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# The effects of exchange rate volatility on trade performance in Southern African Development Community countries: Pooled mean group approach

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## Abstract

*The issue of exchange rate volatility on trade has generated a lot of interest among economists since the liberalisation of exchange rates the in the 1970s. Over the past decade studies on exchange rate on trade performance have also been done for small open economies including southern Africa. This study considered annual data over the period 1985 to 2016 for 15 Southern African Development Community (SADC) member states with the utilisation of the pooled mean-group. The dynamic heterogeneous panel regression used allows for the disentangling of both the long-run and short-run dynamics in the data. Findings of the study show that volatility in real exchange rates deter trade performance in SADC countries. On the other hand nominal or official exchange rates volatility improves trade performance. Basing on the evidence obtained from this study, SADC economies, and dynamics in real exchange rates matter the most compared to dynamics in the nominal exchange rates. As such, temporary trade gains may be enjoyed by changes in the nominal exchange rate but the same does not apply when the changes in nominal exchange rate are significantly affecting the real exchange rates dynamics. The implication of these findings is that while exchange rate volatility may have positive effects on trade performance in SADC economies in the short run, in the long run exchange rate volatility discourages trade between SADC countries and the rest of the world. Thus, SADC countries should therefore pursue policies that reduce volatility of their currencies.*

## 1. Introduction

The effects of exchange rate volatility on trade performance have been under debate for several decades (Senadza and Diaba, 2017; Polodoo *et al*, 2016; Viera and McDonald, 2016; Nicita, 2013; Tandraen-Ragoobur and Emamdy, 2011; Boug and Fagareng, 2010). Extensive studies on the issue under discussion have been done for developed and newly industrialised countries. Studies on exchange rate volatility and trade performance has also been done for some African countries and economic regions (Senadza and Diaba, 2017; Polodoo *et al*, 2016). As observed by Senadza and Diaba (2018), most of the studies on Sub-Saharan African countries have often been country-specific, and are unlikely to generate useful generalizable results.

The novelty of this study is to provide further evidence on the degree of exchange rate volatility on trade performance in SADC countries. The contribution of this study on policy formulation is that the findings present alternative avenues for formulating exchange rate and trade policy in SADC countries.

The purpose of this study is to examine the impact of exchange rate volatility on trade performance in SADC countries. The specific objectives of this study are, first to evaluate the major effects of exchange rate volatility on trade performance in SADC countries, second to establish the long run and short run relationships between exchange rate volatility and trade performance in SADC countries.

## 2. Literature Review

A lot of studies have been undertaken both at theoretical (Ethier W, 1973; Hooper P and Kohlhagen S, 1973; Franke G, 1991; De Grauwe, 1988; McKenzie, 1999) and empirical (Chamunorwa and Choga, 2015; Polodoo et al, 2016; Senadza and Diaba, 2017; Thuy and Thuy, 2019) levels on the possible effects of exchange rate volatility on trade performance. These studies were carried out using time series data, cross-section or panel data. McKenzie (1999) and Orturk (2006) provide thorough review of the literature and discuss several empirical issues that may be important when determining the effects of exchange rate volatility on trade performance. The overall evidence is best characterized as mixed as the results as are sensitive to choice of sample period, model specification, proxies of exchange rate volatility and countries considered.

Polodoo et al (2016) analysed the impact of exchange rate volatility on manufacturing trade in a sample of eighteen African countries spanning the period 1995-2012 using an import-export model and dynamic panel data econometrics. In order to measure exchange rate volatility, the Z score and EGARCH were employed. In a dynamic setting, random coefficient estimates revealed that both real exchange rate and its volatility are statistically significant in explaining real manufacturing imports and exports using both measures of exchange rate volatility. When vector auto regression (VAR) estimation is employed, exchange rate volatility adversely affect real imports and exports only when EGARCH is employed. Kargbo (2006) also used vector error correction model on annual data to investigate the supply and demand relationships for agricultural trade flows in South Africa. The results show that prices, real exchange rates, domestic production capacity and real incomes have significant impacts on the country’s agricultural trade. In particular, exchange rate volatility has negative impacts on agricultural imports and exports.

