Focusing on the Exchange Rate Volatility and International Trade Relationship: Evidence from South Africa

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ABSTRACT

Despite the extensive literature on the exchange rates volatility and international trade, there is no consensus in the literature. This study examines how South African exports demand is affected by exchange rate volatility. The sample period covers the period from the year 2000 first quarter to the beginning of 2021 first quarter. To estimate the volatility of the exchange rates, in this study, we have used the Generalised Autoregressive Conditional Heteroscedastic (GARCH) mode. While we use Autoregressive Distributed lags (ARDL) models to estimate the impact of exchange rates volatility on domestic exports. The findings suggested that there is a positive relationship between exchange rate volatility and exports. Hence, policies such as bilateral trade agreements are important to promote export growth.

KEYWORDS: *exchange rate, volatility, exports, GDP.*

JEL: *E52*

1. INTRODUCTION

After the collapse of the Bretton Woods system in the 1970s, the international monetary system shifted to floating exchange rates. At the time, domestic economies were thought to be isolated from shocks initiated abroad. Hence, this would give domestic policy makers time to focus on local macroeconomic problems using monetary and fiscal policy tools freely. However, the skeptics opposed the move on the bases of exchange rate volatility and uncertainty. Over the years, there are many studies that have emerged seeking to explain the impact of exchange rate volatility. Although, the results are not conclusive since the theoretical developments points to both the positive and negative effect on exports (Bahmani-Oskooe and Arize, 2019).
As noted, the effects of exchange rate volatility on the exports remains unresolved in the literature (Chang et al., 2020). The concept of exchange rate volatility refers to the risk that is linked to unexpected exchange rate behaviour. The literature connects the exchange rate volatility to macroeconomic fundamental such as inflation rates, interest rates, real gross domestic product (GDP) and capital flow which is enabled by the trend of liberalisation, technology, and currency speculation (Achy and Sekkat, 2003; Doroodian, 1999; Krugman, 1989; Tondani and Munyama, 2005). In this sense, high levels of exchange rate volatility have led researchers and policy makers to explore the extent and nature of the effects of such a behaviour.

As noted, the results have been mixed at best, and at other times they produce contradicting theoretical predictions (Ilhan, 2006). While Chang et al. (2020) argues that the overall empirical evidence depends on the specification of the model which is sensitive to the choice

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of a sample period, proxies for exchange rate volatility, and the countries considered for analysis. Therefore, in the context of emerging market economies, Nor et al. (2019) states that countries constantly face the rise and fall of capital flow cycles that are becoming too volatile. Further, this results in a dislocation during the bust which ends up putting pressure on the domestic currencies during the boom. The emerging markets economies have been analysed due to a number of currency crises (Nor, 2015). However, there is a need in the literature to examine emerging markets economies in order to determine the policy direction that would be able to address the high volatility.

South Africa has not been excluded from this debate. In the mid-1990s, when the Rand began floating, high volatility of the domestic exchange rates began. According to Tondani and Munyama (2005), South Africa, experienced its lowest level of exchange rate depreciation in the last quarter of the year 2001, thereafter, experienced a great appreciation. In terms of the South African debate, the variability of the exchange rate has been cited in the National Development Plan (NDP), as one of the central factors preventing the economy from achieving higher levels of economic growth.

This study is important because the findings can be used to recommend a policy that could limit the adverse impact of unexpected exchange rate behaviour. In addition, this study can be used in a wide range of emerging market economies with similar characteristics as South Africa, to solve issues related to exchange rate volatility. The study uses the GARCH model to compute exchange rate volatility. The paper will be presented as follows: the first section is on the exchange rate volatility empirical facts. And then, the methodology. Lastly, the conclusion, policy suggestions, and recommendations.

2. THE EXCHANGE RATES VOLATILITY EMPIRICAL FACTS

The literature argues that the exchange rate volatility has negative effects on export flows; some of those studies include (Arize, 1997; Bahmani-Oskooee, 2002; Ethier, 1973; McKenzie, 1998; Rey, 2006; Vergil 2002). However, researchers found that the high risk linked with the shocks of exchange rate volatility can possibly lead to opportunities for raising export performance for great profits (Abbott, 2001; Achy and Sekkat, 2003; De Grauwe, 1988; Kiheung and Wooree, 1996). The debate on exchange rate volatility and export flows has been an ongoing one. Recently, the literature has been affirming that the results are ambiguous (Bouoiyour and Selmi, 2014; Egert and Morale-Zumaquero, 2008).

