should float, but the currencies of the less developed countries (LDCs) should not; that is to say that each LDC should choose a more developed country (MDC) as a partner, or the Special Drawing Rights (SDR) and tie itself in a fixed relationship."

II.1.5 Administrative Corruption

However, since mid-1980s, the view of the World Bank (International Bank for Reconstruction and Development, IBRD) and the International Monetary Fund (IMF), especially those emanating from case studies on Performances of Structural Adjustment Programmes in the LDCs, are unambiguous in recommending floating rates for all countries (i.e. including all LDCs). This shift was informed by the high incidences of administrative corruption when fixed rates were in place, especially in countries like Nigeria where foreign exchange from the primary exports (e.g. oil) accrue in the main to the government, the operation of fixed rate had always resulted in an over-valued currency sustained by import and exchange controls. Such reliance on administrative controls in allocating the scarce foreign exchange had often created room for influence peddling and rent-seeking behaviour that saw the rent associated with foreign exchange scarcity escaping from government coffers and appropriated to those who are close to the corridors of power. Thus, the adoption of floating rates by such governments would at the minimum improve their budget.

II.2 The Conventional Wisdom on Optimal Exchange Rate Regime

Considering the factors mentioned above and based on some empirical findings, economists over time have had some consensus on the optimal foreign exchange rate regime for every category of economies. However, the conventional wisdom in this regard has been changing with time. For instance, between 1900 and 1929, the conventional wisdom was that all economies should operate fixed rates. However, between 1930 and late 1960s, the conventional wisdom was that less developed countries (LDCs) should float, while more developed countries should maintain fixed rates. Between early 1970s and early 1980s, the conventional wisdom was that the LDCs should not float, while the developed countries should. Today, the dominant view is that all countries – whether developed or less developed - should float. These changes in the state of the conventional were aptly described by Lewis (1979:20):

> "From 1900 to 1929 the consensus of economists was that all countries, whether more or less developed should maintain fixed exchange rates. However, from 1930 to 1965, it was increasingly felt that primary producing countries (even rich Australia) has special problems. Our current consensus that the developed should peg, is the exact opposite or what had nearly become the consensus only twelve years ago."

The changing state of the conventional wisdom is the result of the ever increasing number of studies that have continuously modified our thinking. Since the early 1980 till date, the conventional wisdom has been that all countries should float.

III. Optimal Exchange Rate Regime and the Nigerian Experience

An examination of the factors mentioned in Section 2 above with respect to Nigeria and our earlier analysis suggested that the value of foreign currency denominated assets, and institutional set-up were not the major factors in deciding the optimal exchange rate regime for Nigeria. Rather, the most relevant factors were the source of disturbances to her external balance, extent of corruption/positive budgetary effects on government and degree of openness and diversification. Because the shocks to the economy, especially her external balance indicators come dominantly from foreign economies and because corruption is highly tolerated in the economy as well as the positive budgetary effects of floating rates on government budget, the benefits of floating rates appear to outweigh the benefits that fixed rates would bring as result of her high openness, undiversified production and diversified consumption.

Besides these considerations, a peculiar characteristic of the Nigerian external sector tends to blur the distinction between a flexible and fixed exchange rate regime. In the Nigerian situation, the government is the major foreign exchange earner through its receipts from oil rents. Consequently, the government would be the principal supplier of foreign currencies into the foreign exchange market. This being the case, the government would be able to determine independently what proportion of her foreign exchange receipts she would not monetise since she is not compelled to provide domestic currency equivalent for its foreign exchange holding because it does not accrue to the private sector in the first instance. Given this, the government could make the FLER work more or less like the FXER, by using long-run factors rather than the erratic, short-run market forces to determine her supply of foreign currencies to the flexible exchange market. This way, the FXER may outperform the FLER.

Hence, if Nigeria could do away with corruption, Marston's (1982) testimony best describes the Nigerian policy options:

> "As far as the choice between fixed and flexible rate is concerned, flexible rates generally exhibit less output variation than fixed rates, but it is possible for the opposite to be true."

III.1 The Nigerian Experience

Between 1959 and 1967, Nigeria operated a fixed exchange rate regime in which the Nigerian pound was fixed at par with the British pound. In 1967 when the British pound was devalued, the Nigerian monetary authorities switched the peg to US dollar i.e. the Nigerian pound was pegged to the US dollar; during this period, severe exchange restrictions were put in place (Nnanna, 2001).

In 1970, following the financial crisis suffered by the world payments system and the devaluation of the dollar, the Nigerian pound was pegged again to the British pound. On January 1, 1973, Nigeria introduced the naira to replace the Nigerian pound at the rate of N2 to one Nigerian pound and pegged this currency to the US dollar. In 1978, Nigeria pegged the naira to a basket of 12 currencies of its major trading partners. The practice of pegging to a basket of currencies continued until September 1986 when a variant of flexible exchange rate system was introduced. Thus, between 1959 and 1986, Nigeria operated a fixed exchange rate regime. However, this fixed rate regime all along had coexisted with a flourishing parallel foreign exchange market that had existed since World War II (Pick, 1984). The parallel foreign exchange market became more noticeable since 1962 when the Exchange Control Act, 1962 was enacted.

Since September 1986 till date, Nigeria has operated a variant of a flexible exchange rate regime, except in 1994 when the floating rate was suspended and the naira was fixed at the prevailing market determined rate of N22 to a dollar. But this flexible rate continued to co-exist with a parallel foreign exchange market that is either *de facto* or *de jure* legalised.

Similarly, in 1989, Bureau-de-change was introduced (CBN, 2003: 17-22). On March 5, 1992, the monetary authorities unified the official exchange rate with the parallel rate, moving the official rate from its prevailing rate of N10.56 to a US dollar to N18.0 to a US dollar (which was the then prevailing parallel rate). The records of Nigeria's exchange rate policies and the prevailing conventional wisdom on the subject are summarised in Table1. Therefore, Nigeria operated a fixed rate between 1959 and 1986 and a flexible rate since September 1986. Thus, for most part of its foreign exchange history, it had been guided by the prescription of the prevailing Conventional Wisdom at the time (see Table 1). The only exceptions were between 1965 and 1969 and between January 1980 and August 1986.

Table 1: Conventional Wisdom on Optimal Exchange rate Regime and Nigeria Exchange Policies by Time

Period	Conventional Wisdom	Nigerian Exchange rate Regime
1900 - 1929	Fixed rate recommended for all countries	Fixed
1930 - 1964	Fixed rate recommended for all developed countries, but LDCs seen as having special needs (for floating)	1930- 58: Fixed; 1959-64: Fixed - Nigerian pound fixed to British pound
1965 - 1969	Fixed rate recommended for all developed countries; floating rates recommended for all LDCs.	1965- 66: Fixed - Nigerian pound fixed to British pound; 1967-69: Fixed - Nigerian pound fixed to US$
1970 - 1980	Floating rates recommended for all developed countries; fixed rate recommended for all LDCs.	1970-72: Fixed - Nigerian pound fixed to British pound; 1973-77: Fixed - Nigerian naira fixed to US$; 1978-80: Fixed - Nigerian naira fixed to a basket of 12 currencies
1981 - To Date	Floating rates recommended for all countries.	1980- 1986 (Aug.): Fixed - Nigerian naira fixed to a basket of currencies; 1986 (Sep.) - 2015: Floating; except 1994

Sources: Relevant Literature; CBN (Various Issues) and Nnanna (2001)

In the case of 1965-1969, the Nigerian monetary authorities weathered the storm from its disobedience by changing the currency from the currency it was pegged to, thereby achieving some limited degree of exchange rate flexibility. However, between January 1980 and August 1986 when the conventional wisdom recommended floating rates for all countries and Nigeria was operating troubled fixed rate, the adverse consequences were more severe.

There were significant and persistent balance of payments deficits and the associated loss of foreign reserves (from US$5.6billion in 1980 to US$0.2billion in 1983), inflation was ravaging (from single digit in 1980 to 23 per cent in 1983 and 40 per cent in 1984), stagnation and decline in level of economic activities (at a minus 8 per cent in 1981 and negative 7 per cent in 1984) and high-level unemployment was the order of the day (at 6 per cent in 1984) (see Table 2).

The Nigerian authorities remained defiant. Rather than abide by the conventional wisdom, it put in place a set of expenditure-changing (expenditure-reducing) policies, documented in its Economic Stabilisation Act, 1982, when expenditure-switching policies, like floating rates or parity changes, were needed. As the expenditure reducing policies reduce the national output with multiplier effects, outputs were reduced in greater proportions than the reduction in government expenditure that brought them about. The

result was that fiscal indicators worsened as fiscal deficit as percentage of national output worsened from negative 8.0 per cent in1981 to 12.0 per cent in 1982 (Table 2).

Table 2: Values of Some Key Macroeconomic Variables in Nigeria (1979-1989)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Real GDP	212,665.40	224,018.70	205,222.10	199685.3	185,598.10	183,563.00	201,036.30	205,971.40	204,806.50	219,875.60	236,729.60
Real GDP Growth Rate (%)	2.5	5.3	-8.4	0.5	-4.1	-6.7	7.9	3.2	1.8	4	7.3
Fiscal Deficit/GDP (%)			-8.19	-12.44	-6.34	-4.46	-4.48	-11.94	-5.6	-8.74	-6.98
Price of Crude Oil ($/Barrel)	29.31	43.69	41.74	37.16	33.95	33.57	31.43	16.86	20.72	17.36	21.4
Official Exchange rate (N/$) avg	0.596	0.546	0.61	0.673	0.724	0.765	0.894	2.021	4.018	4.537	7.392
Inflation Rate (%)	11.59	9.87	21.04	7.62	23.23	39.62	5.49	5.4	10.15	56.07	50.5
Unemployment Rate (%)		6.4				6.2	6.1	5.3	7	5.3	4.5
Parallel Rate (N/$)	0.9804	0.9346	0.9346	1.2195	4.1667	3.5714	3.7037	7.6923	6.25	8.35	9.46
Foreign Reserves ($'M)	3,109	5,622	2,441.60	1,043.30	224.4	710.1	1,657.90	2,836.60	7,504.60	5,229.10	3,047.60
Exchange Rate Premium (N/$)	0.38	0.39	0.32	0.55	3.44	2.81	2.81	5.67	2.23	3.81	2.07
Exchange Rate Premium (%)	65	71	53	81	475	367	314	281	56	84	28

The crisis did not abate until 1986 when a floating rate was introduced, which brought Nigeria into alignment with the conventional wisdom. Table 3 provides some summary picture on the comparative macroeconomic performance of Nigeria for 1961-2011 and it showed that the period 1981-1985 was particularly bad on virtually all indicators, compared with other periods.

Table 3: Values of Some Key Macroeconomic Variables in Nigeria 191-2011 (5-Year Average)

Period	1961-65	1966-70	1971-75	1976-80	1981-85	1986-1990	1991-95	1996-2000	2001-2005	2006-2010	2011
Real GDP	84,740.86	96,722.50	176,100.69	214,986.10	195,020.93	226,986.64	273,687.07	309,604.03	471,447.64	679,355.67	833,379.92
Real GDP Growth Rate (%)	5.2	9.3	7.1	3.9	-2.2	4.9	2.7	3.1	7.1	6.7	7.5
Fiscal Deficit/GDP(%)					-7.2	-8.3	-7.2	-3.0	-2.8	-1.7	
Price of Crude Oil ($/Barrel)	3.4	3.8	7.8	24.5	35.6	20.7	20.7	22.2	37.6	77.4	113.8
Official Exchange rate (N/$)(avg)	0.7	0.7	0.7	0.6	0.7	5.2	30.5	87.8	125.4	134.3	153.9
Inlation Rate (%)	2.8	6.4	14.4	15.5	19.4	25.9	48.9	12.3	15.7	10.3	10.9
Unemployment Rate (%)						5.1	2.6	3.3	3.2	17.2	23.9
Parallel Rate (N/$)	0.7	0.9	0.9	1.1	2.7	8.4	52.4	94.8			
Foreign Reserves($'M)	182.0	115.2	1,592.2	3,219.6	1,215.5	4,631.9	3,550.7	6,613.7	14,159.7	44,270.7	32,630.3
Exchange Rate Premium(N/$)	0.0	0.2	0.3	0.4	2.0	3.2	21.9	7.0			
Exchange Rate Premium(%)	3.7	30.8	41.1	74.1	258.2	94.8	103.1	7.7			

Some caution must be exercised when comparing macroeconomic performance of 1981-1985 fixed exchange rate regime with that of 1986-1990 floating rate. The price of crude fell significantly from a five-year average of US$35.6 per barrel in 1981-1985 to US$20.7 in 1986-1990. Similarly, five-year average price of crude oil was US$20.7 per barrel in the floating period of 1991-1995. Consequently, it was a long-period of bad luck for Nigeria in the oil market. This tended to conceal the otherwise good performance of the floating exchange rate policy of that period.

Furthermore, there were a few false steps in the management of the floating rate and some adjustment/learning costs. For instance, the effort to unify the official exchange rate with the parallel rate was not well founded. There will always be a wedge (negative or positive) between the official and parallel rates because of the differences in the needs of

the two markets. Parallel markets for foreign exchange cater for the convenience and confidentiality needs of users of those markets. They also provide cover for proceeds of illegal transactions (e.g. proceeds from administrative corruption, illicit trade, including drug business and smuggling) (Jimoh,1992). On account of these and more, there will always be a difference between the official and the parallel exchange rates. It was, therefore, an error to have wanted to unify the two rates without an adjustment for differences in their basic features. All these had dwarfed the excellent performance of the floating rates.

IV. Concluding Remarks

This paper examined the Nigerian exchange rate experience in the context of the conventional wisdom on the subject. It noted that since the 1960s, Nigerian exchange rate policies had largely obeyed the prescriptions of the conventional except between 1981 and 1985. It noted that during this period, macroeconomic variables worsened significantly and reached a crisis state. The crisis was resolved only with the adoption of floating rates in 1986 and the good performance of the floating rates were often concealed by major negative external shocks that were recorded during this period as well as some few initial false steps that were taken by monetary and fiscal authorities. In particular, the paper noted that exchange rate unification policy of March 1992 may have been inadequately conceived.

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Empirical Exposition of Monetary Policy under Fixed and Managed Float Exchange Rate Regime: Any Lesson for Nigeria

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Abstract

This paper empirically investigated the relationship between monetary aggregates and the exchange rate under alternative exchange rate regimes in Nigeria. Using data spanning 1961 to 2013 to estimate vector auto-regressive (VAR) models, a number of findings ensued. One, the impulse response functions (IRFs) showed that monetary aggregates were responsive to exchange rate shocks. However, this effect was found to be closely linked with the underlying exchange rate regime. Two, the variance decompositions (VDs) indicated that exchange rate shocks had no significant weight as there was no impact recorded on inflation, interest rate and money supply after one year under the fixed regime. Third, the corresponding VDs under the flexible regime showed that the effect of exchange rate on the monetary aggregates was more significant, especially in the long-run. A key policy implication of the foregoing results was that domestic economic management policies should be proactively orchestrated to better align the objectives of exchange rate policy with broader macroeconomic goals.

I. Introduction

The choice of exchange rate regime and its implications for monetary policy have generated debates among researchers and policy makers over the past decades. To a large extent, the decision on whether to adopt a flexible or managed float exchange rate system is driven by a number of policy choices. Under the flexible exchange rate system, the central bank intervention in the foreign exchange market is optional. However, under a managed float exchange rate system, the central bank attempts to influence the foreign exchange market using some indicators, namely, the balance of payments position, the level of international reserves and parallel market development (Duttagupta et. al., 2005). A particular monetary policy rule may work well under a fixed exchange regime, but ineffective under a managed float regime.

In a floating exchange rate system, the central bank allows the Foreign Exchange Market (FEM) to adjust freely in response to the dictate of the forces of demand and supply. These actions increase the time inconsistency[1] problem and exchange rate volatility[2]. A country that embarks on a managed float exchange rate system can effectively cushion inflationary pressure by changing the exchange rate at the expense of foreign country as a result achieve an appreciation of domestic currency.

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[1] A situation that the decision maker preference changes overtime.

[2] This is the measurement of the degree at which exchange rate changes and the frequency of the changes.

Monetary policy affects the exchange rate through two channels: fundamental exchange rate volatility and credibility. In a managed exchange rate system, exchange rate volatility is low due to either currency market intervention and/or an exchange rate-oriented interest rate policy. Conversely, exchange rate volatility is high in the case of a floating exchange rate regime. In addition, exchange rate becomes more volatile when the credibility of exchange rate is low, which occurs in the case of flexible exchange rate regime (Bauer and Herz, 2006).

A tight monetary policy in an open economy with flexible exchange rate system raises domestic nominal interest rate. When the domestic currency rises above the foreign currency, equilibrium in the foreign exchange market requires that the domestic currency gradually depreciate at a rate that serves to equate the risk of returns on various debt instruments, in this case, debt instruments dominated in the two currencies. The Keynesian model requires the expected future depreciation to follow an initial appreciation of domestic currency. Since prices are slow to adjust, the mechanism makes domestically produced goods more expensive than foreign produced goods. This leads to a fall in exports, aggregate income and employment (Ireland, 2005).

Nigeria has pursued different exchange rate regimes that had led to variation in monetary policy actions of the CBN overtime. The fixed exchange rate regime was in operation after the enactment of the Exchange Control Act until 1986. Exchange rate policies after 1986 involved several episodes of floating arrangements; and thus, this period was classified as the flexible regime. Although, several exchange rate systems and monetary policy targets were adopted by the CBN, the desired outcomes and objectives have not been achieved. Nigeria still experiences high rate of unemployment, dwindling foreign reserves and high rate of inflation.

This study, therefore, examines empirically, the effects of fixed and managed float regimes on monetary policy indicators in Nigeria. Annual time series data covering the period, 1961 to 2013 are deployed in estimating VAR models. It is noteworthy that earlier studies in the Nigerian context have given little attention to the comparative effects of alternative exchange rate regimes on monetary policy outcomes. To give a general sense of the results from the analysis, we report the following: One, key monetary aggregates were responsive to exchange rate shocks. Nevertheless, this effect was larger under the managed float regime. Two, exchange rate shocks also had minimal effect in both the short- and long-run under the fixed regime. Finally, under the managed float regime, the effect of exchange rate on the monetary aggregates was more substantial in the long-run.

Following this introduction, Section 2 is an overview of monetary policy and exchange rate regimes in Nigeria, Section 3 theoretical and Empirical literature, Section 4 Econometric analysis while Section 5 discusses the results and concludes.

II. Overview of Monetary Policy and Exchange Rate Regimes in Nigeria

This section initially provides information on monetary policy trends and policies in Nigeria. Next, the corresponding information in terms of the alternative exchange rate regimes is presented. The discussion is essentially structured along the lines of before, during and after the adoption of the structural adjustment programme (SAP).

II.1 Monetary Policy Conduct in Nigeria

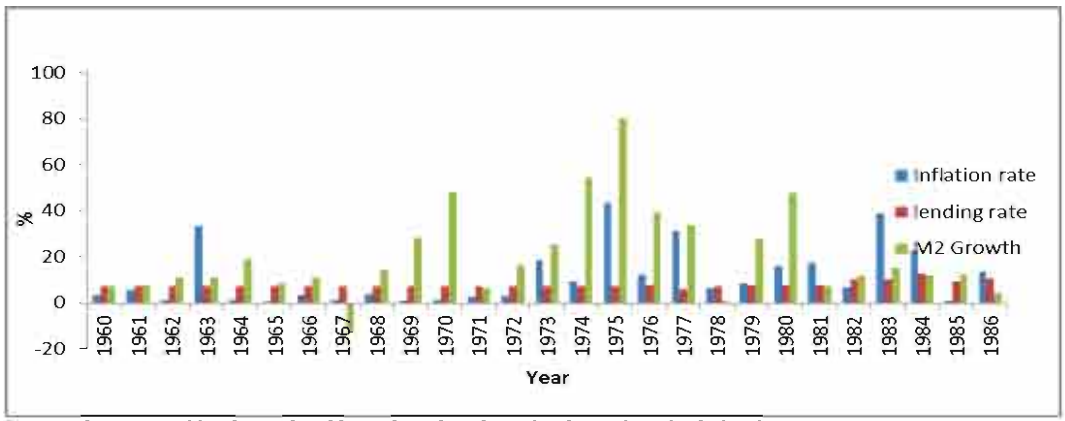
Since the establishment of the Central Bank of Nigeria (CBN) in 1958, it has played a dominant role in the operation and management of monetary policy in the country. Prior to the establishment of the CBN, the banking ordinance of 1952 was designed to ensure orderly commercial banking and to guide against the establishment of unviable commercial banks.

The objective of the monetary policy of the CBN was to achieve both internal and external balance. Specifically, the objectives were to maintain price stability, balance of payments equilibrium, promotion of employment and output growth, and economic development. In line with these objectives, several policy instruments were put in place by the CBN, which can be categorised under the policy instruments before and after the Structural Adjustment Programme (SAP).

Before SAP in 1986, the policy instruments of the CBN were generally focused on direct monetary controls. The monetary policy framework before SAP relied on sectoral credit allocation, credit ceilings, cash reserve requirements, fixed interest and exchange rates, and the imposition of special deposits. The framework was designed to facilitate the Federal Government's objectives in that period that were targeted to small and medium-scale enterprises, agriculture, state-owned enterprises and exports. However, the targets of the monetary authority were not met due to inefficiency in resource allocation (CBN, 2005). A decade after the establishment of the CBN, the most active monetary policy instrument used was the interest rate. The monetary policy strategy between 1970 and 1979 was directed towards removal of ceilings on commercial banks' loan and advances and adopting strategies by which the commercial banks should make credit available to the various sectors of the economy.

Banks were encouraged to maintain a stable interest rate (see Figure 1). A major constraint on the slower rate of monetary expansion in the early 1980s was the decline in the net foreign assets of banks. The decline in foreign assets was 54.3 per cent between 1980 and 1981. This was attributed to the heavy outflow and declined inflow of foreign exchange. The reduced inflow of foreign exchange was as a result of the glut in the world petroleum market (CBN Annual Report, 1981). There was steady increase in money supply in 1985 as M_2 at the end of the year stood at 10.3 per cent above the figure obtained in the preceding year (CBN Annual Report and Statement of Accounts, 1985). Figure 1 shows the behaviour of the monetary policy indicators before SAP in Nigeria.

Figure 1: Movement of Monetary Policy Indicators before SAP



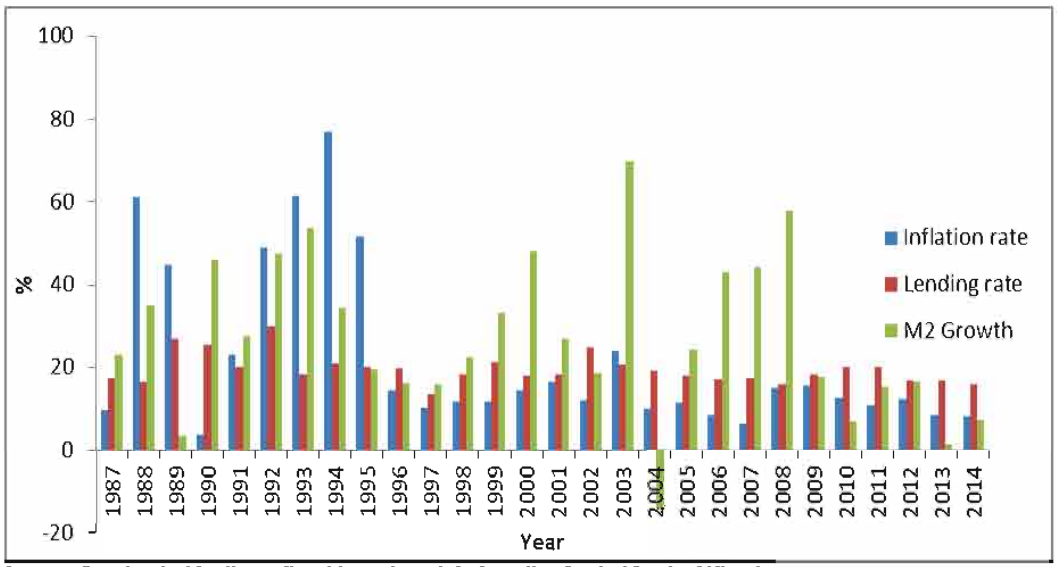
Source: Constructed by the authors' based on data from the Central Bank of Nigeria

The SAP adopted in 1986 was designed to achieve fiscal balance and a favourable balance of payments position by altering the production and consumption pattern of the economy, eliminating price distortions, diversifying the export base of the economy and reducing importation of consumer goods. The sudden crash in the price of crude oil at the international market and deterioration of economic conditions necessitated the adoption of the programme.

Under SAP, monetary policy emphasised market-oriented financial system for effective mobilisation of financial savings and efficient resource allocation. Furthermore, the SAP reforms embraced interest rate liberalisation and foreign exchange management. The main monetary policy instrument used was the open market operation in a market-based framework. The operation was complemented by reserve requirements and discount window operations. In addition, some measures were introduced to mop up excess liquidity from the system.

The CBN made efforts in the period 1986 to 1993 to create a new environment for an indirect approach to monetary management. The main action taken in the monetary policy reforms programme was the initial rationalisation and eventual elimination of credit ceilings for selected banks. Equally, the CBN liberalised interest rate and adopted the policy of fixing only its minimum rediscount rate to indicate the desired direction of interest rate (Nwaobi, 2012). These involved a substantial reduction in the maximum ceiling on credit growth allowed for banks; the re-introduction of the special deposit requirements aligned with outstanding external payment arrears to CBN from banks; abolition of the use of foreign currency deposits as collaterals for naira loans; and the withdrawal of public sector deposits from banks to the CBN. In 1994, direct interest rate control was introduced. However, this measure had negative economic effects in the country (Figure 2). In the last quarter of 1996, the CBN adopted total deregulation of the interest rate.

Figure 2: Movement of Monetary Policy Indicators after SAP



Source: Constructed by the authors' based on data from the Central Bank of Nigeria

In 2002, the medium-term monetary policy framework was adopted by the CBN for the purpose of reducing the time inconsistency of monetary policy and over reaction of the public due to temporary shocks. The CBN introduced a monetary policy framework in 2005, which was directed to achieve single digit inflation rate, gradual reduction in the cost of borrowing, maintenance of monetary stability and exchange rate stability. Monetary management was conducted within the framework of monetary targeting, while the main instruments were open market operations, discount window operations and foreign exchange market interventions. Through its tight monetary policy measures in most of the periods, the CBN managed to keep inflation at a single digit. The headline year-on-year inflation was estimated at 8.6 per cent in 2013, a five-year low. The monetary policy rate, the key determinant of interest rates, was fixed at 12.0 per cent throughout 2013 as was the case in 2011 (African Economic Outlook, 2014).

II.2 Exchange Rate Regime before SAP in Nigeria

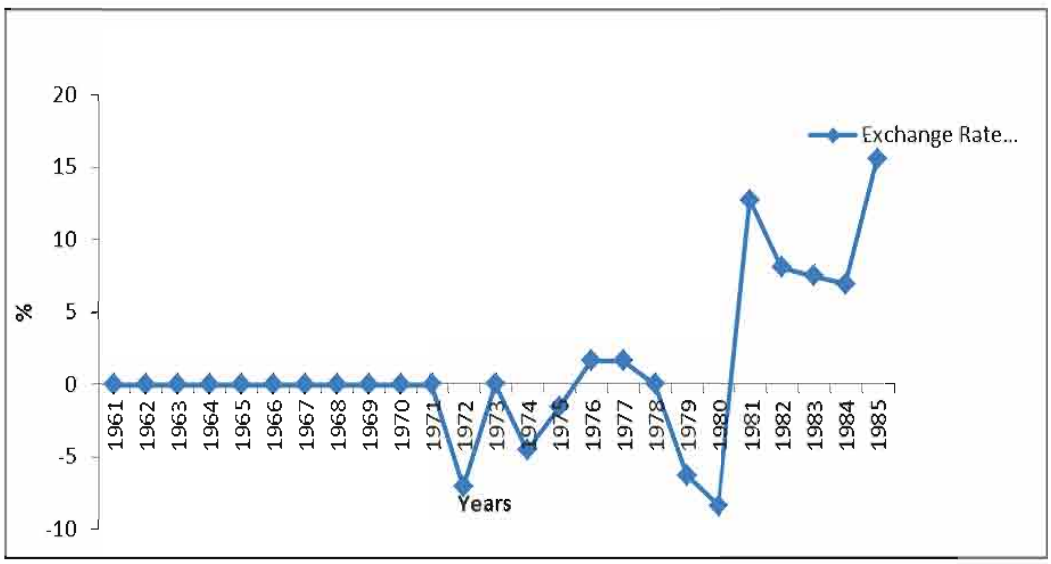
The development of the foreign exchange market in Nigeria was influenced by a number of factors such as the changing pattern of international trade, institutional changes and structural shifts in production. Before the establishment of the CBN in 1958 and the enactment of the Exchange Control Act of 1962, foreign exchange was earned by the private sector and held in balances abroad by commercial banks, which acted as agents for local exporters. During this period, agricultural exports contributed the bulk of foreign exchange receipts. The fact that the Nigerian pound was tied to the British pound sterling, with easy convertibility, delayed the development of an active foreign exchange market. Nigeria operated a fixed exchange rate regime supported by the Exchange Control Act of

1962. The fixed exchange rate regime precipitated an over-valuation of the naira that engendered massive importation of finished goods with adverse consequences for domestic production, balance of payments and the Nation's external reserves. In addition, the period was associated with sharp practices perpetrated by dealers and end-users of foreign exchange.

During the Exchange Control arrangement, the naira was pegged to the British pound sterling, but as a result of the devaluation of the pound in 1967, the domestic currency was allowed to move freely independent of the pound sterling.

The exchange rate policy in Nigeria before 1973 was in line with the IMF fixed exchange rate system. Nigerian currency was subjected largely to administrative management and control by the CBN. On average, exchange rate volatility for the period 1963 to 1972 was 0.70 per cent[3]. In 1973, Nigeria's pound was changed to naira, and it was very strong in value[4]. It was also pegged to a basket of currencies comprising the country's trading partners in 1978 (Obadan, 2006). Exchange rate volatility from 1978 to 1982, (under the pegged arrangement) was 0.19 per cent[5]. Consequently, the CBN embarked on deliberate appreciation of the naira to enable the economy import inputs cheaply from abroad mainly to implement the import substitution industrialisation (ISI) strategy and other development projects.

Figure 3: Exchange Rate Dynamics before SAP



Source: Constructed by the authors' based on data from IMF International Financial Statistic Publication

[3] The period was a decade before the breakdown of Breton Woods system.
[4] At the time Nigeria's Pound Sterling was changed to naira exchange rate was ₦0.66/US$.
[5] This value was computed by taking the standard deviation of the monthly exchange rate.

A sharp rise in the price of crude oil in the early 1970s led to a substantial increase in its exports, which enhanced the official foreign exchange receipts. There was a boom in the foreign exchange market during this period and the management of foreign reserves became necessary to guarantee the sustenance of the fixed exchange rate regime. However, it was not until 1982 that comprehensive exchange controls were applied as a result of the foreign exchange crisis that occurred. The increased demand for foreign exchange coupled with a decline in the supply encouraged the development of a flourishing parallel market for foreign exchange (CBN Annual Report, 1985). After the oil glut of the early 1980s, it became evident that Nigeria could not continue to operate a fixed exchange rate regime. Steps were taken by the CBN to embark on the deregulation of the exchange rate.

II.3 Exchange Rate Regime During and After SAP

The SAP started in July 1986. One of the major policies of the Federal Government under this was to adopt a floating exchange rate system and establish an institutional framework for its operation and trade under a market determined environment. To create an enabling environment for the trading of foreign exchange under the market determined system, the Second-Tier Foreign Exchange Market (SFEM) was introduced in September, 1986 (CBN, 1988). Under SFEM, the determination of the naira exchange rate and allocation of foreign exchange were based on the framework of market auction system. On July 2, 1987, the first and the second-tier market were merged and the Dutch Auction System (DAS) was introduced (Sanusi, 2004). The SFEM was in operation with the official exchange rate system. The official was administratively managed and allowed to gradually depreciate. It was used for a few official exchange rate and international transactions, such as debt servicing and obligations to international organisations (Obadan, 2006).

Accordingly, the dual exchange rate system was operated to avoid a sizable depreciation of the naira, while allowing gradual depreciation in the SFEM. This the CBN did through continued downward adjustment until the desirable convergence was reached. Consequently, in the first quarter of 1987, the CBN adopted a policy of steady depreciation of the exchange rate to reverse its overvaluation. However, these efforts could not achieve equilibrium in the foreign exchange market. Alongside with SAP, new mechanisms were developed for exchange rate system. To enlarge the scope of the FEM, Bureau-de-Change was introduced in 1989 for dealing in privately sourced foreign exchange.

Due to the continued depreciation of the exchange rate, some reforms were introduced in the foreign exchange market in 1994. These included: the formal pegging of the exchange rate; the centralisation of foreign exchange in the CBN; the restriction of Bureaux de Change to buy foreign exchange as agents of the CBN; the re-affirmation of the illegality of the parallel market; and the discontinuation of open accounts and bills for collection as means of payments (CBN, 2000). The operation of the parallel market engendered greater volatility of the exchange rates; the volatility of the naira viz-a-viz the U.S. dollars for the

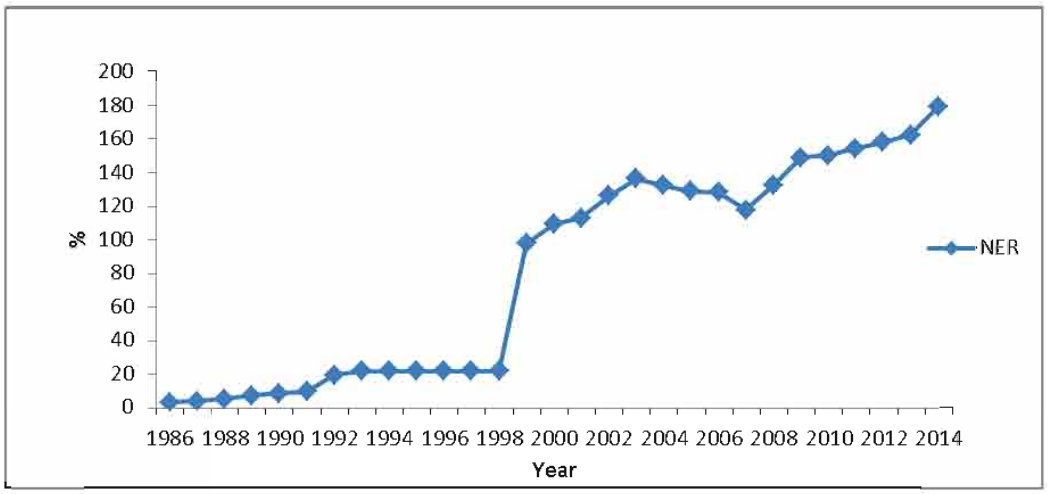
period 1986 to 1995 was 25.1 per cent. This showed that greater volatility of exchange rate was experienced during the SAP era.

Further reforms in the FEM led to its liberalisation in 1995 with the introduction of an Autonomous Foreign Exchange Market (AFEM) for the sale of foreign exchange to end-users by the CBN through selected authorised dealers at market determined exchange rate (CBN, 2002). In addition, Bureau-de-Change was once more accorded the status of authorised buyers and sellers of foreign exchange. The FEM was further liberalised in October 1999 with the introduction of an Inter-bank Foreign Exchange Market (IFEM).

The IFEM was designed to diversify the supply of foreign exchange in the economy by encouraging the funding of the inter-bank operations from privately-earned foreign exchange. It was also aimed at assisting the naira to achieve a realistic exchange rate. Under IFEM, banks, oil companies, and the CBN could buy or sell their foreign exchange at rates supposedly influenced by the CBN. A large number of the informal economy, however, could only access foreign exchange through the parallel market. Companies were allowed to hold domiciliary accounts in private banks, and account holders had unfettered use of the funds. The operation of the IFEM, however, experienced similar problems and setbacks as the AFEM, owing to supply-side rigidities, the persistent expansionary fiscal stance of government and excess liquidity in the system (Sanusi, 2004).

The Dutch Auction System (DAS) was re-introduced on July 22, 2002 as a result of demand pressure in the FEM and the depletion of external reserves. Under the DAS system, the CBN determined the amount of foreign exchange sold at the price buyers quoted. The marginal rate that cleared the market represented the ruling rate at the auction. The DAS was conceived as a two-way auction system in which both the CBN and authorised dealers would participate in the foreign exchange market to buy and sell foreign exchange (Omojimite and Akpokodje, 2010). In addition, DAS was to serve the triple purposes of reducing the parallel market premium, conserve the dwindling external reserves and achieve a realistic exchange rate for the naira. The DAS helped to stabilise the naira exchange rate, reduce the widening premium, conserve external reserves, and minimise speculative tendencies of authorised dealers (Akpan and Ata, 2012). The naira devaluation, which occurred in 2014 was largely expected due to the significant pressure on exchange rate recorded during the year. The increased funding of the foreign exchange market by the CBN to stabilise the naira would have further depleted the external reserves if those strategies were maintained (Nigerian Economic Review and Outlook, 2014).

Figure 4: Exchange Rate Dynamics During and After SAP



Source: Constructed by the authors' based on data from IMF International Financial Statistic Publication

II.4 External Reserves, Crude Oil Prices and Exchange Rate

Table 1 represents the movements in external reserves, crude oil prices and nominal exchange rate from 1961 to 2014. The external reserves serve as important instrument to manage exchange rate fluctuation in Nigeria. Since Nigeria depends heavily on crude oil, the prices of crude oil affect the accumulation of the country's reserves, in turn, determine the extent the CBN could manage fluctuations in exchange rate. The oil boom of early 1970s increased the external reserves and the ability of the CBN to keep the exchange rate fixed. The reserves leapt from an average of US$100 million between 1966 and 1970 to US$1.25 billion between 1971 and 1975, and further to US$3.01 billion between 1976 and 1980. This growth trajectory was truncated with the bust in the crude oil market in early 1980s. Hence, the Nigeria's external reserves was low and the nominal exchange rate was near fixed before the adoption of the SAP. Specifically, the external reserves fell from US$4.7 billion in 1981 to US$0.98 billion in 1985 while the exchange rate maintained its value between N0.61 to N0.89, respectively. This posed grave challenge to the economy and therefore led to the adoption of SAP in 1986.

After the adoption of SAP, the external reserves increased substantially due to the fact that exchange rate was allowed to float, though managed, and crude oil prices increased in the international market. Exchange rate depreciated substantially from an average of N5.20 per US dollar between 1986 and 1990 to N125.58 per US dollar between 2001 and 2005. By 2014, the exchange rate had depreciated to N158.55 per US dollar. The annual figures obtained from the CBN on the movement of the external reserves show an

undulating pattern between 1981 and 2003, but largely below the US$10 billion mark. However, this pattern is masked in the quinquennium data which shows a gradual increase in external reserves from 1961-1965 to 1996-2000, with some occasional declines (table 1). Thereafter, the reserves increased astronomically from an average of US$12.06 billion in 2004 up to US$58.5 billion in 2008 before declining to US$32.6 billion in 2011 due to the dip in the crude oil price. The initial recovery made in 2013 which put the reserves at US$45.6 billion was reversed to US$37.2 billion in 2014. The substantial decline in the external reserves and depreciation of the exchange rate could be attributed to the developments in the international oil market.

Table 1: External Reserves, Crude Oil Prices and Nominal Exchange Rate

Years	Average External Reserves US$' Million	Crude Oil Price USD/ Barrel	Nominal Exchange Rate	Average Growth rate of External Reserve (per cent)
1961-1965	156.74	1.49	0.71	1.90
1966-1970	100.35	1.30	0.71	-2.42
1971-1975	1247.73	5.53	0.65	146.16
1976-1980	3014.39	20.32	0.60	15.93
1981-1985	1549.20	30.13	0.73	-5.19
1986-1990	3966.49	17.01	5.20	51.84
1991-1995	4475.17	17.16	18.61	12.30
1996-2000	5799.38	19.29	52.09	40.48
2001-2005	12578.97	32.44	125.58	33.48
2006	37456.09	66.50	128.65	54.01
2007	45394.31	74.48	125.83	21.19
2008	58472.88	101.14	118.57	28.81
2009	44702.35	63.90	148.88	-23.55
2010	37355.70	80.91	150.30	-16.43
2011	32580.28	113.76	153.86	-12.78
2012	38092.16	113.47	157.50	16.92
2013	45612.95	110.99	157.31	19.74
2014	37220.33	100.35	158.55	-18.40

Source: 1961-2005 data were from BP Statistical Review of World Energy (2015) and 2006-2014 were compiled from CBN Statistical Bulletin December, 2014.

III. Literature Review

This section presents a brief theoretical literature and some relevant empirical results from previous studies.

III.1 Theoretical Literature

The Mundel-Fleming model forms the basis of the recent models of the effectiveness of monetary policy in an open economy. The basic argument of Mundell (1963) and Fleming

(1962) is that given the assumptions of a small open economy with unemployed resources, a perfectly elastic aggregate supply curve and a flexible exchange rate regime, monetary policy is extremely powerful in altering output. An expansionary monetary policy conducted through an open market operation of the central bank leads to an initial decline in domestic interest rate, which in turn, leads to a capital outflow that causes deficit in the balance of payments and exchange rate depreciation inevitably results. The rising price of the foreign exchange generate, via the Marshal-Lerner condition, an improved trade balance has an expansionary effect on income via the multiplier process as demand is switched from foreign goods to home goods (Hallwood and MacDonald, 2000). However, in a fixed exchange rate system, the central bank purchase of securities through the open market operation creates excess reserves and leads to a decline in the interest rate.

A fall in the interest rate will precipitate capital outflow and could lead to the deterioration of the balance of payments. To prevent the exchange rate from falling, the central bank intervenes in the market by selling foreign exchange and buying domestic money. This process continues until the accumulated foreign exchange deficit is equal to the open market purchase and the money supply is restored to its original level. This shows that monetary policy under fixed exchange rates is not beneficial to income. The increase in money supply, arising from open market purchases is returned to the central bank through its exchange stabilisation operations. The ultimate effect of the open market purchase is an equivalent fall in foreign exchange reserves. This implies that the central bank has simply traded domestic assets for foreign assets (Mundell, 1963). The Mundell-Fleming analytical framework concludes that monetary policy is more effective under a flexible exchange rate system, while fiscal policy is more potent under a fixed exchange rate regime.

Henderson (1982) posited that in the period of instability in the financial sector, the monetary authority should hold interest and exchange rates constant to reduce fluctuations in output by allowing money stocks and international reserves to fluctuate instead. However, when disturbances affect the real sector, interest and exchange rates should be allowed to fluctuate, holding constant the stock of international reserves and money supply. This argument is in favour of a managed float exchange rate system.

The theoretical proposition of Dornbusch (1976) emphasised the role of expectations to exchange rate determination and, therefore, to monetary policies under flexible exchange rate. The conclusion of Dornbusch (1976) confirmed the Mundell-Fleming proposition that under conditions of capital mobility and flexible exchange rates, a country can conduct an effective monetary policy in the short-run. Exchange rate serves as an important channel for the transmission of monetary changes to an increase in aggregate demand and output. Hamada (1974) developed a standard open economy model following the standard Keynesian theory. The model showed that if countries are mainly concerned with the balance of payments and their income levels, then a floating exchange rate regime is preferable than a fixed exchange as it allows each country to embark on an independent monetary policy, which is devoid of any conflict.

Giavazzi and Giovannini (1989) used the standard Mundell-Fleming model, augmented with rational expectations and aggregate supply effects to compare the monetary policy responses under flexible and managed float exchange rate regimes.

Under a flexible exchange rate regime, each country takes the other country's money supply as given; hence, it is posited that a change in nominal money stock can affect the exchange rate. In a situation whereby the exchange rate affects prices through aggregate supply channels, each country's monetary policy can affect price level without significantly reducing output. However, in a regime of managed exchange rates the two countries take the output-price level differently. The foreign country assumes that it cannot affect the money supply; hence, it attempts to reduce its loss function subject to the world economy's trade-off between output and the price level.

Based on the theory of time inconsistency of monetary policy, Lucas (1980), Barro and Gordon (1983), Hall (1984) Barro (1986) and Taylor (1986) have all argued for the superiority of rule- based policy over discretion and discussed why it is important for central banks to consider ways in which they can limit discretion and use these new rules in a systematic way. The optimal rule according to Taylor (1986) should be such that stabilises both output and price fluctuations. Barro (1986), in line with the new classical theories associated with Sargent and Wallace (1975) posited that since systematic monetary policy cannot affect output, the stabilisation of price should be the main goal of monetary policy. This view has also been supported by Armeter and Bodenstein (2005). Accordingly, a rule of strict inflation stabilisation should accord the goal of the central bank. Frey (2006) extended the Barro-Gordon model to address a regime of flexible exchange rate. The welfare criterion of the analysis is the expected loss. These losses arise owing to output-supply shocks and nominal exchange rate shocks.