Furthermore, Senadza and Diaba (2017) applied the pooled mean-group estimator of dynamic heterogeneous panel technique to data for eleven Sub-Saharan African economies from 1993 to 2014. Using exchange rate volatility proxies generated by the GARCH and EGARCH models, the study reveals no significant effect of exchange rate volatility on imports. In the case of exports, however, it finds a negative effect of volatility in the short-run, but a positive impact in the long-run. These results indicate the differential impacts of exchange rate volatility between imports and exports and between the short-run and long-run. Bahmani-Oskooee and Gelan (2017) also in their study of a sample of twelve African countries, examined the impact of the real exchange rate volatility on trade flows. The bound testing approach was used to distinguish between the impact of the real exchange rate volatility on exports and imports, both in the short-run and long-run. Results of their study show that while exchange rate volatility affects trade flows of many of the countries in the short run, the long-run effects were restricted only on the exports of five countries and on the imports of only one country. The level of economic activity in the world and at home were identified to be major determinants of exports and imports, respectively.

More so, Alori and Kutu (2019) examined the export function of cocoa production and determined the impact of exchange rates and price volatility on the exportation of cocoa in Nigeria. The Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root tests, Ordinary Least Square (OLS) and Structural Vector Autoregressive (SVAR) methodologies were employed to analyse the time series data that span from the first quarter of 1970 to the fourth quarter of 2016. The results of the study indicate that price of cocoa in the international market and the value of exchange rates play a significant role in cocoa exports growth in Nigeria. Furthermore, findings from the SVAR showed that an increase in the price of cocoa would increase cocoa production and cocoa export growth in Nigeria, while the exchange rate volatility would affect cocoa export growth in Nigeria. The result further revealed that the shocks to exchange rate accounted for the greater volatility (positively significant for the entire period) to the value of cocoa exported, as against other variables in the model.

Nevertheless, Chamunorwa and Choga (2015) uncovered that exchange rate volatility has a significant negative effect on South African exports during the period 2000 to 2014. GARCH method was employed to connect the Rand volatility to export volumes. These findings are in line with Brenton (2007) who concluded that exchange rate volatility decreases trade because of imperfect markets in less developed countries. On the other hand, Dell’ Ariccia (1999) used the gravity model to examine the impact of the exchange rate on the bilateral trade of the fifteen European Union members and Switzerland for the period 1975 to 1994. Findings from the study suggest that exchange rate volatility has a small but significantly negative impact on trade. Additionally, Sun et al (2002) employed a modified gravity-type model to evaluate the effects of exchange rate volatility on wheat exports worldwide. Special attention was given to the econometric properties of the gravity model within a panel framework. Short run and long run measures of exchange rate volatility were constructed and compared. Both measures of exchange rate volatility exhibited negative effects on world wheat trade.

In their study on the impact of exchange rate volatility on exports in Vietnam, Thuy and Thuy (2019) used data from the first quarter of 2000 to the fourth quarter of 2014 The study applied the autoregressive distributed lag (ARDL) bounds testing approach to analyse the relationships between effective exchange rate volatility and exports. Using the demand function of exports, the effect of depreciation and foreign income on exports were also considered. While Senadza and Diaba (2017) findings show a positive impact of exchange rate volatility on exports in the long run, Thuy and Thuy (2019)'s study indicate that exchange rate volatility negatively affects the export volume in the long run. A depreciation of the domestic currency affects exports negatively in the short run, but positively in the long run, consistent with the J curve effect. However, the results also show that an increase in the real income of a foreign country actually decreases Vietnamese export volume. Thus the findings suggest some policy implications in managing the exchange rate system and promoting exports of Vietnam.

Using autoregressive distributed lags (ARDL) modelling, Agiomirgianakis et al (2015) examined the effects of exchange rate volatility for Iceland on tourist arrivals exports during period of first quarter of 1990 to fourth quarter of 2014. Overall, the findings suggest that there is a negative effect of volatility to tourists' arrivals for Iceland. These findings are similar to what Verena and Nawsheer (2011) obtained when they carried out a study on the impact of real exchange rate volatility on Mauritian export performance from 1975 to 2007. Their empirical results based on ARDL analysis reveal that exchange rate volatility has a positive and significant short run effect on exports, while the long run volatility adversely affects the Mauritian exports.

