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IMPACT OF FLOATING EXCHANGE RATE ON THE OUTPUT, EXPORT AND EMPLOYMENT IN THE SOUTH AFRICAN BEEF INDUSTRY

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Abstract

The purpose of the study is to analyse the impact of floating exchange rate through the long-run and short-run changes or dynamic relations amongst total production, Volume of exports and total employment from 1995 to 2020, using a time-series analysis. The study adopts the secondary time series data for total production, volume of exports and total employment. Descriptive statistics was adopted to describe the features of the data quantitatively and to profile the beef industry. Unit root test was performed for the integration of variables where data exabits mixture of level and first integration. Bound test shows that variables are somehow associated in the long run due to their short run cointegration. The results from the cointegration test and the ARDL-ECM estimation suggest a long-run effect among total production, volume of exports and total employment. The adjustment term or coefficient of ECT of dependent variables suggests that the past year's errors are corrected for the current year at a convergence speed of 0.93, 1.72 and 1.06 percentage points, respectively. Furthermore, Causal relation or effect results for beef industry shows that single directional causality effect exists between, or which runs from volume of exports total production output, exchange rate to volume of exports and lastly, causal effect run from volume of exports to total employment. The overall conclusion is that floating exchange rate impact on total production, volume of exports and total employment in the beef industry of the South African red meat industry.

1. Introduction

Globalisation and integration of world economies into international market gained momentum and has benefited both developing and developed economies. The South African economy has been integrated into international market and that has created enormous opportunities for agricultural sector zooming into red meat industry and other sectors of the economy. Opportunities such as, participating in the international market by means of exporting and importing investment goods and having access to advance technological innovations which affect the domestic labour market significantly (Mashinini 2019). However, such benefits came with costs attached, amongst other is the extreme volatility of South African domestic currency and such affect more of the developing economies (Sekantsi, 2011).

According to Dahir at al (2018), volatility of the currency put immense pressure on the economic policy on exchange rate regimes selection for the country. The selection of exchange rate systems and their effects on economic factors is likely one of the most debated subjects in macroeconomic policy. Although the

influence on inflation and policy reliability has garnered significant attention, there has been insufficient research on the consequences of these systems on economic growth. This lack of investigation may be due to the prevailing belief that nominal factors are generally disconnected from long-term growth outcomes.

According to SARB (2000), the South African economy implemented a free-floating exchange rate system alongside an inflation target. This decision was primarily driven by the aim to counteract the adverse effects of globalization on its financial market. A floating exchange rate entails that the currency's value is determined by the interplay of supply and demand forces in the foreign exchange market. Like other subsectors of the South African economy, red meat industry prices as well are determined or set by the forces of demand supply, that makes the industry to be very much competitive in international market and more susceptible to international markets shocks and mostly very much affected by changes in the exchange rate.

Following the breakdown of the previous fixed exchange rate system, exchange rates worldwide have experienced significant fluctuations. Despite the potential exposure to exchange rate volatility, several nations, including South Africa, have embraced a flexible exchange rate regime. This decision is considered a potential threat to global economic stability and macroeconomic growth due to the presence of hedging mechanisms that can be utilized to mitigate the risks associated with exchange rate fluctuations (Sekantsi, 2011). However, the results of this new system of floating exchange rate have stimulated a boiling and extensive theoretical debate regarding the impact of the exchange rate unpredictability on foreign trade which is driven by output (Kihangire, 2004). The study by Munyama and Todani, (2005) indicates that greater exchange rate volatility create insecurity thereby escalating the level of riskiness of trading activity and this will eventually depress trade.

It is argued that free floating exchange rate can have both favourable and unfavourable hallow consequences in that, although it allows unrestricted the foreign exchange and stability in the balance of payment, the negative impact that the exchange rate variability has on exports, output and subsequently employment, negate the little benefits achieved through foreign exchange (Ngondo & khobai 2018). The study of the impact of exchange rate on exports, output and employment looking at South African red meat industry thus became of outmost importance.

