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Global oil prices and exchange rate in Zimbabwe: An ARDL approach

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Abstract

This study aims to investigate the nexus between the Zimbabwean dollar exchange rate against the United States Dollar (USD) and global oil prices from 1991 to 2021. Secondary time series dataset from 1991 to 2021 was extracted from the World Bank, ZIMSTATS, and Global Macro Trends. The study employed an autoregressive distributed lag (ARDL) bounds testing approach to test for the existence of a long-run relationship between the ZWL/USD exchange rate and global oil price. The ARDL results confirmed that global oil prices are significant in explaining long-run variations in the value of the Zimbabwean currency. The results of the study show that higher and increasing global oil prices are associated with lower and depreciating local currency. Conversely, lower and decreasing global oil prices are associated with higher and appreciating currency. The policy recommendation from the study is that policymakers should reduce overreliance on oil usage by reducing its consumption. Zimbabwe should also switch to alternative sources of energy, particularly solar energy. This helps to reduce the adverse impacts of increasing global oil prices on the exchange rate through the reduction in oil importation.

1. Introduction

The Zimbabwean dollar (ZWL) has faced numerous challenges relating to its value and purchasing power for the past three decades. The exchange rate problem progressed to currency crushing in 2008, causing serious concern about how Zimbabwe's exchange rate is determined (Hanke, 2008). The Reserve Bank of Zimbabwe (RBZ), in May 2022, banned lending on suspicion that banks create excess funds through lending, which fuels the depreciation of the local currency through continuous credit creation. In July 2022, the central bank announced the introduction of gold coins to reduce and contain the value of the local currency (ZWL). This was done to retain its function as a store of value and as a standard of deferred payment, which was being compromised daily.

Despite all these efforts, the value of ZWL continued to depreciate, raising concerns about the value of the local currency. In May 2023, the central bank introduced digital coins as an extra effort to contain the value of the local currency. Like other policies, it is yet to be tested. The Reserve Bank of Zimbabwe, in its mid-term monetary policy of August 2021, identified the Russo-Ukraine conflict as one of the major sources of exchange rate volatility in Zimbabwe, disrupting oil supplies and fuel prices. Exchange rate depreciation in Zimbabwe negatively affects employees' living standards. Companies resort to fixed budgets for remunerating employees since they cannot pay in USD.

Given that these challenges are attributed to the depreciation of the ZWL, the main objective of this study was to analyse the long-run nexus that holds between global oil prices and exchange rates in Zimbabwe. The study incorporates other explanatory variables, such as inflation rate, net foreign direct investment, foreign exchange reserves, and interest rates.

The study is structured as follows: section two focuses on Global Oil Price and Exchange Rate Dynamics in Zimbabwe from 1991 to 2021, section three focuses on existing literature in relation to global oil prices and exchange rate in both oil importing and exporting countries, section four concentrates of the econometric model and estimation techniques and finally, section five concludes the study and provides policy implications.

2. Global oil price and exchange rate dynamics in Zimbabwe

The issue of energy shocks is crucial, as oil prices affect exchange rates and economic growth of both net importers and net exporters of oil. An increase in oil prices has a negative effect on oil-importing countries as their input costs increase. On the other hand, it is commonly thought that oil prices will benefit oil-exporting countries through improved terms of trade, at least in the short run (Cantore et al., 2012). Following several episodes of global oil price shocks, several studies examined the vulnerability of developing countries to oil price shocks (Nandelenga and Simpasa, 2020; Cantore et al., 2012).

