# Introduction

Exchange rate is an important macroeconomic variable that is used as an indicator of the international competitiveness. Exchange rate value can be used to assess the overall performance of an economy. Moreover, it is increasingly being regarded as an indicator of the competitiveness of a given country’s currency. Exchange rate essentially refers to the rate at which one currency trades to another. There are generally two forms of exchange rate, the real exchange rate and the nominal exchange rate. The nominal exchange rate is a monetary concept, a measure of the relative price of two currencies or moneies. Real exchange rate, on the other hand, is a real concept that measures the relative price of two tradeable goods (imports and exports) relative to non-tradeable goods (those consumed locally). Changes in exchange rates affect the performance of other macroeconomic variables, underscoring the importance of exchange rate. Some of the effects associated with changes in the exchange rate include influences on the structure of output and investment and altered external accounts.

Exchange rate volatility provides an indication of the tendency of an exchange rate to rise or fall sharply within a short amount of time. Exchange rate volatility (ERV) has a profound effect on the volume of international trade between countries. The effects of this volatility are felt in areas such as macroeconomic policy formulation, investment decisions, and international trade flows. Unpredictability in changes in exchange rates creates uncertainty about expected profits, thereby reducing the benefit of international trade. Since forward markets are not accessible to all traders, then the exchange-rate risk for all countries is generally not hedged. Effects in the short run differ from those in the long run. In particular, a delayed reaction by consumers and producers to changes in prices of products leads to constrained short run trade balances. For the long run, if the impact of price affects both consumers and producers, then the trade deficit gradually reduces.

Currency movements have an effect on domestic wealth as well as on imports and exports. Currency depreciation decreases the relative value of domestic wealth, thereby increasing the relative value of foreign wealth. Consequently, this promotes foreign direct investment. Additionally, depreciation makes a country’s exports cheaper and its imports more expensive. This effect is not perfectly reflected in a globalized economy since exported products will normally contain a sizeable proportion of imported parts. the imported parts become more expensive for exporters, whereby these components may not necessarily have readily available local substitutes.

Instability affects trade and stakeholders in a number of ways. In the long term, instability affects the volume of imports and exports, government sales and procurement policies and the allocation of investment. Medium term areas of effect are balance of payment and economic activity levels. Finally, there are short-term effects on local consumers and traders. Due to this multifaceted effects, it becomes desirable for a government to seek exchange rate stability, in order to allow economic agents to plan ahead without fear.

Clearly, exchange rate volatility has a significant effect on the economy, economic policy, and trade. Consequently, the area of the effects of exchange rate volatility on trade has been an important area of research, particularly since the introduction of the floating exchange rate system. Numerous studies have been carried out with the purpose of establishing the nature of the relationship between exchange rate volatility and trade. However, both the theoretical and empirical literature on this area remains ambiguous on the nature of this effect. Some of the studies investigating this question are considered in the literature review section.

As noted, economic focus on exchange rate volatility rose significantly in the wake of the introduction of the floating exchange rate system. An exchange rate system comprises a set of rules, arrangements, and institutions which nations use to effect trade amongst themselves. Under the flexible exchange rate system, exchange rates are market-determined (by forces of demand and supply). Some of the factors that affect exchange rate include imports, exports and structural influences (Jhigan, 2005). The level of imports and exports also has operations on currency. If a country’s exports are more than its imports, demand for its currency rises, leading to positive outcomes. Conversely, predominant imports increase the demand for foreign currency, driving up the exchange rates.

A number of studies have attempted to investigate the theme of exchange rate uncertainty in Nigeria. Adeniran, Yusuf, & Adeyemi (2014) conduct an empirical investigation into the impact of exchange rate fluctuation on the growth of the Nigerian economy. They focus on data spanning 1986 to 2013, derived from the Central Bank of Nigeria Statistical Bulletins. Analysis of the data is done using ordinary least squares (OLS) regression. They report a positive but insignificant relationship of exchange rate fluctuation. In a different study, Danladi, et al., (2015) use annual data from 1980 to 2013 to investigate the impact of exchange rate volatility on international trade. They apply a series of analysis tools, beginning with the Augmented Dick-Fuller model, cointegration testing, granger causality and finally, the Error Correction Model. They find the variables to be conintegrated, hence related in the long run. Moreover, the ECM analysis reveals that exchange rate volatility negatively affects international trade. There are numerous other studies, such as (Dickson & Andrew, 2013), who investigate the effect of exchange rate volatility on variations of trade in Nigeria, and (Akinlo & Adejumo, 2014), who investigate the effect of exchange rate volatility on non-oil exports. However, no study is yet to investigate the effect of exchange rate volatility on both the oil and financial sectors in Nigeria.