Bakhorov (2011) estimated the effects of exchange rate volatility on the international trade in Uzbekistan from 1999 to 2009. Results show that the real exchange rate volatility has a substantial impact on the exports and imports of the country. Furthermore, using the Johansen's cointegration framework, the study tested for the presence of unique contegrating vectors linking series such as exports/imports, foreign and domestic income, relative exports (imports) and real exchange rate with the volatility of real exchange rate in the long run. The results show that increase in the volatility of real exchange rate have significant negative effects on exports and imports in the long run dynamics. Improvements in terms of trade as represented by declines in the real exchange rate positively affects trade.

Nevertheless, Nyahokwe and NcWadi (2013) using VAR models investigated the impact of exchange rate volatility on aggregate South African exports flows to the rest of the world for the period 2000 to 2009. The study findings suggest that, there exist no statistically significant relationship implying an ambiguous relationship between exports flows and exchange rate volatility. The results of study also show that, depending on the measure of volatility used, exchange rate volatility either does not have a significant impact on South Africa's exports flows, or it has a positive impact on aggregate goods and services. Vieira and MacDonald (2016) investigated the role of real effective exchange rate volatility on export volume and also to address the impact of the international financial crisis of 2008 using the System GMM estimation techniques for a set of 106 countries for the period of 2000-2011. The findings for the complete sample of countries and for a set of developing countries, show that there is evidence that an increase (decrease) in REER volatility reduces (increases) export volume. The results are not robust once the oil exporting countries are removed from the sample. There is evidence that the export volume is price (REER) and income (trade weighted) inelastic. The empirical results are valid for the complete set of countries and for developing and emerging economies when including the oil export countries.

Moreover, Bouga, and Fagereng (2010) examined the causal link between export performance and exchange rate volatility across different Norwegian monetary policy regimes within the cointegrated Vector Autoregression (VAR) framework using the implied conditional variance from a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model as a measure of volatility. The study was unable to find any evidence suggesting that export performance has been significantly affected by exchange rate volatility. The study, however, found that volatility changes proxied by blip dummies related to the monetary policy change from a fixed to a managed floating exchange rate and the Asian financial crises during the 1990s enter significantly in a dynamic model for export growth. A forecasting exercise on the dynamic model rejects the hypothesis that increased exchange rate volatility in the wake of inflation targeting in the monetary policy has had a significant impact on export performance.

Munyama and Todani (2005) applied the ARDL bounds testing procedure in order to test the impact of the exchange rate volatility on South African exports and the findings indicate that depending on the measure of volatility used, exchange rate volatility either does not have a significant impact on South Africa export flows or it has a positive impact. Similarly, Akpokodje and Omojimite (2009) examined the effect of exchange rate volatility on the imports of Economic Community of West African States (ECOWAS), where the GARCH model is used in generating the volatility series. A significant negative effect of exchange rate volatility on imports was realised in the pooled model comprising all ECOWAS economies. Outcomes on the sub-group of countries, however, were mixed. Whereas the non-CFA sub-group evidenced a negative correlation, positive volatility coefficients were obtained for the CFA sub-group Similar results were obtained by De Vita and Abbott (2004) who applied the ARDL technique to analyse the impact of the exchange rate on United Kingdom exports to the European Union. The analysis estimated an export demand equation using disaggregated monthly data for the period 1993 to 2001.The results obtained indicated that UK exports to the EU are unaffected by exchange rate movements. More so, Morgenroth (2000) obtained similar results while examining the flow of Irish exports to Britain.

The literature that have been presented in this section reveals that the effects of exchange volatility on trade performance are ambiguous as there is no real consensus on either the direction or the size of the exchange rate volatility and trade performance. However, results from studies presented in this section show that generally, there is a negative relationship between exchange rate volatility and trade performance. Differences in the results obtained could due to differences across countries depending on the level of economic and financial development and the methodologies used in the study.

## 3. Methodology and data analysis

In this study we employ the pooled mean-group (PMG) estimator of dynamic heterogeneous panels following Pesaran et al (1997) and Pesaran et al (1999). Pesaran et al (1999) as cited in Senadza and Diaba, (2017). Based on Pesaran et al. (1999). The dynamic heterogeneous panel regression can be infused into the error-correction model using the autoregressive distributed lag ARDL (p,q) technique, where p is the lag of the dependent variable, and q is the lag of the independent variables (Loayza & Ranciere, 2006). The other technique is the mean group (MG) following Pesaran and Smith (1995). MG calls for estimating separate regressions for each country and calculating the coefficients as unweighted means of the estimated coefficients. MG allows for all coefficients to vary and be heterogeneous in the long run and short run. However, the necessary condition for the consistency and validity of this approach is to have a sufficiently large time-series dimension of the data. The cross-country dimension should also be large. Furthermore, for small N, the MG estimator is sensitive to outliers and small model permutations (Favara, 2003).