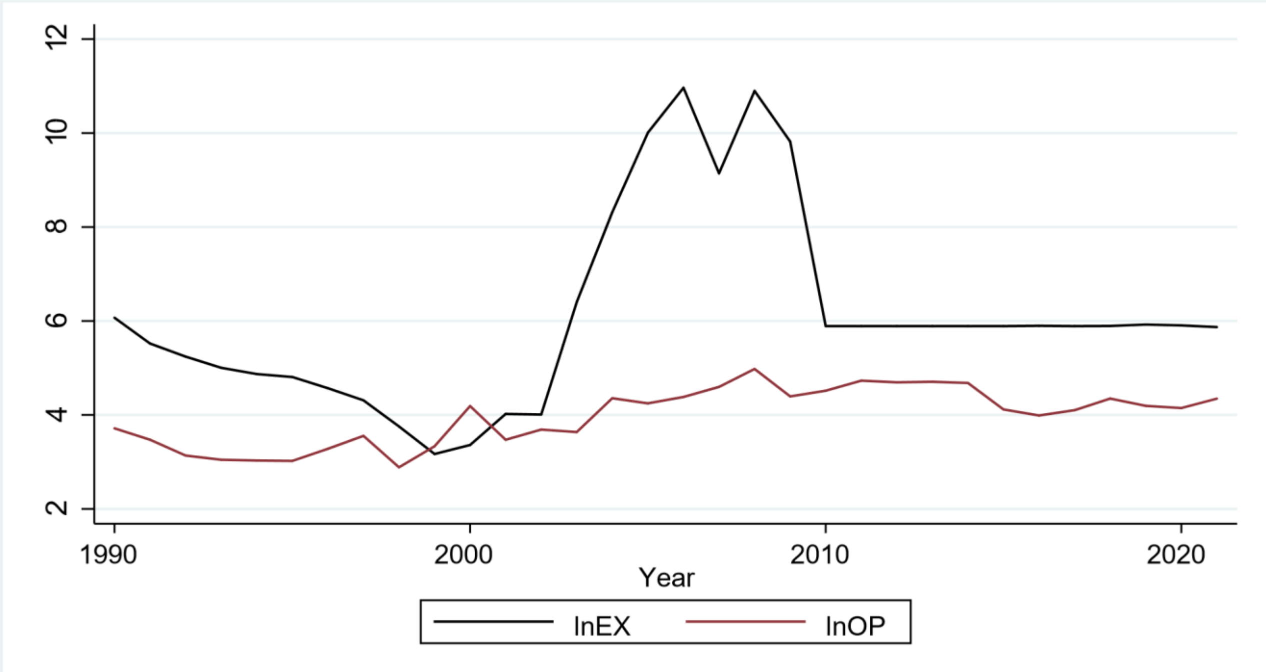
Over the past few decades, the global oil price has fluctuated considerably. These fluctuations were associated with major harsh and severe economic periods, particularly 1973, 1979, and 2008 (Global Financial Crisis), following the economic developments of 2014 and 2015. The price of crude oil has a significant impact on the global economy due to its dominance as a source of commercial energy. In October 1973, the Persian Gulf oil producers doubled the price of their crude oil, then in January 1974, doubled it again. By that time, the average price in the U.S. for imported oil had more than doubled to $6.92 per barrel, and by March, it had increased to $11.10. This led to the rapid depreciation of several currencies worldwide against the USD. According to Widdig (2001), the exchange rate in Germany rapidly depreciated, and it was associated with hyperinflation, which involved pushing a wheelbarrow of notes to buy a loaf of bread.

According to Osuji (2013), during the 1973 Arab-Israeli War, Arab members of the Organization of Petroleum Exporting Countries (OPEC) imposed an embargo against the United States. This led to shortages of fuel and the depreciation of currencies in oil-importing countries. This shows the real importance of oil in the global economy, especially looking at spiking prices and massive currency depreciation. This was the case in Zimbabwe in 2022 when the value of the ZWL massively depreciated in response to increasing oil prices induced by the Russian-Ukraine conflict, which disrupted oil supplies, increasing its prices as a commodity. Given this consensus, it shows that global oil prices are of great importance in the determination of Zimbabwean exchange rates. Therefore, the study seeks to investigate econometrically the dependence structure and volatility spillover between oil prices and exchange rates. Fig 1 gives a glimpse of the trend of global oil prices and the USD/ZWL exchange rate, respectively.

After independence in 1980, the country continued with the fixed exchange rate regime, though the referral currency changed to the South African rand (ZAR). The ZWL was then pegged to the ZAR at the rate of 1ZWL=1ZAR. Further developments in the exchange rate system saw the Zimbabwean dollar being pegged to a flexible basket of currencies, including the South African Rand, British Pound, and United States Dollar, among others, from August 2003 – December 1993 (Ndlela, 2011). Between January 1994 and June 1994, a two-tier exchange rate system was introduced, abandoning a fixed exchange rate regime that was in place. This includes the rate determined by the Reserve Bank and that determined by market forces, thus, the market quoted rate. These policies managed to maintain a relatively stable value of the ZWL against the USD.