2. Literature Review

This study takes cognisance of the change of the South African exchange rate regime from fixed exchange rate to floating exchange rate that was adopted by SARB in the year 2000. Hence is very crucial to understand how the industry of red meat industry benefits from integration into the global market and changes in the regime. Over 50 years ago, Milton Friedman (1953) advocated for the benefits of flexible exchange rates in shielding the economy from shocks. However, subsequent observations have revealed that floating exchange rates can exhibit considerable volatility. International trade or exports, labour market theories and empirical estimates of evidence are essential to launch how labour market and production output of south Africa in the red meat industry are affected by floating exchange rate, precisely with its major trading partners such as Vietnam, United Arab Emirates and Jordan.

The empirical review of the effects of exchange rate on agricultural sector output in Nigeria has shown conflicting findings. Several the findings suggest significant influence from exchange rare especially the moderating effect of nominal exchange rate (Sonaglio at al, 2016; Mashinini, 2019; Obidike at al, 2022). Despite agreeing that agricultural sector output responds to exchange rate, these studies are still at variance with the direction of the effects. For instance, Ozei, Sezgin, & Topkaya, (2013), averred that all the exchange rare variables they employed has a negative effect on agricultural sector output in both the long and short run which implies that exchange rate will rather hamper agricultural sector output in Nigeria; as against the belief from studies like Onuorah and Osuji (2014) where exchange rate enhances agricultural sector output in Nigeria.

Ngondo & Khobai (2018) conducted an empirical analysis on the influence of exchange rate volatility on South African exports by utilizing the ARDL bounds testing procedure and examining monthly data from 2000 to 2013. It not only measured the volatility of the real exchange rate but also assessed the stability of both long-term coefficients and short-term dynamics. The findings of the study indicate that exchange rate volatility has a negligible negative impact on South African exports in the long run. Similarly, the real exchange rate has an insignificant negative effect on South African exports in the long run. Additionally, the coefficient of the error correction term in the export model was found to be positive and statistically insignificant, suggesting that there is no conclusive evidence supporting the existence of a long-term equilibrium relationship between the variables.

Nyahokwe and Ncwadi (2013) looked into how fluctuations in currency rates affected total South African exports to the rest of the globe from 2000 to 2009. To determine the long and short run

relationships between exports and exchange rate, the study used the Vector Autoregressive (VAR) and Vector Error Correctional Model (VECM). The observed data imply that there is an ambiguous link between South African export flows and exchange rate, suggesting that there is no statistically significant association between them.

Filiztekin (2004) used data for a panel of manufacturing industries from 1981 to 1999 to analyze the effects of exchange rate variations on Turkish manufacturing employment and salaries. In contrast to the majority of studies that have looked at this link, he concludes that a depreciation has a net negative impact on both employment and wages, with more pronounced effects on wages. The substantial reliance of Turkey's manufacturing sectors on imported materials outweighs the advantages of depreciation for competitiveness. However, there is a lot of diversity amongst industries. Clothing, the sector that saw the greatest increase in employment throughout the 1980s, is the one most negatively impacted by devaluations.

2.1. Beef Production Trends

South Africa currently has about 430 abattoirs slaughtering cattle on annual basis. Figure 1 below shows production and consumption of beef where from 19195 to 2001 the trends were constant but with consumption being above production. From 2002 to 2007 there was a simultaneous in for production and consumption even if still consumption was over production until 2007, both production and consumption followed the same trend. A decline during 2007 to 2009 was experience and it was due to the global economic meltdown, which led to a decreased disposable income of a large number of consumers. There has been an increase for both production and consumption from the year 2011 until 2020 where peak was reached in 2016 with amount to 1079 000 tons.