III.2 Some Empirical Evidences

The monetary policy rule of the central bank varies under different exchange rate regimes. In the literature, empirical findings have shown the implications of different monetary policy choices under alternative exchange rate regimes. Using a hypothetical case of two countries monetary systems, Giavazzi and Giovannini (1989) indicated that a managed exchange rate regime tends to be unstable since both countries find it desirable to affect the exchange rate.

However, a desirable outcome of managed exchange rate can only be obtained when a country that manages its exchange rate is larger than its partner. Ho and Yeh (2010) also investigated the appropriate monetary policy choice for the Taiwanese economy with heavily managed exchange rates using a VAR model with six endogenous variables. The variables considered were real gross domestic product, the short-term interest rate, broad money, the exchange rate, consumer price index and foreign reserves. It was evident that a contractionary monetary policy shock has a permanent and negative effect on real GDP, broad money and price level.

Shanbaugh (2004) investigated how a fixed exchange rate affects monetary policy using a sample of 100 developing and industrial countries between 1973 and 2000. The paper classified countries as pegged or non-pegged and examined whether a pegged country must follow the interest rate changes in the base country. It used actual behaviour for regime classifications and examined the impact of exchange rate, capital control and other control variables on interest rate using OLS. The findings showed that fixed exchange rate force countries to follow the monetary policy of the base country more closely than floating exchange rate. In a panel study of 41 developing countries, Isik (2005) showed that regardless of whether countries adopt fixed or flexible exchange rate, there is negative relationship between the degree of openness and the effect of money growth on exchange rate.

The relevance of exchange rate regime for macroeconomic stability was investigated by Bergvall (2005) using a hypothetical regime in Sweden, where output was substantially more volatile under the fixed regime than the floating regime. The argument of Simwaka (2010) favoured the peg arrangement as a viable option for the majority of low-income African economies. However, for middle income countries with relatively developed financial markets and linkages to modern global markets, floating arrangements, including the managed floating exchange rate regime should be adopted. Rutasitara (2004) used quarterly data from 1967 to 1995 to examine the major determinants of inflation with a particular focus on the role of exchange rate policy reform. The findings revealed that the liberalisation of the foreign exchange market has a large influence on inflation rate in Tanzania. Other monetary policy instruments, such as, interest rate and money supply were not considered in this study.

Devereux et. al., (2006) investigated the exchange rate regime and alternative monetary policy rules for an emerging market economy that is subjected to volatile environment. It was found that financial distortions amplified external shocks, but had little impact on the ranking of alternative policy regimes. In a single country case, Vuslat (2007) analysed the alternative monetary policy rules in Turkey under inflation targeting using a structural macroeconomic model. The alternative rules identified were the Taylor rule, monetary condition index under strict inflation targeting and monetary condition rule under flexible inflation targeting. The results showed that the monetary condition index under strict inflation targeting produced slightly better results than the one obtained under flexible inflation targeting.

Amaghioyeodiwe and Osunibi (2005) examined empirically the determinants of the choice of the exchange rate regime in Nigeria using both multinomial logit and simultaneous limited-independent models. Variables raging from the degree of openness and macroeconomic performance to real and monetary shocks helped to explain the choice of exchange rate at different periods of time. The study found that when domestic inflation was relatively high with respect to world inflation, a fixed exchange rate regime was preferred.

Some quantitative studies on exchange rate and monetary policy have been based on Vector Autoregressive (VAR) Model introduced by Sims (1980). Berument (2007) considered the factors responsible for monetary policy shocks for Turkey using a Structural VAR (SVAR) model. It was identified that foreign variables are exogenous to monetary variables, domestic monetary policy were affected by the interest rate, monetary aggregate and exchange rate, but not to real gross domestic product and price level. Also, exchange rate affects both domestic and foreign variables in the economy. Cushman and Zha (1997), Berumet (2007) concluded that under flexible exchange rate, the effects of domestic monetary policy shocks on small open economy revolved around the interest rate and the exchange rate effect. Further, Bjornland (2008) examined monetary policy and exchange rate interaction in Norway using SVAR model. A considerable interdependence between monetary policy shock and exchange rate was found. After a contractionary policy shock, the real exchange rate immediately appreciated and later gradually depreciated to the baseline.

One of the major challenges of VAR studies is the problem of simultaneity between monetary policy and exchange rate. This can be dealt with by placing recursive, contemporaneous restriction on the interaction between monetary policy and exchange rates. Mtonga (2011) analysed how a change in the monetary policy regime in South Africa has affected the anchorage of the exchange rate to its fundamental determinants from 1984 to 2005. The study employed a VAR approach and the findings showed that policy regime change has a significant impact on pricing of the currency with regards to fundamental determinants. Hoffmann (2007) investigated the impact of exchange rate regimes on macroeconomic stability using panel VAR. Using a sample of 42 developing countries the paper assessed whether the responses of real GDP, the trade balance and the real exchange rate to world output and world interest rate shocks differ across exchange rate regimes. The results revealed that there were significant differences in the variability of macroeconomic aggregates under fixed and flexible exchange rate regimes. The findings of Arratibel and Michaelis (2014) using time varying VAR on the impact of monetary and exchange policy in Poland showed that exchange rate shock has a time varying effect on output.

Based on Vector Error Correction Model (VECM), Sadiku et. al., (2013) reported that monetary aggregates do not have significant effect on the real effective exchange rate in the long-run in Macedonia. Using a system of instrumental variables estimation technique, Toulaboe and Terry (2013) investigated the link between exchange rate regimes and inflation performance in developing countries. Evidence showed that the rate of inflation was clearly linked to real exchange rate depreciation regardless of the exchange rate arrangement. Further, the rate of inflation was much more responsive to the real exchange rate levels in the flexible regime than in the fixed regime. The results pointed some important arguments that support the fixed exchange rate regime in Macedonia. Said et. al., (2012) employed a Dynamic Stochastic General Equilibrium Model (DSGE) to determine the optimal monetary policy rule to conduct a price stability policy in Morocco, in which the monetary authorities decided to adopt a flexible exchange rate regime. It was found that

optimal monetary rule associated with a flexible exchange rate regime will enhance macroeconomic stability in the country.

Although several studies have been conducted in developed countries on the effectiveness of monetary policy under alternative exchange regimes, literature on developing countries, Nigeria inclusive, are few. Therefore, this study will provide an insightful contribution to the empirical literature by providing evidence on the monetary policy exposition under flexible and managed float exchange rate regime in Nigeria.

IV. Econometric Technique

Data Sources and Measurement

This study used secondary data. Data for real GDP (y), inflation, interest rate (lending rate), money supply and nominal exchange rate were collected from the Central Bank of Nigeria *Statistical Bulletin* (various years). The real exchange rate was obtained by adjusting for relative prices between domestic and foreign countries (United States CPI was used for foreign). The data on CPI were gathered from the International Monetary Fund's *International Financial Statistics Yearbook*.

Since this enquiry involved the use of time series variables, unit root tests of all the variables was conducted to examine their stationarity. Furthermore, to examine the monetary policy response under alternative exchange rate regimes, a Vector Autoregressive (VAR) model was employed. A VAR technique is essential in this type of analysis because it enables the determination of the effect of policy shocks that emanated from different exchange rate regimes on monetary policy and vice-versa.

IV.1 Unit Root Test

The augmented Dickey Fuller unit root test was adopted in this study to test the stationarity of each of the variables. The null hypothesis was that the variable was non-stationary. If the value of the ADF statistic was less than or equal to the critical value, then the null hypothesis was rejected and it can be inferred that the variable was stationary at the conventional level. The expression for the unit root test is given as follows:

$$\Delta y_t = \beta + \rho y_{t-1} + \sum_{j=1}^{n} b_j \Delta y_{t-s} + \upsilon_t \qquad (1)$$

It is important to include the lags of the dependent variable in equation (1) to eliminate autocorrelation. The hypothesis for stationarity and non-stationarity are expressed in terms of ρ. When $\rho = 0$, it implies that the series is not stationary, hence, it has unit root.

IV.2 Vector Autoregressive Model

This study employed a VAR model estimation technique to determine the behaviour of monetary policy under alternative exchange rate regimes. Though the country has experienced two exchange rate regimes since independence, for the purpose of this enquiry, the exchange rate regimes will be divided into pre-SAP and post-SAP regimes. A standard VAR model is, therefore, used to estimate the model. The choice of variables in the VAR model reflected the theoretical setup of the new Keynesian open economy model.

$$\begin{bmatrix} y \\ \text{inf} \\ M_2 \\ i \\ rer \end{bmatrix}_t = B(L) \begin{bmatrix} S_{11} & 0 & 0 & 0 & 0 \\ S_{21} & S_{22} & 0 & 0 & 0 \\ S_{31} & S_{32} & S_{33} & 0 & 0 \\ S_{41} & S_{42} & S_{43} & S_{44} & 0 \\ S_{51} & S_{52} & S_{53} & S_{54} & S_{55} \end{bmatrix} \begin{bmatrix} \varepsilon^{y} \\ \varepsilon^{\text{inf}} \\ \varepsilon^{M_2} \\ \varepsilon^{i} \\ \varepsilon^{rer} \end{bmatrix}_t \quad (2)$$

The VAR model comprised the growth rate of real GDP (RGDP), broad money supply (M_2), domestic interest rate and real effective exchange rate. With the five variables VAR, five structural shocks can be identified in equation (2). The structural shocks after the ordering are $\varepsilon_t = \left[\varepsilon_t^{y}, \varepsilon_t^{\text{inf}}, \varepsilon_t^{M_2}\right] \varepsilon_t^{i}, \varepsilon_t^{rer}$.

V. Empirical Results and Discussion

The result from unit root testing is presented in Table 2. The reported t-values suggested that the variables were mostly stationary at their levels. This implied that there wa no need for differencing in order for the series to attain stationarity. Nonetheless, we equally checked the first differences of each of the five series for unit roots and found them to be I(0) as expected.

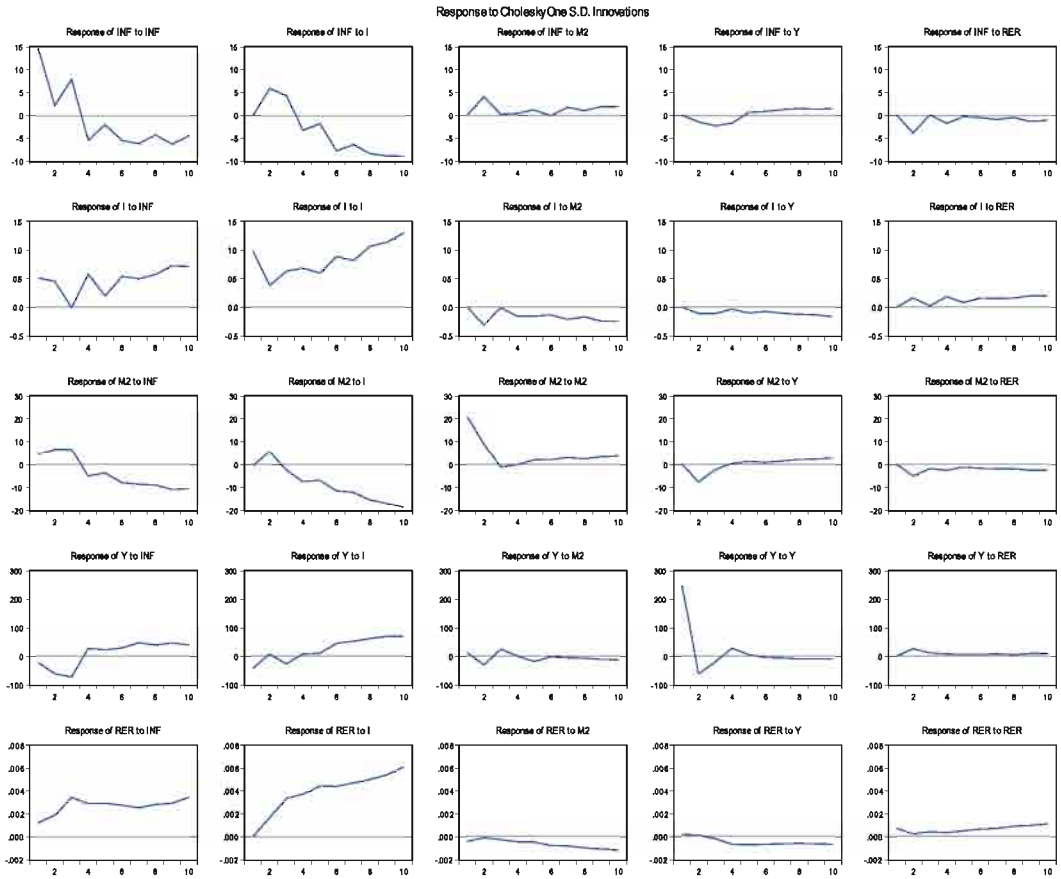
Table 2: Augmented Dickey-Fuller Unit Root Test Results

Series	Level		1st Diff.		Decision
	Drift	Drift&Trend	Drift	Drift&Trend	
INF	-4.1438*	-6.5489*	-9.2084*	-9.6782*	I(0)
I	-1.4095	3.3287**	-11.1678*	-12.1254*	I(0)
M2	-5.5862*	-7.1528*	-10.6422*	-11.7392*	I(0)
Y	-8.1824*	-9.2371*	-7.2114*	-9.4365*	I(0)
RER	-3.2712**	-4.3790*	-6.2333*	-7.2133*	I(0)

Note: *, and *** denote statistical significance at the 1, 5 and 10 per cent levels respectively.**

The foregoing results implied that a vector autoregressive (VAR) model can be fit to the levels of the variables. Furthermore, the impulse response functions (IRFs) and variance decompositions (VDs) can be used to gauge the strength of the relationships among the variables in the VAR model.

Figure 5: Impulse Response Functions for the 1961-1985 Sub-sample



We turn to this line of analysis subsequently and noted at this juncture that the discussion was bifurcated into the fixed and floating exchange rate regimes. For the first regime spanning 1961 to 1985, Figure 5 displays the full set of IRFs on the basis of one standard deviation Cholesky matrix.

To guage the magnitude of the response of monetary aggregates to the exchange rate under the fixed episode, the last column of Figure 5 is of prime interest. It is clear that both inflation and the money supply decline on impact in response to a one standard deviation shock to the exchange rate variable. This drop peaks at about two years following the shock in both cases. However, decline is more pronounced with inflation. By the fifth year, the impact of the shock to the exchange rate on both monetary aggregates is almost nil. On the part of the interest rate, a jump is observed on impact and this tendency appears

not to abate even till the tenth year. Beyond the initial upswing in output, its response to exchange rate shocks is trifling at best.

For the same sample, the VDs are presented in Table 3. The VDs account for the relative proportion of the individual shocks to all variables within the VAR system. Expectedly, own shocks account for the largest proportion of forecast error variance except in the instance of exchange rate shocks. Overall, exchange rate shocks do not appear to have significant weight as there was no impact recorded on inflation, interest rate and money supply after one year.

Table 3: Variance Decomposition Results for the Fixed Exchange Regime (1961-1985)

Horizon (Years)	INF	I	M2	Y	RER
Shocks to INF explained by innovations in:					
1	100.000	0.000	0.000	0.000	0.000
5	73.557	15.593	3.861	2.650	4.338
10	49.914	42.685	2.850	2.002	2.548
Shocks to I explained by innovations in:					
1	21.049	78.951	0.000	0.000	0.000
5	24.436	68.213	4.398	1.109	1.845
10	24.064	69.826	3.235	1.051	1.824
Shocks to M2 explained by innovations in:					
1	4.730	0.091	95.179	0.000	0.000
5	16.467	15.722	56.419	7.215	4.176
10	23.118	50.062	21.183	3.225	2.413
Shocks to Y explained by innovations in:					
1	0.777	2.745	0.171	96.308	0.000
5	12.902	3.243	2.409	80.437	1.009
10	16.976	18.314	2.226	61.471	1.012
Shocks to RER explained by innovations in:					
1	68.801	0.032	10.651	0.879	19.637
5	39.777	56.793	1.091	1.393	0.946
10	28.027	66.879	2.305	1.329	1.500

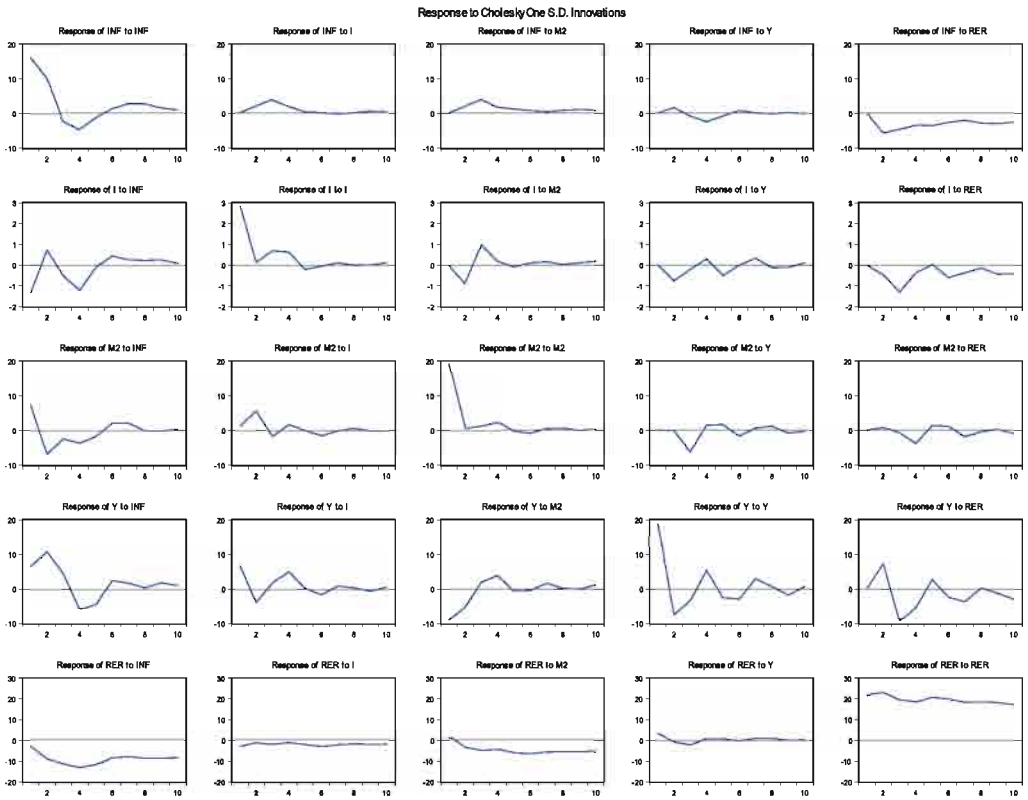
However, following a five-year horizon, about 4.3 and 4.2 per cent of the observed variations in inflation and money supply was accounted for by exchange rate shocks. The 1.85 per cent recorded for interest rate is only about one-third in magnitude. This implied that exchange rate more directly influenced the latter aggregates and their effects on interest rate were likely to be second round effects.

The effect on output settled at a minimal 1 per cent even after the passage of ten years. Interestingly, over the same horizon, the own effect of exchange rate dissipates to a mere 1.5

per cent. This suggested that the persistence of exchange rate shocks in the Nigerian context was miniscule.

The second sub-sample for analysis covers the period 1986 through 2013. The summary of the results is aptly depicted in Figure 6. Again, for completeness and comparability, we retain our focus on the last column of Figure 6. A number of observations are noteworthy in this case. First, there is an initial drop in inflation. This showed a much larger magnitude *vis-a-vis* the preceding regime (that is, 1961 to 1985). This effect was also more persistent in the latter sub-sample.

Figure 6: Impulse Response Functions for the 1986-2013 Sub-sample



Second, the decline in interest rate was considerably large on impact and it stayed negative over the entire ten-year period following the exchange rate shock as against the positive impact observed in Figure 5. Moreover, wide swings were also evident within this negative interest rate range. Third, in response to shocks to the exchange rate, the money supply alternated between positive and negative values regardless of the horizon considered. This starkly contrasts with the response under the 1961-1985 scenario where a muted effect was visible beginning from the fifth year. Also, under the floating exchange rate regime, output

displayed more variability as against the almost zero effect observed in the case of the fixed exchange rate regime. Finally, own shocks to exchange rate were somewhat permanent in nature.

Turning to the VDs in Table 3, the effects of exchange rate on both the monetary aggregates and output are more palpable. From a situation of no influence after one year, by the fifth year, exchange rate shocks accounted for about 14.8, 11.2, 2.8 and 16.1 per cent of innovations to inflation, interest rate, money supply and output, respectively.

This figure increased over the following five-year period to settle at 19.3, 14.9, 3.6 and 17.7 per cent in that order. Unlike the earlier sub-sample (see Table 3), own shocks to exchange rate accounted for the bulk of observed variations in the exchange rate. This effect was vividly persistent as it reduced by less than 20.0 per cent over the ensuing ten-year horizon.

Overall, the key monetary aggregates, namely, inflation, interest rate and money supply were all quite responsive to exchange rate shocks. Nevertheless, the magnitude of responsiveness varied depending on the exchange rate regime in operation. Particularly, the managed float regime exchange rate regime coincided with more substantial response of these variables in the wake of shocks to the exchange rate. The dynamics of output was also found to be similar.

Table 4: Variance Decomposition Results for the Flexible Exchange Regime (1986-2013)

Horizon (Years)	INF	I	M2	Y	RER
Shocks to INF explained by innovations in:					
1	100.000	0.000	0.000	0.000	0.000
5	74.859	4.164	4.274	1.877	14.826
10	70.577	3.860	4.408	1.807	19.348
Shocks to I explained by innovations in:					
1	17.763	82.237	0.000	0.000	0.000
5	22.350	51.207	9.850	5.346	11.247
10	22.628	47.341	9.488	5.675	14.868
Shocks to M2 explained by innovations in:					
1	12.528	0.449	87.023	0.000	0.000
5	20.064	6.671	63.599	6.853	2.813
10	20.799	6.834	61.311	7.433	3.623
Shocks to Y explained by innovations in:					
1	8.076	8.656	15.425	67.843	0.000
5	21.318	8.141	11.859	42.620	16.063
10	21.155	7.979	11.457	41.743	17.666
Shocks to RER explained by innovations in:					
1	1.876	2.075	0.387	2.308	93.404
5	19.312	0.900	3.659	0.640	75.450

10	18.050	1.120	5.477	0.408	74.946

VI. Concluding Remarks

This paper examined the association between key monetary aggregates and the exchange rate under the two broad exchange rate regimes in Nigeria. Time series data of 53-year period spanning 1961 to 2013 were deployed to estimate VAR models with the aim of empirically quantifying the response of monetary variables (inflation, interest rate and money supply) to exchange rate shocks. This analysis was undertaken under two exchange rate regimes corresponding to the era of fixed exchange rate and the period of managed float exchange rates, respectively. Several interesting findings arose from the analysis. Here, we briskly highlighted a number of the more striking ones in what follows. First, for the fixed exchange rate regime, all three monetary variables were responsive to exchange rate shocks as evidenced by the IRFs.

However, this impact was far less than what was displayed by these variables under the alternative managed float exchange rate regime. Second, the VDs revealed that exchange rate shocks do not appear to have significant weight as there was no impact recorded on inflation, interest rate and money supply after one year under the fixed regime. In the managed float exchange rate sub-sample, inflation, interest rate and money supply had not only more pronounced, but also longer lasting responses to impulses originating from the exchange rate. Third, the corresponding VDs clearly showed that the effect of exchange rate on the monetary aggregates was more significant and increased in importance over the long-run. Policy-wise, this suggested a clear role for more proactive domestic economic management policies in an era characterised by alternative experimentation with variants of managed float exchange rate system like it had been in the Nigerian case following the adoption of structural reforms in the mid-1980s.

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An Overview and Dynamics of Money Market Developments in Nigeria and Imperatives for Exchange Rate Stability

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Abstract

The Money market plays an important role in the economic development of any country. It provides the platform for central banks to influence short-term interest rates, which in turn, affects other macroeconomic indicators, such as inflation and exchange rates. Interest rates are inextricably linked to the foreign exchange rate, and both serve as channels for the transmission of central bank's monetary policy. In Nigeria, the money market is supervised and regulated by the Central Bank of Nigeria. It has undergone various changes in terms of both the depth and value/volume of transactions, especially with the structural adjustment programme (SAP) in 1986, and the banking sector consolidation exercise of 2005. The reform programme of those periods also had different foreign exchange regimes. The Bank has, over the years, through various financial innovations, made concerted effort to ensure the effective and efficient functioning of the market. However, the presence of a large informal sector in the economy, low level of technological transformation and largely cash-based transactions, have continued to impair the needed progress. In addition, structural problems, headwinds from softening crude oil prices, slowdown in external demand and the uncertain political landscape, have precipitated demand pressure at the foreign exchange market. In view of this, it is recommended that the Central Bank of Nigeria continues to ensure money market stability, through proactive policy measures designed to achieve market efficiency. This, among others, includes; ensuring strong regulatory and supervisory role, ensuring market liquidity, diligent corporate governance and collaboration with the fiscal authority.

Key Words: Financial Markets and Foreign Exchange Rate Stability

JEL Classification: D53, F31

I. Introduction

All over the world, central banks are faced with the daunting task of ensuring monetary and price stability, among other macroeconomic objectives. In formulating and implementing monetary policy, necessary for achieving these objectives, central banks ensure stable internal and external value for the national currency. It is important that the supply of money and credit to the economy is adequate to support desirable and sustainable growth without causing inflationary pressures and undue instability of the foreign exchange rate. Financial markets provide the veritable platform for the distribution of scarce financial resources either through the money or capital market as well as ensuring the hedging of risks that could arise in the foreign exchange and commodities markets. Thus, the existence of sound financial markets is at the heart of productive activities in any economy.

In literature, financial markets intermediary role of enhancing economic growth is linked to the Mckinnon-Shaw (1973) hypothesis[6]. Arguably, this hypothesis provides the framework for

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the subsequent drive by countries, especially the undeveloped economies to liberalise their financial systems. Nigeria's financial landscape has continued to evolve like other emerging markets and became deeper, following the financial sector reforms that accompanied the structural adjustment programme (SAP) of 1986. Prior to 1986, money market interest rates were administered or fixed, while the foreign exchange rate was either fixed or pegged to a currency or basket of currencies, and that, impeded the growth of the financial markets, thereby, slowing down monetary policy transmission. Since, 1986, money market and exchange rates, among other variables in the market, were driven largely by the interplay of market forces.

The money market rates are very important macroeconomic variables, which central banks use for achieving desired policy objectives. In particular, foreign exchange management is aimed at, the preservation of the external value of the domestic currency, maintenance of healthy balance of payments and ensuring domestic price stability. Central banks usually try to avoid foreign exchange rate volatility, which has adverse effect on the economy. The issue of foreign exchange rate volatility is very crucial to economic agents, owing to the risks of exposure to assets and liabilities on their balance sheet, as well as the current and expected cash flows (Akanji, 2006).

Interest rates play very crucial role in the implementation of monetary policy and at the same time, possess the potential of exhibiting erratic behaviour, which central banks try to mitigate in their pursuit of price stability. Hence, central banks are interested in eliminating frequent changes in interest rates (Bache and Barnhardson, 2009).

However, the efficiency and deepening of the money markets in Nigeria has been impaired by the presence of a large informal sector in the economy, the agrarian nature of production, communal restrictions and laws that guide saving mobilisation, low level of technological transformation and, largely cash-based transactions, despite the Bank's recent financial innovations and financial inclusion policies as well as its cash-less policy.

Thus, the paper examines the dynamics of the Nigerian money market; developments and imperative for foreign exchange stability. Following the introduction is section two, which provides an overview of the Nigerian money market. Section three contains stylised facts on the money and foreign exchange markets, while section four highlights the challenges and proffers the way forward. Section five concludes the paper.

II. Overview of the Nigerian Money Market

Prior to the establishment of the Central Bank of Nigeria (CBN) in 1959, there was absence of any formal money market institutions in Nigeria. However, in existence was part of the

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[6] The hypothesis posits that policies leading to the repression of financial markets reduce the incentives to save. Pointing out the key elements of financial repression as; high reserve requirement on deposits, legal ceilings on bank lending and deposit rates, directed credit, restriction on foreign currency capital transactions and restriction on entry into banking activities, cited in (Nnanna et. al., 2004).

London money market that transferred funds meant for financing exports to Nigeria. The Nigerian money market was established and nurtured by the Central Bank of Nigeria (CBN) for the purpose of mobilising domestic savings for productive investment and providing funds for government to enable its implementation of economic programmes (Nnanna et. al., 2004). The CBN is the major regulatory agency that supervises the activities of the operators in the money market. The apex bank does this through the issuance of policy guidelines and supervision of the market day-to-day activities with the aim of making it robust for monetary policy implementation. Apart from the CBN, there are other regulators, namely the Nigerian Deposit Insurance Corporation (NDIC) and the Federal Ministry of Finance (FMF). Operators in the market include Discount Houses, Deposit Money Banks (DMBs), special purpose banks, Debt Management Office (DMO) and the investing public.

The money market, which is a major component of the financial market, performs both primary and secondary roles. In the performance of its primary function, it serves as a channel for the issuance of short-term financial instruments or securities, of less than one year tenor or maturity, e.g., the Nigerian Treasury Bills (NTBs). The money market securities are more widely traded than capital market securities, owing to their short-term features, thus, making them more liquid. Also, short-term securities are less prone to fluctuations in prices than long-term instruments, hence they serve as a better investment haven. It also performs secondary roles by ensuring the trading of instruments that had been issued or are outstanding, thus reflecting the liquidity status conferred on them.

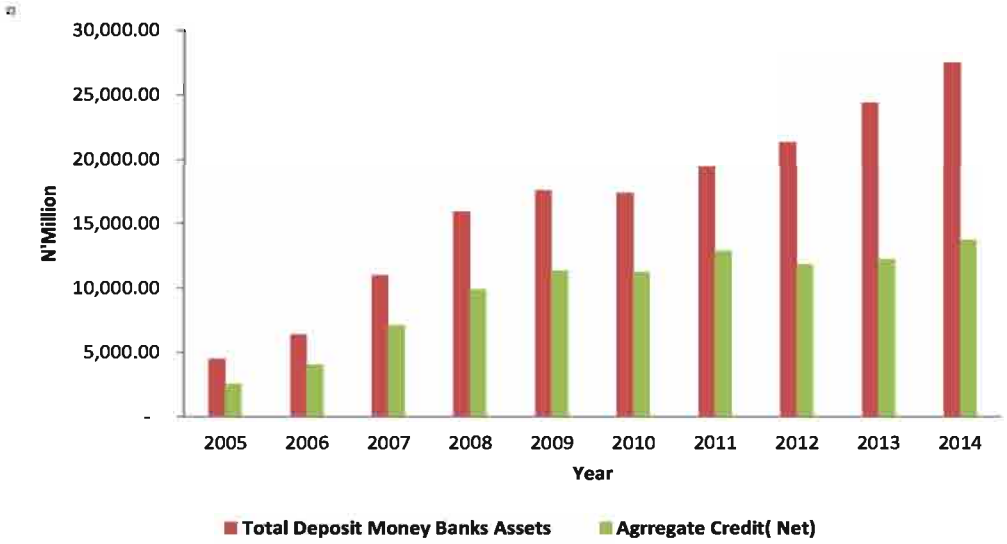
The money market in Nigeria has undergone several changes in terms of its structure and composition, institutions, instruments as well as rules and regulations that guide transactions between persons or corporates involved in financial assets and liabilities of various maturities. Also, the money market has continued to grow both in terms of value and volume of transactions, evolving financial infrastructure platform and rules and regulations guiding activities of the market participants, for example, the Financial Market Dealers Association (FMDA).

The market is dominated by the banking industry. The industry has undergone reforms in recent times, following the upward review of its capital base from ₦2.0 billion to a minimum of ₦25.0 billion, thus, reducing the number of banks to 25, from 89 in 2005, and thereafter to 24. The subsequent introduction of the new monetary policy framework in 2006 brought relative stability in the money market rates. Furthermore, the banks' assets base went up, while trading at the inter-bank funds market became more prominent, given that the overnight inter-bank call rate was influenced by the Bank's monetary policy rate (MPR). In December 2006, the MPR replaced the minimum rediscount rate (MRR), which was adjudged to be disconnected from the inter-bank interest rate and other market interest rates.

With these developments, the total assets of the banks and aggregate credit (Net) in the economy rose tremendously from ₦4,515.12 billion and ₦2,588.92 billion in 2005 to ₦17,

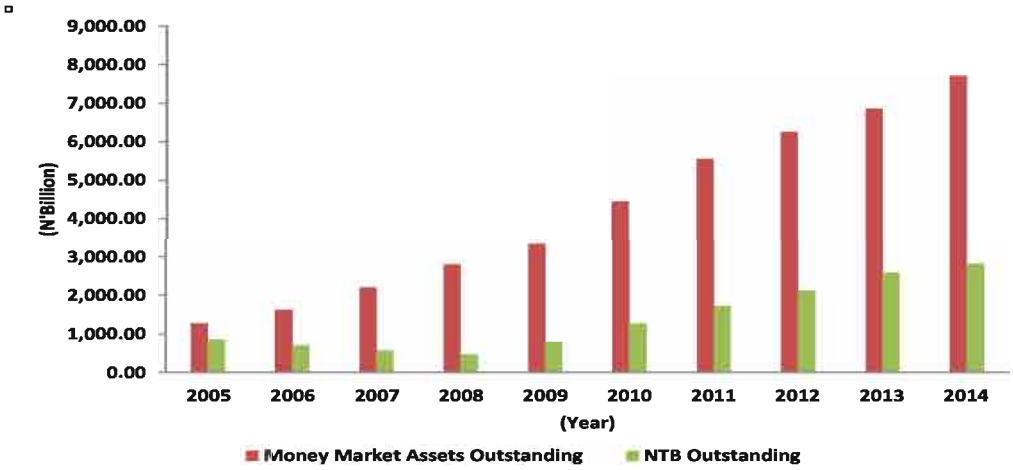
331.56 billion and ₦11, 217.24 billion in 2010, and further to ₦27, 413.58 billion and ₦13, 725.33 billion in 2014, respectively.

Figure 1: Total Deposit Money Banks Assets and Aggregate Credit (Net)



Currently, banks are categorised into commercial, merchant and specialised banks with different capital bases, aimed at ensuring more professionalism in banking practices, rather than banks operating as 'financial supermarkets' to the detriment of core banking practices. Generally, the new banking model was designed to ensure the evolution of a financial landscape that would be capable of providing the platform for sustainable economic growth and development.

Figure 2: Total Value of Money Market Assets Outstanding and the Nigerian Treasury Bills (NTBs) Outstanding from 2005-2014



Trading at the market requires the use of short-term instruments, thus, providing good channel for transmitting monetary policy. Notable instruments/securities traded in the market include the following; Nigerian Treasury Bills (NTBs) of 91-, 182-, and 364-day tenors, bankers' acceptance, certificate of deposits, commercial paper, CBN bills and bankers unit funds, among others. Review of developments in market transactions showed that total value of instruments in the market has trended upward ever since the issuance of short-term treasury bills by the CBN in April, 1960 (Nnanna et. al., 2004). From ₦20.3 million in 1960, it rose to ₦798.0 million in 1970. With the banking industry consolidation of 2005, the total value of money market assets outstanding in the market moved from ₦1,275.52 billion in 2005 to ₦4,447.30 billion in 2010 and further to ₦7,705.25 billion in 2014. Also, the NTBs outstanding rose from ₦854.80 billion in 2005 to ₦1,277.10 billion and further to ₦2,815.52 billion for the period, 2010 to 2014, respectively, reflecting the increased reliance of the Federal Government on the use of NTBs for financing fiscal deficits. Hence, government instruments has dominated the market, and thus, depicting the government as the prime-mover of activity in the market.

III. Stylised Facts on Nigeria's Money and Foreign Exchange Markets

III.1 Inter-bank Funds Market

The market provides a platform for banks to undertake funds transaction in order to meet the cash or liquidity needs of their customers. These transactions are very important as individual banks can hardly maintain an equilibrium cash or liquidity holding at any given point in time. Therefore, the market provides an avenue for banks to lend out their excess funds, and others borrowing to cover shortfalls. It, also, serves as signal for understanding the direction of cost of funds in the money market, through the inter-bank call rate on overnight

loans. This short-term market interest rate is very important for monetary authorities and it lies at the heart of monetary policy (Bernanke and Blinder, 1992).

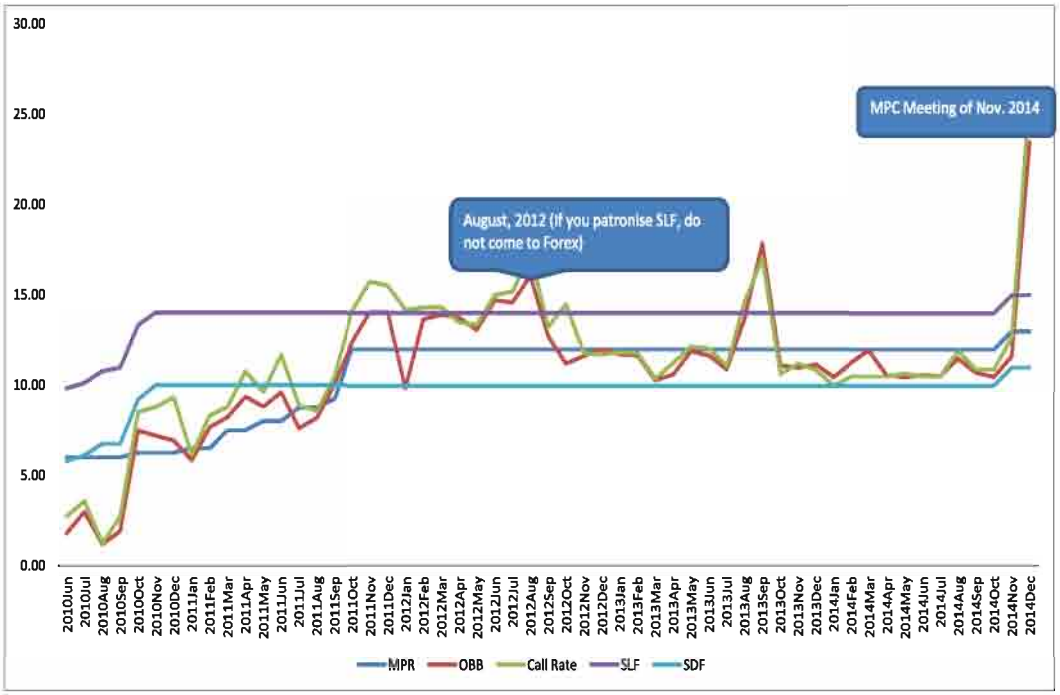
Money market interest rates are influenced by the Bank's MPR that operates within a corridor system. The corridor system has largely been successfully in limiting the fluctuations in the short-term interest rates and, in allowing central banks to provide liquidity, adequately, to the banking system (Kahn, 2010). Depending on the monetary policy stance, the corridor may be symmetric or asymmetric[7]. Furthermore, there are other factors that could influence activities in the market, such as the liquidity position of banks, especially their excess reserve position and changes in the demand for foreign exchange, which determines the frequency with which banks access the market for funds, to cover their bids at the wholesale Dutch Auction System (wDAS) or retail Dutch Auction System (rDAS).

For example, in 2010, the interest rates in all segments of the market were generally lower than their levels in 2009, owing to the impact of the Global Financial Crises (GFC) which impeded the growth of monetary aggregates. During this period, the Bank among other intervention measures, injected over ₦620 billion into the banking system as well as purchased the non-performing loans of the distressed banks through the issuance of AMCON bonds. However, in 2011, there was improvement in the banking system liquidity and this continued into 2012. Money market rates moved in tandem with the credit and liquidity conditions in the banking system during the period. The higher levels of the rates that commenced during the fourth quarter of 2011 persisted through 2012 and peaked at the monthly averages of 17.27 and 16.03 per cent for the inter-bank call and open buy back (OBB), respectively, in August 2012[8]. The high rates were attributed largely to the tight monetary policy stance of the Bank which led to the upward review of MPR to 13.0 per cent in October 2011.

[7] A symmetric corridor is one, which both the central bank deposit and lending rates are equidistant to the MPR. The equidistant rule is not applicable in the case of the asymmetric corridor.

[8] Prior to this period, CRR was reviewed upward from 8.00 to 12.00 per cent in July, 2012 and thereafter, restriction was placed on the simultaneous participation of authorised market dealers at the Standing Lending Facility and the WDAS.

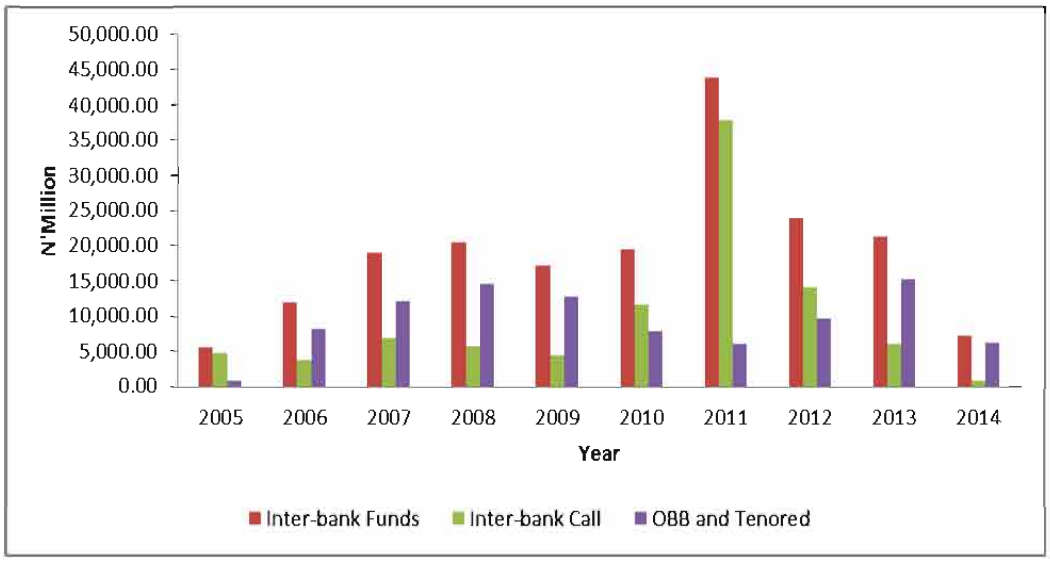
Figure 3: MPR and Weighted Monthly Money Market Rates from January 2010 – 2014 (%)



By December 2012, the inter-bank call and OBB rates were 11.8 and 11.7 per cent, respectively. However, there was relative stability from August 2012 – August 2013, until September 2014, when the rates moved to 17.82 and 16.98 per cent from previous month's 14.61 and 13.68 per cent, respectively. From October, 2013, the rates were very stable until November 25, 2014 following the movement of the mid-point of the exchange rate and the widening of the band from +/-3 per cent to +/- 5 per cent by the MPC meeting of November, 2014.

Given that the Bank is interested in ensuring banking system liquidity that is consistent with non-inflationary growth, its activities continued to influence the oscillation of the overnight, inter-bank rate around the "operating target", that is, the MPR. Consequently, the more the money market rates oscillate around the policy rate corridor, the greater the stability and liquidity position of the inter-bank funds market in Nigeria. For example, during the period of tightness, the Bank allows injection of liquidity into the banking system and vice versa, while maintaining control over the policy rate. Clews et. al., (2012) noted that central banks adjust the aggregate amount of banks reserves by undertaking Open Market Operations (OMO), repurchase agreements (repos) and reverse repos, while the on-demand/standing facilities contribute to keeping short-term market rates as close as possible to the policy rate.

Figure 4: Volume of Inter-Bank Funds Market From 2005 - 2014



The liquidity of the inter-bank funds market has improved remarkably since the banking industry consolidation of 2005. For example, the total volume of transaction at the inter-bank funds market increased from ₦5,600.60 million in 2005 to ₦19,534.75 million in 2010 and further to ₦43,588.80 million in 2011. However, by 2014, it declined to ₦7,242.79 million, compared with ₦21,331.17 million in 2013, thus, indicating reduction in the volume of inter-bank funds transactions. The decline was attributed to the high level of liquidity in the banking system in 2014, and a deliberate action to reduce the Bank's cost of liquidity management since the foreign exchange rates were relatively stable.