One very important notion found in theoretical models by Ethier (1973) and further supported by Kohlhagen (1978) is that greater risk associated with exchange rate volatility is highly likely to lead risk-adverse agents to channel their resources into less risky activities due to increased uncertainty. Consequently, Cori´c and Pugh (2010) provide evidence that the impact of the volatility of exchange rate on trade is adverse. Further, this is especially found when variables are measured in real terms. As noted by Sekantsi (2007), these may be caused by inefficient institutions in economies. (Doroodian, 1999; Krugman, 1989) argue that with risk aversion hypothesis, the exchange rate volatility and exports are negatively correlated.

In contrast, the literature shows that a higher risk in volatility of the exchange rate can be associated with positive effects (Abbott, 2001; Asseery & Peel, 1991; De Grauwe, 1988; McKenzie & Brooks, 1997). Aziakpono et al. (2005) claim that if exporters are fairly risk-adverse, then exchange rate volatility leads to higher expected marginal utility of exports revenue. This encourages exporters to increase their export volumes in order to maximise profits.

The mixed findings of the theoretical literature have made investigating the impact of exchange rate volatility on export flows inconsistent and ambiguous (Bouoiyour and Selmi 2014). There are various reasons in the literature that account for the failure to find consistent and concise results. De Vita & Abbott (2004), firstly, associated this failure with the fact that no conclusive agreement has been reached on whether to use real or nominal exchange rate when measuring for exchange rate volatility. Second, we discuss the failure to reach an agreement on which statistical technique to employ in order to be able to optimally measure exchange rate volatility. Sekantsi (2007) mentioned that there are many factors that can account for these inconsistencies, such as using aggregate data instead of time-series. This hinders exchange rate volatility estimates from being homogenous across countries involved in the data.

The literature is dominated by studies conducted in industrial economies as a result of readily available data. In addition, industrial economies adopted the flexible exchange rate regime earlier (Arize, 1997; Chowdhury, 1993; De Vita & Abbott, 2004; Ethier, 1973; Kenan and Rodrick, 1986; Kohlhagen, 1978; Suppo, 1973). As time progressed and more time series data started being available in developing countries, then researchers developed interest to study the experience of these countries. Some of those studies are Bahmani-Oskooee (1996), Doroodian (1999), Arize et al. (2000), Sauer & Bohara (2001), Willenbockel (2010), Asteriou, and Pilbeam (2016), and Arize & Bahmani-Oskooee (2019).

Recently, researchers have employed different kinds of statistical techniques, which involved cointegrating approaches as well as error correction models, and have accounted for the time series properties of the data (Pilbeam, 2016). Moreover, when using disaggregated data, the effects of exchange rate volatility vary across countries, unlike when using aggregate data (Bahmani-Oskooee, 2019).

Furthermore, this hinders exchange rate volatility estimates from being homogenous across markets. Then, the possibility of finding a statistically significant relationship between trade volumes and exchange volatility decreased. Among recent empirical studies, Baek (2014), who examined the effect of exchange rate volatility on trade between South Korea and the United State of America, found that Korea's major exports industries were highly responsive to bilateral trade and exchange rate volatility in both the short and long-run.

A similar study by Karagedikli et al. (2016), showed that unanticipated shocks in the exchange rates relatively have negative effects on New Zealand's economy's tradable sectors. Bahmani-Oskooee & Gelan's (2018) found that exchange rate volatility affects cross-border trade flows in the short-run. However, the long-run the impact is not clear. Senandza and Diaba (2017) found similar results, however, their study was restricted to the short-run. Based on studies done by Duc Hong et al. (2019), the impact of exchange rate volatility between Vietnam and its export partners, was found to be conditional because it was based on the type of goods being exported and export destination.

Moe Chit et al. (2010) found that exchange rate volatility has a statistically significant negative impact on exports on in East Asian economies. Furthermore, the increased price competitiveness of other emerging East Asian economies has negative effects on the exports to foreign markets. Serenis (2013) examines whether exchange rate volatility hampers aggregate exports. And then, presented a new intricacy to the situation through the assessment of high and low values of the exchange rates. An overall statistical relationship was established; however, a greater part of it suggested a negative relationship between exchange rate volatility and exports.