2.1.1. South African Beef Production Vs Consumption Trend

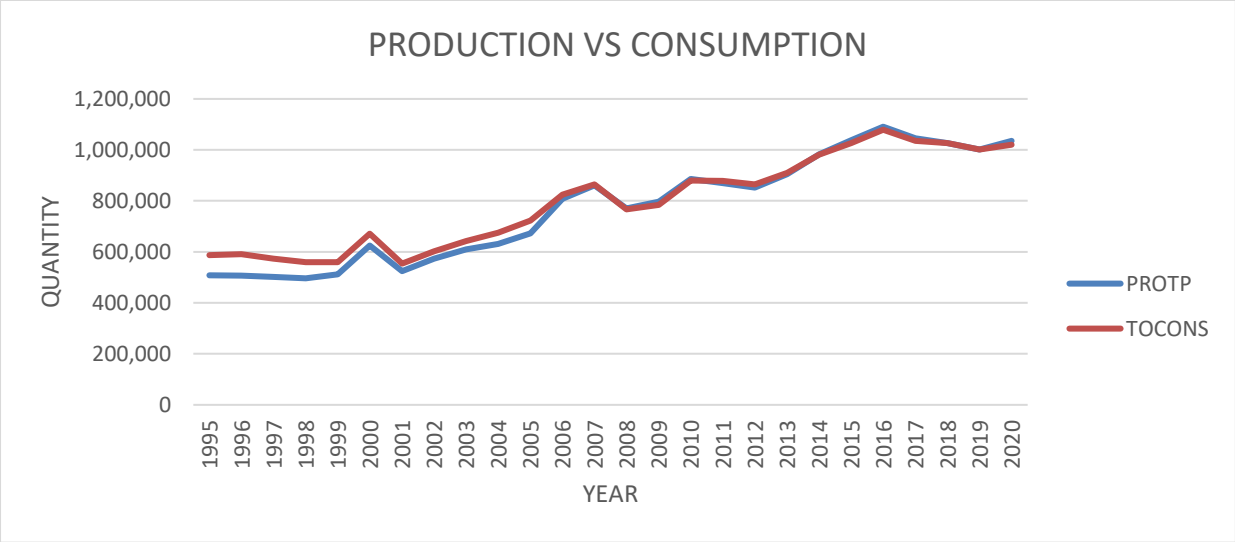

Figure 1. Beef employment in South Africa

Data source: DALRRD (1995-2020)

The figure 2 below demonstrate the beef consumption per capital and exchange rate from the year 1995 until the year 2020. Figure shows structural breaks for exchange rate which affect the consumption per capita pattern. Real exchange rate indicated structural breaks in the year 2002, 2008 and 2016. This was attributed to both internal and external shocks. However, exchange rate has been on an increase over the year under review and this affect the production of beef and the pricing as well. It could be seen that an increase in exchange rates suppressed the increase rate of consumption per capital. The reason behind this is that an increase in exchange rate devalues the value of rand with subsequently affect the level of income that consumers receive.