Oil prices have also been stable from 1990 to 2020 and started to shoot up from 2004 to 2008, reaching a peak of 99.67 USD per barrel. This was attributed to the global financial crisis, according to the World Bank (2009). As a consequence of the spike in oil prices, the exchange rate in Zimbabwe depreciated to a historical level of 6723052073.3381. This was also induced by the hyperinflationary pressures and reckless printing of the bearer cheques by the central bank of Zimbabwe.

Figure 1: ZWL/USD exchange rate global oil price trends from 1991 to 2021



Source: Author's compilation using Word Bank data

From 2009, there was a constant and stable exchange rate due to the full dollarization of the economy, which reverted to the usage of the United States dollar until the introduction of the Zimbabwean dollar in 2019. This was later followed by the introduction of the multicurrency regime in 2022.

According to the Global Macro Trends (2022), in 2020, oil prices fell drastically. Demand for oil fell rapidly as countries restricted travel with stay-at-home mandates due to the COVID-19 pandemic. In April 2020, the International Energy Agency (IEA) estimated that demand was down by 30% compared to the preceding year, reaching its lowest level since 1995 IEA, (2020). Faced with a significant glut in demand, producers were scrambling for facilities to store surplus crude oil, with stocks reaching an all-time high in June 2020. Since then, the pressure on storage capacity has eased somewhat as the effect of production cuts takes hold, and the market starts to rebalance (IEA, 2020). During the same period, according to Coomer (2011), the Zimbabwean government cut its main lending rates from 35% to 25% and set a fixed exchange rate of ZWL$25/US$1 as part of the measures. This led to a slight appreciation of the ZWL compared to 2019 and 2021, with the exchange rate averaging 51.32. In 2019, fuel prices rose to 65 USD per barrel, the highest since 2014. Zimbabwe was experiencing a shortage in foreign currency and was therefore not able to procure sufficient quantities to satisfy demand. Fuel suppliers were required to sell fuel in ZWL, which was not easily convertible to forex by the banks. Financial institutions, therefore, had to wait for forex allocations from the government. This was also attributed to a massive depreciation of the ZWL against the USD.

In 2022, oil prices spiked, reaching a peak of 68.17 USD. This was then fuelled by the Russia-Ukraine conflict. Because of the war, the supply side of oil was disrupted, causing prices to rise. Also, the ZWL depreciated since its inception after the Global Financial Crisis following its reintroduction after full dollarization. In a nutshell, as shown in Fig 1, the exchange rate resembles the oil prices, with their peak values being recorded in the same period during 2008-9. Therefore, there is a need to confirm the long-run nexus econometrically. The research will assist policymakers, especially those countries that share the same features as Zimbabwe, i.e., oil-importing countries and other less economically developed countries. This will assist in analyzing the behavior of exchange rate following shocks to global oil prices and allow policy measures depending on the expected exchange rate movement induced by oil price shocks.

3. Literature review

Given that exchange rates are a macroeconomic fundamental and their stability can also reflect the stability of the whole economy, exchange rate determination becomes a focal point both theoretically and empirically. Various theories have been put forward to explain exchange rate determination. According to Uddin et al. (2013), the theories include the monetary approach to exchange rate determination, the portfolio balance approach to exchange rate determination, and the current account balance approach to exchange rate determination. However, many of these theories focus on macroeconomic variables without directly factoring in the direct prices of strategic commodities that can help explain movements in exchange rates like global oil prices. Also, some research has been conducted in relation to the nexus between global oil prices and other macroeconomic fundamentals. Akinsola et al. (2020) focused on global oil prices and economic growth, and Demirer et al. (2020) focused on oil price shocks and financial market connectedness. However, there is still a gap in understanding how oil prices can affect exchange rate fluctuations. Further research is necessary to fill this gap and provide a better understanding of how oil prices can impact exchange rates.

3.1 Empirical literature review in oil-exporting countries

Rautava (2004) carried out research in Russia analysing the impact of international oil prices and the real exchange rate on the Russian economy and its fiscal policy. The analysis was done using vector autoregressive (VAR) modelling and cointegration techniques. The study found that the Russian economy is influenced significantly by fluctuations in oil prices and the real exchange rate through both long-run equilibrium conditions and short-run direct impacts. The difference with this research is that it was based in Russia, a net exporting country. The research is being carried out using data from Zimbabwe, a net importer of oil. Also, Zimbabwe is a less economically developed country than Russia.