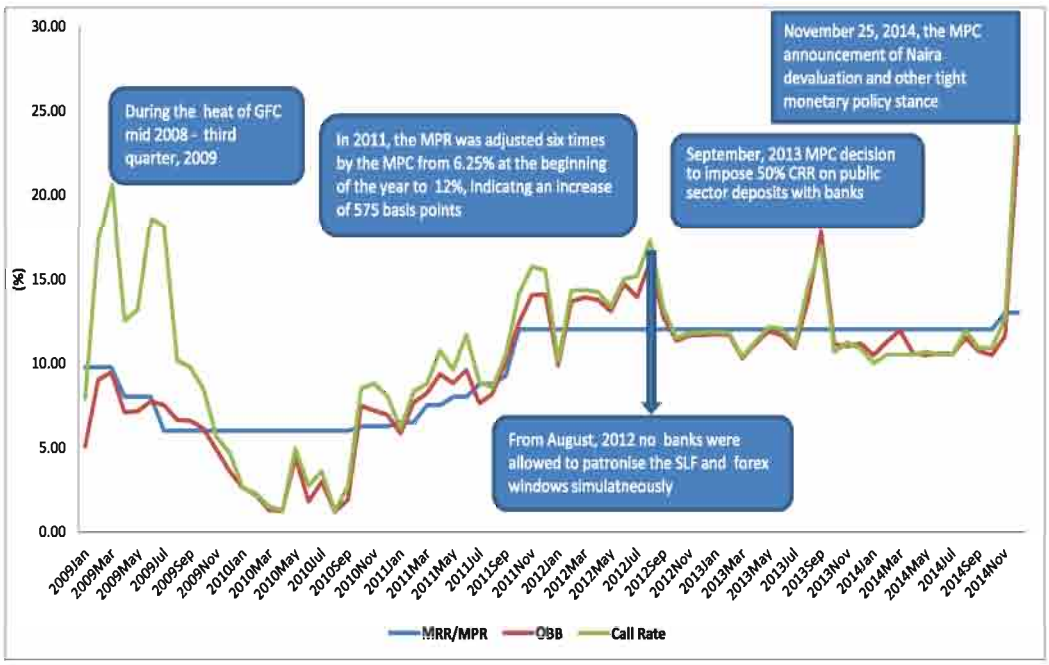
However, in order to encourage trading among banks at the inter-bank funds market and discourage banks that are liquid from dumping such funds at the standing deposit facility (SDF) window, a limit of N7.5 billion was placed on the amount of daily remunerable SDF. Through this process, the market is further deepened. Despite this effort, there still exists an oligarchical structure in the market as banks preference for trading amongst one another differed. These attitudes did not only impact on the volume of transactions in the market, it also affected the movement in interest rate as well as the foreign exchange rate.

The period 2009 – 2010 witnessed the Bank's guarantee of funds placement at the market, thus, encouraging banks to trade more among themselves. The inter-bank call and OBB rates during this period trended around the MPR, while the margin between them reduced. This was further extended into 2011, before the guarantee was withdrawn in December 2011. However, the period witnessed increase in monetary policy tightening, with the MPR moving from 9.25 in September to 12.00 per cent in October, 2011. The tight monetary policy stance led to an increase in the value of transactions at the inter-bank funds market, as banks that could not access the CBN repo windows for lack of government securities as

collateral[9] resorted to trading among themselves at high interest rates. For example, the inter-bank call and OBB rates increased from 6.13 and 5.84 per cent in January to 15.50 and 14.06 per cent in December 2011.

In 2014, transactions at the inter-bank call segment of the money market were very low, especially after the revocation of the operating license of a discount house and the suspension of another. Consequently, at the meeting of November 25, 2014, the MPC tightened the monetary policy stance in order to calm the market and reduce mounting pressure on the foreign exchange market as well as reduce the excess liquidity in the banking system.

Figure 5: Movement in the Inter-bank Funds Market Rates from 2009 - 2014



Thus, the average inter-bank call rate and OBB rate moved from 12.66 and 11.62 per cent to 26.15 and 23.46 for November and December, 2014, respectively, while the demand pressure at the foreign exchange declined in December 2014, compared with the level in the preceding month.

III.2 Foreign Exchange Market

Nigeria's foreign exchange market is a secondary market for trading prices of currencies against another. The exchange rate affects the economy as well as our everyday lives. For example, when the price of the Nigerian naira appreciates against other currencies, it

[9] CBN (2011) Annual Report and Statement of Account.

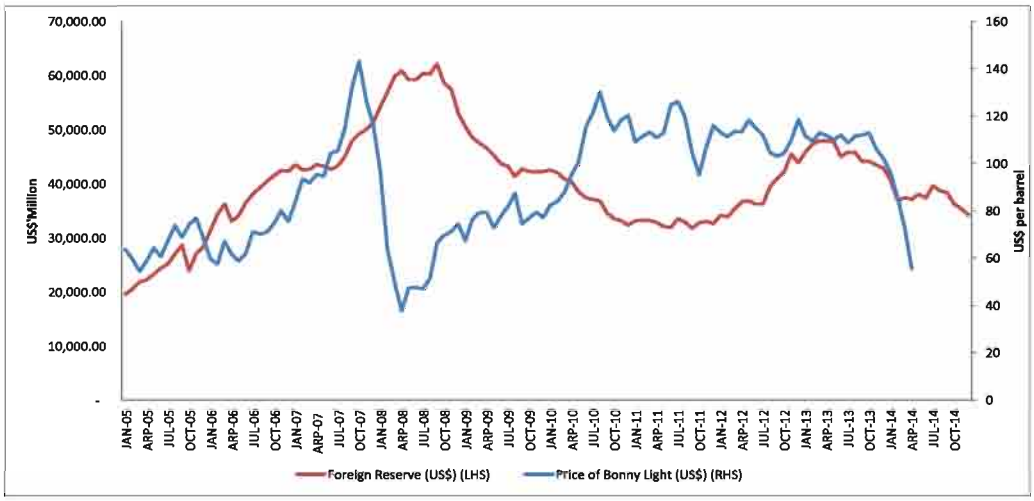
makes foreign goods cheaper relative to those of the domestic currency. By so doing, it affects the domestic prices, interest rate and foreign exchange rate. The interest and foreign exchange rates are channels of monetary policy transmission mechanism, while their stability enhances the effectiveness and efficiency of monetary policy.

The Central Bank of Nigeria has operated various regimes of foreign exchange rate management since its establishment in 1958. The regimes were structured to complement the monetary policy framework of the Bank. More importantly, the Bank is interested in mitigating the volatility of exchange rate movements because of its impact on interest rates, price stability, economic growth, employment and external sector viability.

Nonetheless, the Nigerian economy can be seen as peculiar, considering its mono-product nature. The economy depends heavily on the revenue from the sale of crude oil, whose prices are exogenously determined. In addition, the prices could be very volatile and that affects the level of oil receipts and accretion to foreign reserves. Thus, the foreign reserves level tend to decline as the Bonny Light crude oil price declined and vice versa. The development will affect the level of the net foreign assets (NFA), which in turn affects the money supply as well as the movement in exchange rate.

It, therefore, behoves the monetary authority to design and implement policy measures that would mitigate the impact of foreign exchange rate volatility on the economy. Hence, the needs to manage the nation's foreign exchange resources adequately in order to reduce the adverse effect of foreign exchange volatility (Obaseki, 2001). Until SAP in 1986, activities in the foreign exchange market were concentrated in the Central Bank of Nigeria and the price of the domestic currency was determined based on the local economic conditions and the performance of the naira vis-à-vis other currencies.

Figure 6: Movement in the End-Month Foreign Reserves (US$) and Monthly Price of Bonny Light Crude (US$) From 2005 – 2014



With the deregulation of 1986, the price of the domestic currency was determined mainly by the interplay of market forces. The post-deregulation era showed that the official means of intervention by the apex bank has fluctuated between the wholesale Dutch Auction System (wDAS) and the retail Dutch Auction System (rDAS) and vice versa. In addition, different segments of the foreign exchange market were established to facilitate foreign exchange management, namely w/rDAS (Official), inter-bank and bureau-de-change segments of the market. The derivatives market for forwards and swaps transactions were also developed. Presently, the rDAS segment of the market has been closed. Consequently, the Bank only intervenes at the inter-bank market and the exchange rate at the segment of the market is currently the ruling rate.

III.2.1 Recent Developments in the Money and Foreign Exchange Markets in Nigeria

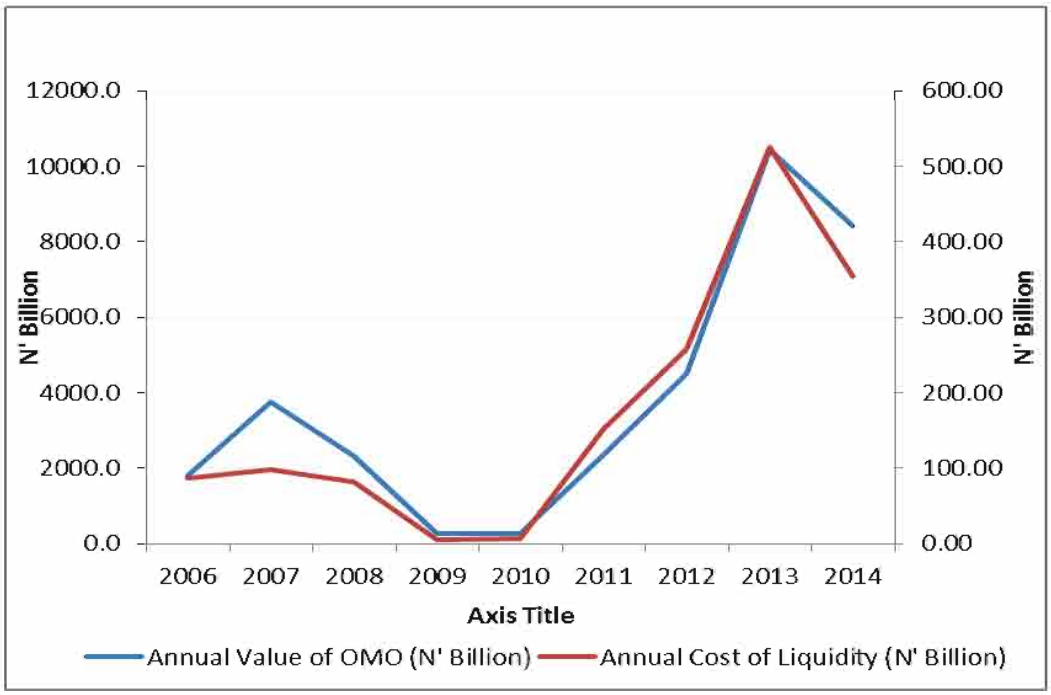
The announcement of possible reduction in the asset purchase programme by the US Federal Reserve Bank in May 2013 as well as economic recovery projections strengthened the US dollar against other currencies. Yields on fixed income went up and that prompted disinvestments from emerging markets, repatriation of investments by foreign portfolio investors in both the capital and money markets as investors moved their funds from riskier markets to more stable markets.

In addition, declining oil prices following the rising profile of shale oil and the seemingly uncertain political landscape fuelled market speculations and sentiments that impacted negatively on the economy. A fall out to these were declining capital inflows, dwindling receipts from foreign exchange earnings through the sale of crude oils and capital flight, all of which exerted undue pressure on the demand for foreign exchange in Nigeria.

Nonetheless, the liquidity surfeit in the banking system and the daunting fear of such funds being channeled to the foreign exchange market, resulted in the Bank's frequent use of OMO for liquidity management. This was complemented with the use of reserve requirements and foreign exchange interventions. From 2006 to 2014, the Bank has been experiencing increase in the total value of OMO bills sold and cost of liquidity management, except for 2009 and 2010, when the monetary policy stance was expansionary to cushion the effect of the financial and economic crises. The upward movement continued up till 2013, with total OMO sales amounting to ₦10,447.95 billion, but declined in 2014, to ₦8,422.70 billion. Also, the cost of liquidity management declined to ₦353.40 billion by 2014 from ₦524.85 billion in 2013. The outstanding OMO bills and Treasury bills holdings by banks and discount houses stood at ₦2,057.07 billion and ₦961.28 billion, respectively, as at end-March 2015.

In an effort to ease demand pressure in the foreign exchange market, the Bank re-introduced the retail Dutch Auction System, which replaced the wholesale Dutch Auction System on October 2, 2013. Owing to the disclosure requirements of the rDAS, it has been adjudged to be more transparent as it enabled the Bank monitor foreign exchange demand from different sectors of the economy. Furthermore, it helped the Bank to track the utilisation of funds and guard against speculation and round tripping.

Figure 7: Value/Volume of Open Market Operations and Movements in the Yearly Cost of Liquidity Management (CBN OMO Bills) from 2006 – 2014 (N' Billion)



However, despite the various actions by the Bank, demand pressure continued unabated at the various segments of the foreign exchange market. To stem this disturbing trend and mitigate the impact of the negative development in the international oil market, the MPC at its November 25, 2014 meeting increased the monetary policy rate (MPR) by 100 basis points from 12.0 to 13.0 per cent and the cash reserve ratio (CRR) on private sector deposits by 500 basis points from 15.0 to 20.0 per cent. Furthermore, the Committee moved the midpoint of the official window of the foreign exchange market from N155/US$ to N168/US$ and widened the band around the midpoint by 200 basis points from +/-3 per cent to +/-5 per cent. However, it retained the public sector CRR at its current level of 75.0 per cent and maintained a symmetric corridor of +/- 200 basis points around the MPR.

Movements in the monthly foreign reserves level and the average foreign exchange rates at the three segments of the foreign exchange market from September 2012 – October, 2014, showed that, during the wDAS period (September 2012 – September 2013) and the rDAS period (October 2013 – October 2014), there was wider premium at the segments of the latter compared with the former. In addition, there was more demand pressure, hence more sales during the rDAS period than the wDAS. On average, the monthly sales of foreign exchange when the wDAS held sway was US$1,820.20 million, compared with sales of US$2,609.08 million recorded during the rDAS period, indicating that the Bank sold more foreign exchange during the rDAS. The increase was attributed largely to activities of

customers who were front loading their demand in order to ensure that demands are met in the face of dwindling oil prices and declining foreign reserves.

Figure 8: Movements in the Monthly Foreign Reserve Level and Average Foreign Exchange Rate at the Three Segments of the Market from September 2012 – October, 2014

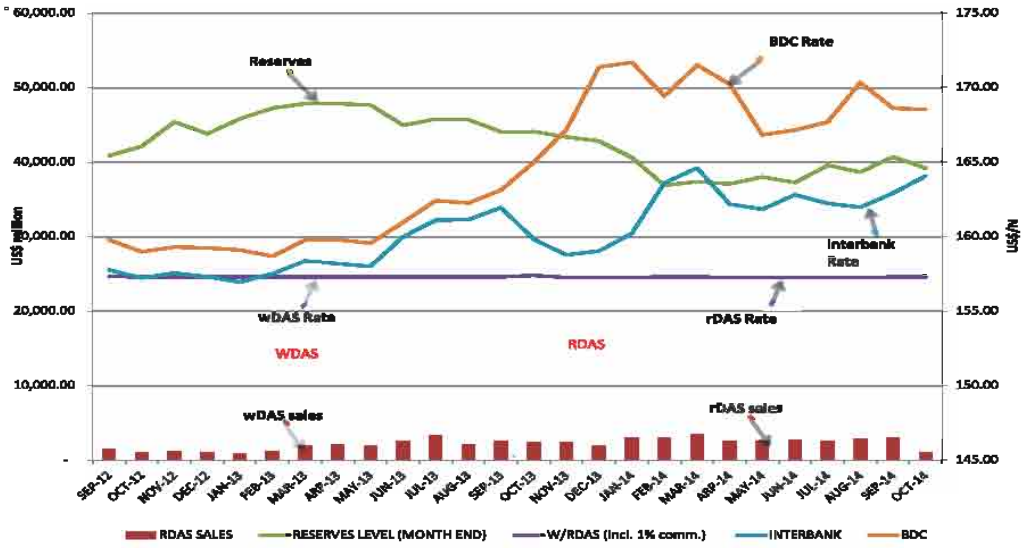
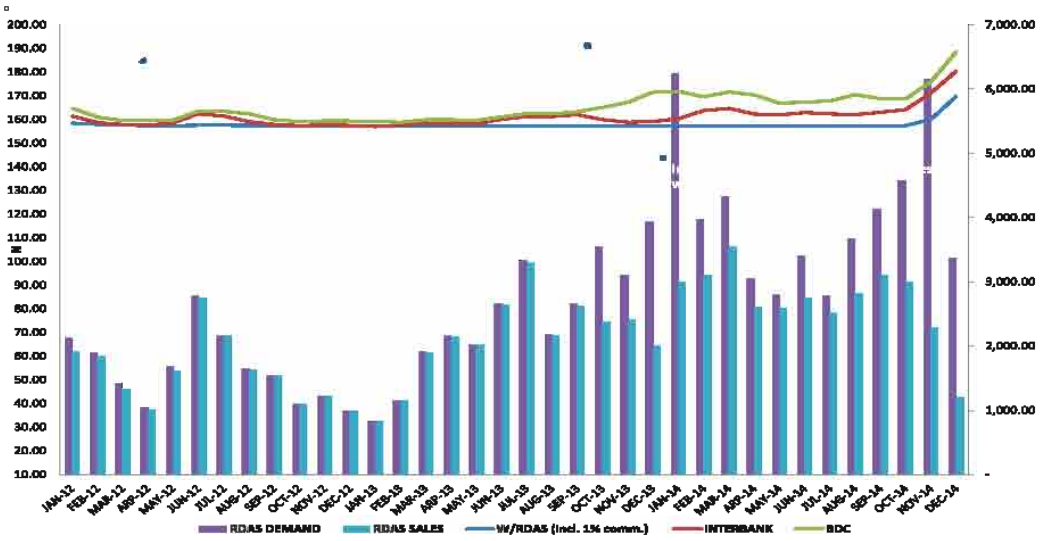


Figure 9: Movement in the Demand and Sales at the r/wDAS, Inter-bank and BDC Markets



A cursory look at the movement in the foreign exchange rate at the w/rDAS, inter-bank and BDC segments of the foreign exchange market from 2012 – 2014 indicated a widening premium between the rates at the segments from October 2013, especially between the w/rDAS and BDC segments. This, however, became pronounced by end December 2013 and throughout 2014. The scenario was also accompanied by increased demand pressure. However, the demand for foreign exchange at the rDAS segment declined to US$3,364.93 million from US$6,148.84 million between November and December 2014, while the exchange rate increased at all the three segments of the market from ₦160/US$, ₦171.10/US$ and ₦175.85/US$ to ₦169.68/US$, ₦180.33/US$ and ₦188.45/US$ for the rDAS, inter-bank and BDC segments, respectively, during the same period.

IV. Challenges and Way forward

IV.1 Challenges

IV.1.1 Market Segmentation among Participants

Transactions at the money market are largely consummated by the banks and trading among operators is very conducive for effective monetary policy implementation and transmission. On its part, the CBN strives to encourage trading among the banks, rather than them patronising the SDF window. However, this is impaired by the inability of some banks to trade with one another, thereby, introducing oligarchical structure within the market, which is not healthy for market stability.

IV.1.2 Volatile Exchange Rate

The volatility of the exchange rate constitutes a very serious concern to the Bank. Apart from exerting pressure on the domestic currency, it affects the short-term money market interest rates, hence, the term structure of interest rates. Currently, the Bank allows its foreign exchange rate to fluctuate within a band of +/-5 per cent, fallout of the demand pressure experienced in the market. The inter-bank market is currently trading outside the official band. Currency volatility leads to erosion of the value of the currency and loss of confidence in the currency as a store of value and medium of exchange.

IV.1.3 Structure of the Economy

The structure of the Nigerian economy is skewed and this has continued to affect her foreign exchange receipts. The economy, which is largely mono-product is dominated by crude oil, which price is exogenously determined. This poses the threat of unstable foreign exchange earnings, especially following the dwindling price of oil in the international market. Furthermore, the monthly monetisation of the Federation Accounts Allocation Committee (FAAC) funds for payments to the three tiers of government affects the cost of funds at the money market, thus, creating structural liquidity challenges for the Bank.

IV.1.4 Low Financial Infrastructure

The financial infrastructure in the money market is still inadequate, despite laudable efforts of the Bank at continuously engendering financial innovations. The Bank has initiated several innovations, including the recently adopted cash-less policy and the financial inclusion strategy. It has equally intervened in the past by guaranteeing inter-bank fund placements. All those efforts were directed at reducing cost of transactions. Yet, the market is still impeded by the underdeveloped financial markets structure.

IV.1.5 Money Market Instability

The Nigerian money market is still fragile, despite the various reforms carried out in the sector since 2005. Consequently, the participants, especially, banks are very cautious about trading among themselves. Recently, the withdrawal of the license of two of the participant, owing to infractions heightened anxiety in the market as interest rates increased, while there was decline in trading among them.

IV.1.6 Fragile Political and Economic Environment

Unstable political and economic environment pose serious threat to exchange rate stability. Given that domestic interest rate is influenced by international interest rate and expected rate of change in the exchange rate, it implies that any uncertainty in capital inflows and political environment affect the demand at the foreign exchange market. Nigeria's money and foreign exchange markets have been bedeviled with these challenges. The increasing demand at the foreign exchange market witnessed prior to the 2015 presidential election was fuelled by the increase in international interest rate and uncertainty surrounding the outcome of the presidential election, among others.

IV.2 Recommendations

IV.2.1 Enhancement of Financial Markets Stability

The CBN should continue to maintain the stability of the financial markets so as to strengthen monetary policy implementation. Sound financial markets require a strong macroeconomic environment and sound management of institutions. On the other hand, unsound macroeconomic environment such as volatility in interest rates, exchange rates, asset prices and inflation rates make it difficult for institutions to assess properly, the credit and market risks facing them.

Therefore, the Bank has a very unique role to play in ensuring the stability of the financial markets by preventing undue risk-taking by participants, ensuring adequate information on the financial conditions of institutions, maintaining effective supervision and regulatory environment as well as preventing concentrated ownership and connected lending. Furthermore, the Bank should continue the adoption of international standard and best

practice, while taking cognisance of our economic environment in developing sound and stable markets as well as ensure exchange rate stability.

IV.2.2 Ensuring Liquidity of the Money Market

Ensuring the optimal liquidity level in the money market is very important for exchange rate stability. As the platform for influencing the short-term interest rates by the Bank, it behoves on it to adequately ensure that the market is not starved of liquidity. Illiquidity of the market causes unnecessary market anxiety and sharp practices that could affect the cost of transaction and reduce market efficiency and vice versa.

IV.2.3 Regular Consultations with Money Market Participants and other Stakeholders

The Bank should consult regularly with market participants and other stakeholders in order to avoid communication gap. In that regard, the central bank's instrument of moral suasion becomes very handy. This involves continuous dialoguing with banks and other stakeholders in the money market through stakeholders' meetings, seminars and conferences. At such fora, operators' choices and thinking are thoroughly discussed with a view to discerning market preferences. Such fora would undoubtedly go a long way in aiding the Bank to come up with appropriate policies and actions capable of facilitating the efficient functioning of the market.

IV.2.4 Effective Collaboration between the Fiscal and Monetary Authorities

The proper functioning of the money market requires continuous collaboration between the fiscal and monetary authorities. This would ensure the stability of the money market. This collaboration could also cascade down to the subnational governments given that the country operates fiscal federalism. The structural liquidity experienced in the economy requires effective collaboration between the monetary authority and the three tiers of government.

IV.2.5 Development of Financial Markets Infrastructure

Recent developments in the financial markets have shown that more efficient financial markets will significantly improve the effectiveness of monetary policy in Nigeria. For example, the financial re-engineering experienced in the money market through the Bank's deployment of the improved real time gross settlement (RTGS) system and the Scripless Securities Settlement System (S4) have improved market operations. Efforts in this area should be sustained and the Bank, as a major stakeholder, should continue to play a leadership role in the development of the Nigerian financial markets. The Bank could

achieve this through the periodic assessment of the performance of market infrastructure, with a view to modifying its short, medium and long – term development initiatives.

IV.2.6 Stable Political and Economic Landscape

Money market interest and exchange rates are more stable in an environment of political and economic stability. Countries achieve much in an atmosphere of stability. Through this process, progress is achieved and macroeconomic variables are strengthened. Nigeria's political and economic stability is a *sine-qua-non* for achieving sound and stable macroeconomic environment.

V. Conclusion

The paper has attempted to explain the dynamics of the money market development as an imperative for foreign exchange stability. It explained how the activities in the money market, especially the short-term interest rates influence the stability of the foreign exchange market. Furthermore, it showed that money market interest rates are inextricably linked to the price of the domestic currency, which affects the cost of purchasing foreign goods and financial assets. It also indicated that the movement in the international price of crude oil affects the level of the nation's foreign reserves.

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Foreign Exchange Market Segmentation, Foreign Exchange Utilisation and Exchange Rate Volatility: The Nigerian Experience

*A. Adeyemo**

I. Introduction

The choice of exchange rate regime impact on the economic growth, inflation and external reserves of emerging economies. Due to the economic costs that exchange rate volatility can bring to an economy, most countries have engaged in exchange rate reforms. This is particularly evident in many sub-Sahara African countries, with a shift towards the independence of their Central Banks, to adopt different forms of exchange rate regimes. Nigeria has gone through different exchange rate regimes over the years. As the nation's foreign exchange earnings increased significantly following the oil boom in the early 1970s, it became necessary to manage foreign exchange rate to prepare for periods of burst.

Prior to the introduction of the Structural Adjustment Programme (SAP) in 1986, Nigeria had a pegged exchange rate regime and strong exchange controls. What existed during this period was more a case of allocation of foreign exchange than free flowing purchase and sale of foreign exchange. The increasing demand for foreign exchange and the inability of the exchange control system to evolve an appropriate mechanism for foreign exchange allocation in consonance with the goal of internal balance, led to a shift in September 26, 1986, to a new mechanism under the SAP. The main objectives of exchange rate policy under SAP were to; preserve the value of the domestic currency, maintain a favourable external balance and the overall goal of macroeconomic stability and determine a realistic exchange rate for the naira.

In an attempt to achieve these objectives, a transitory dual exchange rate system (First and Second -Tier Foreign Exchange Market – SFEM) was adopted in September 1986, which metamorphosed into the Foreign Exchange Market (FEM) in 1987. Bureau-de-change was introduced in 1989 with a view to enlarging the scope of FEM. In 1994, there was a policy reversal, occasioned by the non-relenting pressure on the foreign exchange market. Further reforms such as the formal pegging of the naira exchange rate, the centralisation of foreign exchange in the CBN, the restriction of Bureau-de-change to buy foreign exchange as an agent of the CBN among others were all introduced in the foreign exchange market in 1994 as a result of the volatility in exchange rate. There was another policy reversal in 1995 to that

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of "guided deregulation". This necessitated the institution of the Autonomous Foreign Exchange Market (AFEM), which later metamorphosed into a daily two-way quote Inter-Bank Foreign Exchange Market (IFEM) in 1999. The Retail Dutch Auction System (rDAS) was introduced in 2002 as a result of the intensification of the demand pressure in the foreign exchange market and the persistence in the depletion of the country's external reserves. Finally, the Wholesale Dutch Auction System (wDAS) was introduced in February 20, 2006. The introduction of the WDAS was also to deepen the foreign exchange market to evolve a realistic exchange rate of the naira. This was later changed to rDAS in October 2013, which enabled the Central Bank to monitor uses of foreign exchange purchases from the apex bank. In February 2015, the CBN discontinued the rDAS with a view to gradually relegating its participation in the foreign exchange market to interventions at the inter-bank market on a need basis.

Traditionally, the CBN has dominated the foreign exchange market in the formal sector with some presence from the Bureau-de-change. With the introduction of the two-way quote inter-bank market and the several liberalisation policies by the CBN we have seen the gradual transfer of dominance from the CBN to the inter-bank market. According to the CBN 2013 half year report, of total inflow into the country in the first half of year, inflow through the CBN accounted for 27.3 per cent while 72.7 per cent of the total US$72.44 billion inflow were from autonomous sources. A further breakdown revealed that over-the-counter (OTC) and ordinary domiciliary account, which were traded in the inter-bank segment of the market, were US$34.15 billion and US$16.47 billion, respectively. These figures were far in excess of the US$19.78 billion inflow through the CBN.

II. Foreign Exchange Market Segmentation

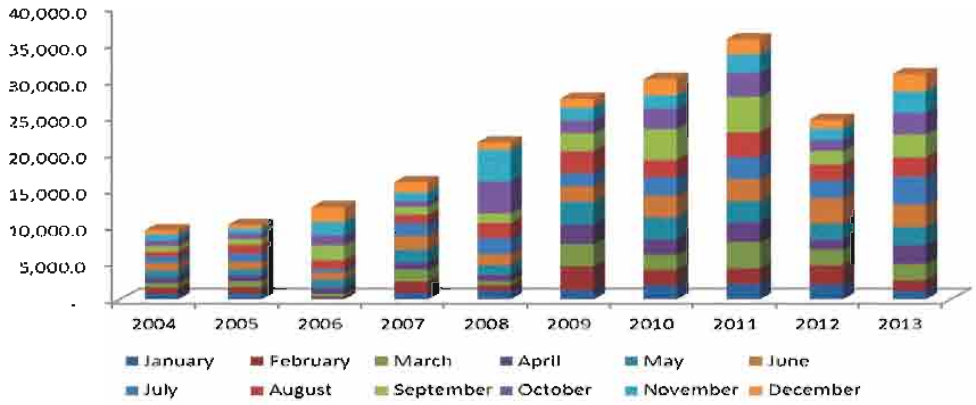
Market segmentation is the process of subdividing a large homogenous market into clearly identifiable segments having similar needs, wants and demand characteristics. In the foreign exchange market, segmentation could be done along products i.e. Spot, Forwards and Derivatives, user type (Institutional, Corporate or Retail), transaction type (imports, exports and services) among others. Nigeria's current exchange rate arrangement is described by the IMF as a managed float with no preannounced target for the exchange rate of the naira. Currently, there are two exchange rates: the inter-bank foreign exchange market (IFEM) at which the CBN transacts, at a rate quoted by a group of commercial banks and the bureau-de-change rate. The markets can be further broken into the official market consisting of the central bank intervention, the inter-bank market, and the bureau-de-change segments.

II.1 Authorised Markets

II.1.1 Central Bank Auction (Interventions at the inter-bank market)

The CBN had historically dominated the foreign exchange market prior to the emergence of the inter-bank market. Till recently, the CBN conducted a bi-weekly auction using the Retail Dutch Auction (rDAS) system, which consisted of the spot and forward auctions. The spot auction held regularly and was more dominant, while the forward auction held less frequently and was often reintroduced during volatile market conditions. The CBN had also been intervening directly at the inter-bank whenever there was a need. The transition towards being purely a participant at the inter-bank market began many years ago, as the CBN had gradually transferred a significant amount of transactions that had been previously eligible at the auctions to the inter-bank market. Prior to the discontinuance of the rDAS, only the importation of refined petroleum products and raw materials used in local manufacturing were allowed at the CBN auctions. The CBN began dollar sale to the BDC segment of the market in 2006. This resulted in appreciation of the naira in the BDC market leading to convergence in the three major market segments.

Figure 1: Dollar Supply from the CBN (including sales to Bureau-de-Change from April, 2006-2013)



Source: CBN

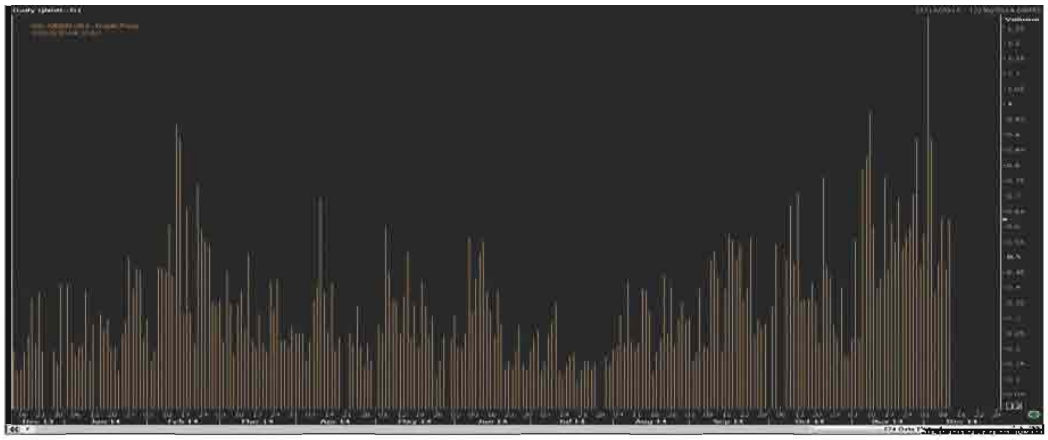
II.1.2 Inter-bank Market

With the closure of the rDAS window, the inter-bank market has become the undisputed dominant segment of the foreign exchange. This emergence was not a sudden one as the reduction of eligible transactions at the rDAS had increased the activity level at the inter-bank market. The active participation and trading by commercial banks in the two-way inter-bank market has enhanced the accessibility and liquidity in the market. The estimated daily turnover of the inter-bank market in 2014 was US$350 million with a record daily turnover of US$1.23 billion on December 02, 2014. The exchange rate at the CBN auction

market has been stable for a considerable period of time, while the inter-bank market has been more volatile and reflects demand and supply conditions in the market. In period of excess supply, the exchange rate appreciates significantly and vice-versa.

The inter-bank market is essential as it provides access to a wider audience than any other segment of the market. It is also the most transparent market as live prices are displayed on both Reuters and Bloomberg. The transparency of the inter-bank market and increased liquidity in this market were contributing factors for the inclusion of the nation's bonds in the JP Morgan emerging market bond index. According to JP Morgan, "liquidity and removal of the one-year lock-in period for foreign investment in government securities" paved the way for Nigeria's bond inclusion in the index. Furthermore, JP Morgan warned of exclusion from the index if additional controls are put in place, "The introduction of any additional controls may also lead to Nigeria's exclusion from the GBI-EM Global and GBI-EM Global Diversified". Thus, it can be translated that an active, liquid inter-bank market together with less restriction on holding period for foreign investors in government securities allowed for index entry and would be needed for the FGN bonds to remain in the index.

Figure 2: USD/NGN Volume analysis



Source: Reuters Eikon

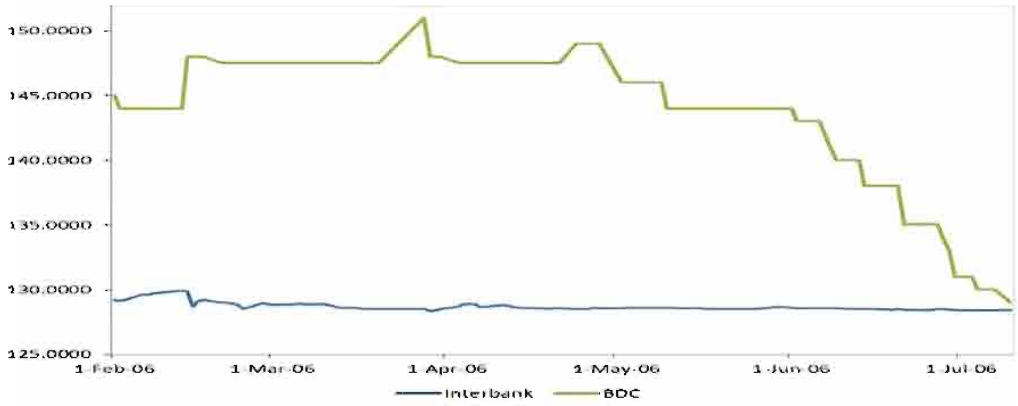
The Financial Market Dealers Association (FMDA) has been canvasing for market development. The emergence of the FMDQ, an OTC exchange registered with the Securities and Exchange Commission (SEC) is expected to accelerate the development of the Nigerian financial markets. The inter-bank market will serve as the base and help to ensure a vibrant foreign exchange market.

II.1.3 Bureau-de-Change

The BDC operators were established to serve the retail end of the market. For a long-term, they have been trading independent of the other segments of the market. However, as the CBN commenced the liberalisation of the foreign exchange market in 2006, the BDC

segment of the market was allowed to purchase funds directly from the CBN and the inter-bank market to meet the needs of their clients. This resulted in a marginal convergence of the exchange rates in the authorised markets. The market is predominantly cash-based and all banks currently source dollar cash from Travelex. Presently, the Central Bank sells US$30,000 weekly to individual BDCs, which the BDCs sell to clients with eligible transactions.

Figure 3: Exchange Rate in the Inter-bank and BDC Market Segments following the CBN's Commencement of Dollar Sale to BDCS



Source: CBN, Citibank

To deepen the BDC segment of the market, the CBN issued new regulatory requirements for BDC operations in the country in 2014. The CBN increased their capital base by 250 per cent to ₦35 million from ₦10 million. Also, the mandatory cautionary non-interest deposit was raised to ₦35 million from the initial ₦1 million. As a result of this, the total number of BDCs in the country fell to 2,586 from 3,208 before the regulatory requirement.

Before the recent changes that barred sales to the BDCs from the inter-bank market, the BDC market was estimated at a daily average volume range of US$150-US$200 million with the majority of this sourced from the inter-bank market and autonomous sources. Historically, average daily volume in the BDC segment of the market was as high as US$300-US$400 million before the enforcement of regulations that helped bring down the volumes.

Policy tinkering on the BDC segment has direct implications for the inter-bank market. Over the years, the inter-bank market appreciated on CBN's pronouncement of a reduction in the amount BDCs can source from the inter-bank market and vice versa. On September 26, 2013, the CBN issued a circular, which limited the amount BDCs can source from individual bank to US$250,000.00. Following the circular, the naira appreciated by 1.05 per cent the following day closing at ₦159.95/USD below ₦161.65/USD. However, the policy was reversed on the January 24, 2014 when the CBN removed the cap on the amount of dollars BDCs can source from the inter-bank market. This resulted in a pressure point, as the currency depreciated by 1.21 per cent the next day to close at ₦162.45/USD from ₦160.50/USD.

Following the circular which limited the dollar sale to the BDC segment, the naira was stable for a sustained period of time in the inter-bank market although the divergence between the inter-bank and the BDC market widened. It must be noted that the increased divergence was mainly a function of supply in the BDC segment and not a function of the transfer price from the inter-bank market as there is a 1 per cent cap on premium charged between the price at which the fund is sourced and sold to the BDCs.

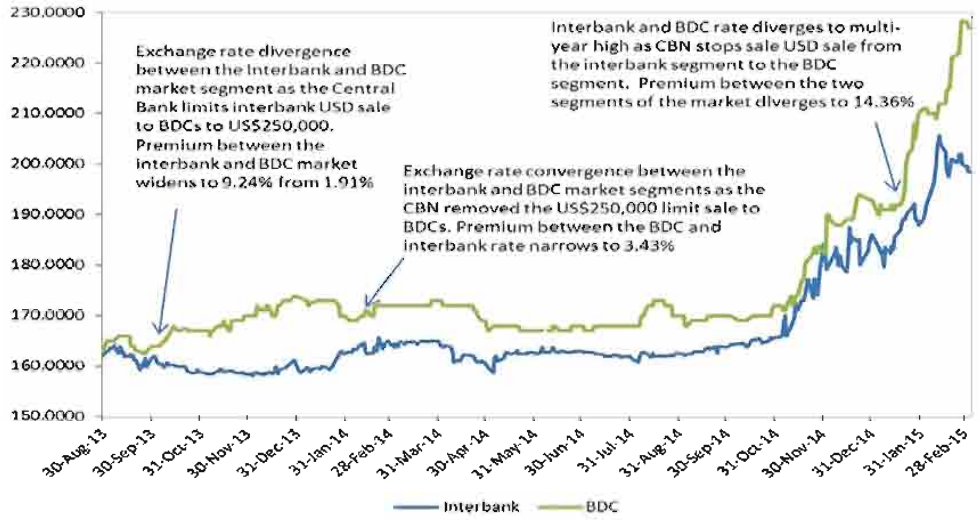
The reversal of the circular in January 2014 coincided with a period of general negative sentiment on emerging markets. The naira subsequently depreciated in the inter-bank market and strengthened in the BDC market. However, persistent pressure in the inter-bank market ultimately fed into the BDC market as a significant portion of its fund were sourced from the inter-bank. This persistent pressure in the inter-bank market was responsible for the unsustainability of the strengthening in the BDC segment. Ultimately, the decision must be taken as to the market that accurately measures the value of the currency and volatility. Exchange rate convergence is desirable by the central bank, while achieving it could be at a cost to the external reserves and increased volatility in the inter-bank market. It must also be noted that the inter-bank market is most tracked market globally and thus, best measures volatility in the exchange rate.

Analysis showed that despite the fact that the naira appreciated in the BDC segment in the short-term following a policy that favoured that segment of the market, this appreciation is often short-lived. However, appreciation of the currency in the inter-bank market is often sustained over a longer period of time. As shown in the graph below, prices in the BDC segment of the market is upwardly sticky and downward trends are not sustained. Higher BDC rates typically lead to uncertainty and increased demand in the inter-bank market, and also put pressure on the CBN to depreciate gradually to reduce the divergence between the Inter-bank and BDC rates.

In January 2015, the CBN outlawed the sale of USD from the inter-bank market to the BDC segment, which led to the widening of the gap between the BDC and the inter-bank market rates. The spread widened from 3.12 per cent on the January, 21 2015 to 14.25 per cent on February 27, 2015. This made it very important to dimension how these markets are interlinked and how a policy for one segment of the market impact volatility in another segment.

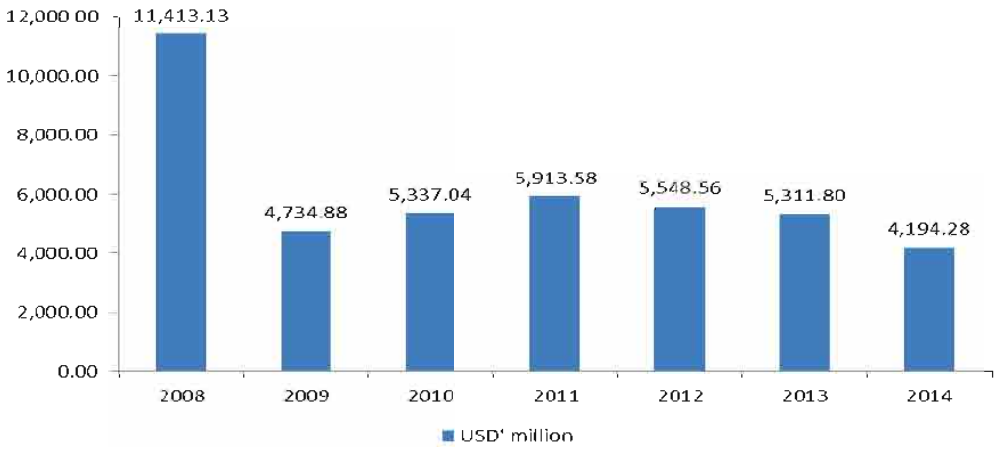
It should be noted that despite the inter-bank market being the most tracked globally, in the Nigerian context, the BDC rate is the widely publicised rate and serves the large informal sector (the size of the parallel market is challenging to estimate).

Figure 4: Lag in Exchange Rate Movement in the BDC Segment



Source: CBN and Citibank

Figure 5: Demand from the BDC sector



Source: CBN Statistical Database

II.1.4 International Money transfer Companies

With an estimated 17 million people in the diaspora, Nigeria like most countries with a large diaspora has a very active and vibrant money transfer market. This includes banks, international money transfer companies and informal agents in the grey market. According to the World Bank, in 2012 Nigeria was the largest receiver of inward remittance in Africa at approximately US$21bilion, which is in line with the average over the past few years.

Table 1: Nigeria Remittance Data (2008-2013)

Year	Amount US$'billion
2008	19.21
2009	18.37
2010	19.82
2011	20.62
2012	20.63
2013	20.89

Source: World Bank Annual Remittance Data

Money transfer operators ("MTO") have been in operation in Nigeria since the mid-1990s with Western Union and MoneyGram being the major players accounting for over 90 per cent of the market. Other operators have included Cash4Africa, Vigo, Rial among others. The business model in Nigeria is based on partnerships with local banks. Western union alone has over 4,800 locations in Nigeria mainly through the branches of their Nigerian bankers. Until September 2014 when the CBN released the Guidelines for outwards transfers, their operations were restricted to inward transfers only.