2.1.2. South African Exchange Rate vs Consumption per Capital Trend

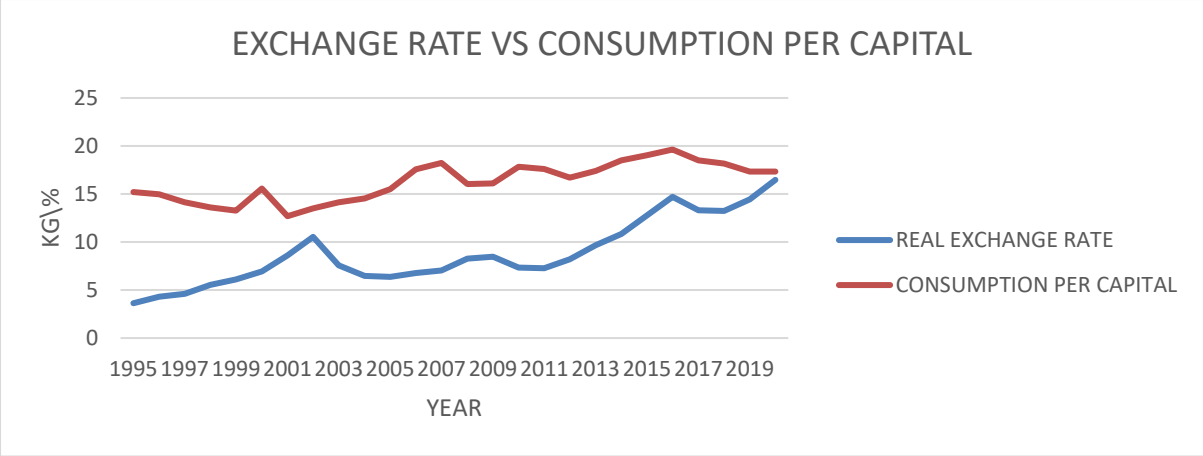

Figure 2. Beef exchange rate vs consumption per capital in South Africa

Data source: DALRRD (1995-2020)

3. METHODOLOGY

The section affords information concerning the source of dataset, descriptive statistics, unit root test applying Augmented Dickey Fuller (ADF) test, and the inferential of analytical methods. The analytical technique of inferential statistics includes the bound test for assessing cointegration between included variables; The ARDL-ECM Model was applied after the cointegration test. Furthermore, granger causality test was employed to determine the causality among variables. Lastly, the ordinal least square estimation was used to determine the relationship between among the variables.

3.1. Data Sources

The paper utilised annual date of observations from the period between 1995 and 2020 to estimate the response of the South African beef industry to floating exchange rate. South African reserve bank (SARB) provided data on south African exchange rate pegged against us currency. The beef export dataset was sourced from quantic data, while production and employment data was sourced from the Department of Agriculture, Land Reform and Rural Development (DALRRD) together with statistics south Africa. The Bureau for Food and Agricultural Policy (BFAP) also provided with consumption dataset of beef in south Africa. The total production, Volume of exports, total employment and exchange rate are denoted by PROTPt, VOLEXPTt, TOEMPt and REXRTt, respectively.

3.2. Descriptive Statistics

By giving condensed summaries of the observations contained in the paper, the paper uses descriptive statistics to quantitatively describe the characteristics of the data. The mean, median, minimum, maximum and standard deviations are used in the study to assess the characteristics of the data. The minimum denotes the series' smallest value, while the maximum denotes its largest value. The most popular way to describe average tendency is to use the mean. The score that falls in the middle of a set of values is the median.

The specific equation:

$$\begin{aligned}\Delta lnPROTP_t = {} & \beta_0 + \beta_1 \Delta REXRT_{1t} + \beta_2 \Delta CONSPC \\ & + \beta_3 \Delta TOCANU_{3t} + \beta_4 TOSLAU_{4t} \\ & + \beta_5 lnVOLEXPT_{5t} + \beta_6 \Delta lnTOEMP_{6t} \\ & + \beta_7 \Delta TOCONS_{7t} + \beta_9 \Delta lnPROTP_{t-1} \\ & + \pi ECMt - 1 \\ & + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)\end{aligned}$$

Where Δln〖PROTP〗_t represent the dependent variable, while X_1 until X_k (REXRT,CONSPC,TOCANU,TOSLAU,VOLEXPT,TOEMP,TOCONS,and 〖PROTP〗_(t-1)) denote the independent variables which are factors that affect production output various as the dependent variable. The t subscript signifies a time period or dimension. Where Δ signify differencing notation, while ln(log) represent natural logarithm, πECMt-1 denotes error correction term andΔln〖PROTP〗_t represents lagged variables including dependent variable. Disturbance term is denoted by 〖ε〗_t, which captures effects of variables not included on the regression.

4. Empirical Results and Discussion

The section presents and discuss the empirical results. In a sequential way it starts with the descriptive statistics, trailed by the unit root test. Afterward that, the Bound test results are discussed, furthermore ARDL-ECM and Granger causality test together are deliberated using Ordinal least square estimation.