## Purpose of the Study

The oil sector and financial sector are two of the most predominant sectors of the Nigerian economy. Despite their importance, no study has investigated the effect of exchange rate volatility on these two core sectors. The purpose of this study, therefore, is to investigate the effect of exchange rate volatility on the financial and oil sectors in Nigeria.

# Literature review

The issue of the impact of exchange rate volatility on the volume of international trade remains a controversial issue. There has been growing interest in the impact of exchange rate uncertainty/volatility on trade flows, ever since the introduction of the floating exchange rate system. Much research has been conducted into this area, although both the theory and empirical research remain ambiguous on the nature of the impact. Different researchers have established varying outcomes. While some models predict a positive relationship, others predict a negative one depending on the key study parameters. There are generally two schools of thought that attempt to elaborate on the impact that exchange rate volatility has on international trade. The first school is the traditional school, which holds that increased volatility of exchange rates increases the risk of trade. The increased risk of trade then leads to depressed trade flows. The other school of thought is the risk portfolio school. In contrast to the traditional school of thought, the risk portfolio theory hypothesizes that increased risk enhances profitability opportunities thereby increasing trade.

The traditional school of thought stems from early approaches, which focused on firm behavior. It was presumed that increased exchange rate volatility would lead to higher profit uncertainty for contracts denominated in foreign currency. The net effect would be a reduction in international trade to levels lower than those that would exist in the absence of volatility (Farrel, DeRosa and McCown, 1983). Due to the uncertainty of profits, risk-averse and risk-neutral agents would react by redirecting their investment activities to lower risk home markets, from the high-risk foreign markets. This thought process underpins the essence of the traditional school of thought.

As noted, the risk portfolio school of thought is fundamentally diametrically different from the traditional approach. This approach postulates that higher risks are likely to increase trade to enhanced profitability opportunities. The approach is not an outright school of thought, but rather, a collection of several studies, which generally agree on the faultiness of the traditional model. In one study, De Grauwe (1988) demonstrates how increased exports may result from high-risk aversion. Normally, exchange rate volatility results in an unambiguous reduction in the total utility derivable from exports. However, if there were an increase in the marginal utility of exporting, then the result would be an increase in exports. This conclusion is, however, based on the assumption that a firm is operating in both the domestic and export markets, with an optimal allocation of output between the two markets. This assumption critically depends on the idea of a non-constant degree of risk aversion. Where the degree of risk aversion is constant, the effect of exchange rate volatility would be an unambiguous reduction in export. Part of the reason for this reduction is that the substitution effect has made exporting less attractive. Consequently, there would be no income effect.

In the alternate case, an increase in the degree of aversion, coupled with shrinking income, leads to an income effect whereby exporters respond to increased exchange rate volatility by exporting more. A summary of De Grauwe’s (1988) argument is that exporters’ returns from the favorable movement of exchange rates, together with the accompanying increase in output surpass the reduction in profitability arising from adverse exchange rates, an association brought about and guaranteed by the convexity of the profit function. Consequently, individuals who are risk-neutral will be attracted by such opportunities that offer high profits.

Obviously then, the theory has failed to provide a definite response on the matter of whether an increasing variability in exchange rates results in greater benefit from the trade-enhancing effect of the diversification of portfolios, compared to the costs, to risk averse agents. Even the results obtained through empirical studies of this relationship yield no conclusive findings. This is due to sensitivities to choices such as sample period, form of proxies adopted for exchange rate volatility, the model specification and the country being considered - whether it is a developing or developed one.