II.2 Unofficial Market

II.2.1 Unauthorised Parallel Market

The parallel market is the most opaque, yet large segment of the market. Parallel markets typically get created in markets where there are exchange control restrictions, which inhibit or out rightly ban the free movement of funds and capital to and from that jurisdiction. Parallel markets hardly exist in countries with freely floated and fully convertible currencies. Nigeria has historically had exchange control restrictions on both current and capital account transactions. A lot of the reforms by the CBN over the years have practically led to full current account convertibility, but there are still some restrictions on capital account transactions. Our history of exchange controls have led to the development of a large and vibrant parallel market which is dominated by the following players:

a. Retail users of foreign exchange;
b. Traders in Nigeria's large informal sector;
c. Investors evading exchange controls on capital accounts; and
d. Money Launderers.

The CBN has put in a lot of effort over the years to bring in legitimate users of foreign exchange (Users 1 – 3) into the official markets. The BDC's operations have been expanded to include transactions that were previously the exclusive preserve of the banks e.g. school fees, insurance, medical fees, travel allowance, among others. The Central Bank also reduced the spread between the BDC/rDAS and inter-bank/rDAS rates by commencing the

sale of foreign exchange directly to them. This has led to mainstreaming retail customers who would have ordinarily patronised the parallel market. Other measures that have been employed to achieve this purpose include:

a. Allowing the use of Naira Debit/Credit cards for foreign exchange transaction;
b. Increasing the allowable limit on these card transactions to US$150,000 per annum from the initial limit of US$40,000;
c. Reducing the documentation for retail importers subject to a maximum of US$250,000 to just Form M and proforma invoice; and
d. Introduction of the investment in foreign securities as an eligible transaction.

These measures have helped in bringing in a significant portion of the demand from the parallel market to the official market. There are enough stress-free avenues for retail users to access foreign exchange in the official market. The outcome has, however, been slightly less successful when one considers the size of small business people in the Nigerian Informal sector. Some of the reasons given by traders who still patronise the parallel market are:

1. Failure of cards at point of payment;
2. Preference for cash by suppliers;
3. Electronic fraud; and
4. Lack of adequate awareness about some of the policies.

These reasons are legitimate and there is also the sense that the reluctance to change has been a part of the reason that some have not adapted to the use of the alternative means of payment. One also has to consider the "tax advantage" that can be negotiated or avoided working outside the official market versus the compulsory payment of these taxes if payments are done through the bank. The challenge for the Central Bank is to work with the operators to find a way to assuage the concerns of the traders and create the enabling environment to make it easier and more convenient for them to come within the official market. This will lead to making the parallel market irrelevant and help to isolate the unwanted users of foreign exchange in that market.

II.2.2 Offshore Non-Delivery Forward ("NDF") Market

The NDF market was developed as an offshore market to trade the currencies of emerging markets with capital controls. NDFs are contracts for differences which are usually cash settled in US dollars. Liquidity typically exists from one month up to a year. London, which is the major financial market for currencies, is where the most liquidity exists for NDFs. The NDF market for USD/NGN is a US$100 million a day market dominated mainly by the global banks, multinationals and international institutional investors. However, liquidity in the market also thins out when the physical spot market becomes stressed. Unlike the deliverable market where the carry trade principle is embedded in the pricing of forwards, in the NDFs the implied yield of the market can widen significantly if the market prices in a major devaluation or appreciation.

The features/terms of an NDF include:

- The notional amount: This is the "face value" of the NDF, which is agreed between the two counterparties. It should be noted that there is never any intention to exchange the notional amounts in the two currencies;
- The fixing date: This is the day and time whereby the comparison between the NDF rate and the prevailing spot rate is made;
- The settlement (or delivery) date: This is the day when the difference is paid or received. Depending on the currencies in deal, the fixing date is one or two good business days before the settlement date;
- The contracted NDF rate: This is the rate agreed between the two counterparties on the transaction date, and is essentially the outright forward rate of the currencies in deal; and
- The prevailing spot (fixing) rate: The fixing spot rate on the fixing date is usually an average dealing rate for the day (in Nigeria, it is provided by the FMDQ), and is commonly calculated by calling a number of dealers in the market for a quote at a specified time of day, and taking the average. The exact method of determining the fixing rate will be agreed when a trade is initiated, but most NDF markets have their own conventions (for example, two days before Settlement/Value date).

Advantages of NDFs

The key benefits of an active NDF market are: reduced pressure on the spot market and hedging for investors and corporates. NDF provides protection against unfavourable foreign exchange movements for both investors and corporates between deal date and the maturity date. This can assist in managing foreign currency exposures. Investors and corporates simply exchange the uncertainty of exchange rate fluctuations for the certainty of an agreed cash flow. Users who have hedged their exposure in the offshore NDF market will no longer have to bring forward obligations or execute plain forward transactions, which may be covered in the Local spot market. NDFs also provide flexibility as the maturity date and the contract amount can be tailored to meet end users' particular requirements.

III. Exchange Rate Regime

The optimal choice of exchange rate regime is a topic with a long tradition in international macroeconomics. No exchange rate regime is empirically superior to others. Choice of the exchange rate arrangements should be tailored to specific circumstances of a country. The potential determinants of exchange rate regimes can be grouped in three categories:

- Macroeconomic Variables;
- Capital Openness Variables; and
- Optimum Currency Area Variables.

Until very recently, we operated a managed float regime. Under this regime, the exchange rate was flexible within a band (the last band was 168 ±5%), with the end points defended through interventions. Over the years, the CBN had managed to keep the currency within

its target band and investors' confidence in the apex bank's ability to maintain the band was often reinforced by the stable/growing external reserves. However, this currency regime was subject to volatility around the band. This volatility was most pronounced in periods of falling oil prices and declining external reserves. Also, it is important to note that Nigeria is overly exposed as the dollar supply into the market is limited and significantly reduced during these periods.

We are currently in transition from a managed float to a lightly managed float. The current regime still runs like an auction albeit at more flexible rates, which are very close to the inter-bank rate. The CBN still requests for details of individual clients and sets a rate at which they sell. The slightly managed float is hinged on the forces of demand and supply being the major determinants of the exchange rate with occasional interventions by the Central Bank whenever liquidity is needed. The CBN will need to subordinate its role in the market and trade at the inter-bank market rate when they intervene to fully crossover.

Table 2: Exchange Rate Regimes

	Main Features	Country Circumstances	Main Advantages	Main Disadvantages
FLOATING REGIMES				
Independent Float	Exchange rate is determined in the market freely by demand and supply. The monetary authority does not intervene in the foreign exchange market. Monetary policy is independent of the exchange rate regime and can be used freely to steer the domestic economy.	Appropriate for medium and large industrialised countries and some emerging market economies that are relatively closed to international trade, but fully integrated in the global capital markets, and have diversified production and trade, a deep and broad financial sector, and strong prudential standards.	More easily deflect or absorb adverse shocks. Not prone to currency crisis. High international reserves not required.	High short-term volatility (excessive fluctuations may be dampened in the case of lightly managed float). Large medium-term swings only weakly related to economic fundamentals. High possibility of misalignment. Discretion in monetary policy may create inflationary bias.
Lightly Managed Float	The exchange rate is determined essentially in the market by demand and supply. Occasional interventions (direct or indirect through monetary policy) aim to moderate excessive fluctuations. Monetary policy is largely free to be used to steer the domestic economy.			
INTERMEDIATE REGIMES				
Managed Float	The monetary authority intervenes actively in the	Appropriate for emerging market economies and	Limited flexibility permits partial absorption of	Lack of transparency because criterion for

	foreign exchange market without specifying or precommitting to a preannounced path for the exchange rate. Intervention may be direct (sterilised and non-sterilised) or indirect through changes in interest rates, etc. It may operate like an unannounced crawling broad band. Monetary policy is relatively free to be used to steer the domestic economy.	some other developing countries with relatively stronger financial sector and track record for disciplined macroeconomic policy.	adverse shocks Can maintain stability and competitiveness if the regime is credible. Low vulnerability to currency crisis if edges of the band are soft.	intervention is not disclosed in managed float, and broad band regimes are not immediately identifiable. This may lead to uncertainty and lack of credibility. High international reserves are required.
Crawling Broad Band	The exchange rate is maintained within a broad band around a central rate that is adjusted periodically at a fixed preanounced rate to keep the effective exchange rate competitive. A common adjustment rule is forward looking crawl (based on differentials between target inflation and expected inflation in major trading partners). It imposes constraints on monetary policy, with the degree of policy independence being a function of the band width.			

		SOFT PEG REGIME		
Crawling Narrow Band	The exchange rate is maintained within a narrow band around a central rate that is adjusted periodically at a fixed preannounced rate to keep the effective exchange rate competitive. A common adjustment rule is forward looking crawl (based on differentials between target inflation and expected inflation in major trading partners). There is limited discretion for monetary policy depending on the band width.	Appropriate for developing countries with limited links to global financial markets, less diversified production and export structure, shallow financial markets, and lacking monetary discipline and credibility. Countries stabilising from very high level of inflation	Can maintain stability and competitiveness if the peg is credible. Lower interest rates Provides a clear and easily monitorable nominal anchor Allows high inflation countries to reduce inflation by moderating inflationary expectations.	Prone to currency crisis if the country is open to international capital markets. Encourages foreign debt. High international reserves are required. Little shock absorptive capacity. Shocks are largely absorbed by changes in the real sector.
Crawling Peg	The exchange rate is adjusted periodically according to a set of indicators. The rate of crawl can be set at a preannounced fixed rate at or below the projected inflation differentials (forward looking). Maintaining a credible crawling peg imposes constraints on monetary policy.			

Pegged Within Band	The exchange rate is allowed to fluctuate within a narrow band around a formal or de facto central fixed peg. The central rate is fixed in terms of a single currency or of a basket of currencies. This regime may be the result of cooperative arrangements or unilateral. There is some limited degree of monetary policy discretion depending on the bandwidth.				
Fixed Peg	The exchange rate is pegged at a fixed rate to a major currency or a basket of currencies (or to SDR). The monetary authority is not committed to the peg indefinitely. The peg is adjusted (devaluation) when misalignment becomes unsustainable. The monetary authority stands ready to defend the peg through direct intervention and monetary policy. Traditional central banking functions are possible but the degree of				

	monetary policy discretion is limited.			
HARD PEG				
Currency Board	Strict exchange rate regime supported by a monetary system based on legislative commitment to exchange domestic currency for a specified foreign currency at a fixed rate. Domestic currency is issued only against foreign exchange. There is almost no scope for independent monetary policy.	Appropriate for countries with a history of monetary disorder, high inflation, and low credibility of policymakers that need a strong anchor for monetary stabilisation.	Provides maximum credibility for the economic policy regime. Can facilitate disinflation Not prone to currency crisis. Low transaction costs, low and stable interest rates. Lack of monetary discretion eliminates inflationary bias.	Central bank loses its role as lender of last resort. Higher probability of liquidity crisis. Low seigniorage under currency board, no siegniorage in the case of dollarisation. No shock absorptive capacity. Shocks have to be fully absorbed by changes in economic activity. Exit from dollarisation is very difficult.
Currency Union Dollarisation	Another country's currency is used as the only legal tender, or the country belongs to a currency union in which the same legal tender is shared by all members of the union. Monetary autonomy is fully surrendered. There is no scope for independent monetary policy.	Appropriate for countries that have already developed extensive trade and other economic ties (EMU). Small countries already integrated in larger neighboring countries (dollarisation).		

Source: Choice of Exchange Rate Regimes for Developing Countries, Africa Region Working Paper Series No. 16, April 2001, The World Bank.

Table 3: IMF Annual Report on exchange Arrangements and Exchange Restrictions 2014

Exchange rate arrangement (number of countries)	Exchange rate anchor				Monetary aggregate target (25)	Inflation targeting framework (34)	Other (43)
	U.S. dollar (43)	Euro (26)	Composite (12)	Other (8)			
No separate legal tender (13)	Ecuador, El Salvador, Marshal Islands, Micronesia, Palau, Panama, Timor-Leste, Zimbabwe	Kosovo, Montenegro, San Marino		Kiribati, Tuvalu			
Currency board (12)	Djibouti, Hong Kong SAR **ECCU** – Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines	Bosnia and Herzegovina, Bulgaria, Lithuania		Brunei Darussalam			

Conventional peg (44)	Aruba Bahamas, The Bahamas, Bahrain, Barbados, Belise, Curacao and Sint Maarten, Eritrea, Jordan, Oman, Qatar, Saudi Arabia, South Sudan, Turkmenistan, United Arab Emirates, Venezuela	Cabo Verde Comoros, Denmark, Sao Tome and Principe **WAEMU** - Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, Togo **CEMAC** - Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon	Fiji, Kuwait, Libya, Morocco, Samoa	Bhutan, Lesotho, Namibia, Nepal, Swaziland			Solomon Islands
Stabilised arrangement	Guyana, Iraq, Kazakhstan (02/14), Lebanon, Maldives, Suriname, Trinidad and Tobago	FYR Macedonia	Singapore, Vietnam		Bangladesh (02/13), Burundi (03/13), Democratic Republic. of the Congo, Guinea (08/13), Sri Lanka, (10/13), Tajikistan,		Angola, Azerbaijan, Bolivia, Egypt (07/13)

Crawling peg (2)	Nicaragua		Botswana		Yemen			
Crawl-like arrangement (15)	Honduras, Jamaica	Croatia			China, Ethiopia, Uzbekistan	Armenia (03/13), Dominican Republic, Guatemala (11/12)	Argentina, Belarus (09/12), Haiti, Lao P.D.R., Switzerland (05/13), Tunisia	
Pegged exchange rate within horizontal bands (1)			Tonga					
Other managed arrangement (18)	Cambodia (7/13), Liberia		Algeria, Iran, Syria		The Gambia, Myanmar, Nigeria, Rwanda	Czech Rep. (11/13)	Costa Rica (08/13), Kyrgyz Rep. Malaysia, Mauritania, Pakistan (12/13), Russia, Sudan, Vanuatu	
Floating (36)					Afghanistan, Kenya, Madagascar, Malawi (05/12), Mozambique, Papua New Guinea, Seychelles (03/14), Sierra	Albania, Brazil, Colombia, Georgia (11/13), Ghana, Hungary, Iceland, Indonesia (08/13),	India, Mauritius, Mongolia, Zambia	

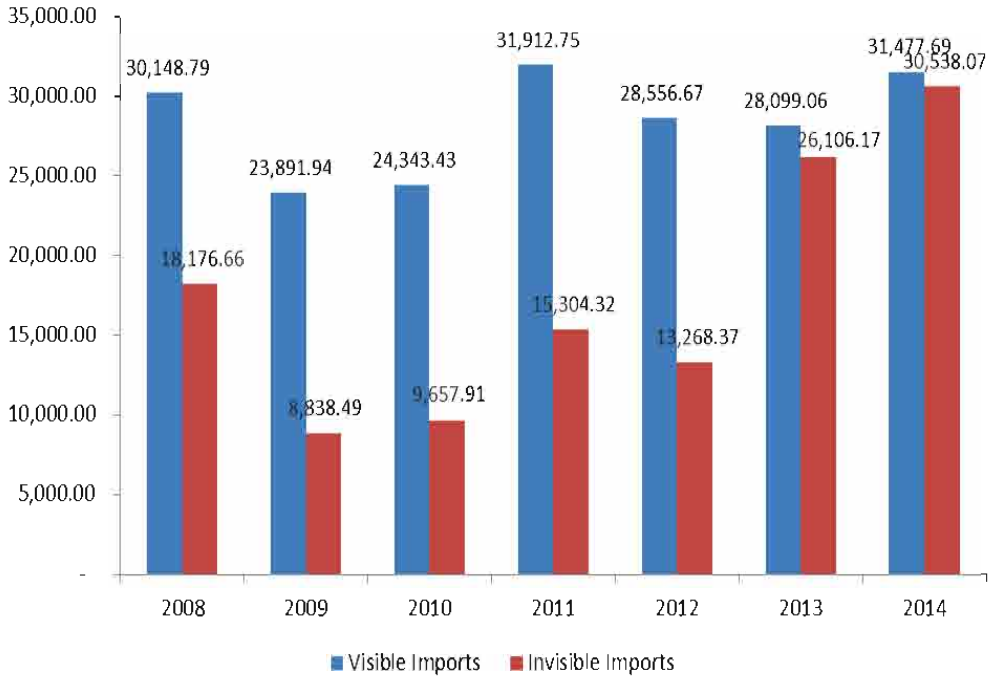
					Leone, Tanzania, Ukraine (02/14, Uruguay	Israel (05/13), Korea, Moldova, New Zealand, Paraguay (07/13), Peru, Philippines, Romania, Serbia, South Africa, Thailand, Turkey, Uganda	
Free Floating (29)						Australia, Canada, Chile, Japan, Mexico, Norway, Poland, Sweden, United Kingdom	Somalia, United States **EMU** – Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia (01/14), Luxembourg, Malta, Netherlands, Portugal, Slovak Rep.,
							Slovenia, Spain

Source: IMF Annual Report on Exchange Arrangements and Exchange Restrictions 2014

IV. Foreign Exchange Utilisation

Utilisation of foreign exchange can be classified into two main categories, visible and invisible imports. Historically, the visible import segment dominates in foreign exchange utilisation. However, with increased depth in financial services and a burgeoning transport services sector, the invisible sector utilisation of foreign exchange has been on the rise.

Figure 6: Visible and Invisible Sector Foreign Exchange Utilisation (USD'Million)



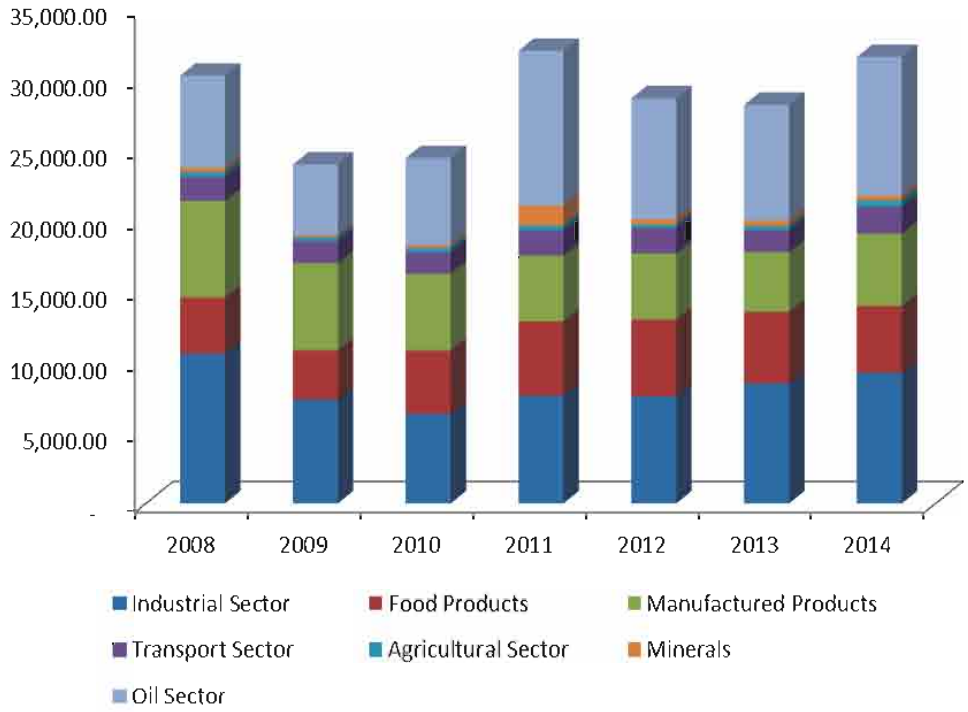
Source: CBN Statistical Bulletin data

Until 2012, the visible sector accounted for an average of 68.6 per cent of total foreign exchange utilisation. However, this average dropped to 51.3 per cent in 2013 and 2014 due to the increase in foreign exchange utilisation by the financial services segment of the invisible sector. Nigeria remains an import dependent country which suggests that visible foreign exchange utilisation predominates. Under the visible sector, industrial sector, food products, manufactured products and oil sector account for 91 per cent of the total utilisation of the sector.

Available data showed that the oil sector, which is mainly the downstream sector of the oil and gas industry, is the single largest buyer of foreign exchange from the CBN, while the sector's dollar inflow into the country is near zero. The oil sector utilisation of foreign

exchange is for financing imports of refined petroleum products (diesel, PMS and kerosene). The sectors' dollar demand should therefore fluctuate depending on the price of crude oil. In a period of high crude prices, the sector's demand and utilisation of foreign exchange effectively increases thus, limiting the ability of the CBN to grow the reserves. However, it remains to be seen whether a decline in the price of crude oil also results in a decline in the sector's utilisation of foreign exchange (Although 2009 suggests this, a recurrence will be needed to prove this). Between 2009 and 2011, the sector utilisation of foreign exchange increased by 120 per cent before the federal government reduced fuel subsidy.

Figure 7: Breakdown of Visible Sector Foreign Exchange Utilisation

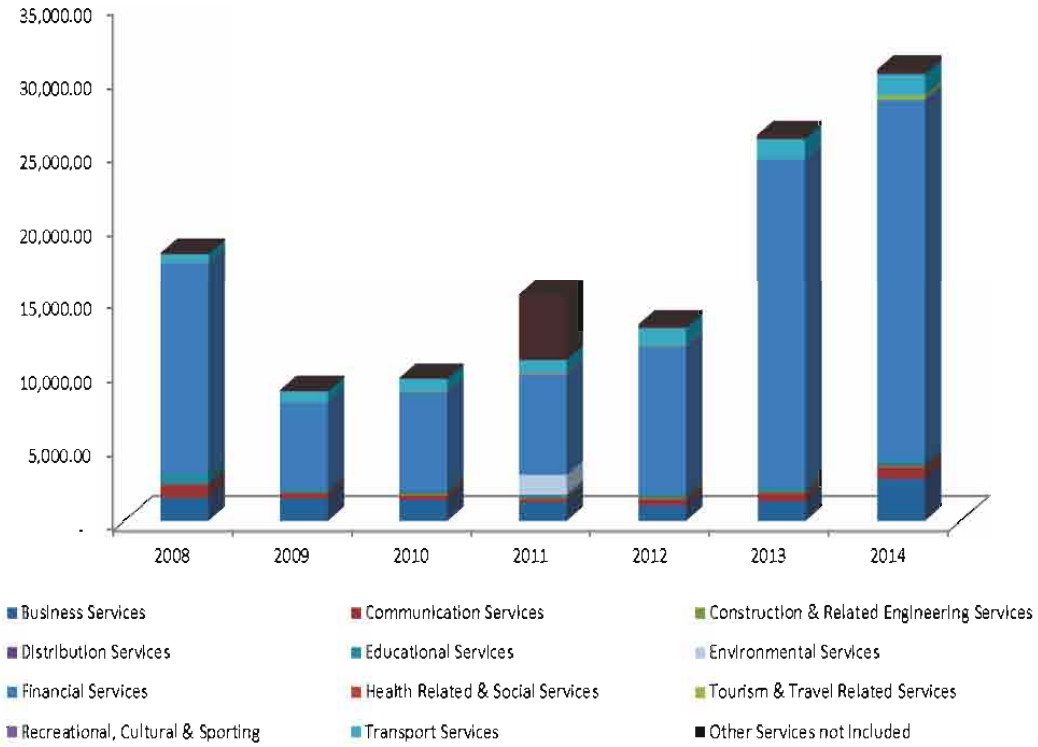


Source: CBN and Citibank

In the last 7 years, the financial services sector accounted for 71.2 per cent of the total foreign exchange utilisation in the invisible segment. It is also important to note that this sector also accounts for a significant inflow of foreign exchange into the country. At the height of the financial crisis in 2008/2009, there was net outflow of foreign exchange leading to the financial services sector utilisation of foreign exchange to rise to USD14.3 billion in 2008. This number reduced significantly in subsequent years to an average of USD7.3 billion over a four-year period. However, the inclusion of Nigeria government bonds in the JP Morgan emerging bond index in 2012, resulted in an increased interest in the country from offshore investors. This was supported by the quantitative easing in the United States, which created cheap dollars for investors seeking higher yields in emerging

economies. The financial integration of Nigeria with the global economy means that the country will experience more volatility and demand for foreign exchange from the financial services sector during periods of outflow from emerging markets. The commencement of tapering, general negative sentiment about emerging markets and falling oil prices led to increase in financial services utilisation of foreign exchange to an all-time high of US$22.2 billion and US$24.4 billion in 2013 and 2014, respectively.

Figure 8: Breakdown of Invisible Sector Foreign Exchange Utilisation



Source: CBN and Citibank

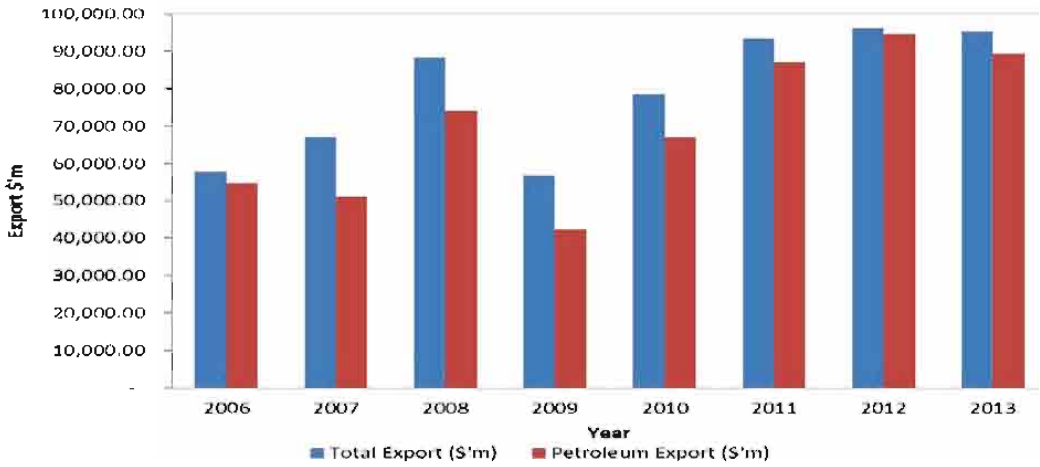
VI. Exchange Rate Volatility

Exchange rate volatility is defined as the risk associated with the unexpected movement in the exchange rate (Ozturk, 2006) i.e., it is the risk associated with currency depreciation ar appreciation. According to Marston et. al., (1988), "Volatility is the day to day, month to month variability of exchange rate, a variability that may have no trend to it". This means valatility is a high frequency cancept referring to movements in the exchange rate over relatively short period of time.

Nigeria is a mono-product economy. According to OPEC statistical bulletin (2013/2014) the value of Nigeria's total export revenue in 2013 was US$95,118 million and the revenue of petroleum exports from the total export revenue was US$89,314 million which is 93.9 per cent of total export revenue. This means that Nigeria's economy will be vulnerable to the movements of oil prices.

During periods of favourable oil price shocks triggered by conflict in oil-producing areas increased in demand for the commodity by the consuming nations, seasonality factors, trading positions, among others. Nigeria experiences favourable terms of trade evidenced by a large current account surplus and exchange rate appreciation. Conversely, when crude oil prices are low, occasioned by factors such as low demand, seasonality factors and excess supply, the reverse becomes the case, with exchange rate under pressure, external reserves depletion, rising budget deficit and slow economic growth (Englama et. al., 2010). An example was a drop in the revenue from oil exports, during the global financial crisis in 2009. According to OPEC statistical bulletin (2010/2011), oil export revenue dropped from US$74,033 million in 2008 to US$43,623 million in 2009 and the naira depreciated to ₦148.902/US$ in 2009 from ₦118.546/US$ in 2008.

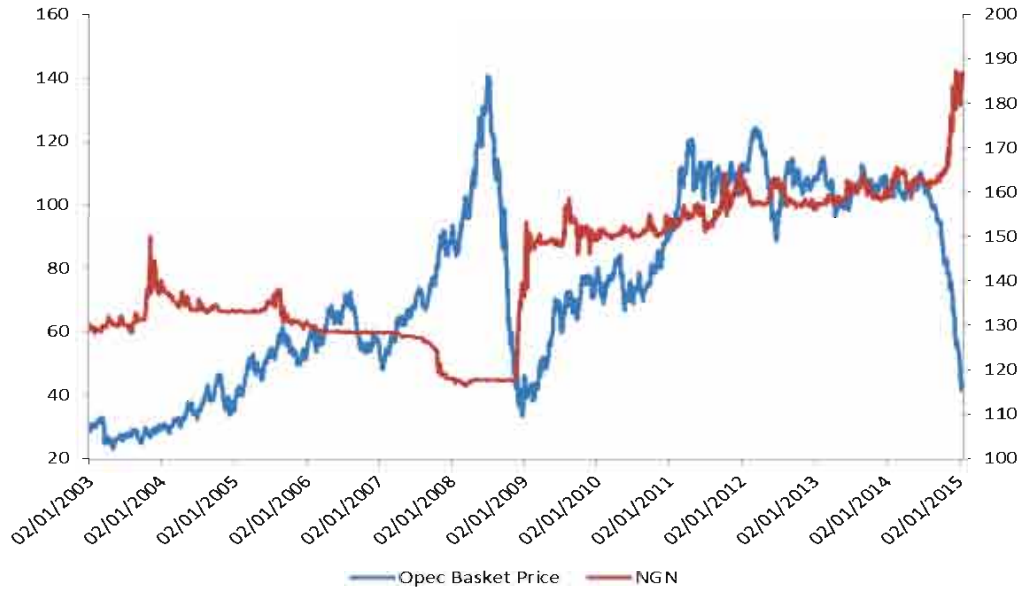
Figure 9: Nigeria's Total Export and Petroleum Export ($' m)



Source: OPEC Statistical Bulletin 2013/2014

In the same period between the oil price peak of 2008 and the trough of 2009, the nation's external reserves declined by US$20.33 billion to US$41.75 billion in August 2009 from below US$62.08 billion in September 2008 as the CBN attempted to stabilise the currency. A similar trend can be observed in the recent oil price decline that has resulted in the first adjustment in naira exchange rate since 2009.

Figure 10: Correlation between Oil Prices and the Naira Exchange Rate



In the last decade, Nigeria has become more intertwined with the global market and thus, impacted by global events other than the oil price. In 2012, Federal Government of Nigeria Bonds were included in the JP Morgan emerging market index (Criteria for the inclusion included liquid currency and bond trading market and lifting of the one year restriction of foreign investors holding of government securities). Consequently, there was significant inflow into the country by both Index trackers and investors searching for higher returns. The inclusion of Nigeria's bond in the JPMorgan Emerging market bond index resulted in a period of appreciating and stable naira as well as external reserves growth. Between August 2012 and March 2013, the inter-bank rate hovered between ₦156.10/US$ and ₦158.90/US$, in-line with the CBN effective rDAS rate of ₦157.36/US$ in the same period. The convergence in inter-bank and rDAS rate meant that corporate clients accessed the inter-bank market for a significant amount of their transactions instead of the CBN rDAS market. According to JP Morgan, estimated fund inflow into the country as a result of the inclusion between August 2012 and the year end was US$4.5 billion. Conversely, global shift in risk and constant changes in risk appetite in emerging market securities means Nigeria is likely to witness more exchange rate volatility in the future.

Since the inclusion of the nation's bond in the JPMorgan index, there have been several pressure points on the currency. The first pressure point came after the then Federal Reserve Bank Chairman, Ben Bernanke, made his famous statement in May 2013 about "Tapering", a term which refers to the Fed reduction of monetary stimulus. Subsequently, there was a net outflow of US$3 billion in Q2, 2013, the first time the country experienced a net outflow since Q2, 2012. Consequently, the naira depreciated by 2.8 per cent in June

2013, closing the month at ₦162.58/US$ from the ₦158.20/US$ close in May 2013. The second period of emerging market outflow experienced by the nation was in February/March 2014. This was a period of general negative sentiment on emerging markets like Turkey and Brazil. Emerging Portfolio Fund Research (EPFR) global data showed that total outflow from emerging markets in the first quarter of 2014 was over US$50 billion. Nigeria experienced the tail end of this risk as outflow from Nigeria began in February, compared with the entire first quarter for most emerging markets. The link between Nigeria and the global market means that the CBN must be more active and decisive in its actions.

V. Comparison with Other Countries- Poland

From the 1940s to the 1980s, Poland was part of the Eastern European Communist Bloc, which was characterised by a closed economy with a centralised and command control. The collapse of communism in the 1980s ushered in the era of democracy, which led to economic reforms. These reforms focused on the gradual liberalisation of their economy, restructuring of their economies and an aggressive privatisation exercise in a bid to improve the efficiency of their industries. They also introduced schemes and policies to induce entrepreneurial development and the free flow of international capital to boost foreign investment. Poland is globally acclaimed as the example of how a country can successfully restructure and reform its economy and make the transition towards being more open and competitive. The collapse of communism had created difficult economic conditions. It was characterised by high unemployment, hyperinflation and huge public debt. This made the execution of the reforms all the more remarkable as it was achieved despite initial difficulties, which led to change and alteration of some of their policies in line with the changing conditions.

Table 4: Selected Economic Indicators for Poland (1990 – 2000)

Selected Economic Indicators	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GDP/capital (US$))	1,547	1,999	2,198	2,232	2,402	3,086	3,484	3,725	4,098	4,011	4,082
Consumer prices, %p.a.	585.8	70.3	43.0	35.3	32.2	27.8	19.9	14.9	11.8	7.3	10.1
Producer prices, %p.a.	622.4	48.1	28.5	31.9	25.3	25.4	12.4	12.2	7.3	5.7	7.8
Real growth wages rates, %p.a.	-24.4	-0.3	-2.7	-3.9	0.5	3.0	5.7	6.8	4.5	4.7	2.6
Retail trade growth rates, %p.a.	-17.4	3.8	7.9	6.9	3.0	2.3	4.5	6.8	2.6	4.0	1.4
Money supply (M2), tri. zloty	19.1	26.1	41.1	55.9	77.3	104.3	136.7	176.4	220.8	263.8	294.4
Discount rate, %p.a.,	48.0	36.0	32.0	29.0	28.0	25.0	22.0	24.5	18.3	19.0	21.5
Deficit of central gov. budget, % of GDP	0.4	-3.8	-6.0	-2.8	-2.9	-2.6	-2.5	-1.4	-2.4	-2.0	-2.2
Unemployment rate, %,	6.3	11.8	13.6	16.4	16.0	14.9	13.2	10.5	10.4	13.0	15.0
Exchange rate per US$, average*	9,500	10,582	13,631	18,145	2.27	2.42	2.70	3.28	3.49	3.97	4.35
Current account, mil. US$	716	-1,359	-269	-2,329	-944	5,455	-1,352	-4,268	-6,858	-11,660	-9,946
Foreign debt, S$mm	48,500	4,8400	47,000	47,200	42,174	43,957	47,354	49,648	59,163	64,890	68,193
Foreign reserve, US$mm	4680	3814	4287	4281	6029	14963	18033	20670	27210	26107	26321

* In 1994 downward redenomination by four figures.

Source: GUS, Rocznik Statystyczny

As with every economy, the monetary policy inclusive of the foreign exchange rate policy was an integral part of these reforms and the Polish Government used it extensively during the transition period. In general, it was a gradual move from a fixed exchange rate regime, through the crawling peg and crawling band and eventually ending up with a free floating fully convertible currency. This was done along with other policies to attract foreign investment by allowing free flow of capital to and from the Polish economy.

Table 5: The Evolution of the Exchange Rate System in Poland

Period	Exchange Rate System	Characteristics
Jan 1990–Oct 1991	Fixed rate against US dollar, and from May 1991 against a basket of five currencies. Devaluation in	Exchange rate as anti-inflationary anchor.
	May 1991, by 16.8%.	
Oct 1991–May 1995	Crawling peg with monthly rate of devaluation declining steadily from 1.8% to 1.2%. Two devaluations, by 12% in Feb 1992 and 8% in Aug 1993.	Attempt to reconcile disinflation objective and maintaining competitiveness of exporters on the world market.
May 1995–Apr 2000	Crawling band system, with fluctuation band increasing from ±7% to ±15%. Steady decrease of monthly devaluation rate from 1.2% to 0.3%. Revaluation of the central parity by 6% in Dec 1995.	Higher flexibility of foreign capital inflow management. Steady move to independent monetary policy framework.
Apr 2000–	Free-floating exchange rate system	Inflation targeting monetary policy framework (the first inflation target was actually set in Jan 1999).

Source: National Bank of Poland

Prior to the commencement of the reforms, the foreign exchange market had been really a system of allocation by the government and no real foreign exchange market in which market forces had any form of influence in its determination. There was no foreign participation and there were restrictions to the flow of capital. It was also characterised by an active black market with a huge premium over the official exchange rate.

Table 6: Daily Market Turnover

	1998 $'billion	2001 $'billion	Apr-04 $'billion	Apr-07 $'billion	Apr-10 $'billion	Apr-13 $'billion
Foreign Exchange Market	2,600.00	4,000.00	4,915.00	9,224.00	7,848.00	7,564.00
Spot Transactions			1,051.00	2,405.00	1,955.00	2,324.00
Outright Forwards			189.00	527.00	318.00	464.00
FX Swaps			3,495.00	5,881.00	5,368.00	4,581.00
CIRS			3.00	68.00	79.00	125.00
Currency options			177.00	343.00	128.00	70.00

Source: Narodowy Bank Polski's financial system development reports 1998-2001, 2004, 2007, 2010 and 2013.

The reforms have led to increased foreign exchange market turnover, improved liquidity, the elimination of the black market and introduction of an array of hedge products, which have all led to the increased flow of capital to Poland. According to the Narodowy Bank

Polski (The Polish Central Bank) the average transaction size grew from nothing before the reforms to .US$5million and €5million, with the minimum amount of 1 million each. The introduction of the Foreign Exchange Law of December 18, 1998 led to the liberalisation of the forwards market, which helped increase the volume of forwards and swaps and led to the introduction of a lot of new hedge products for foreign exchange and interest rates.

By 2010, the Polish foreign exchange market had become the largest currency market in Central and Eastern Europe. The average daily volume in 2010 was approximately US$7.2 billion. A large offshore market for the Zloty had also developed in London. The EUR/PLN had evolved into the dominant currency pair in the market accounting for over 80 per cent of currency transactions. The average daily turnover of spot transactions increased by 19 per cent between 2010 and 2013 driven mainly by increased foreign trade and the development of electronic trading platforms dedicated to corporates and high net worth individuals. The foreign exchange swap market had become the most liquid segment of the domestic foreign exchange market due mainly to its use by foreign banks to manage their exposure to the local treasury bond market. The foreign exchange swap market has gone from obscurity in the 1990s to a peak of a daily turnover of US$5.9 billion in 2007. As with all free floating currencies, there is a large participation of foreign banks and portfolio investors in the Polish foreign exchange market. In April 2013, transactions between local banks and non-residents accounted for about 33 per cent of the turnover.

VII. Way Forward

There are challenges with respect to the best method to manage the exchange rate and reduce volatility. There are debates as to whether a free floated currency could be the solution. However, like many of its peers, Nigeria remains cautious about the idea of a free floated currency. As Calvo and Reinhart (2002) argued, fear of floating - a reluctance to allow exchange rates to fluctuate freely - could arise for various reasons: policy credibility concerns; fear of Dutch disease in case of large appreciations; and fear of inflation, currency mismatches, and/or balance sheet effects (on account of high liability dollarisation) in case of large depreciations. Ultimately, there is no quick fix to exchange rate volatility although a gradual transition of the economy could assist in controlling exchange rate volatility.

It should be noted that there are limitations to what monetary policy can achieve on its own. Poland for example showed a harmonised restructuring of the economy by not only the monetary and fiscal authorities, but by the whole economic management team as a whole. A roadmap was created and difficult decisions were taken in line with overall objective.

VII.1 Segmentation

We have explained earlier the various efforts of the CBN in formalising all legitimate transactions from the parallel market to the official window. This has been partially successful, while efforts must be made to ensure that more of the trades going on through

the parallel market get transferred to the official markets. Some of the reasons for this challenge include:

a. The lack of awareness of some of the policies: There is need for the CBN to cooperate with the commercial banks on a strategy to effectively communicate the various options available to traders in the informal sector. This should also include ways of demonstrating the ease and various advantages to using the array of options available through the banks;
b. Reluctance to Change: As in the above, this can only be managed through improved awareness and engagement;
c. Unreliable access to funds through the use of Debit/Credit Cards: This has improved over the years, while there are still complaints about challenges to access in some countries. Again, a coordinated effort by the CBN and banks to ease this burden, especially by finding ways to remove all obstacles towards the ease of using ATM cards, especially in the top countries visited by the business people;
d. "Tax Advantage": When transactions are done through the banks, all charges, levies, dues and taxes are collected and remitted to the various government and statutory authorities. When funds are sourced through the parallel market, it is easier to avoid or "negotiate" these payments. This has led some parts of this segment to avoid transactions with banks. The CBN has to engage their regulatory partners e.g. the Nigeria Customs Service (NCS) to ensure that there is a stricter compliance to the law to place bank transactions on an equal footing with parallel market transactions.

When all legitimate transactions are done in the official markets, it will be easier for the CBN to isolate unwanted transactions at the parallel market and clamp-down hard towards eliminating or at least ensuring the market becomes largely insignificant. It would also lead to improved data and help the CBN make better decisions that will help boost trade and commerce.

VII.2 Utilisation

Over the last few years, the CBN has done a great job of selecting critical sectors of the economy and providing intervention funds at lower rates to try and boost productivity. The results have, however, been mixed so far. The intervention in the agricultural sector has proven successful, while that of the aviation and manufacturing sectors have not been as impactful as hoped. The power sector has also benefitted from this policy and it's still a bit too early to assess its effectiveness. The success of the CBN's efforts coupled with the various on-going reforms by the Federal Government is critical towards the much needed economic restructuring of Nigeria.

Nigeria remains an import dependent economy which has resulted in a huge import bill. Available data on foreign exchange utilisation from the CBN showed that, the importation of petroleum products, food product imports and manufactured products importation accounted for a significant proportion of the Nation's import bill. From the above, it is clear that if we are able to refine the crude oil locally to meet the needs for the country, the

nation would become agriculturally self-sufficient and spur a resurgent manufacturing sector, and significantly reduce the size of import bill. For this to happen, Nigeria has to transit towards being a much more business friendly country. This will happen when we are able to provide the needed infrastructure, including electricity, transportation, communication; improve access to affordable credit; reduce bureaucracy for businesses; and enact business friendly laws and policies. Beyond self-sufficiency, increased productivity could lead to increased exportation of agricultural products, refined petroleum products and manufactured goods, which would help diversify the foreign currency earnings base as well as boost the growth of our external reserves.

VII.3 Volatility

There are various factors both local and external that can affect market volatility, while improved utilisation and segmentation will help better manage it. The economic changes that would have occurred to lead to a reduced import bill will also make it easier to manage volatility. The current challenge we have in periods of volatility occasioned by lower oil prices is that even if devaluation takes place due to the change in the current account, imports at best remains constant as there is no local manufacturing base that would help import substitution take place. If this was available, it would be easier to come up with policies that would lead to reduction in importation during these periods.

The lack of a vibrant market to hedge products for clients put significant pressure on the naira. Currently, hedging on naira by corporates is done via outright forward transactions (due to the illiquidity of the forward market, Forward transactions are synthetically created through a spot and an interest rate differential). The lack of a vibrant forward market for hedging means that the spot market is effectively where all hedging transactions are covered. As a result, during periods of exchange rate volatility, when clients with dollar exposure are looking to hedge against a naira depreciation/devaluation, the avenue to hedge is not readily available. This calls for the development of a vibrant local market for deliverable forwards and swaps, which should also lead to improved liquidity in the local NDF market. There is also a need to improve the suite of hedge products available to include Options and various interest rate hedge products to help customers better hedge their currency exposures.

VII.4 Role of the CBN in the Nigerian Foreign Exchange Market

The CBN has to continue to work in tandem with all stakeholders in the reform process to ensure that the desired outcome is not only achieved, but also entrenched into the whole of the financial system. The CBN will also have to remain focused and continue to follow the roadmap it has developed towards achieving its set goals for the Nigerian foreign exchange market. Some of the decisions could be tied to certain structural milestones and the CBN could nudge its partners towards attaining these milestones for it to achieve its goals. Several questions need to be asked, and they include:

- What is the utopian exchange rate regime to be targeted and how can we move gradually towards it?;
- What level of involvement should the CBN have in the foreign exchange market beyond setting policy?;
- How segmented should the market be?;
- Should the foreign exchange market have several tiers and if so how many?; and
- Full convertibility i.e. Current and Capital accounts, to be or not to be?.