The dynamic fixed effects estimator (DFE) is another method very similar to the PMG estimator and restricts the slope coefficient and error variances to be equal across all countries in the long run. The DFE model further restricts the speed of adjustment coefficient and the short-run coefficient to be equal too. However, the model features country-specific intercepts. DFE has a cluster option to estimate intra-group correlation with the standard error (Blackburne & Frank, 2007). However as observed by Baltagi, Griffin, and Xiong (2000), DFE model is subject to a simultaneous-equation bias due to the endogeneity between the error term and the lagged dependent variable in case of small sample size.

As alluded earlier, this study employs the PMG model. The justification of the PMG model is that it combines averaging and pooling, permitting the error variances, intercept and short-run coefficients to differ across panel units, while constraining long-run coefficients to be homogenous across the spatial dimension (Pesaran et al.,1999). It also allows for working with data with large time series dimension. As such, the estimated panel models represents a structural long-run equilibrium relationship or a spurious one (Samargandi et al., 2015, Christopoulos and Tsionas, 2004). The main characteristic of PMG is that it allows the short run coefficients, including the intercepts, the speed of adjustment to the long-run equilibrium values and error variances to be heterogeneous country by country, while the long-run slope coefficients are homogeneous across countries. This is particularly useful when there are reasons to expect that the long-run equilibrium relationship between the variables is similar across countries or, at least, a sub-set of them. The short run adjustment is allowed to be country-specific, due to the different impact of the vulnerability to exchange rates, external shocks, stabilisation policies, monetary policy and so on. This dynamic heterogeneous panel regression can be incorporated into error correction model using the autoregressive distribution lag (ARDL) technique (Loayza and Ranciere, 2006) and takes the following form:

$$\Delta TP_{it} = \emptyset_i\left(TP_{i,t-1} - \overline{TP}_{i,t-1}\right) + \sum_{j=0}^{n-1} \delta_{ij}\Delta f_{i,t-j} + \alpha_i + u_{it} \quad (1)$$

$$\overline{TP}_{it} = \beta' f_{it} \quad (2)$$

Where, $TP$ is the Trade Performance indicator, $\overline{TP}$ represents the equilibrium Trade Performance, $f$ represents the vector of explanatory variables which includes the exchange rate volatility, $\alpha_i$ is an unexplained country specific effect which can be correlated with the explanatory variables, $\emptyset_i$ represents the error correction term or speed of adjustment term which describes the reaction of credit to its misalignment, the misalignment itself drives trade performance back to equilibrium in the error correction framework, the error correction term is expected to have a negative sign implying lower than equilibrium trade performance induces trade performance growth in the next period, $\beta$ in equation 2 captures the common long run dynamics between explanatory variables and equilibrium level of trade performance.

There is no assumption of a homogenous slope coefficients of lagged dependent variables which could leads to spurious regressions.

## Data

The study considers annual data over the period 1985 to 2016 and the whole dataset was obtained from the World Development Indicators. The indicators for trade performance considered in the study are trade as a share of GDP, exports of goods and services as a share of GDP and imports of goods and services as a share of GDP. Due to few countries with real exchange rate data, the study took advantage of the available real exchange rate data as well as nominal exchange rate in the construction of the exchange rate volatility to ensure the robustness of the findings following Todani and Munyama (2005). Real GDP per capita growth, real effective exchange rate and nominal exchange rate were the control variables used in the regressions. GDP per capita growth is expected to have a positive contribution on trade performance both in the long run and short run (Senadza and Diaba, 2018). The impact of exchange rates depends with the measure of trade performance that is a negative relationship is expected in relation to imports (Khan et al., 2014, Akpokodje and Omojimite, 2009), while a positive relationship is expected in relatuion to exports (Senadza and Diaba, 2018).