Another research study was done by Suliman and Abid (2020), and the paper's objective was to determine the relationship between oil prices and real exchange rates in Saudi Arabia from January 1986 - March 2019 using monthly data. The autoregressive distributed lag model and the error correction model were used to investigate the existence of a long-run equilibrium relationship between the variables. Jahangard et al. (2017) used the autoregressive distributed lag approach to cointegration to estimate the effect of oil prices on the real exchange rate in Iran from 1961 to 2014 using time series data. They discovered that higher oil prices cause the real exchange rate to rise. The findings show that oil prices affect the real exchange rate in the short and long term. Adgüzel et al. (2013) conducted another research in Brazil to examine the causal dynamics between crude oil prices and exchange rates in Brazil, India, and Turkey. This was done using monthly data from the start of the floating exchange regime to July 2011. The research takes advantage of recent advances in time series econometric analysis and conducts time domain causality tests (linear causality, non-linear causality, volatility spillover) as well as frequency domain causality tests. The findings indicate that the frequency domain causality test results differ slightly from those of the time domain causality methods. The frequency domain study shows bi-directional causality in India and unidirectional causality from real exchange rates to real oil prices in Turkey and Brazil.

Bangura (2021) examines the co-movement of oil prices and exchange rates in Sierra Leone using the correlations and copulas measures of dependence and presents two key results for crude oil prices and various currencies. Although it significantly increased in the wake of the global financial crisis, the relationship between oil prices and exchange rates is generally weak, and there is little to no market reliance. These conclusions have significant repercussions for risk management, monetary policies to control oil inflationary pressures or exchange rates, dollar peg policies of some oil-exporting countries, and budgetary policy in oil- exporting countries generally. The correlation between oil prices and India's real effective exchange rate was studied by Tiwari et al. In 2013, Wavelet decomposition was used to investigate linear and nonlinear causation across several frequency bands. Lower time scales did not reveal any link in the results. At larger scales, however, bidirectional causality was discovered. Using a discrete wavelet transform methodology, Uddin et al. (2013) investigated the impact of oil prices on the actual effective exchange rate in Romania. The findings demonstrated that real effective exchange rates are strongly causally related to oil prices. The study by Tiwari (2013) differs from the current study since it was conducted in India, which has a better economy than Zimbabwe. Lizardo (2010) conducted research and discovered that oil prices explain significantly the movements in the value of the US dollar (USD) against major currencies from the 1970s to 2008. His long- run and forecasting results were eerily similar to an oil-exchange rate relationship. Increases in real oil prices cause the USD to depreciate significantly against the currencies of net oil exporters such as Canada, Mexico, and Russia. When the real oil price rises, the currencies of oil importers, such as Japan, depreciate relative to the USD.

3.2 Studies from net oil importing countries

Hlongwane (2022) examines the relationship between oil prices and exchange rates in South Africa for the period from 1970 to 2021. The study employed annual time series data. The autoregressive distributed lag (ARDL) model was used to analyze the long-run relationships among the variables. The study also carried out the Granger causality test to analyse the relationships between the variables. The research concluded the nonexistence of causality between oil prices and exchange rates in South Africa. Wafula et al. (2020) carried out research to test for a bivariate dependence between exchange rate and crude oil price and volatility spillover in selected emerging and low-income countries. Their basket of nations comprised Nigeria, Angola, Ghana, Mozambique, Kenya, Egypt, and Zambia, among other low-income countries. Their results confirmed previous findings that an increase (decrease) in oil price in a net oil exporting (importing) country is associated with appreciation (depreciation) of the domestic currency against the US dollar.

An investigation by Kin and Courage (2014) was conducted in South Africa to determine how oil prices affected the nominal exchange rate. Using monthly time series data from 1994 to 2012, the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) test was used to ascertain the effect of oil prices on the nominal exchange rate. The findings indicate that nominal exchange rates are significantly influenced by oil prices. The results also show that a decline in the rand exchange rate is due to increased oil prices. This suggests that the strength of the currency and its volatility are strongly influenced by oil prices.

Mwaanga and Nsama (2017) used a vector error correction model and quarterly time series data to explain the movements of Zambia's real effective exchange rate between 1973 and 1997. The study's findings are consistent with those of other studies on the nature of the determinants of the real exchange rate. The study finds that Zambia's real effective exchange rate is heavily influenced by real fundamentals, price differentials, and real shocks using purchasing power parity tests, impulse response, and variance decomposition functions.