4.1. Descriptive Statistics

The table 1 below shows minimum total production (PROTPt) of beef estimation being equivalent to 496 000 tonnes, whereas its maximum value equals 1 million tonnes; the mean value equals 774 thousand tonnes and standard deviation amount to 206834.814. Minimum volume of exports (VOLEXPTt) in South African Rand is R 18.1 million, the maximum volume of exports is R 1.2 billion, average value is about R 279 million and standard deviation amountnt to 366705466.884. furthermore, table 1 highlights that the minimum real exchange rate (REXRTt,) is equivalent to R 3.6271, the maximum real exchange rate is about R 16.4719, while mean is about R 8.824742 and standard deviation is equivalent to R 3.4693039. The minimum total employment is estimated to be equivalent to 92 thousand; the maximum total employment (TOEMPt) is equivalent to 144 thousand, the average total employment is about 118 thousand and the standard deviation equals 13711.085.

Table 1. Summary statistics for the beef/cattle industry

Properties /Variable	**Descriptive Statistics**			
	Minimum	**Maximum**	**Mean**	**Std. Deviation**
PROTP	496300	1090900	774196.15	206834.814
VOLEXPT	18144	1216514	279159.96	366705.884
TOEMP	92000	144000	118076.92	13711.085
TOCANU	12300000	13900000	13450000.00	454532.727
TOCONS	554000	1079000	795500.00	180127.122
TOSLAU	2159000	3662000	2832269.23	447973.174
REXRT	3.6271	16.4719	8.824742	3.4693039
CONSPC	12.69000	19.63000	16.27577	1.987079

Source: Author's calculations

4.2. Unit Root Test

For the determination of stationarity properties of data, the study applied the Dickey, & Fuller (1979) unit root test. In the test, null hypothesis of unit root is rejected if the p-value of ADF statistic is equal or less than five percent level of significance. Table 2 presents the analysis of the cattle/beef industry, incorporating a total of eight variables. Among these variables, one was found to exhibit stationary behaviour at level [I(0)], while seven variables displayed stationarity after first differencing [I(1)]. The presence of stationary variables ensures precise estimations and unbiased outcomes. Furthermore, when aiming to forecast the Best Linear Unbiased Estimate (BLUE), it is necessary to satisfy one of the assumptions underlying Ordinary Least Square (OLS) by assessing the stationarity of all variables included in the estimation.

Table 2. Unit root test for Cattle/Beef variables using ADF test

Variables	**Order of integration**				***Conclusion***
	Level		**1st difference**		
	C	**C&T**	**C**	**C&T**	
TOCANU	0.1414	0.1384	0.0013	0.0084	Stationary at *I*(1)
PROTP	0.8310	0.3235	0.0011	0.0065	Stationary at *I*(1)
TOCONS	0.8353	0.3237	0.0002	0.0108	Stationary at *I*(1)
VOLEXPT	0.9982	0.9713	0.0154	0.0066	Stationary at *I*(1)
TOSLAU	0.0474	0.0306	---------	--------	Stationary at *I*(0)
TOEMP	0.2883	0.5749	0.0000	0.0001	Stationary at *I*(1)
REXRT	0.9440	0.8487	0.0145	0.0434	Stationary at *I*(1)
CONSPC	0.5171	0.1827	0.0002	0.0104	Stationary at *I* (1)

Notes: the difference between the critical value and the calculated t-statistics at 5% ($p \leq 0.05$) level is used to test a presence of a unit root.

4.3. Long Run and Bound Test

In line with Mohammadi et al. (2011), this study employs the ARDL-ECM (AutoRegressive Distributed Lag-Error Correction Model) approach introduced by Pesaran et al. (2001). The adoption of the ARDL technique is advantageous over traditional cointegration methods for several reasons. Firstly, the ARDL test yields effective results even when the variables are integrated at different levels, such as [I(0)] or [I(1)], or when they exhibit mutual cointegration, as confirmed by the earlier stationary test. This flexibility is a notable strength of the ARDL approach. Additionally, the ARDL methodology is particularly suitable when the dataset has a limited number of observations or a small sample size, alongside variables that possess different orders of integration. Given these circumstances, ARDL is the preferred method for this study.