Bahmani-Oskooee et al. (2012) investigated USA-Korea trade flows at a bilateral level for US import and exports industries, and the study found that exchange rate volatility has significantly short-term effects on net exports. Similarly, Narayan et al. (2009) assessed the Fiji-USA exchange rate volatility but used a different time period between 2000-2006, and this study revealed three important findings: firstly, there was a positive and significant relationship between exchange rate volatility and conditional shocks. Secondly, the shocks have asymmetric effects on exchange rate volatility. Lastly, the shocks do not have permanent effects on the volatility of the exchange rate.

The literature shows that the exchange rate volatility has asymmetric shock on the export (Miron and Tudor, 2010; Narsoo, 2015; Omari et al., 2017). Obeng (2018) states that, over time, researchers realised the fluctuating effects of volatility were unequal and could either be negative or positive such that agents responded to these uneven effects differently. Obeng (2018) suggested that this was the birth of the asymmetric approach as a way to study the relationship between these two variables. McKenzie (2002) defined the presence of asymmetry as a situation where there are unequal responses in the shocks. Further, the documentation of asymmetry in exchange rates has no apparent economic reason.

3. METHODOLOGY AND THEORETICAL FRAMEWORK

The exchange rate volatility creates a risk for exchange rates which has implications on the size of the goods or services traded on the international markets. Therefore, the demand for domestic exports. When the exchange rates volatility is high, the cost for a risk-averse trader increases, which leads to a fall in international trade. This occurs because the contracts for trading goods and services internationally are conclude at the time of trade. In this case, the exchange rate is also agreed on at this point. However, payments of goods and services are only done in the future period when the delivery is made.

In the event where the exchange rate movement is not predictable, the uncertainty about future profit emerges. This leads to a reduction in the benefit of international trade. At this point, the exchange rates risk hedging is not possible because not all traders have access to the forward market. Even if hedging in the forward market could be arranged, there would be cost constraint for some traders. The magnitude of the contracts is large and is for a short period. Therefore, it would be difficult to plan for the correct size and timing of transactions to take advantage of the forward markets.

The developments in the literature show that the impact of exchange rates volatility can be expected to be positive or negative on exports (Ilhan, 2008). This can be associated with the dominance of income over the substitution effect, which results in a positive relationship between exchange rate volatility and exports. If exporters are naturally risk-averse, when exchange rate volatility increases, the expected marginal utility of export revenue rises. Therefore, exporters are induced to export more goods and services. De Grauwe (1988) explains that the uncertainty about the exchange rate movement’s impact on exports is determined by the extent of exporters risk aversion.

3.1 Estimation

Following de Vita and Abbott (2004), Tondani and Munyama (2005) and Sekantsi (2007), we use the autoregressive distributed lag (ARDL) model by Pesaran et al. (2001). Unlike many other approaches, this procedure allows testing for the existence of a relationship between a dependent variable and other regressors without focusing on whether the underlying regressors are I (0), I (1). One attribute which acts as an advantage for the ARDL bounds testing procedure is its small-sample properties, which have proven to be better than the Engel and Granger (1987) two-step residual-based procedure and the Johansen (1991, 1995) maximum likelihood reduced rank."

Following Pesaran et al. (2001), we implement the bounds testing approach. The conditional ARDL is presented as follows:

$$\Delta X_t = c_0 + c_1 t + \pi_1 X_{t-1} + \pi_2 Y_{t-1} + \pi_3 Q_{t-1} + \pi_4 V(h)_{t-1} + \pi_5 D + \sum_{i=1}^{n} \alpha_i \Delta X_{t-i} + \sum_{j=0}^{m} \beta_j \Delta Y_{t-j} + \sum_{r=0}^{q} \emptyset_r \Delta V(h)_{t-r} + \varepsilon_t \quad (1)$$

Where c_0 and $c_1 t$ represent drift and trend components, respectively. Here ε_t denote the white noise error processes, Y_{t-1} denote domestic real gross domestic product (GDP) relative to the foreign country, in this case, United States of America (USA), V represents the domestic exchange rates volatility and X_t represents the real exports. De Vita and Abbott (2004) stated that the format of the first difference of the explanatory variables confirms that no serial correlation exists in the estimated residuals. No feedback is presented from level of X_t, this is because Y_t, and $V(h)_t$ are viewed as long-run variables.