It should be noted that since 2006, the CBN has instituted a lot of changes towards the liberalisation of the foreign exchange market. We practically have full current account convertibility and some capital account transactions have become eligible. All these happened despite the tendency of the CBN to roll back some of the reforms whenever there is pressure on the naira, but by and large, most of the reforms have remained impactful.

The most advanced and industrialised nations have free floating/lightly managed float exchange rate characterised by full convertibility and limited to no exchange controls. With the way the economy is currently constituted, it will be ill-advised to adopt a freely floating exchange rate regime, but as stated above, we can create a guide on how we expect to get there, based on certain economic reform milestones. We can also start to structure the foreign exchange market towards being prepared for this outcome.

It is also clear that we need to bring all legitimate foreign exchange transactions into the official market to make the parallel market redundant with the hope of shutting it down completely in the near future. All the various tiers of market should be rolled into one (the inter-bank market, BDCs, International Money Transfer operators and other authorised buyers getting their pricing at the inter-bank market). This will ensure a unified exchange rate within the system and cut out the temptation to round trip and arbitrage between the various tiers of the market.

We need to acknowledge the CBN's recent bold initiative of ending the rDAS and moving towards purely intervening at the inter-bank market to smoothen out increased volatility. The CBN rightfully should be seen less as operating a tier of the market, but as market participant. The CBN should not be getting involved in the minute day-to-day details of customer transactions - the plan should be to shift that responsibility permanently to banks. This move has paved the way for the potential unification of the rates in the various segments of the market, starting with the inter-bank market and the CBN's selling rate. It should be noted that this reform will potentially lead to intermittent increased volatility as the market adjust to the new regime, especially in an environment with lower crude oil prices. The CBN will need to be resolute in its conviction to ensure that the transition is successful. In the medium to long-term, there is need to remain steadfast in the quest to becoming the major financial hub in Africa where capital flows through offshore to Africa will lead to a much bigger, vibrant and liquid Nigerian foreign exchange market where the CBN's participation will become less and less important.

In conclusion, reforms are usually difficult to implement despite all good intentions. There is the typical resistance to change, and this is not usually helped if tough choices have to be made for them to happen. It is not a coincidence that most of the liberalisation reforms we have seen have occurred during the "times of plenty", and that some rolling back takes place once things start to get difficult. There has to be a strong resolve to get things done. The CBN cannot achieve its aims while working in isolation as there are limitations to monetary policy. This has to be done within the context of broader far reaching economic reforms, involving the fiscal authorities.

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Exchange Rate and Inflation: Is there a Relationship in Nigeria?

*Charles N. O. Mordi**

Abstract

The paper attempts to examine the link between exchange rate and domestic price level in Nigeria. Employing the VAR technique, the study used monthly series of inter-bank exchange rate, world export prices, real gross domestic product, oil prices and consumer price index from 2000M1 to 2015M1. The results from the study show that exchange rate pass-through to price level is high. A shock to exchange rate (depreciation) would increase domestic price by 0.72 per cent in the first month. The effect rose to 0.82, 0.85 and 0.86 per cent in month 2, 4 and 6, respectively, before it began to fall. By the sixth month, it stood at around 0.84 per cent, on the average. Also, the results of the VAR model and exchange rate pass-through coefficients indicate that pass-through to price level in Nigeria is partial or incomplete.

I. Introduction

The relationship between exchange rate and inflation is crucial for appropriate exchange rate and monetary policy formulation to achieve internal and external balance. Exchange rate is a forward looking variable that responds to the prevailing economic fundamentals and future expectations (Hafer, 1989). Its importance is reflected on the impact it has on foreign exchange markets, financial stability and the external sector (Ho and McCauley, 2003). Inflation is the result of a general increase in price level. The effect is more pronounced and last longer where the expectation of a future increase is high.

In the literature, various co-integrating models have been adopted to test the relationship between inflation and exchange rate with varying outcomes which largely results from inefficient estimations and test of hypotheses (Kim, 1998; Ramos, 2012). Generally, in open economies, exchange rate and inflation are largely inversely related and exhibits reverse causality. The following theoretical underpinning further highlights these theories.

The literature treats the link between exchange rate and inflation under various theoretical framework including the exchange rate pass-through (ERPT) where movements in the rate of exchange affects the price of imports and tradable (exports of goods and services) resulting in the change in the general price level (Kim, 1998). This could occur where the exporter is a price taker and the depreciation in the exchange rate of its trading partner would lead to a reduction in production in the home economy that would eventually raise prices of its trading partner as demand exceed supply (Hafer, 1989). Developing countries exhibit higher pass-through than advanced economies due to higher exchange rate

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volatility, and weak monetary policy transmission mechanism (Ramos, 2012). Under a high pass-through regime therefore, policies are more focused to maintaining exchange rate stability to reduce expectation of high inflation rate. In developing economies, exchange rate depreciation increase the cost of purchase of foreign goods that most often represent a high proportion of Consumer Price Index (CPI) basket leading to a general increase in price level which would eventually be passed on to consumers (Hafer, 1989). When ERPT coefficient is one (1) it shows an equi-proportionate change in price with exchange rate and when less than one, it is asymmetric (partial or incomplete) pass-through to prices (Aron et. al., 2012).

The relationship is also viewed under the Purchasing Power Parity (PPP). When PPP holds, the rate of change in exchange rate should be symmetric in an inverse relationship with inflation. A change in the price level therefore results in an adjustment of the exchange rate that moves to equate the growth rate of inflation (Ahma and Ali, 1999).

Exchange rate indices that measures trade weighted exchange rates deflated by inflation such as the real effective exchange rate (REER) is also indicative of the relationship between the exchange rate and inflation in the domestic economy in comparison with those of foreign economies. The lower domestic inflation compared to foreign inflation and a strong domestic currency results in the appreciation of the REER index. This signifies loss of external competitiveness of the domestic economy. In contrast, a depreciating REER reflects higher domestic inflation or a depreciating domestic currency signifying increased competitiveness.

Several empirical literature have investigated the relationship between exchange rate and inflation in Nigeria using the ERPT, especially the period of transition from a fixed exchange rate to a flexible regime. A fall out from this reform was the emergence of rising volatility of the exchange rate. Policy focus since then has been on the maintenance of relative stability of the exchange rate to ameliorate the pass-through effect on domestic prices particularly against the backdrop of the high import dependent nature of the Nigerian economy.

Various exchange rate regimes were introduced to manage the foreign exchange market to ameliorate ERPT. The result of the empirical work on the relationship between exchange rate and inflation has been mixed.

Against this background, this paper would examine the relationship between exchange rate and inflation in Nigeria by adopting the exchange rate pass-through model using the Johansen Cointegration technique and monthly data during 2000M1 – 2015M1. The paper would thus extends the literature on the determination of ERPT in Nigeria by focusing on how prices such as exchange rate, import prices and oil prices pass-through to domestic price level in comparison with previous studies. The paper is divided into six sections. A brief review of the literature and empirical framework follows the introduction in Section two. Section three discusses the trend analysis of the nominal exchange rate and inflation, and previous empirical work on ERPT in Nigeria. Section four focuses on data and methodology,

while Section five presents the results of the model. Section six concludes and proffers some policy recommendations.

II. Review of Literature

Several theories have attempted to explain the relationship that exists between exchange rate and inflation; some of these theories are discussed thus:

II.1 Theoretical Literature

II.1.1 Purchasing Power Parity (PPP) Theory

Arguably, this is the starting point of exchange rate theory, also called the inflation theory of exchange rates. This theory presupposes that exchange rates between two currencies at a given period are equal if the ratio of the price level of a fixed quantity of goods and services of the two countries and the exchange rate between those two countries are equal. This theory is grounded on the law of one price which explains that if price rises within a country's economy then the value of the currency has to depreciate to resuscitate the PPP. Thus, assuming there are no transportation cost and other outlays, the competitive market will equate the prices of goods in two countries when the prices are denoted in the same currency. However, for the law of one price to prevail the assumptions of competitive market in both countries; tradable goods between the two economies; absence of transportation cost and other related cost must hold. The practice of capturing misalignment with the level of deviation from linear trends could result in misleading inferences. The two forms of PPP are absolute and relative. Absolute PPP describes a condition of goods market equilibrium; it proposes that the domestic and foreign markets are integrated into a single market. While relative PPP expounds inflation rate; it posits that the appreciation rate of a currency is arrived at by computing the variance between the exchange rates of two countries.

II.1.2 The Monetarist Models

The monetarist models of exchange rate including sticky price model, flexible price monetary model and real interest rate differential model present the demand and supply of money as the major determinants of exchange rates. These models assume the prevalence of the uncovered interest parity theory which states that domestic interest rate is made up of the world interest rate and expected depreciation of the domestic currency. They are developed based on the assumptions of continuous validity of the purchasing power parity theory (PPP), stability in the demand for money function as well as the exogeneity of real and money income. The real interest rate differential model as developed by Frankel (1979) combines the role of inflationary expectancies of the Flexible Price Monetary Model (FPM) with the inelastic prices as assumed in the Sticky Price Monetary Model (SPM).

II.1.3 The Obstfeld and Rogoff Model

The Obstfeld and Rogoff (O&R) model was premised on PPP, it assumes that nominal prices represent producer's currency of production (PCP), thus the exchange rate variations (pass-through) one hundred per cent to consumer prices and a floating exchange rate signifies a direct substitute for flexible goods price[10]. O&R opined that the world economy comprised of a variety of different monopolistic producers producing distinctive differentiated goods with all producers domiciled locally or overseas.

The O&R theory states that exchange rate flexibility was essential for the PCP assumption to hold since flexible exchange rate depicts a perfect substitute for variable nominal prices and relative price changes was attained by exchange rate flexibility assuming PCP pricing applies.

II.2 Review of Empirical Literature

There is an extensive empirical literature on exchange rate pass-through (ERPT) to domestic prices particularly in developed countries with diverse results. The diversity arises from varying methodologies and measures of domestic prices and exchange rate. Several researchers examined the sensitivity of domestic prices to exchange rate movements with their studies divided into three categories. The first focused on examining exchange rate pass-through into disaggregated import prices (Goldberg, 1995 and Bache, 2002). The second examined exchange rate pass-through into aggregate import prices (Hooper and Mann, 1989; Webber, 1999; Campa and Goldberg, 2002). The third analysed exchange rate pass-through into consumer price index (CPI) (McCarthy, 2000; Choudri, Faruquee and Hakura, 2002; Bailliu and Fujji, 2004). The growing research on exchange rate pass-through is driven by the rise in strategic trade policy and developments in the new open economy macroeconomic models.

During the 1980's through 1990's, empirical studies on exchange rate pass-through were largely focused on the industrialised countries, in particular, the United States and Japan. This was confirmed by Menon (1995) when he surveyed 48 studies on the exchange rate pass-through and found that most of the research was carried out on U.S and Japanese data. Similarly, Goldberg and Knetter (1997) observed that, in the 1980s, research on exchange rate pass-through was dominated by the analysis of pass-through in the U.S. However, pass-through literatures on developing countries are beginning to emerge (Alba and Papell (1998), Anaya (2000) and Garcia and Restrepo (2001).

Empirical work by Campa and Goldberg (2005) found that exchange rate showed higher pass-through to import prices than to consumer price. In the finding of Menon (1995), the degree of openness of the individual economies mainly drives the degree of pass-through. Goldfajn and Werlang (2000) investigated exchange rate pass-through into consumer prices in seventy-one countries using panel estimation methods on data from 1980 to 1998.

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[10] See Obstfeld and Rogoff (1995).

They reported that the pass-through effects on consumer prices increased over time and reached its maximum after 4-quarters. The degree of pass-through was found to be substantially higher in emerging market economies than in developed economies.

Calvo and Reinhart (2000) found that exchange rate pass-through, namely, the amount of exchange rate change that translates into changes in import prices and, hence, consumer price inflation was higher in emerging markets. They rationalised that in emerging market economies, high inflation in the past promoted widespread wage and price indexation; therefore changes in CPI resulting from exchange rate changes were consequently locked in future wages and price inflation. In addition, they posited that central banks of such countries were less credible, thus temporary shocks to the exchange rate were accommodated and, hence, become permanent, and continuously impacted on inflation.

Kuijs (2002) studied inflation dynamics in Slovakia during 1993-2000 using a VAR model. The result showed a short-term pass-through of 40.0 per cent which declined gradually as the exchange rate appreciated. Also, Gueorguiev (2003) estimated the pass-through to consumer prices in Romania by using a first-difference VAR model for the period 1997-2002. His result indicated a maximum pass-through to consumer prices of around 30.0-40.0 per cent with most of the impact taking place within 4 quarters.

Part of the empirical work on exchange rate pass-through in Central European countries included the cross-country analyses by Mihaljek and Klau (2001). They estimated the exchange rate pass-through in several emerging market economies including Poland, Hungary and the Czech Republic, using a single equation estimation technique. The outcome showed, exchange rate pass-through of 6.0 per cent in the Czech Republic; Poland, 45.0 per cent; and 54.0 per cent in Hungary. However, possible endogeneity of the right-hand variables was not taken into account and the pass-through was estimated over a period that comprised different exchange rate regimes and inflationary environments.

Darvas (2001) in his study on exchange rate and price dynamics for Hungary, the Czech Republic, Poland and Slovenia used a time-varying parameters framework to account for regime shifts during the 1990s. The results showed long-run pass-through estimates ranging from 15.0 per cent for the Czech Republic; 20.0 per cent for Poland; to 40.0 per cent for both Hungary and Slovenia. The short-term pass-through estimates were lower and ranged from 0-20.0 per cent, with Poland (0 per cent); Czech and Hungary (10.0 per cent each) and Slovenia (20.0 per cent).

Further research on same countries by Coricelli et. al., (2004) used the co-integrated vector autoregressive model to estimate the long-term pass-through for four Central European countries namely Hungary, the Czech Republic, Poland and Slovenia. The results revealed a full long-term pass-through from exchange rate to domestic prices for Slovenia and Hungary, 80.0 per cent pass-through for Poland, and the Czech Republic 50.0 per cent. A major drawback of the study was that, the co-integration analysis assumed a stable long-term relationship between the variables. This assumption may not be appropriate in the

context of regime shifts, so that the estimates of long-term exchange rate pass-through were less relevant in terms of providing the information for economic policy decisions due to the sluggish adjustment process.

Mwase (2006) examined the effect of exchange rate changes on consumer prices in Tanzania using the structural vector autoregression (SVAR) model on a data set covering 1990-2005. Despite the depreciation of the local currency, the paper showed a decline in exchange rate pass-through to inflation in the late 1990s. This was due to the macroeconomic and structural reforms that were implemented during the period. The decline in the pass-through did not necessarily imply that exchange rate fluctuations were less significant in explaining macroeconomic fluctuations. The increase in the share of imports in the economy suggested that the pass-through could rise over the medium term. The author suggested that policy makers should remain vigilant in assessing the potential impact of foreign prices on the dynamics of inflation in Tanzania.

Duma (2008) investigated pass-through of external shocks (exchange rate, oil price, and import price shocks) to inflation in Sri Lanka. Using a vector autoregression (VAR) model that incorporated a distribution chain of pricing, the findings showed low and incomplete pass-through of external shocks to consumer inflation, reflecting a combination of factors including the existence of administered prices, high content of food in the consumption basket, as well as volatility of the exchange rate. External shocks explained about 25.0 per cent of the variation in consumer price inflation, thus suggesting that domestic policies would be relevant in controlling inflation.

Batini (2004) examined the importance of pass-through and the impact of external shocks for Brazil, Chile, Nigeria, and South Africa by adopting a VAR specification using quarterly data from 1990 to 2002. The result showed that exchange rate was significant in explaining around 90.0 per cent of Nigerian inflation spanning 8-12 quarter horizons, when a first difference of the exchange rate in the VAR was used. This implied that inflation in Nigeria may be highly influenced by fluctuations in the value of the naira as this translates directly, albeit, with long variable lags into consumer price changes. Importantly, high pass-through also meant that Nigeria would be more inclined to attempt to regularly stabilise the exchange rate by intervening in the foreign exchange market, the consequence of what Calvo and Reinhart (2000) dub "fear of floating".

Recent studies on exchange rate pass-through in Nigeria using dissimilar variables and methodologies revealed varying results. A recent study on Nigeria by Omisakin (2009) submits that there was no significant impact of exchange rate variations on domestic prices and output. This contrasted with the results from earlier studies by Oladipo (2007) and Oyinlola and Babatunde (2009) that found a significant impact of exchange rate on domestic prices. There is a good reason to believe that the different outcomes of these investigations might have resulted from the different methodologies used. While Oladipo (2007) and Oyinlola and Babatunde (2009) used the Johansen multivariate estimation technique, Omisakin (2009) used the vector autoregressive model which has been criticised for its inability to capture the potential long-run relation among variables.

Barhoumi (2005) had argued that the exchange rate pass-through (ERPT) concept is a long-run phenomenon, which supported Omisakin's outcome of no short-run impact.

Examining exchange rate pass-through in Nigeria, Oladipo (2006) employed Johansen technique and rejected full pass-through of exchange rate to import prices. The result showed that a 1.0 per cent increase in exchange rate and exporters foreign cost of production led to a 0.86 and 0.26 per cent increase in import prices, respectively. Also, Oyinlola and Babatunde (2009) employed an unrestricted error correction model (UECM) and a Bounds Testing Analysis (BTA) to examine the extent of pass-through of exchange rate into import prices for Nigeria using data from 1980 to 2006. The result showed that export prices had a dominant effect compared to exchange rate in the short-run; they concluded that, exogenous factors largely accounted for the changes in import prices than the country's exchange rate policy. Adetiloye (2010) adopted correlation and granger causality analysis to test the relationship that exists between official and parallel exchange rates and import prices in Nigeria. He found that the coefficient of official exchange rate was less significant than that of the parallel exchange rate. He also discovered that import prices showed a near two-way bi-causality with the consumer price index.

Furthermore, Aliyu et. al., (2009) used the Johansen cointegration method to investigate exchange rate pass-through to import and domestic prices in Nigeria using quarterly data from 1986 to 2007. The result revealed that the pass-through during the period was incomplete. A 1.0 per cent shock to exchange rate resulted in 0.143 and -0.105 per cent pass-through to import and consumer prices by the fourth quarter, respectively. The low pass-through by Aliyu et. al., (2009) might be unconnected with weakness in their methodological and estimation approaches adopted.

Leigh and Rossi (2002) applied a five variables recursive Vector Auto Regressive (VAR) model to estimate the pass-through effect from the nominal exchange rate to consumer and wholesale prices from 1994 - 2002 and concluded that the pass-through to consumer prices at 0.45 and 0.40 in the short-run and long-run, respectively was shorter and larger in Turkey compared to other emerging economies.

Frimpong and Adam (2010) examined the influence of exchange rate changes on consumer prices in Ghana using vector autoregression (VAR) models with monthly data between the periods 1990-2009 and found the exchange rate pass-through to inflation to be incomplete and falling.

Cheikh and Cheikh (2013) studied exchange rate pass-through to import prices in 27 OECD countries with quarterly data between 1994 - 2010 using the panel cointegration technique and established the existence of partial pass-through in the long-run at about 0.70.

Table 1 : Summary of some selected Exchange Rate Pass-through Studies

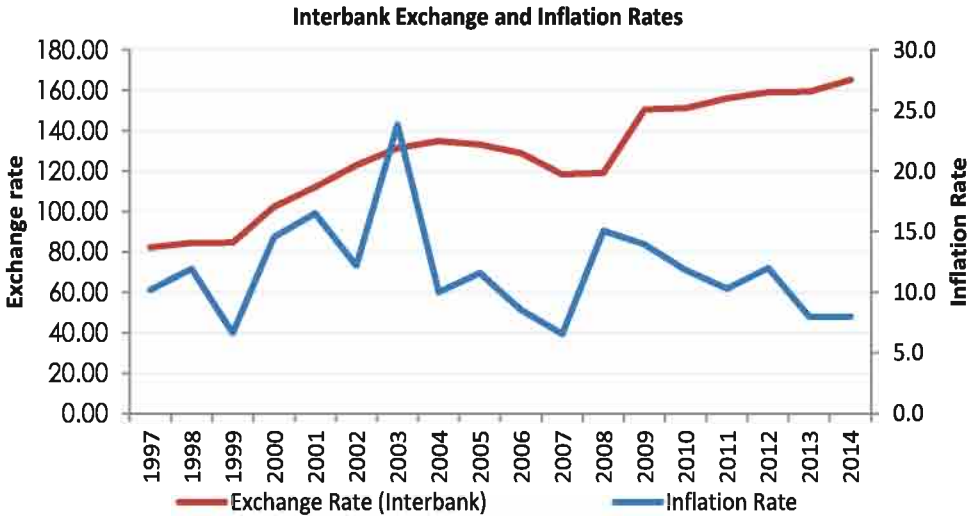
Authors	Period of estimation	Methodology applied	Exchange rate pass-through to:			
			Import prices		Consumer prices	
			Short-run	Long-run	Short-run	Long-run
Frimpong and Adam (2010)	Monthly data for the period 1990-2009;Ghana	Vector Error-Correction (VEC)	-	-	Incomplete and Low	
Campa and Goldberg (2005)	Monthly data for the euro area 1989- 2004	Vectar error correction model	0.56	~ 0.8		-
Leigh and Rossi (2002)	Jan 1994- April 2002; Turkey	Vector Autoregressive Analysis (VAR)	-	-	0.4	0.45
Kuijs (2002)	1993–2000;Slovakia	Vectar Autoregressive Analysis (VAR)	-	-	0.4	-
Darvas (2001)	1993:1- 2000:2; Czech Republic, Poland and Slovenia	Time-varying parameters framework to capture regime shifts	-	-		Complete for Slovenia and Hungary; 0.8 for Poland; 0.5 for Czech Republic
Mwase (2006)	1990:1–2005:1; Tanzania	Structural vector autoregressive (SVAR)	-	-		Incomplete and decreasing between 1990:1 - 2005:1; and zero between 1995:3 -2005:1
Oyinlola (2009)	1980 -2008; Nigeria	Vector Error Correction Model (VECM)	-	-		0.18 - 0.47
Oladipo (2006)	1970:1 - 2001:4; Nigeria	Johansen technique	Incomplete	0.86		-
Cheikh and Cheikh (2013)	1994:1-2010:4; 27 OECD countries	Panel cointegration technique	-	~ 0.70		-
Oyinlola and Babatunde (2009)	1980- 2006; Nigeria	Unrestricted error correction model (UECM)	0.09	0.121	No visible Impact	-
Omisakin (2009)	1970-2006; Nigeria	Vector autaregressive (VAR) model	-	-		No long-run relationship exist

Aliyu et al (2009)	1986:1- 2007:4; Nigeria	Vector autoregressive (VAR) model	-	0.147		Pass-through Incomplete (-0.105)
CBN (2014)	1995Q1-2013Q4: Nigeria	Vector Error Correction Model (VECM)	Pass-through Incomplete (0.35)		Pass-through Incomplete (0.93)	

III. Trend Analysis of Exchange Rate and Inflation (1997-2014)

The trend relationship between inflation and exchange rates in Nigeria showed that the two indicators trended together during 1997 - 2007. However, a divergence was noticed since 2008 when exchange rate has been depreciating but inflation rate seems to be trending downward. In 2000, the exchange rate depreciated to N107.17/$1 from N84.57/$1 in 1999, and the rate consistently and persistently depreciated in the subsequent years and eventually peaked at N134.67/$1 in 2004. Also during these periods, inflation rate systematically rose from 6.6 per cent in 1999 to 16.5 per cent in 2001, although, temporarily fell to 12.2 per cent in 2002 before it eventually peaked at 23.8 per cent in 2003.

Figure 1: Analysis of Inter-bank Exchange and Inflation Rates



However, from 2003 - 2008, the period which corresponded to the period of huge inflows of foreign exchange to the domestic economy occasioned by increase in crude oil price, the exchange rate persistently and consistently appreciated during the period. The exchange rate appreciated from ₦134.67/$1 in 2004 to ₦133.00/$1 in 2005, it further appreciated to ₦128.67/$1and ₦118.23/$1 in 2006 and 2007, respectively. During the period, inflation rate also assumed persistent downward trend. It fell from 10.0 per cent in 2004 to 8.6 and 6.6 per cent in 2006 and 2007, respectively. In 2008, the downward trend in inflation was reverted because of the effect of global financial crisis on oil crude prices and the attendant massive capital outflows from the domestic economy. Consequently, exchange rate depreciated from its position in 2007 to ₦150.40/$1, ₦155.89/$1, ₦159.25/$1 and ₦164.98/$1 in 2009, 2011, 2012 and 2014, respectively. Also, during the period, the inflation rate initially rose from 6.6 per cent in 2007 to 15.1 per cent in 2008. However, because of the proactive policies of monetary authorities, from 2009 despite the depreciation of exchange rate, inflation assume downward trend. It fell to 11.8 per cent in 2010, although, temporarily increased to 12.0 per cent in 2012, before it resume downward trend and remained 8.0 per cent in 2013 and 2014. In general, during the review period, inflation rate recorded major spikes when exchange rate persistently depreciated.

IV Methodology and Data

IV.1 Methodology

In this study, we applied the vector auto-regressive for our empirical framework; first, a standard reduced-form VAR model representation is expressed as follows:

$$Y_t = c + \sum \phi_i Y_{t-1} + \varepsilon_t \quad (2)$$

where Y_t represents the vector of endogenous variables, c is a vector of constants, φi denotes the matrices of autoregressive coefficients and ε_t is a vector of white noise processes. Cointegration of two or more variables implies a long-term or equilibrium relationship among them, given by their stationary linear combination. Equation (2) can be appropriately transformed into a vector error correction (VEC) model given in equation (3)

$$\Delta X_t = \mu + \sum_{i=1}^{p} \Gamma_i \Delta X_{t-i} + \Pi X_{t-p} + \varepsilon_t \quad (3)$$

Furthermore, equation 3 gives the vector error correction (VEC) representation of equation (2) which can be estimated using the Johansen (1991) maximum likelihood procedure.

where Δ is the first difference operator, X_t is a (kx1) random vector of time series variables with order of integration equal to one, $I(1)$, μ is a (kx1) vector of constants, Γ_i are (k x k) matrices of parameters, ε_t is a sequence of zero-mean p- dimensional white noise vectors, and Π is a (k x k) matrix of parameters, the rank of which contains information about long-run relationships among the variables. If the Π - matrix has reduced rank, implying that $\Pi = \alpha\beta'$, the variables are cointegrated, with β as the cointegrating vector. If the variables were stationary in levels, Π would have full rank. The cointegration rank in this study is conducted using the maximum eigenvalue and trace tests. The asymptotic critical values are given in Johansen and Juselius (1990) and MacKinnan-Haug-Michelis (1999). However, in this study we limit the analysis to VAR analysis, because the co-integration test indicated no long-run relationship among the variables of interest.

IV.2 Data

Monthly data spanning from 2000M1 to 2015M1 was used. The choice of time period for the analysis was informed by the availability of data. Four variables were used in the model namely; inter-bank exchange rate *(INTB)*, *world* export prices *(ECP)*, oil prices *(OILP)* and consumer price index *(CPI)*. World export prices was used as proxy for import prices because Nigeria's imports are priced in US dollars and, generally international transactions are denominated in US dollars. A possible limitation of the study is that import prices for Nigeria could generate different results. The inter-bank exchange rate was chosen as it was more responsive to monetary and economic fundamentals. It is measured in nominal terms where the rate reflected the value of the naira in terms of the United States (US) dollar. All the data were obtained from the CBN Statistical Bulletin and the Annual Reports of various years except for ECP. Data on ECP was sourced from the IMF, International Financial Statistics, due to the non-availability of import prices in Nigeria on quarterly basis.

IV.3 Unit Root Tests

Table 2 presents the empirical results of the Augmented Dickey Fuller and the Phillip Perron tests. The regressions were ran for all the series at both levels and first differences and, with constant and trend in the equation. We made use of the information criteria – Scwartz Information Criterion (SIC), Akaike Information Criterion (AIC) and Hannn-Quinn Information Criterion (HQ) in selecting the appropriate lag length.

From table 2, the result showed that all variables were characterised by unit root, meaning that at levels we fail to reject the null hypothesis of a unit root. At first differences, however, the result informed the rejection of the null hypothesis of a unit root in favour of the alternative, which says the variables were stationary at the 1.0 per cent level of significance.

Table 2: Unit Root Tests

	Level		*First Difference*		
Model	ADF Test Statistic	PP Test Statistic	ADF Test Statistic	PP Test Statistic	ADF/PP C.V
LCPI	-2.85	-2.99	-11.70*	-6.93*	-4.01
LWCP	-1.77	-1.33	-8.83*	-5.20*	-4.01
LINTB	-2.32	-2.30	-6.99*	-7.61*	-4.01
LOILP	-1.65	-1.22	-6.15*	-12.22*	-4.01

* indicates significance at 1.0 per cent level using MacKinnon critical values.
Note: Lag length was chosen in line with the Schwarz information criterion which imposes a larger penalty for additional coefficients. It is given by SC = 2*l*/*T* + (*k* log *T*)/T. where *l* is the log likelihood, *T* is the number of observations and *k* is the number of coefficients.

To determine the appropriate lag length structure and stability of the model, we choose the lag length of two as indicated by the Hannan-Quin Information criterion (HQ) in table 3 below. We observed that at the lag length of two, the model exhibits stability as shown in table 4.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	475.2503	NA	5.06E-08	-5.44798	-5.375072	-5.418402
1	1555.058	2097.199	2.31E-13	-17.74634	-17.38179*	-17.59844
2	1586.619	59.83755	1.93E-13	-17.92623	-17.27005	-17.66002*
3	1608.628	40.71096*	1.80e-13*	-17.99570*	-17.04789	-17.61118

4	1616.994	15.08688	1.97E-13	-17.90744	-16.668	-17.40461
5	1627.766	18.92907	2.10E-13	-17.847	-16.31592	-17.22585
6	1634.519	11.55392	2.34E-13	-17.7401	-15.91739	-17.00064
7	1642.167	12.73198	2.59E-13	-17.64354	-15.5292	-16.78577
8	1652.264	16.34236	2.79E-13	-17.5753	-15.16932	-16.59921

Table 4: Roots of Characteristic Polynomial

Root	Modulus
0.996314	0.996314
0.927295	0.927295
0.833138 - 0.119912i	0.841723
0.833138 + 0.119912i	0.841723
0.419294	0.419294
0.273672	0.273672
-0.240912	0.240912
0.121545	0.121545

No root lies outside the unit circle.
VAR satisfies the stability condition.

V. Analysis of Results and Findings

This section of the paper analyses the results and policy implications. First, we derived exchange rate pass-through from the impulse responses generated from the VAR model and present the result below. Also, we examine the drivers of the domestic price, we present variance decomposition of exchange rate from the model.

V.1 Pass-through of Exchange Rate to Domestic Prices

Pass-through coefficients show the predictive adjustment of domestic prices to a shock in exchange rate after accounting for the effects of other endogenous variables in the model. Following Wimalasuriya (2007) and Duma (2008), exchange rate pass-through is therefore generated using estimates of cumulative impulse responses of CPI after j period divided by cumulative response of exchange rate (EXC) to the exchange rate shock after j-periods. It is specifies as follows:

$$PT = CPI_{t,t+m} / EXC_{t,t+m} \quad \text{.....(8)}$$

Where $CPI_{t,t+m}$ is the cumulative change in the price level and $EXC_{t,t+m}$ is the cumulative change in the nominal exchange rate.

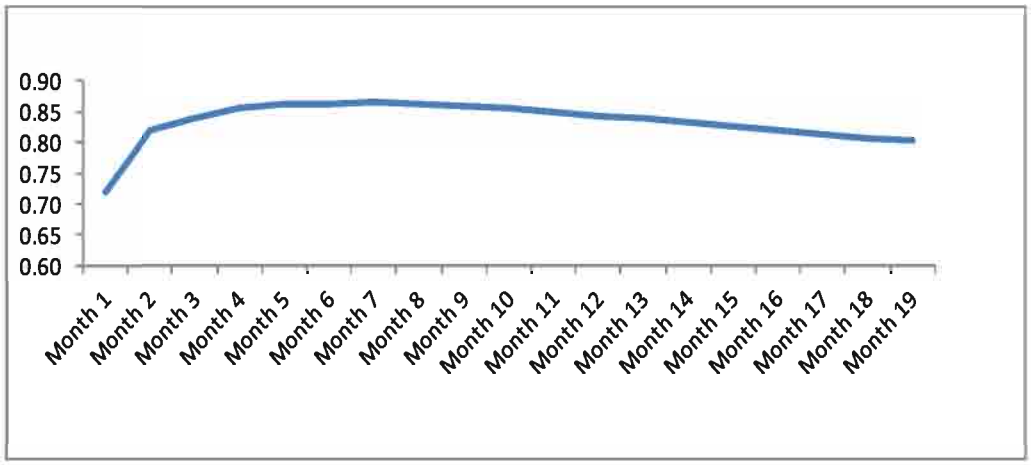
The results from table 5 show that the effect of exchange rate pass-through to price level is high. A shock to exchange rate (depreciation) would increase domestic price by 0.72 per cent at the first month. Also, the effect on the price level rose to 0.82, 0.85 and 0.86 per cent in month 2, 4 and 6, respectively before it began to fall. The marginal fall after the sixth month hovers around 0.84 per cent, on the average. This implies that exchange rate pass-through, though, is high, is incomplete in Nigeria. The graphical illustration also indicates the process of adjustment to shock is slow in Nigeria.

Table 5: Exchange Rate Pass-through

	Month 1	Month 2	Month 4	Month 6	Month 8	Month 10	Month 12	Month 14	Month 16	Month 18
Pass-through to Domestic Prices	0.718	0.821	0.854	0.864	0.862	0.854	0.844	0.832	0.820	0.808

Source: Based on the Authors' calculation

Figure 2: Exchange Rate Pass-Through to Inflation



V.2 Variance Decomposition

The result in table 6 below shows the variance decomposition of domestic prices. The result indicated that innovations in domestic prices accounted from the largest share during the study period.

Table 6: Variance Decomposition of LCPI:

Period	S.E.	LOILP	LINTB	LWCP	LCPI
1	0.01	0.58	1.71	0.01	97.70
2	0.02	1.13	2.99	0.03	95.84
3	0.03	1.04	3.62	0.24	95.09
4	0.03	0.85	4.08	0.51	94.56
5	0.04	0.68	4.43	0.81	94.08
6	0.04	0.57	4.73	1.12	93.57
7	0.04	0.54	4.99	1.45	93.03
8	0.05	0.55	5.22	1.77	92.46
9	0.05	0.59	5.44	2.11	91.86
10	0.05	0.65	5.65	2.44	91.26

Source: Authors' calculation

The share of exchange rate in the variance decomposition for domestic price increases from 1.7 per cent in the first month onwards to 3.0 per cent in the second month, and further to 3.6, 4.1, 4.4 and 4.7 per cent, in months 3, 4, 5 and 6, respectively. The effect seems to last for a long period beyond month eighteen, even though its impact begins to taper off marginally in the subsequent months. The innovation in import prices in period one accounting for 0.01 per cent and then rose marginally to 0.2, 0.5, 0.8 and 1.1 per cent in quarters 3, 4, 5 and 6, respectively. It peaked at 2.4 per cent in period 10. Surprisingly, the variance decomposition of oil prices in domestic price level was also low despite Nigeria been an oil-dependent country. The innovation in LOILP accounted for 0.6, 1.1, 1.0, 0.9 and 0.7 per cent in periods 1, 2, 3, 4 and 5, respectively. It further fell to 0.6 and 0.5 per cent in periods 6 and 7, respectively; and hovered around 0.6 per cent in periods 8 - 10.

V. Conclusion, Policy Implications and Recommendations

The paper examined the link between exchange rate and inflation in Nigeria using the VAR method. A positive shock to exchange rate (depreciation) would translate to a gradual and steady increase in the domestic price level. The pass-through from import prices to domestic price level was moderate as revealed by the impulse response. Furthermore, the effect of oil prices pass-through to domestic price level was relatively low compared with that from the inter-bank exchange rate.

The result of the model has implications for policy. Firstly, it established that there exists a link between exchange rate and inflation in Nigeria. Secondly, the effect of exchange rate pass-through to domestic prices was significant and the pass-through was not complete.

These imply that developments in the exchange rate influence the level of inflation in the economy and its effect lasts for a long period. The policy implication of these is that significant depreciation of nominal exchange rate would have a pronounced effect on the domestic level. In the light of these results, the study recommends that in the management of exchange rate, sharp depreciation should be avoided due to its impact on domestic prices. The use of administrative measures to reduce exchange rate volatility should be encouraged, in view of the high pass-through of exchange rate to inflation.

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Economic Policy Trilemma and Exchange Rate Management in Nigeria

Temitope Oshikoya*

Abstract

This paper considers the choice and trade-offs that Nigeria's economic policymakers face when deciding on the simultaneous combination of monetary policy, exchange rate management, and financial openness policies to adopt—the monetary policy trilemma. The paper finds empirical evidence of the monetary policy trilemma for Nigeria, implying that there is indeed a tradeoff among monetary independence, exchange rate stability, and financial integration. Monetary independence and capital control or openings were the main dominant factors throughout the sample period of 1970-2012. However, between 2000 and 2012, the sharp increase in financial integration created tension between monetary independence and exchange rate stability. The implications of changes in the trilemma indices for inflation were examined. Exchange rate stability, financial integration, and foreign reserves individually dampen inflation, when the objective of monetary independence is traded-off. A sample of global trilemma practices among developed countries, BRIC, MINT, SANE, and Oil producing countries was examined. Countries with very high reserve ratio to GDP of greater than 50.0 per cent, irrespective of their different exchange rate, monetary independence, and financial integration regimes, have navigated the trilemma very well. With low reserves to GDP ratio, Indonesia appears to have successfully navigated the economic policy trilemma by pursuing an intermediate regime. In Nigeria, the increase in foreign reserves has helped to mitigate the severity of the policy trilemma, especially when combined with exchange rate stability and financial integration objectives; the country has now been experiencing the corollary with the dwindling foreign reserves in 2013, 2014 and 2015. In short, in the face of multiple goals including macroeconomic stabilisation and financial stability in an economy with increased financial globalisation, fiscal slippages, external terms of trade shocks, financial market distortions, foreign capital famine, and low foreign reserves, monetary and exchange rate policy carry a bigger burden. Further research questions are raised. Should foreign reserves be used as gunpowder or nuclear weapon? How to cope with foreign capital feast and famine? The issue of foreign capital feast and famine becomes more relevant in the context of a financial trilemma, distinct from monetary trilemma. What are the costs and benefits of capital controls? When are capital controls useful and what types of capital controls are effective?

Keywords: Economic policy trilemma, financial integration, capital control, exchange rate management, international reserves, foreign exchange intervention, monetary policy, financial stability, Inflation, Nigerian economy.

JEL Classification: E4, E5, F3, F4

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I. Introduction

One of the key challenges that economic policy makers in open economies face is how to simultaneously manage interest rates, exchange rates, and capital account openness—the policy trilemma; the unholy or impossible trinity. The trilemma of international economics and finance clearly suggests that only two of these three policies can be achieved simultaneously. Several studies have considered these issues from theoretical, empirical, and policy dimensions. Cross-country studies and single country experiences of China, Egypt, Greece, India, Malaysia, Poland and others have been undertaken in the literature on these issues.

The key insights from these studies can be summarised with the following quotations:

- **Policy Principles**: "One of the great immovable objects in open-economy macroeconomics is the impossible trinity or the policy trilemma" (Obstfeld et. al., 2005). "Governments face the policy trilemma – the rest is commentary". (Klein and Shambaugh, 2013).
- **Policy Trade-Off:** A key message of the trilemma is scarcity of policy instruments. In macroeconomic management, policy makers must face a trade-off of choosing two, not all, of the three policy choices: monetary independence, exchange rate stability, and financial openness. This is the famous hypothesis in international finance called the "trilemma" or the "impossible trinity", (Aizenman, 2011a). "You can't get all three. If you pick two of these goals, the inexorable logic of economics forces you to forgo the third". (Mankiw, 2010).
- **Policy Empirics:** Policy makers face a tradeoff, where increasing one trilemma variable (such as higher financial integration) would induce a drop in the weighted average of the other two variables (lower exchange rate stability, or lower monetary independence, or a combination of the two) (Aizenman, 2011a).
- **Policy History** has shown that different international financial systems have attempted to achieve combinations of two out of the three policy goals. For example, the Gold Standard system guaranteed capital mobility and exchange rate stability while the Breton Woods system provided monetary autonomy and exchange rate stability (Aizenman, 2011a). The Asian financial crisis was triggered by an attempt to achieve the three objectives simultaneously.
- **Policy and Shocks:** "The trilemma does not rule out common shocks that affect all economies, and monetary autonomy does not guarantee insulation from the world economy. Rather, an implication of the trilemma is that there is more scope for addressing shocks with monetary policy in a country with floating exchange rates – or with strong controls on international capital flows – than for a country with a pegged currency and open capital markets". (Klein and Shambaugh, 2013).
- **Policy Choice**: Looking at the diverse experiences of developing and emerging markets during over three decades, the actual choice of the trilemma configuration depends on the varying challenges and priorities facing an economy (Aizenman, 2011a).

- **Policy Quadrilemma**: The experience of emerging markets indicates that the trilemma triangle, while useful, overlooks the possibility that with limited but growing financial integration, countries hoarding international reserves may loosen, in the short-run, some of the trilemma constraints (Aizenman, 2011a).

This paper considers the choice and trade-offs that Nigeria's economic policymakers face when deciding on the simultaneous combination of monetary policy, exchange rate management, and financial openness policies to adopt—the policy trilemma. In section 2, the trilemma principles are outlined using the Mundell-Flemming Framework and its critiques, and the trilemma indices data set constructed for 170 countries by Aizenman et. al., (2014) are discussed. In section 3, we provide a descriptive nature of the evolution of the exchange rate management framework and policy trilemma indices for Nigeria from 1970 to 2012.

In section 4, we empirically find that the trilemma does exist for Nigeria, with the weighted sum of the indices adding up to a constant, and validating the notion that an increase in one trilemma objective variable implies a decrease or trade-off in another objective or two objectives. Monetary independence and capital control or openings were the main dominant factors throughout the sample period. However, between 2000 and 2012, the sharp increase in financial integration created tension between monetary independence and exchange rate stability. We analyse the implications of changes in the trilemma indices for inflation. The best empirical results are obtained when the objectives of exchange rate stability and financial integration, and loss of monetary independence are combined with increase in foreign reserves. Exchange rate stability, financial integration, and foreign reserves individually dampened inflation, when the objective of monetary independence is traded-off.

In section 5, a sample of global trilemma practices among developed countries, BRIC, MINT, SANE, and oil producing countries are examined. Countries with very high reserve ratio to GDP of greater than 50.0 per cent, irrespective of their different exchange rates, monetary policy, and financial integration regimes, have navigated the trilemma very well. With low reserves to GDP ratio, Indonesia appears to have successfully navigated the economic policy trilemma by pursuing an intermediate regime. In Nigeria, the increase in foreign reserves has helped to mitigate the severity of the policy trilemma, especially when combined with exchange rate stability and financial integration objectives; the country is now experiencing the corollary with the dwindling foreign reserves. This section also concludes the paper and outlines issues for further research.

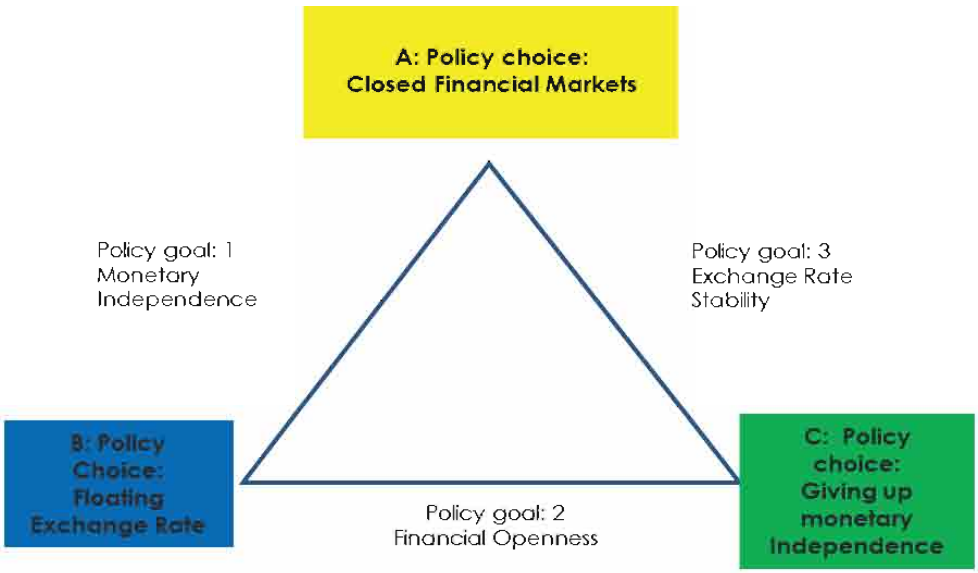
II. Mundell-Fleming's Framework and the Trilemma Indices

II.1 The Mundell-Fleming Framework

What is the trilemma in open economies and international finance? It is rare to win a Nobel Prize in Economics: it is usually awarded for a major seminal contribution to the field. The

1999 Nobel Prize was awarded to Robert Mundell for his seminal and fundamental contribution to open-economy macroeconomics on the Impossible trinity or the Trilemma. This seminal contribution often regarded as the Mundell-Fleming Framework simply states that a country may simultaneously choose any two, but not all of the following three policy goals – monetary independence, exchange rate stability and financial integration (Aizenman, 2011a). Figure 1 depicts the "Trilemma triangle", with each of the three sides of the triangle showing desirable policy goals: monetary independence, exchange rate stability; and financial integration. However, no nation can be on all three sides of the triangle simultaneously.