The exchange rate volatility is measured as the conditional variance exchange rate level and the moving sample standard deviation of both nominal and real annual exchange rates. The conditional variance is the true measure of volatility about a variable given a model and information set. To obtain conditional variance of exchange rate, the study uses Generalized Autoregressive Conditional Heteroskedasticity GARCH (1, 1) specification as follows:

$$EX_t = \emptyset_o + \sum_{t=1}^{n} \emptyset_i EX_{t-1} + u_t \quad (3)$$

$$Exchange\ Volatility_t = \sigma_t^2 = \theta_o + \sum_{i=1}^{p} \vartheta_i u_{t-1}^2 + \sum_{j-1}^{q} \varphi_j \sigma_{t-1}^2 \quad (4)$$

Equation 3 is the mean equation, where $EX_t$ is exchange rate, $EX_{t-1}$ stands for the previous exchange rate and $u_t$ represents the error term. In Eq. (4), $\sigma_t^2$ is the one-period ahead forecast for the variance of exchange rate based on past information or volatility, $\sigma_{t-1}^2$ is the previous volatility (GARCH term) and $u_{t-1}^2$ denotes the previous information about volatility (ARCH term) while the equation is called conditional variance equation. The GARCH (1, 1) equation above is used to generate the exchange rate volatility series for annual data set and in included in panel model in equation 1.

Besides, the moving sample standard deviation of the growth rate of both nominal and real exchange rate following Todani and Munyama (2005), de Vita and Abbot (2004), Das (2003) and Arize (2000) takes the form:

$$Exchange\ Volatility_{t+m} = \left[\left(\frac{1}{m}\right) \sum_{i-1}^{m} (R_{t+i-1} - R_{t+i-2})^2\right]^{\frac{1}{2}} \quad (5)$$

Where m is the order of moving average, and R represents the exchange rate indicator used (real and nominal exchange rate). $Exchange\ Volatility_t$ was estimated for m = 5.

## 4. Results and discussion

The summary statistics in Table 1 below shows that the data used is not strongly balanced with real effective exchange rate being the variable with the least observations of 150. Only 5 countries in the SADC have data reported for this indicator from the World Development Indicators. Besides, it can be noted that proportion of exports as a share of GDP in relation to that of imports as a share of GDP implies negative trade balances in the region as exports have remained lower than imports. On the other hand, it can also be observed that the data for real effective exchange rate is more stable than that of official exchange rate as reflected by the standard deviation. This then shows how the nominal fluctuations in the exchange rate may not necessarily translate into real exchange rate fluctuation with the same magnitude. This shows how critical basing economic decision on real exchange rate data could be.

Table 1: Summary Statistics

| | Unit of Measurement | Obs | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|---|---|
| Trade | Total exports and imports (% of GDP) | 436 | 84.202 | 37.509 | 14.325 | 225.023 |
| Exports | Exports of goods and services (% of GDP) | 388 | 36.021 | 19.181 | 2.524 | 107.994 |
| Imports | Imports of goods and services (% of GDP) | 420 | 46.753 | 21.219 | 11.466 | 117.153 |
| REER | Real effective exchange rate index (2010 = 100) | 150 | 116.854 | 68.927 | 46.009 | 538.364 |
| ER | Official exchange rate (LCU per US$, period average) | 472 | 1420000 0 | 309000000 | 0.0000000001 66 | 6720000000 |
| GDP capita growth | GDP per capita growth (annual %) | 444 | 1.599 | 4.979 | -26.453 | 23.027 |

Source: Owners' computations

In tables 2 and 3 below, we present pooled mean regression results from our study. Reergarch (Table 2) and Ergarch (Table 3) represents the measures of exchange rate volatility using GARCH method for real or effective exchange rate and nominal or official exchange rate, respectively. Reersd5 (Table 2) represent the measure of real effective exchange rate volatility using 5 year moving standard deviation while Ersd5 (Table 3) is the volatility for the nominal/ official exchange rate.