Following Shin and Yu (2006), we determine the ARDL specification by initially estimating the OLS conditional error correction model (ECM). Thereafter, we choose the optimal model specification using the general to specific approach. And then, we conduct a cointegration test.

When a long-run relationship has been established, Pesaran & Shin (1999) suggested that the following conditional long-run model for X_t can be deducted from the reduced form solution of equation (1) given $\Delta X = \Delta Y = \Delta Q = \Delta V(h) = 0$, thus,

$$X_t = \Theta_1 + \Theta_2 t + \Theta_3 Y_t + \Theta_4 Q_t + \Theta_5 V(h)_t + \mu_t \quad (2)$$

Where we have $\Theta_1 = -\frac{c_0}{\pi_1}, \Theta_2 = -\frac{c_1}{\pi_1}, \Theta_3 = -\frac{\pi_2}{\pi_1}, \Theta_4 = -\frac{\pi_3}{\pi_1}, \Theta_5 = -\frac{\pi_4}{\pi_1}$ it is also assumed that μ_t is an $IID(0, \sigma^2)$ error process. The long-run estimate coefficients are then given by $\widehat{\Theta_3} = -\frac{\widehat{\pi_2}}{\widehat{\pi_1}}, \widehat{\Theta_4} = -\frac{\widehat{\pi_3}}{\widehat{\pi_1}}$ and $\widehat{\Theta_5} = -\frac{\widehat{\pi_4}}{\widehat{\pi_1}}$.

3.2 Exchange rate volatility

In this study, we use the GARCH (1, 1) method to measure exchange rate variability. This study uses the Auto Regressive Conditional Heteroscedasticity (ARCH) by Engel (1982), followed by the Generalised Auto Regressive Conditional Heteroscedasticity, advanced by Bollerslev (1986), and it comes as a generalisation of the ARCH model. In order to model exchange rates variability, we need the first difference of the log of exchange rate in the form of a conditional variance. Moreover, we assumption that the first difference of this log of exchange rate can be produced as follows:

$$\Delta \log RER_t = \alpha_0 + \partial_1 \Delta \log(RER_{t-1}) + \varepsilon_t \quad (3)$$

Where α_0 is a constant, ∂_1 represents a coefficient, $\Delta \log(RER_t) = \log\left(\frac{RER_t}{RER_{t-1}}\right)$ and RER_t depicts the South African Rand(ZAR)/United States Dollar(USD) real exchange rate. And $\varepsilon_t |\ \varphi_{t-1}\widetilde{N}(0, \sigma^2)$, here ε_t represents the error term which is normally distributed and has an average mean of zero. Then σ^2, represents the variance. While φ_{t-1}, denote all available information at time $t-1$. The ARCH model's main idea is to investigate the changes in the variance over a period of time. Engle (1982) permitted the varying of the variance over time. The model assumes that the variance can be estimated and presented as:

$$VLT = \gamma_0 + \emptyset_1 \mu_{t-1}^2 + \sigma_1 s_{t-1}^2 = Var\left(\frac{\mu_t}{\varphi_{t-1}}\right) \quad (4)$$

The exchange rate's conditional variance is presented by VLT, γ_0 , $\emptyset_1$ and σ_1, represents the variables that will be estimated. The residuals are represented by μ_{t-1}^2, and are squared extracted from equation (4), which inform about the level of volatility from previous periods. s_{t-1}^2, depicts the GARCH term which shows the variance from the previous periods. Choudhry (2005) stated that the GARCH (1, 1) model has an advantage of being able to include heteroscedasticity into the estimation. And that, the model assumes that the conditional variance in a time series model depend on squared residuals.

To make sure that the predicted variance (VLL) from the GARCH (1, 1) model is always positive, it requires imposing restriction such that $\emptyset_1 \geq 0, \gamma_0 \geq 0, \sigma_1 \geq 0$. As noted, equation (4), contains information that suggests the current period's level of volatility is greatly influenced by the levels of volatility in the previous periods. Therefore, we find that fluctuating periods of volatility persist. Choudhry (2005) stated that the level of significance and size of $\emptyset_1$ exhibits the existence of the ARCH process in the residuals.
In this model, when $\emptyset_1 + \phi_1 < 0$, means the variance process shows mean reversion to the unconditional expectation depicted by λ_0 / (1- $\emptyset_1$- λ_1). Another situation would be when $\emptyset_1 + \phi_1 = 1$, which implies persistence of a forecasted conditional variance over all finite horizons and infinite variance for the unconditional distribution of μ. That means that current shocks persist to exist in a recurring manner in conditioning the expected future variance and this model is called the Integrated- GARCH model.