Patterns begin to emerge in the more recent literature. There are pronounced differences in the effects that different countries experience. For newly industrialized countries, exchange rate volatility results in a pronounced negative effect on their trade flows. In contrast, this volatility results in a positive weak effect on the trade flows for industrialized countries. Baum, Caglayan and Ozkan (2004) use a non-linear specification to investigate the effect of exchange rate uncertainty. They show that this effect is a positive but complex one. Further, they consider the role of the volatility of income on trade flows in several industrialized countries but are unable to establish any clear effect. Brollet et al. (2006) apply portfolio theory to study optimum production decisions by an international firm. Their results indicate that the effect of increased exchange rate uncertainty on trade could either be negative, positive or neutral. Indeed, there are three principal types of effects of exchange rate uncertainty on trade and trade flows. A few studies predict a significantly negative relationship (BiniSimaghi, 1991; Brada and Mendez, 1988), while others predict a significantly negative one (Bahmani-Oskooee and Wang 2008). Finally, there are those studies which find no significant relationship (Koray and Lastrapes 1989), (McKenzie 1998), (Lee 1999), and (Herwartz Weber 2005).

In their 1998 study, Sercu and Uppal also investigate the hypothesized relationship of a decline in international trade volumes arising from increases in exchange rate volatility. Their study model is a general equilibrium analysis model. Per this model, trade and exchange rate volatilities are considered endogenous quantities within an imperfect international commodity market. The authors use a model involving two-countries, one good, and complete markets to illustrate their arguments. This model comprises a stochastic general equilibrium economy, with a partially segmented international commodity market. Through this model, Sercu and Uppal are able to provide a potential rationale for the findings of other empirical studies that are unable to identify any strong negative correlation between exchange rate volatility and international trade volumes.

There are significant discrepancies in the effect of exchange rate volatility on a country depending on whether it is industrialized or developing. One early study is by Dornbusch (1989), which investigates the differences in real exchange rate volatility between developing and industrialized countries. The results indicate that there is a higher volatility in developing countries, in comparison to industrialized ones. In particular, volatility in developing countries is three times higher than that in industrialized ones. This study, however, does not provide any insight into what could be the possible explanations for these discrepancies in volatility. Another study on this subject is by Grier and Smallwood (2007). They investigate the role of exchange rate uncertainty for exports. They find that exchange rate uncertainty has a significant role for exports of developing countries. Moreover, they also report that exchange rate uncertainty plays a strong role in the income uncertainty of most countries.

There are a number of other studies that report closely related findings. For instance, their study on exchange rate volatility and U.K exports, Cheong Mehrari, Pattichis and Williams (2002) find that there is a negative effect of exchange rate volatility on export trade. Aristotelous (2001) investigates the impact of exchange rate volatility on the performance of British exports between 1889-1999. The results reveal that for the period under investigation, there is no significant relationship between the variables. Other studies such as Osang and Slottje (2000), and Sauer and Bohara (2001) report that exchange rate uncertainty has a negative impact on export trade. Some of the other studies are described below.

Yutaka and Kurihara (2013) use panel data to examine how exchange rate uncertainty and financial development affect international trade. They conduct a dynamic panel model, using ordinary least square (OLS) method for empirical analysis. The use yearly average data for a sample period beginning 2009 to 2011. However, similar to much of the other empirical literature, their results are inconclusive, with no significant influence of exchange rate volatility on the volume of international trade. Similar to other studies that have been discussed, they also find exchange rate volatility to have a negative influence on the volume of international trade in developing countries. Increasing volatility in exchange rates normally results in dampening of international trade. Another study that looks into least developed countries is Accam (1997). He uses data from a selection of 20 least developed countries to examine exchange rate volatility, and FDI flows. An OLS methodology is applied, with standard deviation serving as a proxy for instability. Accam finds that for the period investigated, there is a significant negative relationship between exchange rate volatility and the flow of FDIs.