Unlike some of the previous studies, the current study gives a clearer picture and attracts more attention because it is being conducted in Zimbabwe, where the scenario includes a multiple-currency regime and uses the more robust autoregressive distributed lag (ARDL) method.

4. Research methodology and empirical analysis

4.1 Methodology

The research used the ARDL approach to analyse the long-run relationship between the Zimbabwean exchange rate and global oil prices. The unit root tests show that the variables possess a mixed order of integration, i.e., both I (1) and I (0) variables. These results justify the use of the ARDL model as variables have mixed levels of stationarity, as suggested by Pesaran et al. (2001). The absence of I (2) variables further validates the usage of the ARDL model.

The generalized ARDL (p, q) model is specified as follows:

Equation 1

$$EX_t = \Upsilon_{0j} + \sum_{i=1}^{p} \delta_j Y_{t-1} + \sum_{i=o}^{q} \beta'_j X_{t-1} + \mu_{jt}$$

Where EXt is a vector and variables in are allowed to be purely of integrated order one I(1) or integrated of order zero I(0); $\beta'$and δ are coefficients $\Upsilon$is a constant j =, … , k; p, q are optimal lag orders; μjt is a vector of the error terms – unobservable zero mean white noise vector process (serially uncorrelated or independent). This implies that the dependent variable is a function of its lagged value, the current and lagged values of other exogenous variables in the model, where the lag length for p, q, may not necessarily be the same. The p lags are used for the dependent variable, while q lags are used for explanatory variables.

The functional relationship between exchange rate, global oil prices $lnOP$, inflation rate $lnINF$, net foreign direct investment $lnFD$, foreign exchange reserves $lnFER$, and interest rates $lnIR$ with exchange rate being the dependent variable is illustrated below.

Equation 2

$$\Delta lnEX = \beta_0 + \beta_1 lnEX_{t-1} + \beta_2 lnOPt - 1 + \beta_3 lnINF_{t-1} + \beta_4 lnFDI_{t-1} + \beta_5 lnFER_{t-1} + \beta_6 lnIR_{t-1} + \sum_{i=1}^{n} \beta_7 \Delta lnEX_{t-1} + \sum_{i=0}^{n} \beta_8 \Delta lnOP_{t-1} + \sum_{i=0}^{n} \beta_9 \Delta lnINF_{t-1} + \sum_{i=0}^{n} \beta_{10} \Delta lnFDI_{t-1} + \sum_{i=0}^{n} \beta_{11} \Delta lnFER_{t-1} + \sum_{i=0}^{n} \beta_{12} \Delta lnIR_{t-1} + \mu_t$$

The ARDL bound testing approach to cointegration permits us to model both I (0) and I (1) variables together. The ARDL approach involves estimating the unrestricted error correction model version of the ARDL model for the log of exchange rates and its determinants and the error correction version is specified as follows:

Equation 3

$$\mathrm{d}lnEX_{t-1} = \beta_0 + \sum_{i=1}^{n} \beta_1 \mathrm{d}lnEX_{t-1} + \sum_{i=0}^{n} \beta_2 \mathrm{d}lnOP_{t-1} + \sum_{i=0}^{n} \beta_3 \mathrm{d}lnINF_{t-1} + \sum_{i=0}^{n} \beta_4 \mathrm{d}lnFDI_{t-1} + \sum_{i=0}^{n} \beta_5 \mathrm{d}lnFER_{t-1} + \sum_{i=0}^{n} \beta_6 \mathrm{d}lnIR_{t-1} + \beta_7 ECT_{t-1}$$

Where, $dlnEX, dlnOP, dlnINF, dlnFDI, dlnFER$ are variables at first difference, , ECT_{t-1} is a lagged error correction term and dln represent the first difference operator of all the logged variables thus; EX, OP, INF, FDI, FER *and* IR.

4.1 Unit root tests

To identify the presence of a unit root, and to avoid spurious results with no economic meaning, stationarity tests were carried out. This is done to choose the rightful methodology, according to Herranz (2017). In this regard, the current study used the Augmented Dicky-Fuller (1981) test and confirmed the findings using the Philips-Perron (PP) test. The estimated results of the unit root test are shown in Table 1.