Table 3 shows the first stage of ARDL-ECM approach which is to carry out lag length selection criterion which was used throughout the estimation process for the cattle /beef industry. There are several criteria for lag length selection when dealing time series, namely: Akaike Information Criterion (AIC), Final Prediction Error (FPE), Hannan Quinn Criterion (HQ) and Schwartz Information Criterion (SC). The paper deploys the Akaike Information Criterion as the preferred criterion which take cognisance of sample prediction error and specification error (Metsileng at al 2018; Dincer & Kandil 2011; Alam & Ahmed 2012). As presented in Table 3, optimum lag for cattle/beef estimation is on level one, which shows that one lag was implemented throughout the estimation procedure on cattle/beef industry's regression.

Table 3. Lag selection criteria cattle/beef industry

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-562.9019	NA	9.45e+09	45.67215	46.06219	45.78033
1	-392.9336	217.5595*	2576252.*	37.19469*	40.70505*	38.16831*

Author: own computation

*indicate lag order selected by the criterion: LR: sequential modified LR test statistics (each at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

The paper adopted bound test of ARDL approach to determine the long run and short run cointegration among the variables in the estimation. The ARDL approach affords some desirable results or advantages over the other traditional cointegration approaches like Engle Granger cointegration test (EG) and Johansen cointegration test (JJCA). On the other, these traditional cointegration approaches require that all variables included be in the same order of integration. The utilization of the ARDL test procedure yields reliable outcomes, regardless of whether the variables are integrated at [I(0)], integrated at [I(1)], or mutually co-integrated (Pesaran et al., 2001). In this study, the preference for ARDL as the chosen method is driven by the limited number of observations and the presence of variables with multiple orders of integration.

As indicated on earlier that paper used the AIC for selection of lag length for ARDL approach (Ke-Chyn N & Mui-Yin C. (2021),). The findings for cointegration test from ARDL bound testing approach are presented in detailed in Table 4. Results reveal that when total production output, volume of exports and total employment are used as dependent variables for cattle/beef industry the calculated F-statistics are 319.9608, 6.187654 and 4.058013 respectively, which are greater than lower bound (2.69) and upper bound (3.83) at 5% significance level. The outcomes of the bounds estimation indicate that there are three cointegrating variable or vectors which validate the presence of long-run linkage among total production output, volume of exports and total employment in the cattle/beef industry of the south African red meat industry. Results in Table 4 shows that there are cointegration vectors among total production output, volume of exports and total employment, which confirm the robustness of long-run relation or association.

Table 4. Long-run and bound test for cattle/beef industry

Variable	F-Statistics value	Significant level	Lower bound 1(0)	Upper bound 1(1)
LNPROTP	319.9608	5%	2.69	3.83
LNVOLEXPT	6.187654	5%	2.69	3.83
LNTOEMP	4.058013	5%	2.69	3.83

Author: own computation

5. ARDL-ECM Estimation Results for Beef/Cattle Industry

5.1. Total Production Output

This study confirmed the long run cointegration by using ARDL bound estimation earlier. The short-run elasticities or adjustments for total production output and its determinant when total production output is used as the dependent variable are presented below in table 5. Table 5 shows that ECT coefficient linked to the total production output, which carries a negative sign as anticipated, while it presents to be significance statistically at five percent level and its adjustment of speed towards equilibrium is 0.93 percent.

In the short term, the implication is that the total production output is gradually moving towards equilibrium, with a convergence rate of at least 0.93 percent of the previous year's deviations from the equilibrium. The smaller value, such as 0.93 percent, indicates a slower adjustment speed towards equilibrium. As a result, the total production output takes longer to reach a state of balance. Among the variables considered in the estimation of total production output, consumption per capita and real exchange rate demonstrate statistical significance at the 5 percent level, while the significance of other variables is not observed.

Table 5 result also reveals that the values of the adjusted R2 was estimated to be 70 percent, when total production output is dependent variables, which confirms that the models is strongly good fitted. Estimated error correction term (ECTt–1) coefficient is negative and significant ensuring that the adjustment process from the short-run deviation for the equilibrium is at slow speed on total production output from the previous period's shock which will converge back to the long-run equilibrium in the current period by the explanatory variables.