In yet another study, Najafav (2010) analyses the effect of different exchange rate regimes and exchange rate volatility on international trade as the main objective. Najafav uses high-frequency data, fixed effect estimation methods and a large sample to investigate panel data that includes US trade with a large number of countries. Like Yutaka and Kurihara (2013), panel least squares is applied to a large sample of up to date data to obtain an estimate of the effect of exchange rate volatility on the volume of US imports and exports. Moreover, the different exchange rate regimes serve as instruments for volatility. The high panel data comprises of information from 79 countries over a period of 276 months spanning from 1985 to 2007. While the study finds exchange rate volatility to have a significant negative effect on trade, the effect is not an unambiguous one. Again, this finding corresponds with much of the other literature.

In their study on the relationship between trade and exchange rate volatility, Broda and Romalis (2003) adopt a rather different approach. They use disaggregate data for a large number of countries over the period between 1970 and 1977. Compared to the existing literature, this study is different in that it represents an attempt at structurally estimating the effect that exchange rate volatility has on the composition of trade. They hypothesize that trade has a dampening effect on exchange rate volatility. Moreover, through the use of a bilateral trade model, they attempt to estimate the effect that exchange rate volatility and exchange rate regimes have on trade. Exchange rate regimes include fixed exchange rate and currency boards. Their results strongly support their hypothesis. Moreover, their model provides insight into how trade influences bilateral real exchange rate volatility, a case of reverse causality. Another unique finding is that there are different impacts of real exchange rate volatility on trade for different types of goods.

Nuroglu and Kunst (2012) use panel data analysis and the fuzzy logic approach in their investigation of the effect of exchange rate volatility on the flow of international trade. They also compare the results from these two approaches. Their panel comprises of a cross-section of 91 pairs of EU15 countries, within a time range from 1964 to 2003. To determine the effect of exchange rate volatility on the bilateral trade flows of the EU15 countries, Nuroglu and Kunst use an extended gravity model of trade. Their findings indicate a negative impact of exchange rate volatility on bilateral trade flows.

In yet another research, Nicita (2013) explores whether the misalignment of exchange rates affects trade policy decisions. This study investigates the effect of exchange rate volatility and exchange rate misalignment on international trade, and contributes to the understanding of international trade and international trade policies. Like many of the other studies already described, they employ panel data methods with panel data comprising of over 100 countries and a period of 10 years (2000 to 2009). They utilize a fixed effects regression estimates methodology. They find that international trade flows are indeed substantially affected by exchange rate misalignments. In particular, the undervaluation of currency promotes exports and constrains imports, whereas a converse effect is established with overvaluation. Moreover, their analysis downplays the significance of policy concerns pertaining to exchange rate volatility, since increasingly, financial instruments are available to hedge against exchange rate risks. Another reason for this reduction in concern is the rising share of intra-industry trade. The empirical literature has generally served to reaffirm the ambiguity of the relationship between currency volatility and trade, as highlighted in the theoretical literature.

In their study on this subject, Brada and Mendez (1988) test flexible exchange rates and fixed exchange rates to determine which of the two has a more profound effect on the volume of international trade. Their study approach is similar to that of Nuroglu and Kunst, whereby they use a gravity model to compare bilateral trade flows. Their research is hinged on the assumption that where there are differences in the trade volumes between two types of partners, these differences should be reflected systematically in the commercial policies of a fixed versus a floating regime country. Their study model is based on the premise that there is a positive relationship between bilateral trade and the respective incomes of two countries, and a negative relationship based on the distance between them. They use data from thirty developed and developing countries, over the period spanning from 1973 to 1977. They note that over this period, there have been both turbulent and tranquil periods of exchange rate volatility. Their results indicate that there is higher bilateral trade among countries with a floating exchange rate than those with fixed rates. While exchange rate uncertainty inevitably lowers the trade volume among countries regardless of the nature of their exchange regimes, these effects are less than those occasioned by the commercial policies of fixed exchange rate countries. Another study that looks into the type of exchange rate regime is Devereux and Engel (2003). Their study finds that when prices are sluggish, a flexible exchange rate regime facilitates adjustment of relative prices. Another study that looks into price is

Chen (2004). In this study, exchange rate volatility due to uncertainty increases price rigidity. This is because of speculative pricing whereby firms hold on to prices in anticipation of a future reversion of exchange rate. Chen further discovers a significant positive coefficient for exchange rate volatility, through a test on the speed of convergence.