When estimating the GARCH (1, 1) model, we need first to test for ARCH effects in the real exchange rates process using the LM-ARCH test. Thereby, following the standard way of collecting residuals from equation (4). And then, we square them; thereafter, we regress them on q lags on their own. We then take the R^2 from this regression and multiply it by the number of observations. This allows construction of the test statistic which is distributed as a chi-squared. The idea behind this test is that, if it happens that the value of the test statistic is larger than the chi-square's critical value, then Brooks (2002) suggests that we reject the null hypothesis that there is an ARCH effect. Therefore, the opposite is true when the test statistic is less than the chi square's critical value.

3.3 Augmented Dickey Fuller

We run the augmented Dickey-Fuller (ADF) test in order to determine the if the series contains unit root. This model tests the null hypothesis on whether a unit-root exists or not in time series sample. The test is based on the following regression:

$$k_t = \beta_1 + \beta_2 k_t + \mu_t \qquad (5)$$

$$k_t = \beta_1 + \beta_2 k_t + \beta_3 k_{t-1} + \mu_t \qquad (6)$$

$$k_t = \beta_1 + \beta_2 k_t + \beta_3 k_{t-1} + \beta_4 k_{t-2} + \mu_t \qquad (7)$$

$$k_t = \beta_1 + \beta_2 k_t + \beta_3 k_{t-1} + \beta_4 k_{t-2} + \beta_5 k_{t-3} + \mu_t \qquad (8)$$

]Now accounting for time period imbalances:

$$\Delta k_t = \tau k_{t-1} + \beta_1 \Delta k_{t-1} + \mu_t \qquad (9)$$

$$\Delta k_t = \tau k_{t-1} + \beta_1 \Delta k_{t-1} + \beta_2 \Delta k_{t-2} + \beta_3 \Delta k_{t-3} + \cdots + \beta_n \Delta k_{t-n} + \mu_t \qquad (10)$$

Continuously adding a lagged variable will be implemented until autocorrelation is none existent in the model. One of the Ordinary Least Square (OLS) assumptions suggest that the error term (μ_t) should be independent. This means that there shouldn't be heteroscedasticity, μ_t must be normally distributed with the inclusion of no structural breaks. As far as the testing procedure is concerned, the ADF test simply follows the Dickey-Fuller test, to test for stationarity. The null hypothesis $H_0: \tau = 0$ means there is a unit root in the ADF test, and also that the series is non-stationary. In this case, if the series is non-stationary then exchange rate will not be volatile. Exchange rate volatility is however volatile in the alternative hypothesis $H_1: \tau < 1$ because this suggests that the unit root does is nonexistence.

3.4 Model Specification

Following Sekantsi (2007) the study adopts a two-country model such that.

$$X_t = \beta_0 + \beta_1 Y_t + \beta_2 R_t + \beta_3 VLT + \varepsilon_t \qquad (11)$$

Where X_t represents a logarithm (log) of real exports. These exports are constructed by deflating nominal exports with the Consumer Price Index. Y_t, represents South Africa's real GDP relative to the United States of America (USA). In this study, it is used as an indicator of USA's demand for South African exports. R_t represents the log of real exchange rate. These presents relative prices and are a proxy for external competition. VLT measure the domestic exchange rate volatility and the risk associated to it. And then, ε_t is an error term.

3.5 Data

The study utilises quarterly data of South Africa, for the period of the first quarter of 2000 to the first quarter of 2020. The specification of the mode is based on the literature reviewed and the theory of monetary model discussed above. Thus, the data is collected from the Federal Reserve Bank of St Louis (FRED).

3.5.1 Empirical Results

The following table shows the results for the unit root test. This test allows us to determine if there is volatility on the variable measuring exchange rate volatility and other variables in the specification of the model.