Figure 1: Trilemma Triangle



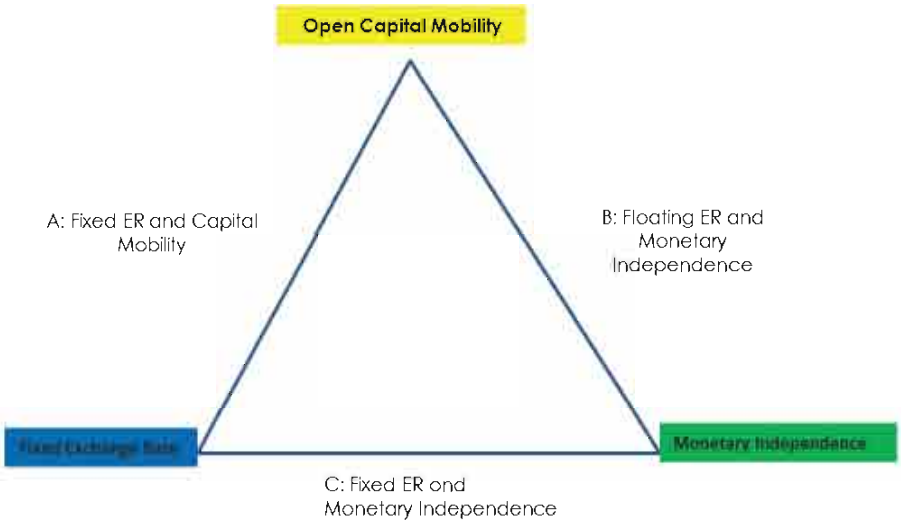
Mankiw (2010) provides a succinct and layman exposition of the trilemma stating that economic policy makers in most countries would like to achieve three goals as illustrated in Figure 2:

- First, make *the country's economy open to international flows of capital.* This capital mobility has the advantage of encouraging foreign investors to bring along resources and expertise into the country, while nationals can diversity their portfolio by investing abroad.
- Second, use *monetary policy as a tool to help stabilise the economy.* The central bank has the flexibility to adjust money supply and interest rates depending on the conditions of the economy.
- Third, *maintain exchange rate stability by preventing exchange rate volatility, especially driven by speculation,* can destobilise the economy and prevent

forward planning by businesses and households. Unfortunately, policy makers cannot pick all three simultaneously.

Economic logic dictates a trade-off of one, if choices are made about two of these goals at the same time. To illustrate with the major economies and country experiences, in Figure 1, China is at the top vertex, point A, with "closed financial markets," representing a combination of monetary independence and mostly a fixed exchange rate regime. China has a preference for monetary independence and exchange rate stability: first and third goals. However, in order to accomplish these two goals, the Chinese Authorities restrict capital mobility, without which money would flow into and out of the country, forcing the domestic interest rate to match foreign interest rates.

Figure 2: Goals to be achieved



The United States is at the left vertex, Point B with "floating exchange rate regime", which is a combination of monetary independence and financial openness or integration. The United States has picked monetary independence and capital openness, the first and second goals, resulting in trade-off of the third goal of exchange rate stability. The Federal Reserves can conduct independent monetary policy, while Americans and foreigners can move funds in and out freely, at the prevailing exchange rates determined by the market. The countries of the European Union (for example, France, Germany, and Greece) are at Point C, the right vertex, which is associated with giving up monetary independence through a Currency Union, ensuring a combination of exchange rate stability via a pegged exchange rate regime, and financial openness or integration. The member

countries of the European Union agreed to the second and third goals, by trading-off independent national monetary policy. These countries used the Euro to replace their national currencies, eliminating all exchange rate movements within the zone, while capital is free to move among nations.

Mundell's Trilemma framework can be viewed in the context of an open economy extension of the IS-LM Neo-Keynesian model, which focuses on a small country selecting its exchange rate regime and its financial integration with the global financial market. The model is simplified with a focus on polarised binary choices, i.e., credibly fixed exchange rate or pure float, and prefect capital mobility or financial autarky (Aizenman, 2011a). Most macroeconomics, international economics, and monetary economics textbooks provide illustration of the models and its policy implications. Several other studies have been done in recent times on the issues raised by the Mundell's Trilemma framework. Some of these studies include Edison et. al., 2002; Shambaugh, 2004; Obstfeld et. al., 2005, 2009, 2010; Henry, 2006; Popper et. al., 2011; Aizenman et. al., 2008b, 2011a; Aizenman, 2011; Aizenman and Ito, 2012; Hutchinson et. al., 2010; Kohli, 2011; Hsing, 2012, 2013; Sengupta and Sengupta, 2013; Chetwin and Munro, 2013; Obstfeld, 2014; Rummel, 2014; Klein and Shambaugh, 2014; and others).

II.2 Dilemma with the Trilemma Foreign Capital Feast and Famine

Some have argued that the policy tilemma paradigm is too restrictive of the real world. While the insights from the model are well established among academic economists and shared by practitioners and policymakers, most countries rarely face the binary choices articulated by the trilemma. Instead, countries choose the degree of financial integration, with varying degree of capital flows restrictions, and exchange rate flexibility, with managed floating now more prevalent, especially in developing countries. In essence, policy makers can "round the corners" of the policy trilemma triangle with intermediate policies including softly pegged exchange rates, managed floating exchange rates, temporary, narrowly targeted capital controls (Klien and Shambaugh, 2013). Understanding these mixed regimes remains a challenge.

Others insist that the policy trilemma seems to give too much credit to the ability of central banks to manage an economy. Rey (2013a, 2013b) observes that financial globalisation has rendered obsolete the policy trilemma paradigm, with policy makers now facing instead a dilemma, or an "irreconcilable duo": implying that free capital flows inevitably leads to a loss of monetary autonomy. In essence, monetary policy independence is possible if and only if the capital account is managed. Rey points out the correlation among prices of equity and bonds risky assets with capital flows and credit growth and market volatility of US S&P 500 index options (VIX). These movements in global financial cycle also linked to US monetary policy suggests that central bankers sitting in one corner

of the world cannot easily lean against a barrage of investment coming from another corner (The Economist, August, 2013).

There have been responses to these arguments, showing that the policy trilemma framework, especially its implied trade-offs, is still valid. Klein and Shambaugh, (2013) note that the trilemma is alive and well and find evidence that first, exchange rate flexibility is associated with greater monetary-policy autonomy, so there is some rounding of that corner of the policy trilemma; second temporary, narrowly targeted capital controls do not enable a country with a fixed exchange rate to have greater monetary-policy autonomy than it has under full capital mobility; and thirdly, widely applied, longstanding capital controls break the link between domestic and foreign interest rates under a fixed exchange rate system. They also note that the issue raised by Rey is that of interdependence or contagion, which is distinct from whether exchange rate regimes affect monetary policy independence. While the credit channels by Rey is important for macroeconomic performance, monetary policy also impacts macroeconomic outcomes via the interest rates and exchange rates channels.

Klein and Shambaugh, (2013) conclude that "the trilemma does not rule out common shocks that affect all economies, and monetary autonomy does not guarantee insulation from the world economy. Rather, an implication of the trilemma is that there is more scope for addressing shocks with monetary policy in a country with floating exchange rates – or with strong controls on international capital flows – than for a country with a pegged currency and open capital markets." While financial cycles and large country interest rates, such as the US, do impact other economies, the degree of floating of the exchange rates or capital market integration determines the degree of freedom over how to respond to these shocks. In terms of policy debate surrounding the expected tapering of accommodative monetary policy by the Fed, Klein and Shambaugh (2013) note that emerging markets with floating exchange rates can either choose to depreciate their currencies, raise domestic interest rates, or some combination of the two.

Overall, capital inflow and its sudden reversal can lead to financial vulnerabilities and dislocations as witnessed among emerging markets in the 1990s, especially the Tequila crisis of two decades ago. Calvo et. al., (1996) observed that countries that implemented a comprehensive policy package and not relied on a single instrument have been the most successful in managing capital flows. On the other hand, Obstfeld (2014) notes that, "a less productive policy mix has consisted of persistent sterilisation (which keeps short-term interest rates comparatively high), heavy intervention in the foreign exchange market (which results in little short-run exchange rate uncertainty), and no controls on short-term capital movements". All of these policies have tended to provide especially wrong incentives for short-term capital inflows. A big sell-off of domestic assets by foreign investors is likely to induce a significant exchange rate change before enough buyers come forward to restore market equilibrium." Does that sound familiar in the Nigerian context with what has been observed in the past ten years, especially between 2010 and 2015?

II.3 From the Trilemma to Policy Quadrilemma Foreign reserves: gunpowder or nuclear weapons?

Large holdings of foreign reserves tend to serve to relax the policy trilemma constraints, which suggest a fourth dimension of policy quadrilemma. The experience of emerging markets indicates that the Trilemma triangle, while useful, overlooks the possibility that with limited but growing financial integration, countries hoarding international reserves may loosen in the short-run some of the trilemma constraints (Aizenman, 2011). Three key factors have been associated with the growing trend in reserve hoarding by Obstfeld, Shambaugh, and Taylor (2009). First is the fear of floating factor, as efforts are made by policy makers to stabilise the exchange rate in order to grow trade, to minimise the impacts of dollarisation, and to provide nominal anchor for inflationary expectations. Second is the attempt to promote financial intermediation through the domestic banking system. Third factor relates to increase in financial integration with the global financial markets. These three factors increased the transmission of shocks from the global financial markets into the domestic economy.

Bussière et. al., (2014) raises another set of questions relating to whether foreign reserves are gun powder or nuclear weapons. If foreign reserves are 'gunpowder', then they have to be deployed during a war (crisis); while if they are 'nuclear weapons,' then they serve as deterrents as the mere existence of reserves serves as a form of protection. Aizenman and Sun (2009) look at reserve depletion and its impact on economic growth of the same period; much like using reserves as gun powder. On the other hand, Bussière et. al., (2014) show that foreign reserve adequacy relative to short-term debt contributes, on its own or jointly with capital controls, to real output growth during the recent global financial crisis; much like using reserves as nuclear weapon. Bussière et. al., (2014) also show the stabilising impacts of foreign reserves and capital control measures, while presenting evidence of more reserves accumulation and capital controls by developing countries relative to advanced economies.

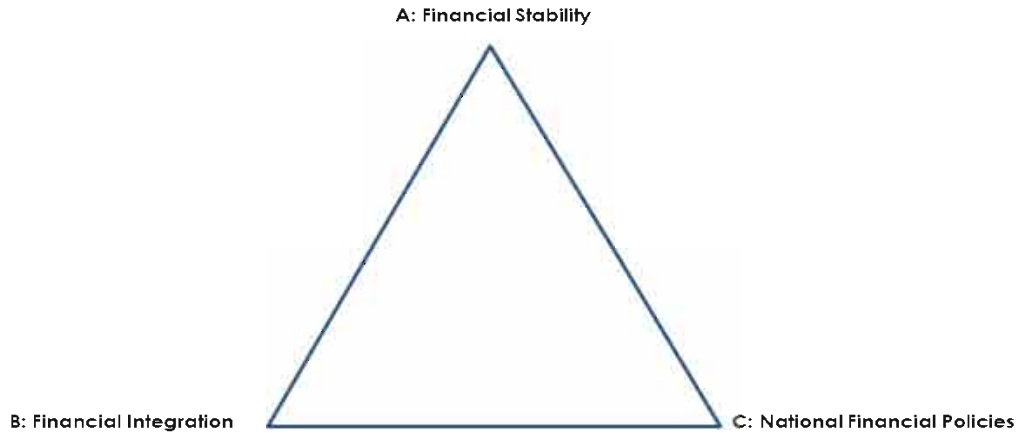
Popper et. al., (2011) find that trilemma policy stability is linked to large official holdings of foreign reserves in low-income countries that are characterised by relatively fixed exchange rates and relatively closed capital markets. Popper et.al., (2011) also find that the combination of fixed exchange rates and financial market openness is a more stable arrangement within the trilemma; and that middle-income countries have less stable trilemma arrangements than either low or high-income countries.

On the other hand, Aizenman and Ito (2012) empirical evidence cast doubt on the optimality of open capital accounts and floating exchange rates. They find that countries occupying the middle ground of the policy trilemma (flexible managed exchange rates, intermediate levels of monetary policy and widespread, but incomplete, capital account restrictions) experienced lower output volatility than other countries in the past two decades. The IMF now seems to support this middle ground approach.

II.4 Financial Trilemma and Monetary Trilemma

While the monetary trilemma is well established both in the academic literature and the policy circles, the global financial crisis of 2007 and 2009 highlights the importance of managing financial stability and underscores the financial trilemma phenomenon. In Nigeria, this issue came to the forefront with the efforts of the Central Bank of Nigeria (CBN) under Sanusi Lamido Sanusi to manage financial crisis and restore financial stability. Schoenmaker (2011) provides an insight into the financial trilemma in Figure 3, which suggests that financial stability, financial integration, and national financial policies are incompatible. Any two of the three objectives can be combined but not all three: one has to give way. When Figures 1, 2, and 3 are viewed together, the main link between monetary trilemma and financial trilemma is financial integration or degree of capital mobility or controls.

Figure 3: Financial Trilemma



The combination of monetary trilemma and financial trilemma poses more difficult trade off among multiple policy objectives: inflation targeting, output stabilisation, and financial stability in the face of financial globalisation and domestic policy instruments shortages for simultaneously attaining these objectives. Obstfeld (2014) examines this particular issue for emerging market economies and notes that while potentially a potent source of economic benefits, financial globalisation has its own downside for economic management as it worsens the trade-offs monetary policy faces in navigating among multiple domestic objectives. With financial globalisation, the potency of national macro-prudential policies are constrained by the existence of the financial trilemma, that is distinct from the monetary trilemma, and which shows the incompatibility of national

responsibility for financial policy, international financial integration and financial stability. In essence, macro- prudential policies are rendered ineffective by the financial trilemma with capital mobility.

In short, in the face of multiple goals including macroeconomic stabilisation and financial stability in an economy with increased financial globalisation; fiscal slippages, external terms of trade shocks, financial market distortions, and foreign capital famine, as well as low foreign reserves, monetary policy carry a bigger burden.

II.5 The Trilemma Indices

It is quite challenging to empirically test the insights from the Trilemma framework with no unique definition and measurement of the degree of exchange rate flexibility, monetary independence, and financial integration. However, Aizenman et. al., (2010, 2014) have made important contributions to this effort with the construction of the trilemma indices for 170 countries, including Nigeria. The trilemma indices quantify the degree of achievement along the three dimensions of the "trilemma" hypothesis: monetary independence, exchange rate stability, and financial openness, and available for more than 170 countries. These indices are first introduced in Aizenman, Chinn, and Ito (ACI, 2008b), and have been regularly updated. The dataset is available in both Excel and STATA format at http://web.pdx.edu/~ito/trilemma_indexes.htm. This sub-section draws mainly from the Note on the Trilemma Measures, with more details in (ACI, 2010). ACI defines the trilemma measures as follows.

Monetary Independence (MI): The extent of monetary independence is measured as the reciprocal of the annual correlation between the monthly interest rates of the home country and the base country. Money market rates are used for the calculation. By construction, the maximum value is 1, and the minimum value is 0. Higher values of the index indicates more monetary policy independence. The formula assigns MI value of 0.5 for use of other policy tools such as CRR and other monetary controls.

Exchange Rate Stability (ERS): To measure exchange rate stability, annual standard deviations of the monthly exchange rate between the home country and the base country are calculated and included in the formula to normalise the index between 0 and 1. Higher values of this index indicate more stable movement of the exchange rate against the currency of the base country.

Financial Openness/Integration (FOI): *De jure* index of capital account openness, reflecting the policy intentions of the countries. FOI is based on information regarding restrictions in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*. FOI is the first standardised principal component of the variables that indicate the presence of multiple exchange rates, restrictions on current account transactions, on capital account transactions, and the requirement of the surrender of export proceeds.

The index is normalised between zero and one. Higher values of FOI indicate that a country is more open to cross-border capital transactions.

III. Nigeria's Policy Trilemma and Quadrilemma

According to the Central Bank of Nigeria (2014, 2009), the main objectives of exchange rate policy in Nigeria are to preserve the value of the domestic currency, maintain favourably external reserves position and ensure external balance without compromising the need for internal balance and the overall goal of macroeconomic stability. In this section, we examine the evolution of the trilemma indices in the context of the exchange rate, interest rate, and capital controls management framework in Nigeria. We also add the foreign reserves management to extend the policy trilemma to policy quadrilemma. The descriptive analysis of the trilemma indices is complemented with actual developments based on materials on the subject obtained from the website and publications of the CBN including the book: CBN (2009) "50 Years of Central banking in Nigeria: 1958-2008."

Figure 4-8 present Nigeria's trilemma and quadrilemma indices for the period 1970-2012; and further divided into three periods: 1970-85, 1986-99, and 2000-2012. In addition, to facilitate the discussion of the evolution of the indices and the principal factors behind them, the figures include the trilemma by Governors' regimes.

Figure 4: Nigeria's Trilemma Indices: 1970-2012
Exchange Rate Stability, Monetary Independence & Financial Openness
Isong (1-6); Vincent (8-12); Ahmed1 (13-18); Ahmed2 (19-24);
Ogwuma (25-29); JSanusi (30-34); Soludo (35-39); Lamido (40-43)

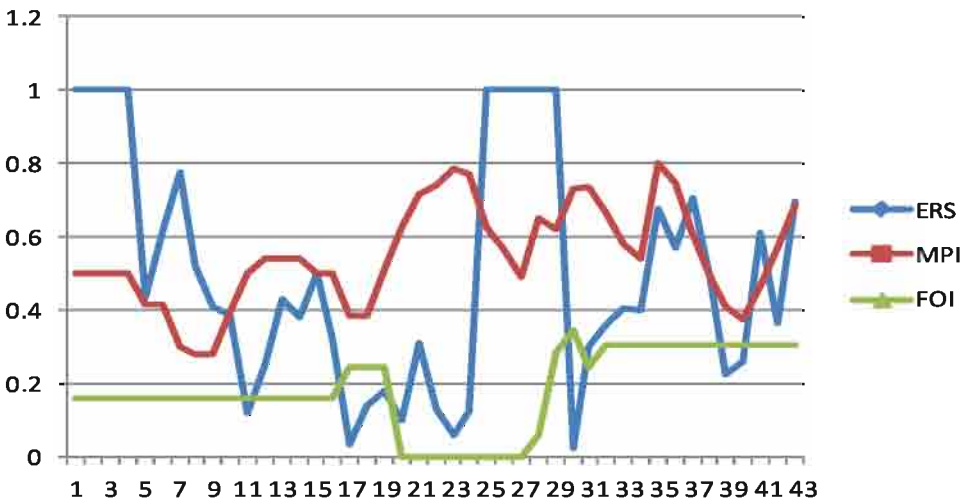


Table 1: Trilemma indices for Nigeria: 1970-2012

		1970-2012		1970-1985		1986-1999		2000-2012	
Means	**ERS**	0.50185		0.57227		0.43637		0.468512	
	MI	0.5465		0.45068		0.61545		0.590244	
	FOI	0.18452		0.161549		0.101928		0.301752	
Coefficients	**ERS**	0.54883		0		0.337899		-0.32469	
	MI	2.44998		0		2.663836		0.571037	
	FOI	1.686743		12.38011		1.602091		6.004249	
R-Squared		0.963		1		0.975		0.998	
Contributions	**ERS**	0.2754	14%	0	0%	0.1474	7.6%	-0.1521	-8%
	MI	1.3389	70%	0	0%	1.6395	84%	0.3371	17%
	FOI	0.3112	16%	2	100%	0.1633	8.4%	1.8118	91%
Total		1.9255	100%	2	100%	1.95	100%	2	100%

Table 2: Contributions to the Trilemma: Nigeria's Policy Trilemma

1970-2012 • MI with high policy weights throughout. Tension between FOI and ERS. **1970-1985** • High Administrative control • Main goal was ERS, MI is lost • Closed capital mobility used to achieve ERS. **1986-1999** • MI is asserted • ERS is lost • FOI wanes **2000-2012** • Open FOI increased along with the use of FXR	• **Monetary Independence (70%)** • Exchange Rate Stability (14%) • Capital Mobility (16%) • **Closed Capital Mobility (100%)** • Exchange Rate Stability (0%) • Monetary Independence (0%) • **Monetary Independence (84%)** • Exchange Rate Stability (7.6%) • Capital Mobility (8.4%) • **Open Capital Mobility (91%)** • Exchange Rate Stability (-8%) • Monetary Independence (17%)

• Balance between MI and ERS • Tension between FOI and ERS	

III.1 1960-1985: Top Point A: Closed Capital Mobility, Fixed Exchange Rate and Stability; and Intermediate Monetary Independence

Overall, during this period, there was essentially closed capital mobility, fixed exchange rate and stability, and intermediate degree of monetary independence with direct controls, which corresponds to the vertex, point A, with "closed financial markets," in Figure 1. Following the creation of the CBN in 1958 and the passing of the Exchange Control Act of 1962, foreign exchange earnings, mainly from agricultural exports, were deposited and centralised with the CBN (2014). During the 1960s and up to 1974, the monetary policy framework was exchange rate targeting, in line with a fixed exchange rate regime, with the Nigerian currency fixed at par, first with the British pound sterling, and subsequently, with a basket of 7 currencies (CBN, 2009). However, in 1974, the CBN adopted monetary targeting framework following the collapse of the Breton Woods system of the fixed exchange rate regime in the early 1970s. Monetary policy instruments were in the form of direct controls, and exchange controls were administered with import licensing regime.

Figure 5: Nigeria's Policy Trilemma

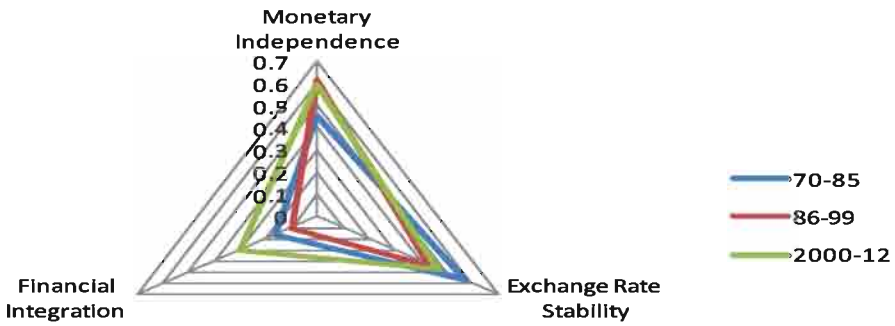
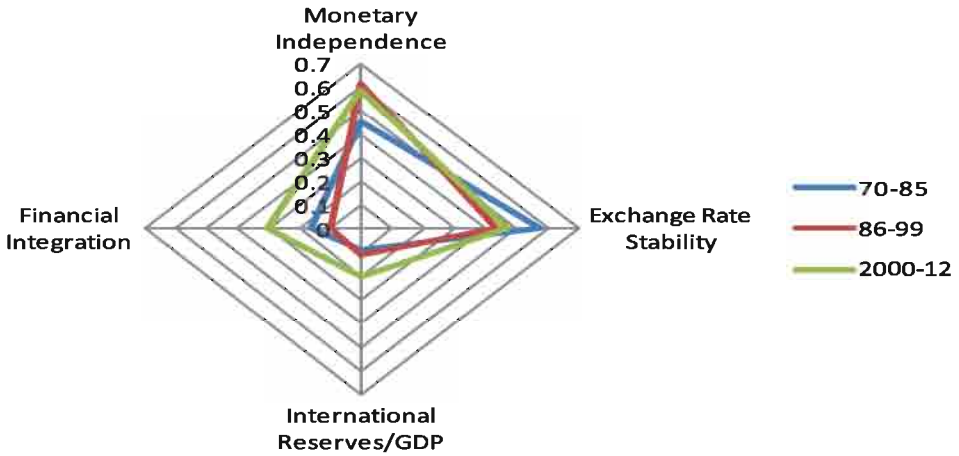
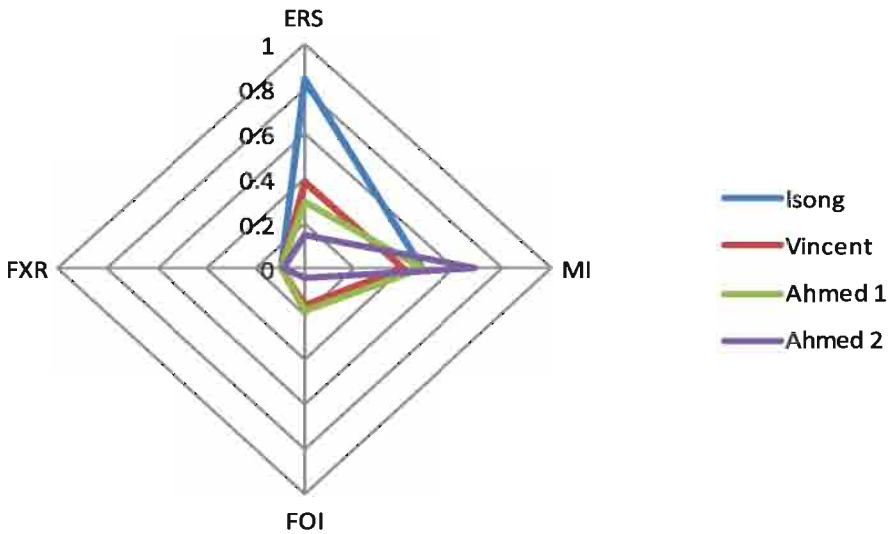


Figure 6: Nigeria's Policy Quadrilemma: Trilemma and Reserve Accumulation



At that time, Nigeria had a preference for first and third goals: monetary independence and exchange rate stability. However, in order to accomplish these two goals, the Monetary Authorities in Nigeria restricted capital mobility. These choice and trade-offs are reflected in the blue line for Isong in the diamond graph Figure 7 where ERS index was close to 1 at an average of 0.85, FOI index close to zero, at 0.161, and MI was in the middle range at 0.472. During the Isong's regime, foreign reserves as a ratio of GDP was quite low at 3.0 per cent, up to 1973; and then shot up to 23.0 per cent in 1974-1975 as rising foreign exchange inflows resulted from increased crude oil prices and exports. Inflation rates averaged 14.0 per cent, with the lowest point at 3.5 per cent in 1972 and the highest point at 34.0 per cent in 1975.

Figure 7: Trilemma by Governors' Regime



The CBN under Governor Ola Vincent continued mainly with the regime of near closed capital mobility with FOI index still at 0.161. On the other hand, as shown in the red line in the diamond graph of Figure 7, the exchange rate stability (ERS) index declined by more than half to 0.38; while the monetary independence (MI) index also declined from 0.48 to 0.40. Although monetary policy instruments were also in the form of direct controls, and exchange controls were also administered with import licensing regime and foreign exchange rationing during this period, both exchange rate stability and monetary independence lost ground as foreign exchange reserves to GDP ratio declined from 23.0 in 1974 to 6.0 per cent in 1978. It picked to 17.0 per cent in 1980 before sliding to 7.0 per cent in 1981, although absolute foreign reserves increased from US$220 million in 1970 to US$10.6 billion in 1980, by end-1981 it stood at US$4 billion. Inflation rates averaged 16.0 per cent during Vincent's period, with the lowest point at 10.0 per cent in 1980 and the highest point at 21.0 per cent in 1981 when the GDP growth rate actually declined by 13.0 per cent following the slide in oil prices.

For analytical purpose, the period described here as the first term of Ahmed, not the legal term, witnessed from 1982 more comprehensive exchange controls including prescriptions of eligible transactions and parallel foreign exchange market begun to flourish. Monetary policy instruments remained largely that of direct controls, but it was heightened to fight inflation which was brought down from an average of 16.0 per cent earlier to 12.0 per cent, the lowest at 5.7 per cent in 1986 and the highest at 23.0 per cent in 1983. The GDP growth rate contracted during this period at an average negative rate of 3.2 per cent; and a significant decline of 11.0 per cent in 1987. The foreign exchange reserves fell from a high of US$10.6 billion in 1980 to US$1.5 billion in 1987; with reserves to GDP ratio at an average of 5.0 per cent.

III.2 1986-2014: Left Point B: More Open Capital Mobility, Less Exchange Rate Stability, and More Monetary Independence

From 1985-86, several structural breaks as part of structural adjustment program (SAP) in respect of exchange rate management were witnessed. In 1985, a "one currency intervention system in the form of the US Dollar was adopted. A flexible exchange rate regime was adopted in 1986, with a dual exchange rate system emerging. Under the Second-tier Foreign Exchange Market (SFEM), official transactions were carried out at the fixed pre-SFEM rate, while transactions from the private sector were sourced at the market-based rate. In July 1987, both rates were merged into a single system, CBN (2009)".

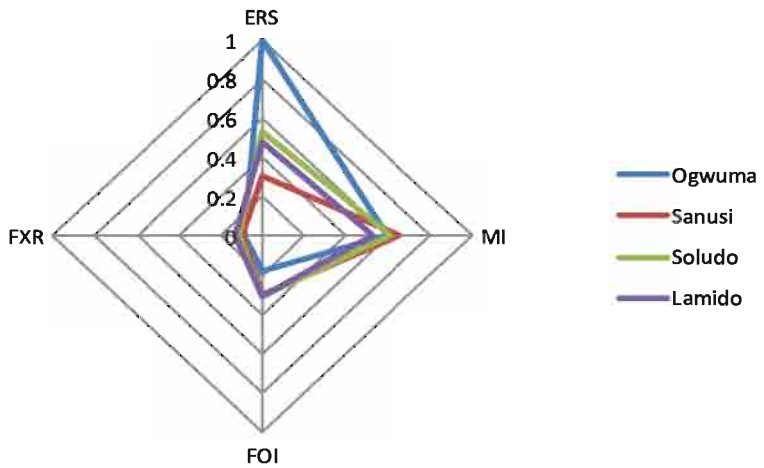
Overall, exchange rate stability was lost with ERS index now at 0.14 in1987, the lowest, while monetary independence (MI) index moved back towards 0.47 and the capital control was relaxed by 1987 with the FOI index increasing to 0.24. There was a considerable movement away from Point A in the triangle Figure 1 towards Point B, as the choice of regained more monetary independence and foreign exchange flexibility led to a trade-off in exchange rate stability.

From 1989 to 1996, corresponding to the second term of Ahmed and the regime of Paul Ogwuma, FOI was reduced to zero as more capital controls were instituted. In 1989, several Bureau-de-Change operators were licensed to provide access for small users of foreign exchange. From 1993, monetary policy instruments shifted from direct controls to indirect controls and market-based instruments were introduced including interest rate policy, reserve requirement, discount window operations, and open market operations (CBN, 2009). Several experiments were made with foreign exchange market including the Dutch auction system, unified exchange rate system, autonomous foreign exchange market, inter-bank foreign exchange market, deregulated exchange rate system, and wholesale Dutch auction system.

Between 1994 and 1998 which was during Ogwuma's regime, the official exchange rate was fixed. As a result, ERS moved back to 1 same as during the early part of Isong's regime, MI averaged 0.6, while FOI was 0.05, with more restrictions on capital mobility. Inflation was high at an annual average rate of 35.5 per cent, in the same range similar to the second regime of Ahmed, and a high of 73.0 per cent in 1995. Although Ogwuma inherited a foreign reserves-GDP ratio of 9.0 per cent in 1994, the ratio improved to 23.0 per cent by 1998 as foreign reserves increased from US$1.65 billion to US$7.3 billion in the same period.

Joseph Sanusi's regime from 1999-2003 was characterised by attempts to improve on financial integration with FOI increasing to 0.3 compared to 0.07 under Ogwuma and 0.04 under Ahmed II, exchange flexibility as the ERS indicator declined from 1 in 1998 to an average of 0.3, and a high degree of monetary independence with MI at 0.65 in Figure 8. Indeed, it can be said that Joseph Sanusi was trying to round the corners of the triangle by moving towards the middle ground, even with a reserve-GDP ratio of 17.0 per cent on average and an inflation rate of 12.0 per cent, three times lower than under Ogwuma and Ahmed.

Figure 8: Trilemma by Governors' Regime



In 2004, under Charles Soludo, while maintaining the same level of capital control with FOI at 0.30, initially tried to increase monetary independence with the MI at 0.8, the highest throughout the 50 years period, and exchange rate stability with ERS of 0.68. But by the end of his tenure, both monetary independence and exchange rate stability have been lost as the MI and ERS now registered 0.41 and 0.226 respectively in 2008. Monetary policy instruments became more market-based and inflation targeting was introduced in 2007. The success of the rDAS, the rise in the external reserves position, fiscal discipline, and the banking consolidation exercise encouraged the transition from rDAS to wDAS in 2006 as the mechanism for exchange rate determination (CBN, 2009). The highest period of reserves to GDP ratio was recorded under Soludo at 31.0 per cent in 2007, while inflation rates averaged 11.8 per cent.

From 2010, following the banking restructuring exercise, Sanusi Lamido Sanusi tried to focus attention towards gaining more exchange rate stability and monetary independence with the ERS at 0.7 and MI at 0.69 by 2012, while maintaining about the same degree of capital mobility at 0.3, much the same as during Joseph Sanusi and Charles Soludo. Sanusi Lamido Sanusi also pursued inflation targeting, with an average inflation rate of 12.0 per cent between 2009 and 2012. The foreign reserves to GDP ratio, however, declined from 27.0 per cent in 2009 to 10.0 per cent in 2012 due to low accretion and the re-based GDP. As noted earlier, this period was characterised by policies that tended to provide wrong incentives for short-term capital inflows with persistent sterilisation, which keeps short-term monetary policy rates (MPR) comparatively high among emerging markets economies, heavy intervention in the foreign exchange market to maintain exchange rate stability, and with relatively low controls on short-term capital movements. In 2013 and 2014, the big sell-off of Nigerian domestic assets by foreign investors induced a significant downward pressure on exchange rate change.

Table 3: Trilemma by Governors' Regime

			Priority			Explanation
1970-1993		**INF%**	**1**	**2**	**3**	
1970-1975	Isong	14.2	ERS	MI	FOI	ERS key objective; MI second priority; Closed FOI
1977-1981	Vincent	15.9	MI	ERS	FOI	Loss of MI and ERS; Closed FOI
1982-1987	Ahmed1	12.2	MI	ERS	FOI	Regained MI; Loss ERS; Slight Opening of FOI
1988-1993	Ahmed2	37.9	MI	ERS	FOI	Strengthened MI; Lost ERS and Stringent FOI
1994-2012		**INF%**	**1**	**2**	**3**	
1994-1998	Ogwuma	35.5	ERS	MI	FOI	ERS main objective; MI reduced; FOI maintained
1999-2003	Sanusi	11.9	MI	FOI	ERS	Regained MI; Increased FOI; Reduced ERS
2004-2008	Soludo	11.6	MI	ERS	FOI	MI declined slightly; ERS and FOI increased
2009-2012	Lamido	12.0	MI	ERS	FOI	MI and ERS lower; FOI increased
Highest and Lowest Inflation in recent years						
1995	**Ogwuma**	**72.8**	**1**	**0.56778**	**0**	**Closed FOI and tension between ERS and MI**
2007	**Soludo**	**5.4**	**0.48797**	**0.49266**	**0.24430**	**Intermediate regime approximated**

III.3 2020 Onwards: Top Point C: Open Capital Mobility, Exchange Rate Stability, Loss of Monetary Independence

As Nigeria prepares to join the West African Monetary Zone (WAMZ) and single currency arrangement in 2020, it would have completed the movement from Point A (1960-1985) through Point B (1986-2019) to Point C (2020 onwards), which will correspond to loss of monetary independence, more capital mobility within the Zone, and exchange stability. Mundell (1961) also provides the relevant theory using the optimal currency area (OCA) for analysing the central conditions for an ideal monetary union. The OCA is considered the optimal geographical area of a common currency, or of several currencies, whose exchange rates are irrevocably pegged. Three main OCA criteria are factor mobility, degree of economic openness, and diversification of production and consumption. Nigeria is the dominant economy in the WAMZ, accounting for over 80.0 per cent of the population, and 90.0 per cent of the Zone's GDP. The issues of asymmetric shocks arising from the fact that oil contributes over 80.0 per cent of total revenue and 90.0 per cent of

foreign exchange earnings have been of concern for other WAMZ countries (Oshikoya, 2010). In view of these facts, developments relating to the economy of Nigeria will likely dictate the pace of monetary and exchange rate policy and may look like the country, as the centre, is still at point B, although monetary policy will be set by supra-national body, while the other countries, as the periphery, will be at point C.

IV. Empirical Analysis and Results

IV.1 Empirical Results: Trilemma Policy Stance

This sub-section empirically examines Nigeria's trilemma policy stance using the annual indices provided by ACI. First, Table 1 reports the means of the three indices for the periods 1970-2012, 1970-1985, 1986-1999 and 2000-2012. The entire sample period, 1970-2012 considered; overall, monetary independence has a higher mean value follow by exchange rate stability, and capital mobility, a distant third. The first sub-period focuses on the period when the central bank maintained essentially a fixed exchange rate and closed capital mobility. The second sub-period captures the structural break from 1986, when the pegged exchange rate was abandoned. The third sub-period was meant to cover the democratic dispensation. With these measures, exchange rate stability was relatively high in the first period, then fell in the second period, but gained marginally in the third period. Monetary independence increased from the first period to the second period, but declined modestly in the third period. Capital mobility declined from the first period to the second period, but then tripled in the third period.

As noted, The trilemma triangle represents a binding trade-off between three policy objectives. Accordingly, the methodology of the trilemma estimation is based on the principle that an increase in any one of the three indices must be balanced by a decrease in one or two of the other indices; thus ensuring that there is a binding constraint. All three indices cannot simultaneously reach their maximum values, but policymakers can experiment with a combination of the three policy goals. In this context, the index with the higher value would indicate the desirable policy goal that the central bank would like to focus on. Following the approach by ACI (2008), a simple functional form is adopted where a constant value of 2, the dependent variable is regressed on the three indices at the same time. The usual constant term is omitted on the right hand side of the equation as follows:

$$2 = aMIt + bERSt + cFOIt + Ut \quad (1)$$

Table 1 provides an explanation of the contribution of each trilemma indices. First, it is observed that the R-squared numbers are very high ranging from 0.97 to 1; a high regression goodness of fit clearly indicates that the linear model specification has provided an explanation of the trade-off facing the Central Bank of Nigeria among the three policy goals. The preferences attach to each policy goals can be measured by the estimated coefficients in equation 1; all three indices are consistently and statistically significant in all

the regressions. But there are variations across periods. Furthermore, the contribution of each policy goal is obtained by multiplying the mean value with the estimated coefficients for each variable in each period. The findings are interpreted by periods:

- For the entire period of 1970-2012, monetary independence dominated with high statistical value and a 70.0 per cent contribution weight of the total. Thus, according to Figure 10, for the whole period, monetary independence was given more importance, with both exchange rate stability (14.0 per cent) and capital mobility (16.0 per cent) providing about the same share of the total.
- In the first sub-period of 1970-1985, closed capital control was the dominant policy objective in line with the findings in section 2, where the country was at point A. Indeed, closed capital mobility significantly outweighs, with contributions of 100.0 per cent to the total, both monetary independence and exchange rate stability.
- For the second sub-period of 1986-1999, monetary independence regained upper hand with 84.0 per cent contributions, while both exchange rate stability (7.6 per cent) and capital mobility (8.4 per cent) made modest contributions. Monetary independence was re-asserted as exchange rate stability is lost and capital mobility wanes.
- For the third sub-period of 2000-2012, capital mobility, with a 91.0 per cent share, became once again a dominant factor after falling between 1970-1985 sub-periods and 1986-1999 sub periods. This result is consistent with the observation in section 2, where it was indicated that due to more open capital mobility, the index tripled during Joseph Sanusi, Soludo and Lamido Sanusi era compared to Paul Ogwuma and Abdulkadri Ahmed era. However, exchange rate stability suffered significantly providing negative contribution (-8.0 per cent), while monetary independence contributed 17.0 per cent.

Going by the size of the estimated coefficients and the share of contributions of the indices, monetary independence and capital mobility have been given more policy weights relative to exchange rate stabilisation objective. It appears that exchange rate stabilisation comes out more as residual goal both in the period from 1970-1985 when the country was at Point A with closed capital mobility and in the period 1986-1999 when more flexible exchange rate regime and open capital mobility were instituted. However, between the period 2000 -2012, the sharp increases in financial integration created tension between monetary independence and exchange rate stability. The story that emerges from these empirical results is that monetary independence and capital control or openings have been the most dominant throughout the sample period of 1970-2012, while exchange rate stability goal is simply a residual in the background.

IV.2 Empirical Results: The Trilemma, Inflation and Reserves

In addition to maintaining external exchange rate stability of the naira, one of the principal goals of the Central Bank of Nigeria is to maintain domestic price stability, measured as the

year on year inflation. In this sub-section, we empirically examine the impacts on inflation of the trilemma policy stance and their interaction with the reserve ratio. In essence, how has the policy choices affect inflation during the sample period.

Following IACI (2008, 2009, and 2010), Hutchinson, et.al (2010), and Aizenman and Sengupta (2011), the model is etimated:

$$yt = d0 + d1TLMt + d2FXRt + d3\ (TLMt*FXRt) + Vt \qquad (2)$$

where, *yt* is a measure for YoY inflation calculated using annual data in year *t*. *TLMt* is a vector of any two of the three trilemma policy indices, namely, *MI, ERS, and FOI. FXRt,* is the level of international reserves as a ratio to GDP., and finally (TLMt * FXR*t*) is an interaction term between the trilemma policy indices and the FXR. The significance of the interaction terms is that it identifies whether foreign reserve accumulation complement or act as a substitute for other policy stances. In accordance with Aizenman and Sengupta (2011), which undertake a similar study for China and India, the objective is to analyse the impact of the evolving trilemma choices on domestic inflation in Nigeria and to find out the impacts of foreign reserves accumulation on this macroeconomic policy dynamics. In essence, to what extent have reserves hoardings being used to soften the policy trilemma trade-off?

Given the limited degree of freedom, the regression analysis of inflation as a dependent variable on MI, ERS, FOI, FXR and their interaction has been focused on the entire sample period of 1970-2012. As the three trilemma indices are collinear, the estimated regressions used two policy indices at a time. The results are presented in Table 4.

The R-squared for the regressions are in the range of about 0.25 to 0.43, similar to the range of 0.16 to 0.46 obtained for India by Hutchinson, et. al (2010).

- Capital Mobility: The increase in capital mobility (FOI) has the most direct, significant and predominant dampening impact on inflation. Increased financial integration with the outside world helped in reducing inflation. However, when capital inflows openings were interacted with foreign reserves (FOI*FXR), this has a large, positive and significant association with inflation, counteracting the effect of FOI alone. This suggests that reserves hoarding tends to soften the impact of this policy stance.
- Exchange Rate Stability: The increase in ERS dampens inflation, but not in a significant way; suggesting a weak relationship between the objectives of exchange rate stability and inflation rates. The interaction of ERS*FXR shows positive but insignificant sign on inflation. ERS, FOI, and FXR are positive and move in the same direction interactively as they are geared towards external balance, while MI is geared towards internal balance, albeit unsuccessfully.