Many of the studies described so far have focused on trade between countries either a single country versus the rest of the world, or on one country and her major trading partners, or on bilateral trade. Bahmani-Oskooee and Kovyryalova (2008) adopt an alternative approach to their investigation on the topic of exchange rate uncertainty impact on trade flows. They focus on 177 commodities traded between the US and the UK. They use techniques such as cointegration and error correction to analyze data spanning 1971-2003. They find that real bilateral dollar-pound rate volatility leads to a short-run but significant effect on exports of 99 and imports of 109 industries, with most of these effects being adverse. When the focus shifts to the long run, however, there is a reduction in the number of cases where there is a significant impact of exchange rate volatility to 62 import and 86 export industries. Their conclusion is that in most of the cases, the effect of exchange rate volatility is negative, a finding which is in support of the opponents of floating rate.

In a similar study involving products, Bahmani-Oskooee and Wang (2008) investigate whether there is any effect of exchange rate volatility on the comparative advantage commodities of a country. To achieve their objectives, they focus on industry level data for bilateral exports and imports between Australia and the US. In particular, they focus on 107 industries where trade between the two countries occurs. Just like in Bahmani-Oskooee and Kovyryalova (2008), their study investigates effects at the short-run and long-run level. Their results are similar to Bahmani-Oskooee and Kovyryalova (2008) in that short-run effects are more pronounced than long-run effects. In particular, in 60% of the cases for which data is available, exchange rate uncertainty is found to have short-run effects on imports and exports. When it comes to the long run, there were twice as many importing US industries affected in the long run as there were exporting industries. For Australia, the case was different whereby exports are affected more than imports. Another study that investigates short term and long term effects less developed countries is Arize et al (2000). They employ quarterly data for the years 1973-1996 to examine the real exchange rate volatility on exports for 13 less developed countries. Their models include Johansen’s multivariate procedure and the error correction model. They find that exchange rate volatility has a significant negative effect on export flows. Broda (2004) uses panel data from 75 countries for a period ranging from 1973 to 1996. He employs a VAR model. They find that in the short term, there are substantial shocks to the terms of trade and the real GDP. Moreover, in countries that have adopted a flexible exchange rate, negative shocks result in larger exchange rate changes.

A study that has yielded contrasting results is by Koray and Lastrapes (1989). This study investigates bilateral imports of the United States from five other countries, namely the United Kingdom, Canada, France, Germany, and Japan. The researchers construct a VAR model, which they use with monthly data over a 30-year period, from 1959 to 1989. The overall findings from this research is that there is a weak correlation between exchange rate variability and US bilateral trade flows. In their empirical investigation, Lee (1999) fails to identify any significant effect of exchange rate volatility on the price or volume of trade. For price, the effect is barely significant. Volatility on volumes, on its part, disappears when relative prices are included in the regression. Furthermore, Lee also finds that the price depression of exchange rate volatility is more pronounced for durables than it is for non-durables. These findings are consistent with the hypothesized negative relationship between volatility and demand for durable imports. Herwartz and Weber (2005) look into exchange rate uncertainty and trade growth for 15 industrialized countries. They find a weak causal link.

In his study, Bleaney (2008) hypothesizes the correlation between real exchange rate volatility and the openness of trade to be a consequence of the adjustment of domestic prices to the movement of exchange rates. His work, however, fails to establish a satisfactory explanation for the phenomenon. According to Aydin (2010), there are different dynamics that impact on the equilibrium real exchange rate of sub-Saharan economies. Their study uses panel data from 182 countries over the period 1973-2008. In Yoon (2009), the effect of the exchange rate regime is investigated. His findings indicate that within a fixed exchange rate regime, the real exchange rate series behaves as a stationary process. Yoon, however, acknowledges that there were more stationary episodes during the gold standard and Bretton-woods periods.