Table 2: Coefficient estimates - Pooled Mean Group Regression 1985-2016

| | Reergarch | | | Reersd5 | | |
|---|---|---|---|---|---|---|
| Variables | Trade | Exports | Imports | Trade | Exports | Imports |
| Long-run dynamics | | | | | | |
| Exchange Volatility | -0.0016* (0.091) | - 0.0010*** (0.007) | -0.0007 (0.225) | - 0.2167*** (0.000) | - 0.1012*** (0.000) | -0.1086*** (0.000) |
| REER | -0.0618 (0.358) | -0.0223 (0.472) | -0.0474 (0.341) | -0.0342 (0.268) | -0.0312** (0.034) | -0.0296 (0.169) |
| GDP capita growth | 3.9580*** (0.000) | 1.0424* (0.052) | 2.1242*** (0.002) | 2.7726*** (0.000) | 0.6667** (0.032) | 1.2616*** (0.006) |
| Constant | 0.2289 (0.264) | 9.9524*** (0.009) | 18.0457** (0.019) | 35.0164** (0.028) | 16.3072** (0.012) | 19.4905** (0.016) |
| Convergence coefficient | - 0.3552*** (0.000) | - 0.2951*** (0.003) | - 0.3337*** (0.000) | - 0.3918*** (0.007) | - 0.4351*** (0.004) | -0.3764*** (0.006) |
| Short-run dynamics | | | | | | |
| D.Exchange Volatility | -0.0491 (0.336) | 0.0139 (0.296) | -0.0600 (0.309) | -0.8197 (0.324) | -0.3974 (0.314) | -0.6926 (0.323) |
| D.REER | 0.0121 (0.943) | -0.1271 (0.132) | 0.0692 (0.655) | -0.0062 (0.974) | -0.0562 (0.215) | 0.0429 (0.782) |
| D.GDP capita growth | 0.5331 (0.530) | 0.6274 (0.105) | 0.1889 (0.756) | 0.3485 (0.574) | 0.4008 (0.163) | 0.0840 (0.836) |
| Number of countries | 4 | 4 | 4 | 5 | 5 | 5 |
| Observations | 86 | 85 | 85 | 115 | 115 | 115 |

Note: p-values in parentheses; *** indicates significance at 1%, ** significance at 5% and * significance at 10%.

As shown in Tables 2 and 3, there is strong evidence of a strong negative and significant relationship between exchange rate volatility and trade performance (with exception of Reergarch on imports which is insignificant) in the long run. Using the GARCH method, results reveal that real exchange rate volatility has a negative and significant effect on Trade performance and exports at 10% and 1% intervals respectively. While Reergarch is negative with respect to imports, however it is not significant in the long run. Ergarch is positive and significant on trade performance and imports, both at 5%. Ergarch is also positive but not significant on exports in the long run. The short run dynamics show that both Reergarch and Ergarch have a negative relationship with trade performance and imports. It should also be noted that, while Ergarch is negative on exports, Reergarch shows a positive relationship.

The pooled mean group regression results using Reersd5 uncover negative and very strong levels of significance with the key variables namely trade performance, exports and imports in the long run. The short run dynamics also reveal that Reersd5 has negative impact on trade performance, exports and imports. However, Ersd5 has positive impacts on trade performance and imports and a negative impact on exports in the long run. Moreover, all the variables are insignificant. In the short run, Ersd5 has positive relationship with the variables under discussion and only exports is significant at 10%.

The results are in line with Chamunorwa and Choga (2015) and Brenton (2007) who concluded that exchange rate volatility decreases trade because of imperfect markets in less developed countries. The relationship is also negative in the short run but with insignificant coefficients. On the contrary to real exchange rate volatility, it is shown in Table 3 that there is a positive and significant relationship on Ergarch with respect to trade performance and imports only while other coefficients are insignificant. As implied by Todani and Munyama (2005) in South Africa, the positive impact could be due to more trading (particularly of exports) to absorb all excess supply that may arise from exchange rate volatility such that revenues would be maintained despite the increased risk.

Evidence from this study shows that there is a negative and significant effect of exchange rate volatility on trade performance in SADC countries. These results are in line with findings from studies of other African regions Polodoo et al (2016) and Senadza and Diaba (2017).