Table 1. Augmented Dicky-Fuller Test

Variable(s)	Series at levels	Series in first difference
Exchange rate volatility	-12.74543***(1)	
Exchange rate volatility	-12.64226***(2)	
Exchange rate volatility	-12.53256***(3)	
Real GDP	-4.1808***(1)	
Real GDP	-5.87594***(2)	
Real GDP	-5.84913***(3)	
Export	-0.31177 (1)	-8.0651***(1)
Export	-1.90403 (2)	-8.00413***(2)
Export	-2.11108 (3)	-8.04077***(3)
Real Exchange rates	-4.50337***(1)	
Real Exchange rates	-5.964***(2)	
Real exchange rates	-5.89667**(3)	

*The above table shows Unit Root Tests Results using ADF. (1) represents a model with just the intercept (2) represents a model with an intercept and trend component. ***represents the rejection of a null hypothesis at 1% level of significance*

Source: Authors' Computation

The results show that the variables are stationary at the level except for the variable measuring export which are stationary at I (1) (See Table 1). As noted, the ARDL does not require for all the variables to be stationary at the same level for it to be estimated.

The exchange rates volatility does not contain the unit root. This shows that the variable measuring exchange rate volatility does exhibit a variable behaviour (see Table 1). These results justify Nelson's (1990) theorem that this procedure is considered in a very strict manner. The rest of the variables GDP, EXP and INRER, are also stationary at series of levels.

The following table shows the results of the GARCH estimation. As noted, in this study, we used the GARCH analysis. The results are shown below.

Table 2. GARCH

Variable	Coefficient
Real GDP	0.021802***
Real exchange rates	-13.23119***
Exchange Rates volatility	10.03447***
C	0.387398***

The table shows garch regression results where *,** &*** respectively mean 10%, 5% & 1% level of significance

Source: Authors' Computation

In calculating this GARCH, we used the direct method (See Table 2). The real GDP is a proxy for foreign income. The positive sign means the higher the level of foreign income leads to a higher level of domestic exports (See Table 2). The Real exchange rates show that it has a negative impact on the level of exports, so when the Rand appreciate against the USD, the demand for South African exports decrease (see Table 2). The exchange rates volatility is positive (see Table 2). This result proves to be against economic theory because the literature

suggests that there should be a negative relationship between exchange rate volatility and trade.
The following figure shows the estimated domestic exchange rates volatility.

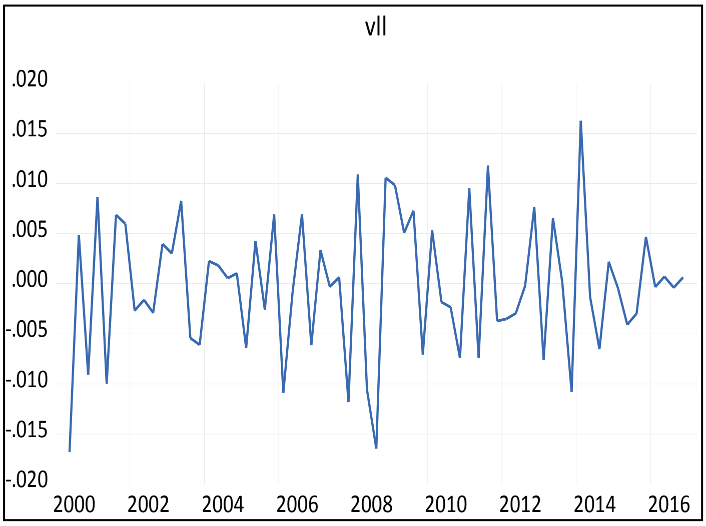

Figure 1. Volatility Graph.
Source: Authors' Computation

The domestic exchange rates volatility of the Rand for the periods of the first quarter of 2000 to first quarter of 2020(see Figure 1). We can see that the exchange rate is volatile. This confirms the unit root results.

Then, we estimated the ARDL model, whose results are shown in the following table.