5.2. Volume of Exports

The short-run elasticities or adjustments for volume of exports and its determinant when volume of exports is used as the dependent variable are presented below in table 5. The analysis reveals that the coefficient associated with the error correction term (ECT) related to export volume, which is expected to have a negative impact, is statistically significant at the 5 percent level. Moreover, the adjustment speed towards equilibrium for this variable is measured to be 1.72 percent.

In the short term, the implication is that the volume of exports is gradually moving towards equilibrium, with a convergence rate of at least 1.72 percent of the previous year's deviation from the equilibrium. The smaller value, such as 1.72 percent, indicates a slower adjustment speed towards equilibrium. Consequently, the volume of exports takes longer to reach a state of balance. Among the variables considered in the estimation of export volume, consumption per capita and real exchange rate exhibit statistical significance at the 5 percent level, while the statistical significance of other variables is not observed.

Table 5. result also reveals that the values of the adjusted R2 was estimated to be 0.99 percent, when volume of exports is dependent variables, which confirms that the models is strongly good fitted. Estimated error correction term (ECTt–1) coefficient is negative and significant ensuring that the adjustment process from the short-run deviation for the equilibrium is at slow speed on volume of exports from the previous period's shock which will converge back to the long-run equilibrium in the current period by the explanatory variables.

5.3. Total Employment

The short-run elasticities or adjustments for total employment and its determinant when total employment is used as the dependent variable are presented below in table 5. Based on Table 5, the coefficient associated with the Error Correction Term (ECT) related to total employment, which is expected to be negative, is found to be statistically significant at the 5 percent level. The adjustment speed towards equilibrium for this coefficient is determined to be 1.06 percent.

In the short term, the implication is that total employment is gradually moving towards equilibrium, with a convergence rate of at least 1.06 percent of the previous year's deviation from the equilibrium. This indicates a slower speed of adjustment towards equilibrium. The smaller value, such as 1.06 percent, signifies a slower convergence rate. Among the variables considered in the estimation of total employment, only the variable of total slaughtered demonstrates statistical significance at the 5 percent level, while the statistical significance of other variables is not observed.

Table 5. result also reveals that the values of the adjusted R2 was estimated to be 70 percent, when total employment is dependent variables, which confirms that the models is strongly good fitted. Estimated error correction term (ECTt–1) coefficient is negative as anticipated and significant ensuring that the adjustment process from the short-run deviation for the equilibrium is at slow speed on employment from the previous period's shock which will converge back to the long-run equilibrium in the current period by the explanatory variables.

Table 5. ARDL-ECM estimation results for beef/cattle industry

Error correction	***D(LNPROTP)***	***D(LNTOEMP)***	***D(LNVOLEXPT)***
Error correction term (speed of adjustment)	-0.93* (0.0000)	-1.06 (0.0001)	-1.72 (0.0000)
CONSPC$_t$	0.05 (0.0000)	-0.11 (0.4614)	1.73** (0.0016)
REXRT$_t$	0.0093** (0.018)	0.039 (0.1829)	0.25** (0.0008)
LNTOCANU$_t$	6.64 (0.1409)	3.37 (0.4578)	1.04 (0.2707)
LNTOSLAU$_t$	6.13 (0.1771)	1.13 (0.0287)	1.03 (0.9117)
LNTOCONS$_t$	-1.09 (0.1534)	-51.35 (0.4390)	16.59 (0.9367)
R-squared	0.70	0.70	0.99