- Monetary Independence: The increase in MI alone is positively related to inflation, but in an insignificant manner. MI*FXR is of the opposite sign suggesting that the presence of FXR softens the impact of MI stance, with either FOI or ERS. When increased monetary independence is interacted with increases in reserves, this dampens inflation, but also in an insignificant way.
- Foreign Reserves: The direct impact of foreign reserves hoarding on inflation is also examined. Foreign reserves are negatively correlated with inflation, except when monetary independence variable is included and capital mobility variable is excluded in column 5, when the sign of the coefficient becomes positive, but insignificant. The best empirical results were obtained in Column 4 when the objectives of ERS and FOI, and omission of MI, are combined with FXR. ERS, FOI, and FXR individually reduce inflation rates, when the objective of MI is traded-off. This makes intuitive sense: when financial integration is given, reserves hoarding provides some flexibility in dealing with short-run trade-offs between exchange rate stability and monetary independence. Overall, the increase in foreign reserves has helped to mitigate the severity of the Trilemma, especially when combined with ERS and FOI objectives.

Table 4: Inflation, Trilemma Configurations and Reserves

	1	2	3	4***	5
Intercepts	**28.84** 2.566	**28.974** 2.5634	**29.273** 1.1489	**66.215** 5.606	**-25.393** -1.103
FXR		**-23.304** -0.771	**-53.94** -0.336	**-274.49** -2.852	**193.65** 1.377
ERS	**-1.558** -0.224	**-1.4044** -0.2006		**-17.858** -1.5191	**-11.547** -0.8567
ERS*FXR				**127.27** 1.407	**139.4** 1.33
MI	**11.018** 0.6826	**13.753** 0.828	**41.3167** 1.0674		**110.21** 2.727
MI*FXR			**-217.26** -0.9315		
FOI		**-72.523** -3.257	**-152.73** -3.1103	**-183.92** -4.136	
FOI*FXR			**660.33** 2.031	**844.29** 2.727	
R-Squared	**0.3085**	**0.3191**	**0.4087**	**0.4271**	**0.248**

V. Navigating the Policy Trilemma

V.1 Global Practices with the Trilemma

A sample of global Trilemma practices among developed countries, BRIC, MINT, SANE, and Oil producing countries was examined. Among the advanced countries considered as at 2012, the policy choices in France were exchange rate stability and capital mobility, with a loss of monetary independence and relatively low foreign reserves to GDP ratio; the United Kingdom policy choices were high capital mobility, monetary independence, with less exchange stability and low reserves ratio; Switzerland opted for high capital mobility, with high reserves ratio of more than 80.0 per cent minimising the tension between exchange rate stability and monetary independence.

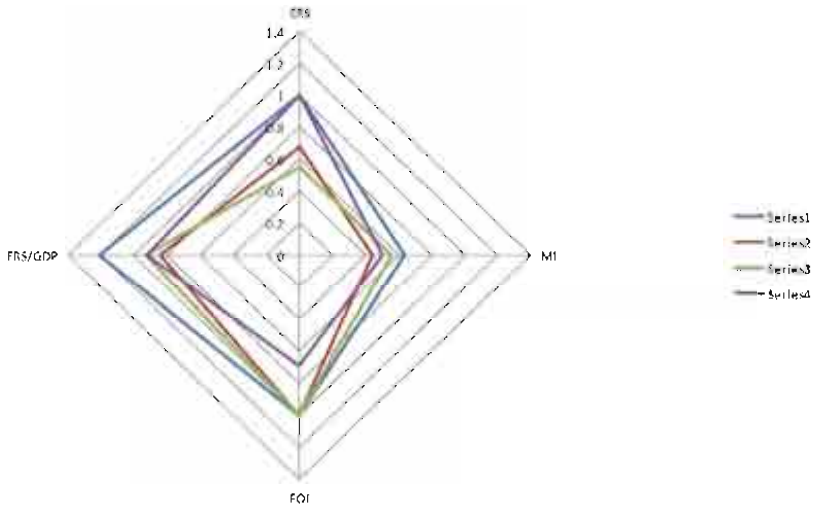
Table 5: Global Trilemma Practices

Advanced and Emerging Markets			**Other Countries**		
	Policy Choice	**Trade-Off**		**Policy Choice**	**Trade-Off**
Developed Countries			**SANE**		
UK:	FOI and MI	ERS	SA	MI and ERS	FOI, high Reserves
FR:	ERS and FOI	MI	AL	MI and ERS	FOI, high FRS
SW	FOI and ERS	MI, high FRS	EG	MI and FOI	ERS, low FRS
BRIC			**OIL PRODUCERS**		
BR:	MI and FOI	ERS	SA	ERS and FOI	MI , high FRS
RU:	MI and FOI	ERS,	VE	ERS and MI	FOI, how FRS
CN	ERS and MI	FOI, high FRS	AO	ERS and MI	FOI, high FRS
MINT			**Low Reserve African Countries**		
MX:	FOI and MI	ERS	CI:	ERS, MI	FOI
ID:	**ERS , FOI, MI**	**Medium FRS**	**GH:**	**Poorly**	**ERS , FOI, MI**
TR	MI and FOI	ERS	KE	MI and FOI	ERS
			High Reserve Asian Countries		
			HK	ERS and FOI	MI negotiated
			SG	FOI and MI	ERS negotiated
			MY	MI, and ERS	FOI negotiated
Indonesia has navigated the trilemma better with an intermediate regime than most countries with values of 0.4 evenly, and given its low reserve ratio of 0.13%. Rounding the corners of the Trilemma.			*High reserves provide a cushion for successful trade-off in HK, SG, MY, CN, SW, SA, and AL.*		

Among the BRIC countries, China stood out with emphasis on exchange rate stability and low degree of capital mobility, while high reserves ratio has enhanced its ability to conduct independent monetary policy. Brazil and Russia focused more on monetary independence and capital mobility, with exchange rate stability ranking third. Among the four countries, India appeared to have relatively less ability to navigate the three trilemma policy stance. The four MINT countries hod relatively low reserves rotios, with Mexico favouring open capital mobility, while navigating between exchange rate stability and monetary independence; Turkey put more emphasis on monetary independence and capitol mobility and less on exchange rate stability. Indonesia is in the intermediate range among the three choices. Relative to the other MINT countries, Nigeria had higher exchange rate stability and monetary independence, but lower capital mobility.

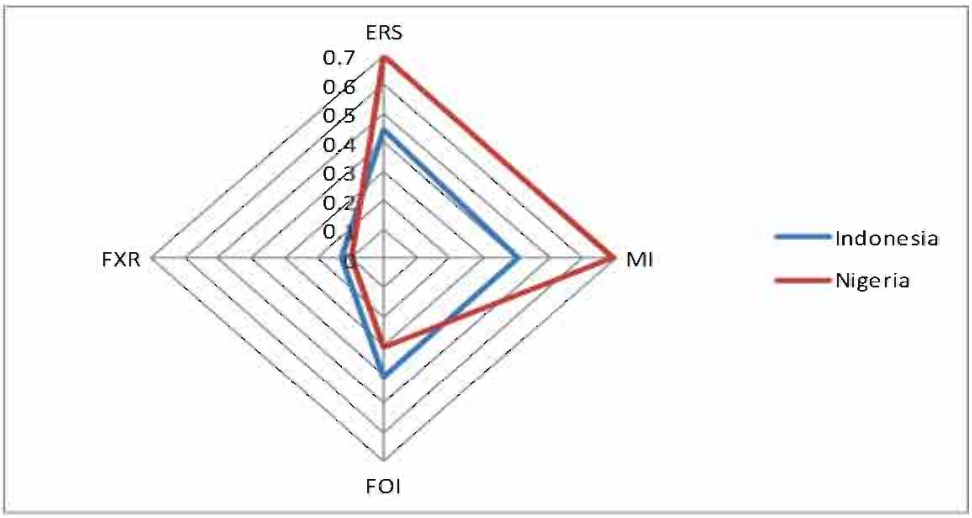
Among the high reserve small Asian nations, Hong Kong and Singapore favoured high capital mobility, while Malaysia had low capital mobility, but slightly more monetary independence. Among the large oil producing countries, Soudi Arobia hod successfully navigated the trilemma with very high reserve ratio, stable exchange rate, high capital mobility, and intermediate monetary policy stance. Angola and Venezuela opted for stable exchange rate ond closed capital mobility, with relatively low monetary policy independence, than even that of Nigeria. Among the SANE countries, Egypt opted for higher degree of capital mobility and monetary independence; South Africa had high monetary independence, but low exchange rate stability ond capital mobility. Algeria had low capital mobility, an intermediate monetary policy, but high foreign reserves ratio of more than 90.0 per cent. Among the smaller African countries, Cote D'Ivoire had exchonge rate stability, but low copital mobility and monetary independence; while Kenya had high degree of capital mobility and monetary independence. Ghana performed poorly on all three trilemma policy indices.

Figure 9: High Reserves Countries
Series 1: Hong Kong; Series 2: Switzerland; Series 3: Singapore; Series 4 Saudi Arabia.



As at 2012, countries with very high reserve ratio of 50.0 per cent to 100.0 per cent of GDP (Hong Kong, Switzerland, Saudi Arabia, Singapore, and China) appeared to navigate the trilemma very well, irrespective of exchange rate regimes, with fixed exchange rate in Saudi Arabia (SA) or floating exchange rates in Switzerland; irrespective of financial integration regimes, with closed capital mobility in China or open capital mobility in Switzerland; and irrespective of monetary policy regime, with monetary independence in China or lack of monetary independence in Hong Kong. With low reserves, an intermediate regime rounding the corners is best. Indonesia appears to have successfully navigated the economic policy trilemma by pursuing an intermediate regime among ERS, MI, and FOI, with modest foreign reserves as a ratio of GDP of 13.0 per cent. For Nigeria, with FXR of 10.0 per cent, FOI of 0.306467, to move towards an intermediate regime, more exchange rate flexibility and some loss of monetary independence may be necessary. With FOI constant and FXR low, there is increasing tension between exchange rate stability and monetary independence.

Figure 10: Trilemma: Nigeria and Indonesia



V.2 Summary and Conclusions

The impossible trinity or trilemma refers to the trade-offs policymakers in an open economy face. They can choose a combination of two of ERS, MPI and FOI, but not three simultaneously. Trilemma Indices for ERS, MPI, and FOI have been constructed for 170 countries including Nigeria. We examined the evolution of the policy trilemma indices for Nigeria from 1970 to 2012, descriptively, statistically, and empirically. We find that the trilemma does exist for Nigeria, when the three policy objectives were regressed on a constant number 2. An increase in one implies a decrease in another objective or two objectives. Monetary Independence and financial integration were the main dominant

factors. In general, monetary independence dominated throughout the sample period. However in Phase I, between 1970 and 1985, the objective of exchange rate stability was maintained as closed capital mobility dominated with extensive capital control. In Phase II, 1986-1999, monetary management dominated as exchange rate stability was lost with more flexible exchange rate regime and more capital mobility. In Phase III, 2000-2012, the sharp increase in capital flows created tension between MI and ERS, as exchange rate depreciated sharply.

The increase in foreign reserves has helped to mitigate the severity of the Trilemma, especially when combined with ERS and FOI objectives. Foreign reserves are negatively correlated with inflation. The best empirical results were obtained when the objectives of exchange rate stability and financial integration, with loss of monetary independence were combined with higher foreign reserves accumulation. Capital mobility alone has the most direct, significant, and predominant dampening impact on inflation. With capital mobility objective constant, and foreign reserves low, there is increasing tension between the objectives of exchange rate stability and monetary independence. Indonesia appears to have successfully navigated the Economic Policy Trilemma by pursuing an intermediate regime among ERS, MI, and FOI, with modest foreign reserves as a ratio of GDP of 13.0 per cent. For Nigeria, with foreign reserves to GDP ratio of less than 10.0 per cent, and a given level of capital mobility indicator, to move towards an intermediate regime, more exchange rate flexibility and some loss of monetary independence may be required.

In short, in the face of multiple goals including macroeconomic stabilisation and financial stability in an economy with increased financial globalisation, fiscal slippages, external terms of trade shocks, financial market distortions, foreign capital famine, and low foreign reserves, monetary and exchange rate policy carry a bigger burden.

V.3 Scope for Further Research

Given the importance of the policy trilemma for the monetary authorities, it is essential to continue to refine the framework, the methodology and data set used in this paper. It is recommended that the study be extended to 2014 and beyond as data become available. More importantly, a new set of the three trilemma indices should be constructed using quarterly data, which will even provide more insights as to the evolution of the policy stances within each given year. The framework can also be used to study the impact of the policy stances on inflation volatility, and not only inflation level, as well as output volatility, and financial stability. While the level of reserves ratio provides insights on the ability to maneuver with respect to the trilemma policy choices, actual policy execution will reflect in the changes in the level of reserves. Another research question worthy of pursuing: should foreign reserves be used as a gun powder or as a nuclear weapon? The issue of foreign capital feast and famine becomes more relevant in the context of a financial trilemma, distinct from monetary trilemma. As noted by Obstfeld (2014), the costs and benefits of capital controls require more research as capital flows pose a severe trade-off problem and macro-prudential tools are weakened. When are capital controls useful and what types of capital controls are effective?

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Dollarisation: Any Possibility in Nigeria and Its Effects on Economic Management and Exchange Rate Stability

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I. Introduction

I.1 Definition

There are several definitions, similar but somewhat varying, that have been used in the literature. Alesina and Barro (2001) defined dollarisation as the use of another country's currency as legal tender which may not be specifically the dollar. Bogétic (2000: 179) defines dollarisation as "a portfolio shift away from domestic currency to foreign currency, to fulfil the main functions of money—store of value, unit of account, and medium of exchange". According to Slivinski (2008), the term "dollarisation" describes a shift away from a country's domestic currencies toward a foreign currency- typically the U.S. dollar, but not always - as a store of value, unit of account, and medium of exchange. It is a generic term used to characterise the use of any foreign currency that effectively serves as a replacement for national currency. The substitute currency is typically the currency of a major trading partner or an important industrial power with a reputation of a sound monetary policy (Kessy, 2011).

To be sure, dollarisation in a broader sense could be of several forms depending on the legal arrangement and monetary policy focus. Yeyati (2006) makes the distinction between official dollarisation (de jure or formal dollarisation) and unofficial dollarisation (de-facto or unofficial dollarisation). The former is defined as a monetary arrangement whereby a foreign currency is given legal and exclusive status as a country's legal tender to perform all the functions of money without restraint. He defines the latter as an unofficial monetary arrangement facilitating the use of foreign currency alongside domestic currency.

Yeyati further breaks down unofficial dollarisation into two separate phenomena, which may take place separately or simultaneously. The first phenomenon is the use of foreign currency as a medium of exchange known as currency substitution, while the second is the use of foreign currency as a store of value known as asset substitution. In currency substitution, foreign assets are used as money, essentially as means of payment and unit of account, and it typically arises under conditions of high inflation or hyperinflation when the

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high cost of using domestic currency for transactions prompts the public to look for available alternatives. Once the use of foreign currency in transactions becomes accepted, it may not be rapidly abandoned.

Literature suggests that de facto dollarisation precedes de jure or official dollarisation where countries have previously owned a domestic currency. Moreover, there is more focus on de facto dollarisation than official dollarisation in the literature. Bogétic (2000) attributes this situation to the prevalence of more de facto than officially dollarised economies, the demographic size of most dollarised countries and the lack of published data on dollarised economies. Dollarisation in the sense of the unofficial use of foreign currency by economic agents is not a new phenomenon. What is new is the official adoption of foreign currencies in geographically large developing countries.

Until recently, formal dollarisation was seen as an option limited only to tiny enclaves or micro-states like San Moreno or the Marshall Islands. In all, only some dozen sovereign entities – including only one country (Panama) with a population exceeding 3,000,000, thus far, use the currency of a larger neighbour or patron in lieu of money of their own. Today, however, even nations as big as Argentina or Mexico are debating the merits of the approach (Cohen 2000: 2). Transcending the national level debate, pointed out by Cohen over official dollarisation, Ecuador and El Salvador have already gone ahead to introduce the dollar as their countries 'sole and legal tender.

"Dollarisation" no longer refers just to the U.S. dollar. San Marino and Vatican City are officially "dollarised"; Italian lira is the only legal tender (and will be replaced by the euro). Bosnia is officially "semi-dollarised"; German marks, are legal tender along with Bosnian marka. Macau and much of south-eastern China are unofficially "dollarised;" the Hong Kong dollar circulates but is not legal tender.

Table 1a below shows a high level of de-facto dollarisation for the period 1999 – 2003. This is an indication that official or formal dollarisation is imminent in several developing countries, especially in the face of recurrent economic distress and political instability.

TABLE 1a: Unofficial Dollarisation in Developing Countries (in Per cent)[2]

Country Name	Deposit Dollarisation[3]	Loan Dollarisation[4]	Public Debt Dollarisation[5]
Argentina	14	20	96
Bolivia	92	96	95
Brazil	0	0	49
Chile	15	14	45
Colombia	1	5	59
Costa Rica	46	55	53
Guatemala	10	25	88
Honduras	34	26	95
Mexico	10	32	42
Nicaragua	71	84	98
Paraguay	64	57	N/A
Peru	74	79	92
Uruguay	85	61	96
Venezuela	0	1	67
Latin America Country Average	37	40	75
Emerging Country Average [6]	22	19	39

2 Data are for (1999, 2001, 2002, and 2003), gathered from central banks and ministries of finance of respective countries.

3 Foreign currency deposits as a percentage of total deposits.

4 Foreign currency loans as a percentage of total deposits.

5 Public debt in foreign currency as a percentage of total public debt.

6 Emerging country average also comprise African countries including Morocco and Nigeria.

Source: Garlindo and Leiderman (2005:38).

I.2 Historical Experiences

Countries that use foreign currency as legal tender can be divided into two main groups. The first one corresponds to independent nations, while the second group covers territories, colonies or regions within a national entity. Panama is a good example of the first type of country, while Puerto Rico belongs to the second group. The countries and territories that have had a dollarised monetary system are very small indeed. Many are city-states well integrated into their neighbours' economies. Monaco, Lichtenstein, the Vatican and Andorra are good examples. Some of them are not only tiny, but also have an exciting and romantic origin. This is the case of Pitcairn Island, the place where a group of English

mutineers and Tahitian women settled in 1790. Many of the dollarised economies are so small that they do not have data on basic economic indicators such as inflation or growth.

The largest dollarised territory is Puerto Rico, and the smallest is Pitcairn Island. In 1998, the median population in the independent dollarised countries was 63,000 people; the median population in the territories was even smaller at 19,000 people. Another characteristic of these economies is that they are extremely open (Table 1).

Table 1. Dollarized countries and territories: Experiences and data availability

Country	Population	Currency	Data availability	
			Growth	Inflation
(A) Independent countries				
Andorra	73,000	France, Spain	1971–1998	—
Kiribati (1980)	82,000	Australia[†]	1971–1998	1983–1997
Liberia	2,900,000	USA	1971–1981	1971–1981
Lichtenstein	31,000	Switzerland	1971–1998	1971–1997
Marshall Inds. (1987)	61,000	USA	1971–1998	1982–1997
Micronesia	130,000	USA	1971–1998	1987–1998
Monaco	32,000	France	1971–1998	—
Nauru	10,000	Australia	1971–1998	1989–1998a
Palau (1995)	17,000	USA	1971–1998	—
Panama	2,700,000	USA	1971–1998	1971–1997
San Marino	26,000	Italy[†]	1971–1998	1985–1998
Tuvalu (1979)	11,000	Australia[†]	1971–1998	1983–1998
Vatican City	900	Italy	—	—
(B) Non-independent territories				
American Samoa	65,000	USA	—	
Cocos Islands	600	Australia	—	
Cook Island	20,200	New Zealand	1971–1998	1983–1998
Greenland	60,000	Denmark	1987–1997	1971–1998
Guam	150,000	USA	—	
Niue	2,000	New Zealand	—	
Norfolk Islands	1,900	Australia	—	
N. Mariana Inds.	70,000	USA	—	
Pitcairn Island	50	New Zealand, USA	—	
Puerto Rico	3,880,000	USA	1971–1998	1974–1998
Saint Helena	7,000	UK	—	
Tokelau	1,500	New Zealand	—	
Turks & Caicos	17,000	USA	—	
UK Virgin Inds.	19,000	USA	—	
US Virgin Inds.	120,000	USA	—	

Notes: [a]Consumer Price Index for Nauru is not available for the years 1994–1996.
[†]Also own coins in circulation.
Sources: Bogetic (2000), CIA Fact Book, US Congress Joint Economic Committee, October 2001 and The Statesman's Yearbook. Other recently dollarized countries and territories include East Timor (US dollar), Ecuador (US dollar), El Salvador (US dollar) and Kosovo (German mark).

II. Types of Dollarisation

The various types of dollarization are discussed below namely official, semi-official and unofficial. ***Official dollarisation*** means the dollar is legal tender; there is no local currency.

For example, the dollar is the only legal tender in Panama, Ecuador, Micronesia, East Timor and others.

Semi-official dollarisation means the dollar is legal tender and country also issues its own currency as practice in Bahamas, Haiti, Liberia, Laos, Cambodia and El Salvador.

Unofficial dollarisation (**"currency substitution"**) means the dollar is widely used in private transactions (as a unit of account, medium of exchange, and store of value), but is not legal tender; the local currency is legal tender. For example, the dollar is used in most of Latin America and most of the former Soviet Union, but is not legal tender. Unofficial dollarisation ranges from hoarding dollars in countries in which residents cannot legally convert local currency into foreign exchange, to the situation in Argentina where a government "currency board" fixes the exchange rate at 1 peso per US dollar, banks offer dollar-denominated accounts, and the dollar circulates freely – but is not legal tender.

II.1 Pros and Cons of Dollarisation

The pros of official dollarisation are as follows:

- Ensure low inflation (an inflation rate close to U.S. inflation);
- Lower the level and volatility of domestic interest rates (real and nominal interest rates) by eliminating the risk of devaluation and, thus, eliminating the devaluation-risk premium in local currency interest rates;
- Spur the development of domestic long-term capital markets by eliminating the risk of high inflation and devaluation;
- Lower transactions costs in international trade and investment;
- Reduce financial fragility by eliminating currency mismatches and by promoting integration of domestic financial firms into world markets;
- Financial deepening: Provides vehicle for domestic investment as alternative to capital flight, supporting financial deepening; and
- Spur substantially greater international trade.

The cons of official dollarisation mean that a country:

- Becomes unable to adjust its exchange rate when that might be helpful;
- Loses the ability to run an independent monetary policy and reduces effectiveness of monetary transmission mechanism;
- Loses the seignorage from issuing its own money;
- Loses the possibility of using the inflation tax ("revenue of last resort") by printing money in a national emergency;
- Faces balance sheet risks: Exposes public and private sectors to foreign exchange rate changes when asset and liabilities are mis-matched (liquidity);
- Loses the lender of last resort role which complicates the central banks' ability to stabilise the banking system; and

- Loses political sovereignty.

II.2 When to Dollarise Officially

- If a country chooses to dollarise officially, it may be that it wants to drive home series of reforms in its fiscal policy, the banking system and labor markets.
- Or it could do so as a first-step shock treatment, as in Ecuador, to rein in fiscal reforms, banking sector reforms among others.

It is important to note that the key issue is not whether dollarisation comes first or last, but whether the country has a political consensus to put in place (and to maintain) policies that are necessary to make dollarisation sustainable and credible. These policies include reducing budget deficits to a sustainable level, strengthening the banking system, making labour markets more flexible. Dollarising without such a consensus is extremely risky; if the appropriate policies cannot be put in place, dollarisation will fail.

II.3 Why Does Unofficial Dollarisation/Currency Substitution Occur?

- After repeated episodes of high inflation and currency devaluation/depreciation, residents of a country no longer view the local currency as a reliable store of value; they would, therefore, desire to hold dollars and dollar-denominated assets instead.
- Similarly, people become unwilling to denominate medium- or long-term loans in local currency because they have no confidence that they can estimate its future purchasing power; so, financial transactions are denominated in dollars (and long-term lending often disappears in any case).
- When inflation is high and variable, and reliable measures of inflation are not available promptly, it is easier to write contracts of all kinds in dollars than it is to write inflation- indexed contracts in local currency. When inflation is high, it is easier to quote prices in dollars than to quote prices in local currency and change them frequently.

II.4 Benefits and Costs of Unofficial Dollarisation

II.4.1 Benefits

- The major benefit is that it allows people to protect themselves against inflation and currency devaluation.
- Another benefit is that it makes longer-term lending and borrowing possible, enabling firms to finance long-term investment projects with longer-term rather than short-term debt.

II.4.2 Costs

- The major cost is that it leads to currency mismatches: firms with local currency receipts take on dollar-denominated debt because that is the only way to borrow longer-term.
- A country adopting a foreign currency as legal tender sacrifices its seignorage, the profits accruing to the monetary authority from its right to issue currency. The immediate cost of this issuance can be significant, and it continues on an annual basis thereafter.
- Dollarisation involves two kinds of seignorage loss. The first is the immediate "stock" cost: as the dollar is introduced and the domestic currency withdrawn from circulation, the monetary authorities must buy back the stock of domestic currency held by the public and banks, effectively returning to them the seignorage that had accrued over time. Second, the monetary authorities would give up future seignorage earnings stemming from the flow of new currency printed every year to satisfy the increase in money demand.
- In the event of a large devaluation of local currency, such firms may find themselves unable to service their debt; that can make their banks insolvent. This problem is particularly acute in countries that have maintained a fixed exchange rate for a long time because the fixed rate leads borrowers (and lenders) to believe that they need not hedge currency mismatches.

III. Measurement of Un-Official Dollarisation

Conceptually, the degree of unofficial dollarisation is measured by the stock of foreign currency held by domestic residents, which includes foreign currency deposits (FCD) in the domestic banking system, foreign currency in circulation (FCC) within the domestic economy and the offshore deposits (OSD) held by the domestic residents at foreign banks. Data on foreign currency deposits (FCD) is, in most cases, readily available and so much of the dollarisation literature has focused on various ratios that use combination of foreign currency deposits, local currency deposits and money supply, broadly defined.

Measures commonly used include:

- Foreign currency deposits as a ratio of local currency deposits (FCD/LCD);
- The ratio of foreign currency deposits to total deposits (FCD/(FCD+LCD));
- The ratio of foreign currency deposits to broad money supply (FCD/M_2); and
- The ratio of foreign currency deposits to extended broad money (FCD/M_3) .

It is extremely difficult to measure the amount of foreign currency held by domestic residents in the form of cash (FCC) since no domestic institution is responsible for its issue. At best, foreign currency in circulation can only be estimated.

A number of approaches have been proposed in the literature. For example, Kamin and Ericsson (2003) estimated foreign currency in circulation in Argentina by aggregating the net inflows of U.S. dollars based on the data obtained from the Currency and Monetary

Instruments Reports (CMIR) of the U.S Treasury Department, which documents the flow of U.S. currency between the U.S. and foreign countries. Feige et. al., (2002) used these data to estimate the foreign currency circulating in Latin America and transition economies.

Erasmus et. al., (2009) propose a method of estimating foreign currency in circulation based on the assumption that local currency money multiplier is identical to foreign currency money multiplier. The estimation procedure proceeds as follows: Money supply (*M*) is given by currency in circulation (CC) plus total deposits (*TD*). Letting *f* denote foreign and *l* denotes local, then the foreign and local components of money supply can be represented as:

$$Ml = CCl + TDl \qquad (1)$$

$$Mf = CCf + TDf \qquad (2)$$

Likewise reserve money (*B*) defined as currency in circulation plus total reserves (*R*) can be presented as

$$Bl = CCl + Rl\ Bf + CCf + Rf \qquad (3)$$

The money multiplier (*m*) is given by the ratio of money supply to reserve money i.e.

$$m = M/B \qquad (4)$$

$$ml = (CCl + TDl)/(CCl + Rl) \qquad (5)$$

$$mf = (CCf + TDf)/(CCf + Rf) \qquad (6)$$

There are two unobservable elements in these final expressions: foreign currency in circulation and the money multiplier for foreign currency. Erasmus et. al., make the assumption that the multipliers for the two currencies are identical.

Thus *ml* = *mf*, which allows the two equations to be solved for foreign currency in circulation *(CCf)*

$$CCf = ((ml * Rf) - TDf)/(1-mf) \quad (7)$$

Erasmus et. al., (2009) used this method to estimate foreign currency in circulation for Liberia and concluded that the amount of U.S. dollar circulating in Liberian economy in 2007 was about nine times higher than domestic currency in circulation. This method depends entirely on the plausibility of the assumption that the domestic and foreign currency multipliers are equal.

Another method that has been used in the literature to estimate foreign currency in circulation is the denomination displacement method proposed by Feige et. al., (2002). The thrust of this method is the hypothesis that foreign currency is typically used in large ticket transactions such as purchase of houses, automobiles and high value consumer durables. They argue that countries that are heavily dollarised will have domestic currency denomination structure that is skewed away from higher denomination domestic bills. This would occur as higher foreign currency denominations substitute for higher denominations of domestic currency.

Foreign currency in circulation could, therefore, be estimated indirectly as a cumulative value of the reduction in higher denominations of domestic currency in circulation. Feige et. al., (2002) applied this method to the Croatian data but did not find evidence of denomination displacement.

IV. Effects of Dollarisation

With regard to the effects of dollarisation, some researchers have shown its positive impact on the economies of Latin American countries. Dollarisation has helped these countries to reduce inflation, increase output growth and enhance international integration. In respect to the Euro area, studies by Meller and Nautz (2009) also showed a decline in inflation volatility persistence as a result of common currency in the area. Similarly, Bleaney and Fielding (2002) and Elbadawi and Majd (1996) have noted lower average inflation rate in Franc Zone area.

Although dollarisation can generate some benefits to the dollarised economy, several studies have found its negative impact on micro and macroeconomic variables. Dollarisation increases exchange rate and output volatility, lowers growth of economies with floating exchange rate systems, makes countries vulnerable to external shocks, increases financial risk and makes monetary policy less effective.

As a point of departure, this paper focuses on the main variables of interest in the dollarisation debate including inflation, fiscal discipline, currency risk, financial and trade market integration, labour market reform and economic growth.

IV.1 Inflation

For so long, inflation has been a common enemy in monetary policy circles in almost all countries. It is often defined as the sustained increases in the general price level of goods and services in an economy (Kibritçioğlu, 2002:45). Maintaining inflation targets has often been achieved through monetary policy adjustments. Such policy adjustments are mostly instituted through upward or downward adjustments in money supply or through exchange rate adjustment by means of devaluation or revaluation. In developing countries, inflationary situations are even of greater magnitude, sometimes sparking civil and political unrests. These inflationary situations are the reasons prompting the shift in monetary policy thinking in developing countries from maintaining independent domestic currency to the adoption of stable foreign currency as legal tender (dollarisation).

The central idea behind the introduction of a foreign currency and the elimination of domestic currency is that it wipes out inflation or reduces it to a level equivalent to that of the currency issuing country such as the United States. For example, political tension fuelled by hyperinflation and dismal economic performance prompted the government of Ecuador to drop the use of the Escudo and officially adopt the U.S. dollar as legal tender in 2000.

Proponents such as Vos (2000) believe it was a right decision by the Ecuadorian authority because both fixed and flexible exchange rate regimes had failed to re-verse inflation in that country. Hausmann (1999) justifies the proposition for dollarising Latin America, and by extension developing countries, with the contention that independent monetary policy has failed to deliver currency stability in the region citing cases of inflationary upswings and wage indexations across the continent. In the wake of the failure of both fixed and flexible exchange rate regimes, Hussmann proposes the adoption of a supra-national currency. Alesina and Barro (2000) also support this proposition for small closed economies with high historical inflation, especially if they are geographically proximate to a large economy.

Dollarisation prevents countries from printing money. Moreno-Villalaz (1999) for example argues that the absence of excess money supply and the inability to monetise fiscal deficits in Panama explains its success in maintaining low inflation. However, while the adoption of stable foreign currency may seem to be a solution to inflationary problems in developing countries, there are equally corresponding problems created to the monetary system. It takes away a country's independence in monetary policy. In a sense, a dollarised country delegates its sovereign control over monetary policy to a foreign country from which it has no direct benefits. It can no longer make money supply adjustments even when necessary.

Domestic savings and lending decisions cannot be influenced by local monetary authority as there are no central banks with active role of performing monetary policy governance, i.e., government loses control over monetary policy. At the same time, the central monetary authority is stripped of the ability to shelter the banking system during periods of liquidity constraints. Moreover, dollarised economies tend to lose revenue from printing money. These are the basic counter arguments which opponents of dollarisation, for example Chang (2000) and Chang and Velasco (2002), consider as posing potentially high costs when a country loses its domestic influence over monetary policy. The crux is that, it is not the mere use of foreign currency which cuts down inflation in developing countries. Instead, it is when developing countries are prevented from printing money that inflation is lowered. Inflation in this case is not absolutely eliminated. It still exists under dollarisation.

IV.2 Fiscal Discipline

The growing assumption is that developing countries are corrupt and imprudent in fiscal management. They run large fiscal deficits funded by seignorage. Monetising budget deficits has, therefore, been largely blamed for inflationary episodes in many developing countries for which dollarisation have been justified. Vos (2000) and Eichengreen (2002), for example claim that unsustainable budget deficits was one factor, which fuelled inflation in Ecuador prompting political unrest and a compelling decision to dollarise.

Hence, it is believed that dollarisation enforces restriction on fiscal profligacy. According to pundit Edwards (2001:249), countries that give up their currencies, will be unable to engage in macroeconomic mismanagement. However, the mechanism by which dollarisation enforces fiscal discipline remains inexplicit in dollarisation literature. The underlying assumption is that when developing countries are prevented from printing money to finance deficits, they are compelled to run balanced budgets. But balance budgeting is only one measure of fiscal discipline, which in itself does not guarantee that fiscal misappropriation and misallocation can be prevented. On the other hand, even if balanced budgeting explains fiscal discipline, there is no guarantee in theory that preventing countries from printing money prevents them from borrowing in foreign currency to finance deficits.

The crux is that preventing a dollarised country from printing money does not assure fiscal discipline. It only eliminates domestic inflation, which is the hub of the rationale for dollarisation. In this case, the dollarised country accepts external inflation imposed by the currency issuing country, America for example, in the case of the Ecuadorian and Panamanian economies. This highlights a weakness in the dollarisation-credibility link as economic governance transcends monetary policy alone. Eichengreen (2002) for example, argues that credibility offered to monetary policy by dollarisation may not necessarily enhance credibility in other policies.

IV.3 Currency Risk

Currency instability is one reason for which dollarisation has been encouraged in developing countries. Under independent monetary policy, alternative fixed and flexible exchange rate regimes are believed to have failed in preventing currency fluctuations.
Some critics have even ignored inflationary reasons as not compelling for dollarisation. They tend to attach more relevance to the risk of domestic currency devaluation under fixed or flexible exchange rate regimes and cost of trading domestic currency for international transactions. Bencivenga et. al., (2001) for example, ignores the relevance of price stability rationale advocated by dollarisation proponents since there are other mechanisms other than dollarisation by which inflation can be curtailed. They attach relevance to the uncertainties posed by alternative exchange rate regimes in currency conversion for international transactions; and the exposure of domestic currency to speculative attacks as most compelling for dollarisation in developing countries.

The assumption is that dollarisation eliminates this risk. Antinolfi and Keister (2001) equally contend that the urgency for dollarisation in developing countries has been primarily stirred by currency crisis. They make particular reference to the 1994 Mexican crisis, which was caused by a sudden devaluation of the Mexican Peso.
Whatever it is, the assumption of currency risk elimination under dollarisation is already a forgone conclusion. For example, in the case of adopting the euro, there is no nominal exchange rate factor between a member country of the European Monetary Union and the dollarised country.

IV.4 Effect on Trade and Financial Links

A powerful but still longer-term argument for full, legal dollarisation is that it makes economic integration easier with the rest of the world, and insulation of the domestic financial system correspondingly more difficult. Dollarisation may establish a firm basis for a sound financial sector, and thus promote strong and steady economic growth. The argument here is that dollarisation is perceived as an irreversible institutional change toward low inflation, fiscal responsibility, and transparency. Furthermore, dollarisation may contribute to greater economic integration than otherwise would be possible with the United States, or any other country whose currency is adopted.

A number of studies have found evidence that Canadian provinces tend to be more integrated in trade volume and price level differences among themselves than with the states in the USA that are closer geographically, trading in the order of twenty times more among themselves than with nearby USA. The use of a common currency may, thus, be a vital factor in market integration, given the fairly low transaction costs and restrictions to trade across the US-Canada border.

Dollarisation could also bring about a closer integration in financial markets. One of the most profound effects of Panama's dollarisation is the close integration of its banking system with that of the United States and indeed with the rest of the world, particularly since a major liberalisation in 1969–70. One major challenge posed to developing countries is the under development and isolation of their product and financial markets from international markets. The absence of a well-developed financial market, for instance, limits intermediation for investment capital in developing countries as domestic financial intermediaries are limited in scope and capacity. Product markets in developing countries are under-developed and largely restricted to limited markets. Hence, dollarisation is considered by proponents as a channel through which integration between developing countries product and financial markets and developed countries product and financial markets can be achieved in a short space of time with limited constraints.

The priori justification is that transaction costs are radically reduced, interest rates are lowered and investment credit is accessible in a dollarised economy and then market integration takes place (Schuler and Stein, 2000). Antinolfi and Keister (2001) and Alesina and Barro (2001) also acknowledge this potential benefit of dollarisation. They claim such integration is encouraged by other factors outlined as potential benefits of dollarisation including lower transaction costs and the elimination of currency risk. The rationale is that this integration helps to cushion a dollarised economy during periods of external shocks.
In a somewhat different context of financial market integration, Stockman (2001) claims that the most important effect of dollarisation is the use of the Federal Reserve by the dollarised country's central bank. This argument is hinged around the moral hazard created when political systems resort to printing money to bailout politically influential financial institutions. The trade integration assumption is that dollarised countries are likely to increase their trade with the currency issuing country, the United States for instance. Rose and van Wincoop (2001 cited by Klein 2005) and Frankel and Rose (2002) for example, suggest that dollarisation increases international trade.

IV.5 Labour Market Reform

One vague assumption sparsely discussed in dollarisation literature is that adopting a stable foreign currency and eliminating domestic currency enhances labour market reform. But the mechanism by which dollarisation enhances this reform remains unclear and unconvincing. Hussmann et. al., (1999) for example, argues that independent monetary policy in Latin America has prompted more wage indexation with surging prices. Dollarisation in this sense is meant to prevent wage indexation as prices are expected to remain stable. Soto (2009) in this regard explains that in Ecuador, it was anticipated that dollarisation would have impacted labour markets positively by increasing employment and real wages thereby improving the welfare of its residents.

However, the critical point which proponents have failed to consider is that an increment in real wage for domestic wage earners implies that the cost of hiring labour increases for employers. If labour market reform is to be impacted by dollarisation, then in this case, workers should accept lower wages to induce employers to hire more labour.

To suggest that labour market reforms can be driven by dollarisation is a fundamental flaw. The reason is that there is no clear direction in literature on how this process is enhanced by dollarisation. Jácome and Lönnberg (2010) for example propose flexibility of labour markets in dollarised economies to enhance the anticipated reform, but equally warn that hike in administrative wages could hinder job creation. Implicit in this proposition are both wage flexibility and wage ceiling measures, which are two extremes.

Hence, contrary to dollarisation proponents' claim, the answer to labour market reform is more of institutional than a market-driven process. Nickell and Nunziata (2002) and Belot and van Ours (2004) arrive at similar conclusions that institutional changes have mattered

more in unemployment histories even in OECD countries.

IV.6 Economic Growth

It has also been canvassed that dollarisation promotes economic growth. The flow of expectations are that dollarisation reduces inflation and transaction cost for international trade. Inflation cutting reduces currency risk, while a lower currency risk environment attracts foreign financial institutions and intermediation. Hence, foreign investment leads to growth in output.

Jácome and Lönnberg (2010) for example, make the assertion that the prime reason for dollarisation is the importation of a monetary policy framework which facilitates price stability and economic growth. It is presented as the ultimate way for achieving credibility, growth and prosperity (Edwards, 2001:249). All of the proposed benefits of dollarisation are gravitated towards growth.

Alesina and Barro (2001) make particular reference to the unprecedented growth periods of the 1960's and 1970's when expansionary monetary policies and inflation delivered higher economic growth and lower unemployment. As far as literature provides, there are no theories on which official dollarisation is based. It is a conglomeration of assumptions rationalised only in the context of developing countries, which have no routes in standard macroeconomic theories.

The general consensus in literature is that hyperinflation is the main reason why dollarisation is encouraged in developing countries. The core of the argument is that developing countries are unable to manage independent monetary policy and should, therefore, abandon it. The main proposition for relinquishing independent monetary policy is that it prevents developing countries from currency printing and monetising fiscal deficits.

IV.7 Effectiveness of Monetary Policy

It is contended that dollarisation makes the economy more vulnerable to inflation, decreases the effectiveness of monetary policy, and increases the volatility of the exchange rate. This occurs because dollarisation increases the elasticity of response of the public to changes in the real rate of interest on holdings of domestic monetary assets.

For example, suppose that the public holds only domestic currency and domestic currency deposits. If, in the face of a given fiscal deficit, the monetary authorities want to tighten the domestic money supply by operating in the open market to sell government securities in exchange for local currency, this results in a decline in the price of those securities and a rise in interest rates. If the only two assets that the public holds are government bonds and local currency, interest rates will rise to the point that induces people to hold the additional bonds in the place of the money used to purchase them.

To the extent that the public holds foreign currency, as well as, domestic currency and deposits, some of this foreign exchange will be sold for local currency in order to buy domestic bonds. This will result in both an appreciation of the exchange rate and a lesser decrease in domestic monetary assets held by the public. If the monetary authorities allow the appreciation of the currency to take place, this will help to control inflation through the direct effect that it will have on the prices of tradable goods and services. It may also have a deflationary effect on the overall level of output and income. This is the classical way in which monetary policy operates under a flexible exchange rate regime. It may also help to explain why the real exchange rate in Nigeria has tended to appreciate over the past few years in the face of persistent fiscal deficits and high rates of interest.

However, although inflation may be lessened through this mechanism, it has the unfortunate side effect of crowding out, not only domestic investors but also producers of tradeable goods, especially exports. On the other hand, if the monetary authorities intervene to stabilise the currency, this will result in the sale of the domestic currency, which will defeat the purpose of selling government bonds to mop up excess liquidity. Monetary policy will in this case be ineffective.

Dollarisation may also affect the stability of the money multiplier that is the ratio of the money supply broadly defined to the monetary base (reserves of the deposit money banks with the monetary authorities plus currency held by the public). For example, if the monetary authorities try to tighten the domestic money supply, the public may react by increasing their holdings of domestic currency through the selling of foreign exchange. This will have the effect of increasing the currency/deposit ratio and decreasing the money multiplier, which will reduce the effectiveness of the central bank's action in tightening the monetary base.

IV.8 Lender of Last Resort Function and Financial System Stability

While full dollarisation eliminates vulnerability of the banking system to the risk of devaluation, it does not eradicate all sources of banking crisis. And when they occur, full dollarisation may well impair the country's lender-of-last-resort function and hence, the central bank's response to financial system emergencies. The central bank's role in operating a discount window to provide short-term liquidity must here, be distinguished from its role as the ultimate guarantor of the stability of the financial and payments systems, in the event of a systemic bank run. Dollarisation should not greatly impede the ability of the authorities to provide short-term liquidity to the system or assistance to individual banks in distress. Such facilities are available if the central bank (or its replacement) saves the necessary funds in advance or perhaps secures lines of credit with international banks.

In contrast, the government loses some ability to respond to a sudden run on bank deposits throughout the entire system. In the case of a generalised loss of confidence, the authorities would be unable to guarantee the whole payments system or to fully back

bank deposits. Ultimately, the ability to print money as needed is what allows a central bank to guarantee beyond any doubt that all claims (in domestic currency) will be fully met under any circumstance. Once the ability to print money ceases to exist, limits to the lender-of-last-resort function appear. A fully dollarised country that had already spent its foreign currency reserves to redeem its stock of domestic currency might well lack the resources to respond.

V. Dollarisation in Nigeria: Any Possibility?

Prominent economists have begun to argue that essentially all developing countries should dollarise, and some industrial countries have even been urged to consider it. Partly prompted by the example of European countries giving up their currencies for the euro, some have suggested that Canada should adopt the U.S. dollar as the North American Free Trade Agreement (NAFTA) evolves.

Weighing the pros and cons of full dollarisation is complicated by the virtual absence of historical experiences. Panama is the only sizable country with a history of using a foreign currency—the U. S. dollar—as legal tender, and it is fairly small, and has very close historical, political, and economic links to the United States. Even if there were more country experiences to assess, they would have to be over longer periods than is usual for evaluating monetary and exchange rate options. That is because dollarisation is nearly permanent, and some of its benefits can be gained only in the long-run.