Table 3. ARDL Results

Variable	Coefficient
Export(-1)	0.904063**
Real GDP	0.019143***
Real GDP(-1)	-0.06843***
Real GDP(-2)	0.060023**
Real GDP(-3)	-0.00142**
Real GDP(-4)	0.001314***
Real Exchange rates	-4.44408*
Exchange rate Volatility	3.194117**
Exchange rate Volatility(-1)	-4.80838**
Exchange rate Volatility(-2)	24.01684***
C	0.032935***

*The result of the ARDL model is shown where ***, ** & *, respectively represent the levels of significance at 1%, 5% & 10%.*

Source: Authors' Computation

The exchange rate volatility variable is significant at all lag levels (see Table 3). In period t, a one percentage point increase of the exchange rate volatility leads to a 3.1, percentage points increase in exports. Moreover, the relationship between the exchange rate volatility and exports is positive. This means the exchange rates volatility does not have a negative impact on the demand for domestic exports. However, at time t – 1, the exchange rate volatility has a negative relationship with exports (see Table 3). A 1 percentage point rise in exchange rate volatility result in a decrease in demand for exports by 4 percentage points (Table 1). Whereas, in period t – 3, the exchange rate volatility and the demand for local products have a positive relationship (see Table 1). When the exchange rate volatility increases by 1 percentage point, the demand for exports increased by 24 percentage points (Table 3).

All lags of the variable measuring real GDP are significant (see Table 1). When there is a 1 percentage point increase in the real GDP of the US, the demand for domestic exports rise by 0, 091 percentage points (Table 1). While in t – 1, if the USA income increases by 1 percentage point, the domestic exports fall by 0,001 percentage points (see Table 1). And then, in time t – 2, when the foreign income increases by a single percentage point, the domestic export rises by 0,06 percentage points (Table 1). In period t – 3, the increase in the US' real GDP by a unit percentage point, lead to a decrease in the quantity of goods demanded in South Africa by 0,001 percentage points (see Table 1). While in t – 4, if the USA real GDP increased by 1 percentage point, the level of exports increases by 0,003 percentage points (Table 1).

An increase in the export in by 1 percentage point in t – 1, lead a rise in exports by 0,9 percentage points in the current period (see Table 1). The sign of the relationship of the export with itself is positive. Accordingly, when the real exchange rate appreciates rise by a single percentage point, the demand for exports depreciates by 4.44 percentage points (Table 1). The relationship between the real exchange rate and the export is positive.

4. DISCUSSION

The unit root test shows that the variable measuring exchange rates volatility is indeed stationary at level, which is an indication of the presence of volatility. Furthermore, the test reveals that most variables are stationary at a level. Hence, testing for cointegration would not be appropriate in this case. All variables were stationary at the level except for the variable measuring exports.

Firstly, the GARCH effect shows that the higher the level of variability in foreign income increases the demand for domestic exports. This may be encouraged by the bilateral trade agreements between South Africa and the United States of America. Second, the relationship between the real exchange rates and the exports is negative, which is an indication that an increase in variability of appreciation of the Rand against the USD, lead the domestic goods to be less competitive. Hence, this results in a decrease in demand for domestic goods. Lastly, the relationship between the exchange rate volatility variability and exports is positive. This may be explained by the existence of the bilateral agreements between the South Africa and the United States of America. This may suggest that trade between the United States of America and South Africa, is independent of the degree of volatility.

The exports response to the exchange rate volatility varies depending on the lags. In the time t, the exchange rate volatility has a positive relationship with exports. A rise in the exchange rate volatility impacts the demand for domestic goods positively. While in t – 2, the relationship between the exchange rate volatility has a negative relationship. This may be suggesting that the impact of exchange rate volatility on exports depends on time. However, in period t – 3, the exchange rate volatility has a positive relationship with the exports. This is consistent with our expectations.

5. CONCLUSION AND POLICY RECOMMENDATIONS.

Since the wide adoption of the flexible exchange rates regime across economies in the world, the concerns about the effects of the increase in exchange rates volatility rose. In this paper, we assessed the impact of exchange rate volatility on South African exports. The study employed GARCH (1, 1) model to measure the exchange rate volatility. We also tested real export's determinants, which included the real GDP, real exchange rate volatility, and relative prices. The study found that the higher the income in the US, leads to a higher demand for South African exports. This means the exchange rates volatility of the rand exchange rate does not impact negatively on the exports. Furthermore, the exchange rates volatility changes sign depending on the lag length. In current period, the exchange rate volatility is positively related to the domestic exports. This may be as a result of existing trade agreements that guarantee the demand of local goods regardless of the economic condition. Therefore, this means that the South African government needs to make more bilateral trade agreements with large economies to smooth out exports demand.

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