A number of studies investigate the effect of exchange rate volatility within specific countries. In a study on exchange rate volatility in Uzbekistan, Olimov and Sirajiddinov (2008) identify an inverse relationship of volatility on both trade inflows and outflows. Their study is underpinned by a period of high volatility in the exchange rate system following exchange rate reforms between 2001 to 2003. Another study on Uzbekistan is by Bakhromov (2011), who estimates the effects of exchange rate volatility on trade flows for the period between 1999 and 2009. He finds real exchange rate volatility to have an effect on the imports and exports of Uzbekistan for the period studied.

Mohammadi et al., (2011) investigate exchange rate uncertainty in Iran, with a focus on the effect on import trade. They identify a significant and negative impact. In a study of New Zealand, Zhao (2010) investigates the effect of real exchange rate volatility on real bilateral export flows. Zhou uses quarterly data from 1991Q1 to 2007Q1. He finds that there is a significant negative effect of real exchange volatility on long run real exports, with this effect being a weak and positive one for the short run. In their study, Huchet-Bourdon and Korinek (2011) investigate trade between China, the United States and the Euro area, with a focus on the agricultural and mining and manufacturing sectors. They find only a marginal effect of exchange rate volatility on trade flows. Moreover, the level of the exchange rate affects trade in the two sectors but does not fully explain trade imbalances in the three countries. Wang and Barrett (2002) study Taiwan’s exports to the US in the period from 1989-1998. They use the case of Taiwan to investigate the study question. They find that for most sectors, the effect of the real exchange rate risk is insignificant in a majority of the industries except for the agricultural sector whose trade volumes appear to be highly responsive to real exchange rate volatility. Another country study is done by Khan et al. (2014), who study Pakistan. They investigate the impact of the exchange rate volatility of domestic and foreign currency on the import and export demand function. They find that during the period where the US dollar was the vehicle currency for trade, volatility discouraged imports as well as exports. Contrastingly, when trade was carried out through bilateral exchange rates that were valued in domestic currency terms, the import and export demand functions were unaffected by volatility distortions.

There are a number of other studies which use US trade to investigate the effect of exchange rate volatility on trade. For instance, Cushman (1985) analyzes four models of direct investment. Risk-adjusted expected real foreign currency appreciation has the effect of lowering the cost of foreign capital. This effect stimulates direct investment. In this particular study, Cushman finds that FDI flows from the US to four other industrialized countries, namely Canada, France, Germany, and Japan, can be explained by higher exchange rate volatilities. A similar study is carried out by Froot and Stein (1991) who believe that exchange rates can have a moderating effect on relative wealth thereby influencing FDI flows. In particular, the effect operates as follows: the devaluation of currency would result in depreciation of domestic wealth, and a relative increase in foreign wealth, thereby making foreign direct investments more attractive. Consequently, the devaluation of a country’s currency leads to foreign direct investment inflows. In their study, Bryne et al. (2006) look into the effect of exchange rate volatility on the volume of bilateral trade for both exports and imports. They use sectoral data. They find that there is a robust and significant effect of exchange rate volatility across sectors. However, this effect is more pronounced in exports of differentiated goods.

A number of similar studies have attempted to investigate the subject matter with reference to Nigeria. Some of these studies include Obiora and Igue (2006), and Aliyu (2008). Just like the cases already described, these studies have also found mixed results. Obiora and Igue (2006) examine the impact of exchange rate volatility on U.S – Nigeria trade flows. Their study found that there is a significant negative effect of exchange rate volatility, on Nigerian exports to the U.S. On his part, Aliyu (2008) uses quarterly data to investigate the impact of exchange rate volatility on non-oil exports. Another study is by Ibikunle and Isaac (2011). Their study found the relationship between exchange rate volatility and aggregate trade to be an inverse and statistically insignificant one. Omisakin, Oyinlola and Adeniyi (2010) use a panel study approach to investigate the effect of exchange rate volatility and find that the relationship is a significant one for the countries selected.

In his study, Odili investigates the impacts of exchange rate volatility on imports in Nigeria. They employ a data set of 40 years, from 1971 to 2011. Their model employs cointegration and Parsimonious ECM model. This study finds that there is a positive and significant effect of exchange rate trends on imports, but only in the long run. Moreover, they also report that exchange rate volatility has a depressive effect on imports. In terms of causality, the study reports a unidirectional causality running from exchange rate volatility to imports.

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