Table 3: Coefficient estimates - Pooled Mean Group Regression 1985-2016

| | Ergarch | | | Ersd5 | | |
|---|---|---|---|---|---|---|
| Variables | Trade | Exports | Imports | Trade | Exports | Imports |
| Long-run dynamics | | | | | | |
| Exchange Volatility | 0.0004** (0.018) | 0.00003 (0.481) | 0.0005** (0.011) | 0.0124 (0.771) | -0.0247 (0.427) | 0.0050 (0.872) |
| ER | 0.0082** (0.012) | 0.0052*** (0.000) | 0.0003 (0.924) | | | |
| GDP capita growth | 2.7677*** (0.000) | 1.1030*** (0.000) | 2.5778*** (0.000) | 3.0588*** (0.000) | 1.6501*** (0.000) | 3.0543*** (0.000) |
| Constant | 15.9462*** (0.000) | 7.8376*** (0.009) | 7.7728*** (0.000) | 16.1095*** (0.000) | 7.6664*** (0.000) | 6.9670*** (0.000) |
| Convergence coefficient | -0.2199*** (0.000) | -0.2448*** (0.000) | -0.1846*** (0.000) | -0.2046*** (0.000) | -0.2208*** (0.000) | -0.1598*** (0.000) |
| Short-run dynamics | | | | | | |
| D.Exchange Volatility | -0.5092 (0.518) | -0.4773 (0.453) | -0.0208 (0.855) | 1.2552 (0.236) | 1.4979* (0.054) | 0.0311 (0.968) |
| D.ER | 1.2471* (0.050) | 0.6833* (0.053) | 0.5337 (0.173) | | | |
| D.GDP capita growth | -0.1693 (0.234) | 0.1014 (0.341) | -0.3195*** (0.007) | -0.2173 (0.140) | 0.0598 (0.578) | -0.3570*** (0.008) |
| Number of countries | 14 | 14 | 14 | 14 | 14 | 14 |
| Observations | 391 | 375 | 375 | 391 | 375 | 375 |

Note: p-values in parentheses; *** indicates significance at 1%, ** significance at 5% and * significance at 10%.

As such, it can clearly be noted that the impact of exchange rate volatility on trade performance varies with respect to the measures of volatility which is in line with host of studies in the literature which comprise of Meniago and Eita (2017) on Sub-Saharan African and Todani and Munyama (2005) in South Africa. By large, there is evidence of negative impact of real effective exchange rate volatility on trade performance which can be attributed to general observation that traders in the SADC are risk averse in such a way that they would be forced to reduce their trading activities as the real exchange rate becomes more volatile. The same conclusion was also drawn by Meniago and Eita (2017). There is, however, evidence of a positive impact of nominal exchange rate volatility with respect to trade performance. This can be attributed to the need to absorb excess supply that may follow exchange rate volatility and risky trading in open economies. Traders would likely trade more so that they can maintain high revenues in such times. This evidence is also supported by Todani and Munyama (2005). Besides, the positive relationship shows that traders' negative decision on trade flows with respect to volatile exchange rate is largely linked to dynamics in the real terms. That is, the volatility in the nominal exchange rate alone has no capacity to influence trading operations in the region.

The impact of real effective exchange rate as shown in Table 2 is, however, negative and insignificant in the long run with exception of exports in a model with Reersd5 which exhibited a negative and significant relationship. On the other hand, nominal or official exchange rate exhibits a positive and significant impact on trade as well as on export in both the long run and short run dynamics as shown in Table 3. This implies that depreciation in the nominal exchange rate has a positive impact on trade and exports in both the long run and short run which conforms to the theory. Economic theory postulate that exchange rate depreciation would increase exports and/or trade as they become cheap from foreign markets.

As expected from the theory, the per capita GDP in Table 2 shows a positive and significant impact on all trade performance indicators used in the long run. The relationship was, however, insignificant in the short run. Table 3 also shows a positive impact of per capita GDP on all trade performance indicators used in the long run which conforms to the literature. The relationship is, however, negative and significant in the short run with respect to imports.

The dynamic results in Table 2 and Table 3 are validated by negative and significant coefficients of the error correction term or convergence coefficient which integrates the short-run dynamics with the long-run equilibrium without losing long-run information.

## 5. Conclusion

The study considered annual data over the period 1985 to 2016 for 15 SADC countries with the utilisation of the pooled mean-group method following Pesaran et al (1997) and Pesaran et al (1999). The dynamic heterogeneous panel regression used allows for the disentangling of both the long-run and short-run dynamics in the data. Mixed findings are observed with real exchange rate and its volatility deterring trade performance in the region while nominal or official exchange rate and its volatility improves trade performance.

Given that there is a clear difference on the impact of real exchange volatility with that on nominal or official exchange rate, attention must be directed to the real changes in the exchange rate as they contribute adversely to the success of trade and development in the region. Significant evidence brought in this study shows that dynamics in the real exchange rate matters the most to be contained as compared to the official or nominal exchange rates. As such, temporary trade gains may be enjoyed by changes in the nominal exchange rate but the same does not apply when the changes in nominal exchange rate are significantly affecting the real exchange rates dynamics.

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