Author: own computation

5.4. Granger Causality Test

The Granger causality test is employed to test the causal relationship or causality effects amongst variables that are included in the regression namely volume of exports (LNVOEXPTt), real exchange rate (REXRTt), total employment (LNTOEMPt) and total production output (LNPROTPt) in beef/cattle industry. Table 6 below highlights a single directional causality effect between real exchange rate and volume of exports, as the p-values are less than 0.05 significant level (5%). statistical hypothesis test for determining whether one time series is useful in forecasting another (Aye at al, 2015 on Granger, 1969). This is attributed to the fact that the more the real exchange rate fluctuate it affect or triggers the volume of products exported to other countries by the South African cattle/beef industry. As the real exchange rate changes that tends to affect the volume of exports by the industry because, it translates into long-term causality effects between the two variables. Under this industry is not only real exchange rate and volume of exports that has long run association, also volume of exports and total employment in the cattle/beef industry shows that there in long run effect. Meaning volume of exports has effect on total employment in the long run. Table 6 shows no notable long run effects of causality for other variables that were also included in the Granger causality test for cattle/beef industry.

Table 6. Granger causality test for Beef/cattle industry

Null hypothesis	***F-statistics***	***Prob.***
LNPROTP$_t$ does not granger cause (*REXRT$_t$*	1.39058	0.2509
(*REXRT$_t$* does not granger cause *LNPROTP$_t$*	0.35832	0.5556
LNTOEMP$_t$ does not granger cause (*REXRT$_t$*	0.34648	0.5621
(*REXRT$_t$* does not granger cause *LNTOEMP$_t$*	0.96544	0.3365
LNVOEXPT$_t$ does not granger cause (*REXRT$_t$*	2.73836	0.1122
(*REXRT$_t$* does not granger cause *LNVOEXPT$_t$*	3.94305	0.0497
LNTOEMP$_t$ does not granger cause *LNPROTP$_t$*	0.00388	0.9509
LNPROTP$_t$ does not granger cause *LNTOEMP$_t$*	0.27620	0.6045
LNVOEXPT$_t$ does not granger cause *LNPROTP$_t$*	0.29183	0.9509
LNPROTP$_t$ does not granger cause *LNVOEXPT$_t$*	3.15770	0.6045
LNVOEXPT$_t$ does not granger cause *LNTOEMP$_t$*	3.64399	0.0494
LNTOEMP$_t$ does not granger cause *LNVOEXPT$_t$*	1.05757	0.3149

Author: own computation

Note: the causality effects between the variables is signified by the relationship with p-values below 0.05 percent, while the relationship showing no causality between among the variable denoted by p-value over 0.05 percent.

6. Conclusions

This study represents a rare endeavor that empirically examines the short-term and long-term effects of exchange rates on total production, export volume, and employment within South

Africa's beef/cattle industry. The empirical analysis utilizes an annual time series dataset spanning from 1995 to 2020. Prior to conducting the inferential and conclusive estimations, the unit root test using the ADF (Augmented Dickey-Fuller) test was employed. The ADF test confirmed that all variables were stationary, either at the level or after taking first differences. To explore the impact of exchange rates on total production, export volume, and employment, various analytical tools were employed, including descriptive statistics, the Bound test, the ARDL-ECM (AutoRegressive Distributed Lag-Error Correction Model), and the Granger causality test.

The results for cattle/beef regression display that in a short-run, the system is stable and able to adjust to equilibrium at very slow speed when all the three are dependent variable (total production output, volume of exports and total employment). The conclusion for the apple regression is that exchange rate has effect on total production, volume of exports and total employment in a long run as they are able to adjust to equilibrium at that minimal or low speed. Furthermore, the statistical significance of all ECT's coefficients displays that the selected variables for estimation cause one another in the long run.

Causal relation or effect results for cattle/beef industry shows that single directional causality effect exists between, or which runs from volume of exports total production output, exchange rate to volume of exports and lastly, causal effect run from volume of exports to total employment. Other pairs for cattle/beef estimation does not show causal relationship or effect because their p-values are greater than 5% significant level.

Government and policymakers should work together to lower the cost of agricultural exports as this indirectly lowers the cost of production and the price of the products through the provision of fiscal incentives, such as tax exemptions for the import of agricultural processing equipment and tax holidays for other inputs used in agriculture. Since an increase in the exchange rate stimulates (increases) agricultural export output, policymakers should act to stabilize the exchange rate from the current downward trend.

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