In Nigeria, the Central Bank Governor noted that "we are going to be looking at areas where people are doing what I call the unholy attitude of attacking the currency and making demands that are not needed. You have heard of dollarisation of the economy.

We will take actions to prevent that. The currency for doing businesses in Nigeria remains the Naira. And we will be looking at areas where people are making demands for foreign currency. People, who are landlords that are asking for rents in dollars; schools that are asking for fees in dollars, or transacting business in dollars in Nigeria, are illegal and I will like to advise those involved in these practices to desist from them because the CBN will very soon come after them".(CBN MPC Report, March 2015).

Again, on 7th April, 2015 the CBN restated its resolve to prosecute anyone found transacting business in the country with any foreign currency as a medium of payment. It goes further to state it had observed that some institutions price their goods and services in foreign currencies and demand payments in foreign currencies rather than the domestic currency (the naira), which is the legal tender in Nigeria. To this end, it drew the attention of members of the public to the provisions of the CBN Act of 2007, which states inter-alia that "the currency notes issued by the Bank shall be legal tender in Nigeria...for the payment of any amount".

Furthermore, the Act stipulates that any person(s) who contravenes this provision is guilty of an offence and shall be liable on conviction to a prescribed fine or six months imprisonment. It added further that "this prohibition, however, is without prejudice to foreigners, visitors and tourists who are encouraged to continue to use their cards for payments or exchange their foreign currency for local currency at any of the authorised dealers' outpost. It concluded by saying that "the general public is hereby advised to report any contravention of the provision of this Act to the Economic and Financial Crimes Commission (EFCC) and the CBN for appropriate action".

These comments do not in any way suggest that dollarisation of any form is a crime. Rather, the CBN is simply saying that it is illegal to transact businesses in foreign currencies and that it would impose sanctions on institutions in Nigeria that price their services in dollars without the required permits.

Historically, the preference for the U.S. dollar and other foreign currencies by Nigerian elites and aristocrats had never enjoyed the support of economic managers. The unrestricted and over-bearing demand for the U.S. dollar by Nigerians specifically the political and business classes exert much pressure on the strength of the Naira and its purchasing power. Factors believed to be propelling the dollarisation of the economy are: importation of refined petroleum products whose transactions are mainly done in U.S. dollars; bribery and corruption ; bulkiness of Naira notes when transacting business in huge amounts of money; increasing demand for dollars for the payment of school fees by "high-brow" educational institutions; the high demand for dollars when paying for hotel bills especially in top classed hotels; the demand for the payment of flight tickets in dollars by some foreign airlines; preference for dollars by estate developers when selling or renting real estate properties especially in cities like Abuja and Lagos.

Nigeria as a country has not officially adopted the dollar as a legal tender, but, unofficially, it is used as a means of exchange in the payment for goods and services. The incidence of the use of dollar in Nigeria arose from the adoption of the Structural Adjustment Programme (SAP) when the CBN officially encouraged the opening of domiciliary account, allowed hotels to charge and accept dollars from foreigners. That was when Nigeria was in dire need of foreign exchange to foot accumulated foreign trade bills. This was followed by the high inflation rates which decreased the demand for naira and raised the demand for alternative assets, including foreign currency and assets denominated in foreign currency.

Yinusa and Akinlo (2012) in their well-researched study submitted that "it could be deduced that the level of dollarisation in Nigeria is generally low but increasing". For Nigeria to adopt dollarization as a policy mix, there are basically three feasible forms namely: Unilateral, full monetary union with the US and through a bilateral agreement or treaty with the US. Unilateral dollarisation would represent a policy of adopting the US

dollar without any formal recognition or engagements of significance. We do not believe that monetary union with the U.S. is feasible – at least not today. It is often argued that the requirements for dollarisation are so demanding that those that would qualify would not stand to benefit much.

The other form consists of adopting the dollar in the context of a limited agreement between the dollarising country and the U.S. Other proponents tend to view dollarisation as a cure-all that will take care of fiscal, financial and real sector problems.

Basically, there are three different criteria to prepare a country for dollarisation.

- What would make dollarisation feasible?
- What would make dollarisation the best among the available choices?
- What would make it successful?

VI.1 Minimum Conditions for Feasibility

The truth is that there are very few minimum pre-requisites for dollarisation. First, the government needs to be legally and constitutionally empowered to make the decision. In some countries the President can impose such a decision by decree.

In others, the national currency is set in the Constitution. Getting the necessary legal authorisation involves political support. In addition, the country needs to be able to buy back the currency in circulation and transform it into dollars. To do that, it needs to secure sufficient international reserves which is currently low in Nigeria. Moreover, the country has fiscal and financial weaknesses or important rigidities of some other sort which are bound to generate problems no matter what exchange rate arrangement is chosen.

Preconditions may also be understood at a second level. Namely, one can ask the question what conditions are necessary to ensure that dollarisation is a better strategy than any alternative arrangement. The debate has often been framed as a choice between fixed, floating or something in between, such as a crawling rate or band.

The choice between a currency board and full dollarization is important in this subject matter. There are three technical differences which stand out:

- First, under a currency board, seigniorage revenue is preserved whereas it would be lost under full unilateral dollarisation.
- Second, full dollarisation would result in lower interest rates and in the absence of exchange rate mismatches.
- Finally, a currency board provides the option to adopt an alternative exchange rate regime at some future date.

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- Finally, a currency board provides the option to adopt an alternative exchange rate regime at some future date.

Whether dollarisation is preferred to a pure currency board depends on whether the advantages of having seigniorage revenue plus the value of the exit option to another exchange rate system outweighs the cost of having a higher country risk premium.

In this context, the experience of Argentina indicates that, even after 8 years of the convertibility, there is a large and very volatile exchange rate risk, as observed in market prices. (Rubinstein, 1999 and Borenzstein, 1999).

VI.2 Assuring Success

A different set of conditions is needed to assure success. Here the most important definition of success is that the process maintains ample public support, years after its adoption. This is likely to happen if inflation declines, growth and employment pick up in a sustained manner, interest rates decline, credit becomes more widely available on longer term and the export activities maintain their dynamism. To assure success a strategy is required to put in place supporting policies, the full exploitation of the virtuous reform circle, the prudent management of the likely initial boom and adequate precautions against external negative shocks.

VI.3 Dollarisation: What is Being Given Up?

In order to understand the policy issues that are involved in the decision to dollarise, it is useful to consider first what is being given up. Here, I would like to mention four broad categories:

- The ability to manage monetary and exchange rate policy;
- The ability to print fiat money;
- The ability to guarantee the liquidity of bank deposits; and
- The ability to default on the real value of nominal commitments

All these abilities represent options that a government has and can use at certain points in time, especially in difficult circumstances. However, markets know and understand that

these options exist and hence tend to factor them in. For example, the option to devalue is perceived by the market as a risk, which is then reflected in higher interest rates and shorter maturities.

Workers understand that the government has an option to inflate and consequently demand higher nominal wage increases or indexation. So the structure of contracts develops in such a way that it takes into account the presence of the options which the government has. There are various reasons why policy makers in Nigeria may have cause to worry about the increased dollarisation of the economy.

First is the stability of financial sector. If a significant part of the financial system is dollarised, there are two major risks to financial sector stability: liquidity risk and solvency risk. The liquidity risk associated with foreign currency deposits is qualitatively different from that of domestic currency deposits. For domestic currency deposits, the central bank can step in as lender of last resort, since it can create domestic currency in case of emergency.
For foreign currency deposits, international reserves are the only buffer that exists to stem a liquidity crisis, thereby limiting the central bank's scope for taking preventative measures.

The other risk that policy makers should be concerned about is the solvency risk arising from potential currency mismatch. In the event of a large depreciation of local currency, dollar debtors whose receipts are in local currency may be unable to service their bank loans which would potentially lead to banking crisis.

In addition, dollarisation reduces the ability of central banks to raise revenue from money creation. In economies where the demand for money is growing, the revenue thereby foregone may be substantial. Also the use of foreign currency as means of exchange in the non-tradable sector may potentially amplify the magnitude of exchange rate pass-through to domestic prices – making it harder for the monetary authority to control inflation through monetary targeting.

Widespread transaction dollarisation will likely increase demand for dollars in the economy to finance domestic transactions, which would otherwise be financed by domestic currency, which will in turn put pressure on exchange rate, weakening the domestic currency (which may further increase the demand for dollars).

VII. Concluding Remarks

Dollarisation is not something that should be debated in the abstract, as though the issues are the same everywhere. All in all, dollarisation is a complex enough problem to think that simple rules are going to be the solution for every country. The rationale for dollarisation in developing countries is not only weak, but lack any theoretical justification in standard macroeconomic theory.

On the one hand, one could argue that macroeconomic solutions should be needed in as far as dollarisation clearly has macroeconomic causes. On the other hand, the so-called "hysteresis" behind the dollarisation process point to government intervention as an important tool. More generally, economic authorities may want to think in terms of setting up the right incentives for residents to be willing to transact and hold local currency. Both market forces and government intervention should reinforce each other in that regard. As regards market forces, reducing price uncertainty seems key as it would reduce the need of consumers and firms to insure against inflation surprises. One important measure in this

regard includes strengthening the institutions, which promote monetary stability. The European experience shows that a clear focus on price stability and central bank independence are very important improvements on the institutional side.

As for government intervention, prudential regulation should aim at limiting the possibility of agents mispricing risk due to dollarisation. More specifically, prudential regulation should discourage financial intermediaries lending in foreign currency to agents who cannot generate revenues in foreign currency but are attracted by a lower cost of financing. While this measure is reasonable in terms of financial stability, it should be noted that it may encourage disintermediation. This is generally the case of any administrative measures, which may aim at reducing dollarisation.

Finally, empirical results by Edwards (2001), Abrego (2000), Soto (2011), Ghosh, Gulde and Wolf (1998) and Goldfain and Olivares (2000) are not suggestive that dollarised countries experience faster and higher economic growth than non-dollarised countries. In fact Edwards and Goldfain and Olivares results show that dollarised countries experience lower growth rates than non-dollarised countries considering Brazil, Chile and Costa Rica against Panama. The veracity of these results were verified using current data (2002 – 2010 and 2015 projections) from the World Bank and the IMF.

A policy agenda for dollarisation in Nigeria would seem to require a three-pronged approach:

- Ensuring that regulation encourages or, at least, does not penalise intermediation in domestic currency;
- The use of local-currency, or at least indexed, instruments should be promoted; and
- The institutional set-up of a central bank as well as its monetary policy strategy should be geared towards reducing uncertainty about the value of the local currency. This obviously implies that price stability should be central bank's main objective and real independence should be granted so as to facilitate the achievement of this objective.

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Exchange Rates, Capital Flows and Monetary Policy: Lessons from Emerging Market Economies

Dr. Biodun Adedipe*

I. Introduction

Monetary policy transmission depends on the openness of the capital account and the exchange rate regime, which is commonly described as the 'trilemma'[1] from the Mundell-Fleming model that countries cannot simultaneously fix their exchange rate, have an open capital account and pursue an independent monetary policy. Only two out of these three objectives are mutually consistent. It has been a major challenge to monetary authorities in the advanced economies as well as the emerging economies and more recently, the frontier economies. The challenge however, gets perpetuated with financial globalisation that raises the risk of contagion, and exposes the vulnerability of emerging economies to financial instability caused by the effect of huge capital inflows and outflows on asset prices and credit supply.

International capital is highly volatile and very mean. There have been several reviews and empirical studies of the relationships of these variables, with evidence that fall into two major planks of:

a. Peculiarities of nations do not matter much to international capital flows, with evidence that the exchange rate regime and other local macroeconomic conditions show low correlations with capital movements. This is more evident among advanced economies, but there is weak evidence that pure exchange rate floats are more amenable to stability than the hard pegs or any of the intermediate regimes.
b. Domestic monetary policy can indeed respond effectively to capital mobility, depending on the cocktail of instruments applied, including the unconventional capital controls. A strong case can be made however, for temporary controls irrespective of whether the exchange rate regime is pure float or hard peg.

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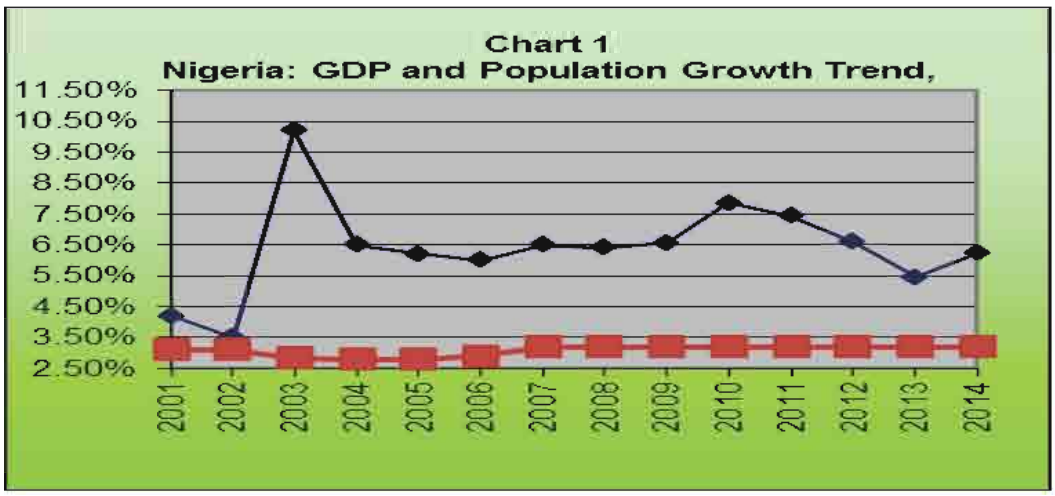
[1] The traditional 'trilemma' is choosing between free capital flows, a fixed exchange rate regime and independent monetary policy

Financial integration along with capital mobility has also posed a challenge in how foreign interest rates impact domestic rates, and thus having significant implications for capital flows. As such, the monetary policy stance of the advanced financial systems will have deep implications for the less developed systems. The monetary policy autonomy of central banks in the emerging economies has therefore, been questioned and become somewhat controversial, especially during financial and/or banking crises. The phenomenon of emerging and frontier economies attracting huge international capital during recovery and boom, and losing them rapidly during recession with accompanying difficulty of reviving credibility during slump invited a review of the trilemma debate to the dilemma argument.

Does exchange rate regime matter then? If it does, particularly in attracting international capital, should capital controls be introduced when the market appears unable to stabilise a financial system in contagion-induced turmoil? To what extent can a central bank of the impacted financial system claim autonomy of its monetary policy when international interest rates obviously impact domestic rates? Can capital controls be an independent instrument (aside from the traditional policy instruments) for reducing the impact of capital flows on domestic financial instability? Are there emerging economies that have succeeded with capital controls, and under what circumstances?



Source: National Bureau of Statistics, Nigeria

Table 1: Nigeria: Selected Development Indices

2013	GNI / capita	Life Expectancy (years)	School Enrolment (Primary)	Poverty Headcount	Access to Potable Water (rural)
Nigeria	2,710	52	85%	46.0%	49%
South Africa	7,190	56	102%	45.5%	88%
Ghana	1,770	61	109%	24.2%	81%
Egypt	3,140	71	113%	25.2%	99%
Mexico	9,940	77	105%	52.3%	91%
Indonesia	3,580	71	109%	11.3%	76%
Turkey	10,970	75	100%	2.3%	99%

Source: World Bank Development Indices, 2012/2013

The Nigerian economy recorded a robust growth that averaged an annual 6.4 per cent during 2001 to 2014 (Chart 1). This growth was non-inclusive, development indices worsened and inequality extenuated, with Nigeria falling into the global pattern of wealth concentration of 46 percent of global wealth in the hands of only one percent of world population!

The issues are: what role, if any, did international capital mobility played in these developments, especially leading up to the second half of 2008 and from 2014 up until the first quarter of 2015? Are there lessons for Nigeria from the experiences of emerging countries in dealing with the trilemma?

True independence of monetary policy means it is not dictated by the vagaries of the international capital market, which is difficult to attain when the capital account is open and there is full mobility of international capital. Independence is lost when fixed exchange rate is combined with full capital mobility, as increase in foreign interest rates can trigger rapid capital outflows and require currency devaluation to stem the 'tide'. A rise in the domestic interest rate will then become inevitable in order to adjust the current account. Credit becomes expensive and pressure on the exchange value of the domestic currency should ease. If the exchange rate regime is flexible and there is full capital mobility, the link between foreign and domestic interest rates becomes nebulous. There will then be need to apply a cocktail of instruments, some unconventional, to adjust the current account and balance the capital account in order to avoid the risk to growth and welfare.

This is the crux of the trilemma or what is also referred to in international finance parlance as the 'Holy Trinity'. It is ultimately about growth and welfare, and therefore implies that financial markets and trends in them should not be taken in isolation. In terms of trade-offs,

the critical choices transcend the conventional policy tools, final target and the policy anchor(s) in the domestic context, but also include variables that are international in nature. The direction of trade, the accounting and reserve currencies, as well as stocks and flows are also important.

This paper proceeds in four sections as follows. Section 2 gives a cursory summary of the literature on the 'trilemma-dilemma' that tend more towards the relevance of capital controls as an independent instrument in monetary policy irrespective of the exchange rate regime, while section 3 examines the evidence and effectiveness of the management of the process and relationships in emerging market economies (EME). Section 4 examines a country experience, while section 5 draws inferences for Nigeria and section 6 concludes with recommendations.

II. Summarised Literature and Stylised Facts

The increasing popularity and adoption of inflation targeting by most monetary authorities since the early 2000's has shifted more of policy attention to interest and exchange rates issues. Exchange rate regimes lie at or in-between the polar extremes of hard pegs and pure floats. Whether the regime adopted influences capital inflows has been subject of intensive research in international economics. Recent evidence suggests that susceptibility to risks associated with external shocks seem to be higher for hard peg regimes and less so for pure and 'managed' floats. The effectiveness of exchange rate regimes is also influenced by the state of the financial system, as banking or currency crisis raises the risks of hard pegs, whereas managed and pure floats have tended to perform better during crises.

Studies on emerging economies provide evidence of how well coordinated monetary policy can produce stable exchange rate in extreme situations of capital mobility. In some cases, there were controls to capital flows that lasted only with banking and/or currency crises, which seemed to reflect the low and high ebbs in the monetary policies of the advanced economies. This marked the reality of contagion and effect of globalisation, and raised the poser of "how can emerging economies protect themselves against the rich world's monetary policy?"[2] Some analysts however, argue differently that central bankers in the emerging market economies were merely using contagion as excuse for their 'incompetence'. Yet, it is difficult to disregard the facts that the Indian rupee lost 23 per cent against the US dollar between May and August 2013, at the same time that the Turkish lira lost 15.0 per cent and the Indonesian rupiah lost 16.0 per cent, all reflecting what the rich world was doing with their monetary policy.

[2] London Economist issue of August 31st 2013.

Until world attention was drawn to the quartet of Brazil, Russia, India and China (the BRICs) in the early 2000s by Goldman Sachs, not much of economic theory considered deviations from the traditional arguments for democratic economic management. The general thinking was that the market has the capacity for self-correction and thus interventions should be minimised, if they become inevitable and unavoidable. This classical *laissez faire* argument does not recognise the injurious nature of extremely mobile international capital whose large inflows trigger asset price bubbles and credit surfeit, and then the huge volume of toxic assets that ensue with rapid outflows. There is a new normal!

The central question is whether capital controls are desirable at all and under what circumstances in a world of increasing capital mobility. On its own, capital controls can become a disincentive by creating a perception of restriction on capital outflows and thus inhibit a country's access to fresh international capital inflows. Is this always so?

Saxena (2008) argues that if the capital account is closed, then domestic interest rates would transmit to domestic demand, irrespective of the exchange rate regime. However, if the capital account is open, then domestic monetary policy will be determined by the exchange rate regime and the degree of substitutability between domestic and foreign financial assets. Under a floating regime, monetary policy can work either through the interest rate and liquidity channel or through the exchange rate channel. Under the latter channel, the impact of monetary policy on aggregate demand is larger if domestic and foreign assets are substitutable, as policy induced changes in interest rates affect the exchange rate, which in turn affects output and inflation.
Saxena concludes that:

> "Since emerging markets are moving towards higher capital mobility, they need to adopt a free floating exchange rate regime in order to gain any monetary independence. The econometric results from the paper indicate that although exchange rates have become more flexible in these economies, they are nonetheless not free floats and accordingly the interest rates of these economies do still respond to foreign rates to some degree. Nevertheless, the impulse response functions show a decreased response of domestic interest rates to changes in US interest rates since 2000, which might suggest that as these emerging economies gain credibility with their newer forms of monetary policies (a move away from fixed to flexible exchange rate regimes with inflation targeting), there may be further delinking between these interest rates."

Volatile capital flows have been extensively blamed for episodes of booms and busts in emerging markets. (Calvo,1998). As helpful as large capital inflows are in driving rapid growth in the financial markets of emerging markets, they have also been strongly fingered in the boom-bust cycles since the mid-1990s[3] when they plunged those economies into

[3] Mexico in 1994-5, East Asia in 1997, Russia in 1998, and Argentina in 2001.

chaos by constrained credit and out-of-control exchange rates. In a sequel, Calvo (2005) suggests that the conventional wisdom about such crises is strongly influenced by the experience of advanced economies, prompting an urgent search for cogent explanations, especially the role credibility plays in containing financial crises.

Where a country operates the pure float exchange rate regime, Farhi and Werning (2013) argue that:

> "Without capital controls, optimal monetary policy responds by allowing a depreciation of the nominal exchange rate and an increase in the nominal interest rate. The rebalancing in the current account occurs by a drop in domestic spending."

The depreciation in nominal exchange rate should make imports more expensive and when complemented by costlier credit, will result in decrease in domestic spending. This ignores the rigidities peculiar to individual domestic markets that cause economic agents to behave irrationally. More expensive credits at times correlate with growth in credit volume, while demand for foreign currencies surges despite that they are more expensive! This irrationality also reflects in big government spending. They then made a clear case for capital controls, positing that:

> "Optimal capital controls take the form of temporary subsidies on inflows and taxes on outflows to smooth out these responses. This mitigates the required depreciation of the exchange rate, the increase in nominal interest rate, the reversal in the current account, and of the drop in consumption."

They cite papers that provide a rationale for "prudential" policies that attempt to prevent excessive borrowing to include volatility of capital flows, especially "sudden stops". (Mendoza, 2010), models with financial frictions (Caballero and Krishnamurthy, 2004) that emphasise domestic and international collateral constraints that create inefficiencies and a potential role for intervention in international borrowing, even without nominal rigidities, and those that emphasise pecuniary externalities that work through prices in borrowing constraints (Bianchi and Mendoza, 2010; Bianchi, 2011; Jeanne and Korinek, 2010; and Korinek, 2011).

The real argument is beyond the typical financial crisis theory on emerging markets that focuses on fiscal deficits and debt sustainability within agreeable limits (which have been misleading in some instances), real currency devaluation and the role of the financial sector. Economies that kept strictly to the 2 to 3 per cent limit of fiscal deficit have not exhibited any resilience to banking or financial crisis better than those that did not. As well, debt sustainability that was thought to be strong indicator of credit worthiness has failed to provide a safe anchor in times of crisis. Equally, currencies have been devalued and re-devalued to no end, followed by redenomination in some cases, without any enduring effect on determined capital outflows! Even the state of the financial sector has been proven repeatedly as important but insufficient to stem capital flows during a crisis. For

instance, capital requirements were thought strong enough to keep financial institutions stable during any crisis, but experience (especially the recent Great Recession, 2008-2010) has proven the insufficiency of capital, bringing in a cocktail of requirements among which the strongest today is risk management.

There is growing emphasis on stocks rather than flows. While flows are important to track in terms of accretion to and decrease in stock, the absolute stock amount is even more important. The stock also has to be interpreted in many relative terms. For example, the stock of external reserves that supports the management of the exchange value of a currency may be 'huge' by all standards, but inadequate buffer when compared to trade flows (especially import bills for a net importer), GDP, population, etc. There was such experience in Nigeria during April to November 2008 when massive capital outflows rapidly depleted the external reserve buffer and warranted a 20 percent devaluation of the Naira by the Central Bank in December 2008.

In a more recent survey of the literature, Davis and Presno (2014) put the summary as:

> "Rey (2013) and Forbes and Warnock (2012) show that capital flows into and out of emerging markets are largely driven by global factors. They both show that a measure of global risk is one of the main determinants of international capital flows. Meanwhile, country-specific characteristics are largely irrelevant for driving capital flows into and out of a particular emerging market economy. Reinhart and Reinhart (2008) argue that surges in capital inflows into emerging markets are associated with a higher likelihood of banking, inflation and currency crises, and contribute to economic and financial instability. Kaminsky, Reinhart and Vegh (2004) show that capital inflows are a primary reason for the procyclicality of fiscal and monetary policy observed in many emerging markets. Rey (2013) argues that since these foreign capital flows can lead to asset price bubbles, excess credit creation, and financial instability, capital controls or some tool of active capital account management is necessary in many countries. She argues that this cycle of capital inflows and outflows means that the classic "trilemma" of international finance is actually more of a "dilemma", and that "independent monetary policies are possible if and only if the capital account is managed." Klein and Shambaugh (2013) dispute this result and instead argue that a country with an open capital account can still gain considerable monetary autonomy by simply allowing its exchange rate to float."

The central argument of Ghosh, Ostry and Qureshi (2014) is that the choice of exchange rate regime is a major issue facing emerging market economies (EME), and the choice should be guided by its crisis susceptibility. The argument rests on the background of a statement by Stanley Fischer (1999) which they quote as:

> "Whatever exchange rate system a country has, it will wish at some times that it had another one."

They find it strange that Fischer would argue later (in 2001) that the two extremes of pure floats and hard pegs are less vulnerable to shocks and crisis than the intermediate regimes (managed floats). On the one hand, resilient hard pegs are difficult to relate to conventional wisdom, and on the other, the economies (even the advanced ones) that practiced pure floats have also from time to time interfered as warranted by market turbulence or events. It is easy then to claim that there is no pure system in operation anywhere! This further made Ghosh et. al., (2014) to ask whether such interference can correctly be interpreted as intermediate systems. Since managed floats are more vulnerable, shouldn't EME learn 'how to float'?

Following the great recession of 2008-2010, some facts appear to stand out:

a. In an era of globalisation and financial integration, whether an economy is advanced, emerging or frontier does not confer advantage over others in terms of the impact of financial crisis occurring at the same time as crisis in a sector to which the banking system is heavily exposed.
b. The impact of financial crisis on the economy disregards the exchange rate regime.
c. Terms of trade are important, but they are not strong enough to ameliorate the rapid capital outflows in a crisis situation.
d. The stock of external reserves is a proven factor in dealing with the trilemma of exchange rates, capital flows and monetary policy.

Looking at the specific experiences of emerging market economies with respect to the trilemma should give further insight into the options that are open to Nigeria, and what the policy makers should be considering.

III. Emerging Market Economies (EME) Experience

Saxena (2008) reports that the EME have become more open on capital account and are following freer exchange rate policies. For example, on a scale of 3, the average index of capital mobility increased from 1.61 during 1975–99 to 2.59 between 2000 and 2006 for a group of 17 emerging economies in Asia and Latin America and including South Africa. The proportion of observations on exchange rate regimes classified as floating increased from 68.0 per cent to 73.0 per cent between 1975–99 and 2000–06. Against this background, she indicates that it would be interesting to see if any of the following plays out.

a. Higher capital mobility has increased the impact of foreign interest rates on domestic rates;

b. Floating the exchange rate helps reduce the impact of foreign interest rates on domestic rates.

The issues come clearer when the expected domestic interest rate link with the foreign interest rate is explored under the following four scenarios. Monetary policy is designated as MP.

	Fixed Exchange Rate	Flexible Exchange Rate
Capital Immobility	1. No link	2. No link
Capital Mobility	3. Possible link	4. ???

MP independence

MP dependence

MP independence (credibility induces delinking)

Scenario 1: Capital immobility in a fixed exchange rate system makes monetary policy independent, and thus domestic interest rate is not influenced by foreign interest rates.

Scenario 2: With capital still immobile, monetary policy will remain independent even with flexible exchange rate system.

Scenario 3: With full capital mobility under a fixed exchange rate system, rising foreign interest rates will trigger capital outflows and depreciation of the domestic currency. The safe thing to do to prevent depreciation would be to raise domestic interest rates. This establishes a positive link between domestic and foreign interest rates.

Scenario 4: The link between domestic and foreign interest rates is not clear under full capital mobility and flexible exchange rate, as central banks intervene either to keep the exchange rate within the target band or to amass external reserves. This obfuscates the link.

Concluding, Saxena (2008) states that for the 24 emerging market economies she sampled[4]:

> "The trilemma states that ... countries cannot simultaneously control their exchange rates and their interest rates. In order to gain monetary independence, countries either have to adopt a free float or impose full capital controls. Since emerging markets are moving towards higher capital mobility, they need to adopt a free floating exchange rate regime in order to gain any monetary independence ... although exchange rates have become more flexible in these economies, they are

[4] Asia: CN = China; HK = Hong Kong SAR; ID = Indonesia; IN = India; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; TW = Taiwan, China. Latin America: AR = Argentina; BR = Brazil; CL = Chile; CO = Colombia; MX = Mexico; PE = Peru; VE = Venezuela. Others: CZ = Czech Republic; HU = Hungary; PL = Poland; RU = Russia; SA = Saudi Arabia; TR = Turkey; ZA = South Africa.

> nonetheless not free floats and accordingly the interest rates of these economies do still respond to foreign rates to some degree."

Furthermore:

> "The econometric results from the paper indicate that although exchange rates have become more flexible in these economies, they are nonetheless not free floats and accordingly the interest rates of these economies do still respond to foreign rates to some degree. Nevertheless, the impulse response functions show a decreased response of domestic interest rates to changes in US interest rates since 2000, which might suggest that as these emerging economies gain credibility with their newer forms of monetary policies (a move away from fixed to flexible exchange rate regimes with inflation targeting), there may be further delinking between these interest rates. Indeed, several central banks have stated that inflation targeting has helped bring expectations of inflation down and the expectation channel is becoming stronger, whereby stronger anticipated effects of monetary policy require less aggressive interest rate changes. Such credibility will help monetary policy become more independent of external influences."

The above conclusion is at variance with the argument and inference of Helene Rey (2013) from the results of US data analysis and references to several studies cutting across advanced and emerging economies. She states:

> "Whenever capital is freely mobile, the global financial cycle constrains national monetary policies regardless of the exchange rate regime.... Hence, the most appropriate policies to deal with the "dilemma" are those aiming directly at the main source of concern (excessive leverage and credit growth). This requires a convex combination of macroprudential policies guided by aggressive stress-testing and tougher leverage ratios. Depending on the source of financial instability and institutional settings, the use of capital controls as a partial substitute for Macroprudential measures should not be discarded."

More recent and wider scope by sample size (50 major EMEs over 1980-2011) is the study by Ghosh et. al., (2014) that provides the following:

> "First, when it comes to financial vulnerabilities (rapid credit expansion; excessive foreign borrowing; FX-denominated domestic currency lending), and macroeconomic vulnerabilities (currency overvaluation; delayed external adjustment), less flexible intermediate regimes (pegs, bands, and crawls) are significantly more vulnerable than pure floats—but so are hard pegs. Second, intermediate exchange rate regimes as a class are indeed the most susceptible to banking and currency crisis, but de facto managed floats—a subclass within intermediate regimes—behave much more like pure floats, with significantly lower risks and fewer crises. The vulnerabilities under hard pegs however tend to be manifested in growth collapses rather than in banking or currency crises—perhaps because the high cost of exiting the regime makes the authorities reluctant to

> abandon it, opting instead for long and painful adjustment. Third, at the soft end, we find that there is no simple uni-dimensional dividing line (e.g., according to nominal exchange rate flexibility) between safe floats and risky intermediate regimes. Rather, the key to avoiding crises is to ensure that the real exchange rate does not become overvalued—and what makes for a "safe" managed float is that the central bank intervene in the face of overvaluation pressures and refrain from intervening to defend an overvalued exchange rate."

The critical question then will be whether the currency is overvalued at all, and how the central bank should respond to that. Is overvaluation established by reasons of the premium on the official exchange rate over the rate at the road side, or the purchasing power parity vis-à-vis the terms of trade? Does this consider the nature and structure of exports as well?

IV. Specific EME Country Experiences

IV.1 Singapore[5]

Foreign exchange intervention is directly pertinent in the conduct of monetary policy by the Monetary Authority of Singapore (MAS), whose monetary policy focus since 1981, is on the management of the exchange rate. The preference for exchange rate over interest rate as the instrument of monetary policy is predicated on the Singapore economy's small size (GDP of US$297.94 billion in 2014 and number 36 globally)5 and its high degree of openness to trade and capital flows (40.0 per cent of domestic consumption goes on imports and trade was 300.0 per cent of GDP in 2011). This has helped a stable and predictable relationship between the exchange rate and price stability, as the intermediate and final targets respectively over the medium term.

Tee (2013) argues that the three major features of the exchange rate system have served as an effective anchor of price stability, keeping inflation low and stable over the past 30 years.

1. The basket feature indexes the rate (S$NEER, nominal effective exchange rate) to Singapore's major trading currencies, and not an individual currency.
2. The band feature sets upper and lower limits for the trade-weighted exchange rate, and

[5] According to the International Monetary Fund (IMF) statistics for 2014, when Nigeria ranked 21st with GDP of $594.26 billion. It requires a growth rate of 14.0 per cent in 2015 to dislodge Switzerland ($679 billion economy) from the 20th position.

3. The crawl feature (slope of the band) indexes it as well to economic fundamentals. The slope of the policy band, as well as the level at which it is centred, is not disclosed. Moreover, the openness of the economy makes the exchange rate relatively controllable through direct intervention in the foreign exchange markets.

The corporate sector of the Singaporean economy is dominated by foreign multinationals that hardly borrow from the domestic credit markets and their borrowings are thus price inelastic, whereas capital mobility between offshore banks (denominated in foreign currencies) and domestic (Singaporean dollar) banking makes small changes in interest rate differentials capable of triggering rapid and huge capital movements! For the exchange rate however, changes in it can act directly to dampen imported inflationary pressures and indirectly to tackle domestic sources of inflation.

In essence, the exchange rate-based monetary policy allows the Singapore government to retain greater control over macroeconomic outcomes such as GDP and CPI inflation, and thus over the ultimate target of price stability. In addition, Singapore has complemented monetary policy with micro- and macroprudential measures to ensure overall price and financial stability in the economy. The Monetary Authority of Singapore (MAS) thus cedes control over domestic interest rates and money supply -- all it worries about is how to dampen excessive interest rate volatility. As such, Singapore dollar interest rates are therefore largely determined by foreign interest rates and investors' expectations of the future movement of the Singapore dollar.

IV.2 Malaysia[6]

Malaysia was in a desperate situation in 1998 when she introduced capital controls – there were massive capital outflows and currency speculation that warranted depreciation of the ringgit by 40.0 per cent at a time the stock market took a shaving of some US$140 million of its value. Raising interest rates to counter depreciation of exchange rate was bad news for growth because it will hurt businesses. The economy contracted by 2.8 percent in the first quarter of 1998. Amid accusing the world financial centres of conspiracy, Malaysia introduced the following controls:

- The ringgit was fixed at 3.8/US$, which was 10.0 per cent higher than the rate at the time it was trading freely.
- All ringgit taken out were ordered repatriated within one month, although the deadline was later relaxed.
- Tight limits were imposed on capital transfers abroad by residents.
- Freeze on foreign direct investment (FDI) outflow for 12 months.

[6] This was culled from the paper by Ong Chong Tee who was the Deputy Managing Director of the Monetary Authority of Singapore.

As speculative pressure eased on the ringgit, the government began spending on public works projects to boost domestic demand and stave off recession. All these were strictly motivated by the prime minister, because the central bank governor, his deputy and finance minister disagreed, and they all resigned!

But soon after the controls were imposed, the Kuala Lumpur Stock Exchange's KLSE index rose by 80.0 per cent as repatriated ringgit moved back into the market. Foreign reserves rose to US$27 billion, or five months of import cover, from US$20 billion in the four months after the controls were imposed. Economic growth came in at 5.4 per cent in 1999, rebounding from a contraction of 7.5 per cent in 1998.

By February 1999, the country started to ease the controls to avoid a run. Fresh capital inflows were subjected to shorter control periods, while there were taxes imposed on exiting portfolio investment. Foreign businesses operating in Malaysia did not worry about the cocktail of policies, which would strengthen the economy and thus support their business. The only worry was impeded access to international capital. The controls were lifted finally in July 2005, being in place for all of seven years.

More recently, the prime minister stated that Malaysia will not impose capital controls because its situation is not the same as it was during the crisis of 1997. With some US$130 billion in reserves and small chance of default, Malaysia is in a strong position to weather the storm of rapid outflows being experienced. In a retrospective acceptance of the capital controls imposed in Malaysia in 1998, the International Monetary Fund (IMF) report on Malaysia in 1999 gave a clear pointer as to preconditions for capital controls, arguing that this was why it succeeded in Malaysia.

- The adequacy of foreign exchange reserves permitted the central bank to credibly fix the exchange rate. If it hadn't already possessed enough reserves to defend the ringgit, it might not have been able to prevent local savers to flee fearing a collapse in the new exchange rate regime.
- The fact that the Malaysian economy had relatively strong fundamentals when the controls were adopted and that the controls were accompanied by an economic reform program.
- The ringgit was somewhat undervalued at 3.8 ringgit to the dollar as other regional currencies were starting to strengthen, so there was less reason for people to evade the peg.
- The fact that the controls were so wide-ranging meant they closed a lot of possible loopholes.
- Strict implementation by the central bank and a disciplined banking system willing to obey the controls.
- Transparent and clear information about the controls, why they were imposed and how they would work.

This makes it obvious then that dealing with the trilemma is largely a function of the peculiar situation of each country and the commitment by all stakeholders to the changes required to stabilise the financial and re-energise growth.

IV.3 Other Emerging Economies

Strauss-Kahn (2010)[7] stated that:

> "Nations from Brazil to China are striving to restrain their currencies by selling them or applying capital controls as investors seek higher-yielding emerging market assets amid near-zero U.S. borrowing costs. Capital flooding into Asia may lead to excessive exchange rate moves, asset bubbles and financial instability."

Finance chiefs of emerging economies blamed monetary easing by advanced nations for pushing investment into their markets and stoking currency appreciation. Yet, the U.S. and Europe have been pressuring emerging countries to let their exchange rates appreciate to rebalance demand in the world economy. South Korea promised further measures to counter capital inflows triggered by "low" interest rates overseas, according to the Finance Minister Yoon Jeung Hyun. The authorities will act when "herd behaviour" causes sudden moves in the currency.

V. Major Inferences

From the preceding two sections, the following can be inferred:

1. Financial globalisation is making international capital increasingly mobile thereby heightening the risk of contagion.
2. There are disparate exchange rate regimes that theoretically, fall along a continuum from pure float to hard pegs, and the intermediate systems of the managed and 'dirty' floats (crawling peg), with several operational variants of each system. No country operates a pure float in the real sense of it.
3. Capital immobility makes the exchange rate regime adopted irrelevant, as it delinks the domestic interest rate from foreign interest rates and thus makes monetary policy independent.
4. A fixed exchange rate regime with full capital mobility presents a strong positive link between domestic interest and foreign interest rates, and has high vulnerability in times of financial and/or banking crisis.
5. In an open economy that allows full capital mobility, a flexible exchange rate system is more amenable to minimising vulnerabilities of massive capital outflows,

[7] Dominique Strauss-Kahn, President, International Monetary Fund (Oct. 18 2010).

although there is no conclusive evidence to support a strong link between domestic and foreign interest rates.

6. Most EME have evolved from fixed exchange rate regimes to flexible regimes as their economies became more internationalised. The lessons of the early years of liberalisation and massive capital outflows during financial crisis have given credence to reforming their economies and financial systems, proving that capital controls over a well-defined period of time and in response to crises or destabilising events is productive.
7. Flexible exchange rate regime and full capital mobility creates credibility on the back of strong fundamentals that allow effective use of capital controls to manage financial and banking crisis.
8. Capital controls can exist side-by-side with conventional monetary policy instruments.
9. The boom-bust cycle can be moderate by aggressive stress-testing of and tougher leverage ratios for financial institutions.

VI. Conclusion and Recommendations

Whether the central bank is faced with the trilemma (fixed exchange rates, independent monetary policies and full capital mobility) or dilemma (full capital mobility and managed capital account) is largely a function of the exchange rate regime adopted. The more internationalised the financial system of an emerging economy is, the more attractive it becomes to international capital. This creates vulnerabilities that are best managed under flexible exchange rate regimes, as opposed to hard pegs or managed float systems.

There are however, hard lessons for Nigeria to take from the experience of the EME, and these go beyond the arguments surrounding the 'Holy Trinity' of central banking. These should indeed be regarded as preconditions (Adedipe, 2007) for the recommendations to follow, and they are:

1. Macroeconomic stability
2. Fiscal discipline
3. Strong and liquid financial system, both the money and capital markets
4. Minimal interest rate differential
5. Flexible exchange rate management regime
6. Robust external reserves
7. Fast growing GDP
8. Effective and efficient financial regulatory and supervisory framework.

Singapore and Malaysia were singled out for mention in country experiences, given their significant improvement in the annual 'Competitiveness Index' compiled by the World Economic Forum as well as the 'Doing Business' ranking by the World Bank and International Finance Corporation. For example, Malaysia improved significantly in the

doing business ranking from 24 in 2005 to 6 in 2014, while Singapore has topped doing business for nine years at a row from 2007 (its competitiveness index ranking improved from 5 in 2008/2009 to being among the top-three since 2009/2010). This no doubt, is one of the reasons the Singaporean and Malaysian economies are attractive to international capital, with the underlying factors listed out in Appendix.

In specific terms then, the Central Bank of Nigeria and other emerging/frontier economies that are faced with the trilemma should:

1. Introduce capital controls for defined period of time, not exceeding 12 to 18 months. Capital controls are inevitable unconventional instrument whenever a currency is under persistent pressure as a result of rapid capital outflows. This is irrespective of the exchange rate regime being pursued.
2. Fix the Naira exchange rate for the same 'control window', resisting every argument or suggestion of devaluation of the Naira. The pressure in the foreign exchange market is largely driven by speculation and demand that delinks from the trend in economic activities. Historically, devaluation based on premium on the official exchange rate has not produced any enduring benefit to the economy because the principal export products/produce are items on which the exporters have little or no control over the prices.
3. Strengthen regulatory oversight to ensure a disciplined banking system that ensures effective policy transmission.
4. Introduce tax incentives for capital inflows and a higher tax on outflows over the 12 to 18 months 'control window' to encourage capital inflows and discourage rapid outflow of international capital. Target FDI incentives to sectors that offer fast growth opportunities and development prospects that will make growth inclusive.
5. Encourage proper coordination of fiscal and monetary policies, putting emphasis on macroeconomic stability, fiscal discipline and advice to fiscal authorities to invest more in infrastructure projects.

Perhaps the greatest lesson from these experiences is that the respect for the theory and logic of international finance do not in any way preclude introducing capital controls during a crisis and keeping the exchange rate fixed. Once the economy and financial system stabilise and confidence of investors is regained, the controls should be eased gradually over a six-month period.

Appendix

Annual Ranking of Selected Countries

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mexico	73	62	43	42	55	51	58	53	48	53	61
Nigeria	**88**	**109**	**108**	**114**	**125**	**134**	**137**	**133**	**131**	**147**	**127**
Indonesia	74	131	135	127	122	115	121	129	128	120	34
Turkey	93	84	91	60	63	73	59	43	71	69	45
Brazil	65	122	121	126	129	124	127	126	130	116	57
South Africa	42	28	29	35	34	32	34	35	39	41	56
Malaysia	**24**	**25**	**25**	**25**	**23**	**23**	**21**	**18**	**12**	**6**	**20**
Singapore	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**
Ghana	n.a.	n.a.	82	87	97	77	67	63	64	67	111

Source: The Global Competitiveness reports by the World Economic Forum

The best ranked countries are reported to have:

1. Efficiency of goods and labour markets.
2. Sophistication of the business culture.
3. Impressive capacity for technological innovations of their companies.
4. Strong public and private institutions.
5. Macroeconomic stability
6. Longer term and broader competitiveness agenda.
7. Consistently reform and proactive in quick response to new economic realities.
8. Comprehensive, broad approach to reforms.
9. Inclusive – public sector agencies, private sector representatives and institutionalised reform at the highest levels.

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