Table 1: Unit root test

	Augmented Dickey (ADF)			**Phillips-Perron (PP)**		
Variable	Level	First Difference	Order of Integration I(0) or I(1)	Level	First Difference	Order of Integration I(0) or I(1)
$lnEX$	-1.895	-3.277**	I(1)	-1.661	-4.331***	I(1)
$lnOP$	-1.335	-5.729***	I(1)	-1.513	-6.945***	I(1)
$lnINF$	-2.127	-4.199***	I(1)	-2.147	-4.296***	I(1)
$lnFDI$	-1.918	-3.421**	I(1)	-2.746	-7.146***	I(1)
$lnFER$	-2.088	-3.872 ***	I(1)	-2.088	-7.151***	I(1)
$lnIR$	-3.020**	-	I(0)	-2.991**	-	I(0)

Source: Authors' compilation from STATA 15.0
**** and *** denote statistical significance at 1% and 5% levels, respectively.*

The variables $lnEX, lnOP, lnINF, lnFDI$ *and* $lnFER$ are nonstationary at level as confirmed by both the ADF test and the Phillis Peron test. Only $lnIR$ is stationary at level as shown in Table 1. To make sure that there are no I(2) variables include in the model, the variables are first differenced and tested for stationarity. After first difference, both tests conclude that the variables $lnEX$, $lnOP$, $lnINF$, $lnFDI$ and $lnFER$ are stationary after first difference thus integrated of order one. In this case, the most appropriate technique to be used is the ARDL approach.

4.3 Empirical analysis

Table 2 shows that the F statistic value is 6.115. This is greater than the upper bound critical value at a 1% significance level. Therefore, in this case, we reject the null hypothesis and conclude that there is strong evidence of cointegration between Zimbabwean exchange rates and the selected explanatory variables.

Given that the series exhibits a long-run relationship, we proceed to estimate the dynamic Error Correction Model (ECM) reflecting the dynamic response of Zimbabwe's exchange rate against the USD to global oil prices and other explanatory variables in this study. Table 3 below provides coefficient estimates on how the exchange rate responds to changes in global oil prices and other explanatory variables in the long run and in the short run.

Table 2: The bound test to cointegration

Test Statistic	10%		5%		2.5%		1%	
Integration order	l(0)	l(1)	l(0)	l(1)	l(0)	l(1)	l(0)	l(1)
F-Statistic =6.989	2.26	3.35	2.62	3.79	2.96	4.18	3.41	4.68

Source: Authors' computation from STATA 15.0

The short-run and results are reported in Table 3.

Table 3: Table 3: Long-run and short-run results

Long-run results				
Variable	Coefficient	Std. Error	t-Statistic	P-Value
$lnOP$	2.21265***	0.44834	4.94	0.000
$lnINF$	0.20026***	0.05344	3.75	0.001
$lnFDI$	-0.6333***	0.14943	-4.24	0.000
$lnFER$	1.47058***	0.4056	3.63	0.002
$lnIR$	0.13395	0.24039	0.56	0.584
Short-run results				
$ECM-1$	-0.5329***	0.09982	-5.34	0.000
$dlnOP$	-1.082463***	0.3765574	-2.87	0.009
$dlnINF$	0.1738924***	0.044751	3.89	0.001
$dlnFDI$	0.105413*	0.541797	1.95	0.066
$dlnFER$	0.550411*	0.289312	1.9	0.065
$dlnIR$	-0.2159573	0.1270584	-1.7	0.105
$\_cons$	-12.06299	4.201276	-2.87	0.009

R-Squared = 0.80 Adjusted R-Squared = 0.70 Prob > F = 0.0000

Source: Authors' computation from STATA 15.0

****Level of significance at 1%; figures in parentheses indicate p-values.*

The results reported in Table 3 show that $lnOP$, $lnINF$, $lnFDI$ and $lnFER$ are significant in explaining variations in exchange rates in the short run. This has been confirmed by their respective short-run coefficients, which are statistically significant. The results signify a positive short-run relationship between the exchange rate and inflation.

A coefficient of 0.1738924 for $lnINF$ shows that a 1% increase in the inflation rate is associated with a 0.1738924% depreciation in the value of the exchange rate in Zimbabwe.

A coefficient of -1.082463 for global oil price shows that an increasing global oil price by 1% is associated with an appreciation of the exchange rate in the short run by 1.082463%. The coefficient of foreign direct investment is statistically significant at the 10% level. This shows that a 1% increase in the value of foreign direct investment would lead to a 0.105413% depreciation of the local currency in the short run. Likewise, the coefficient of foreign exchange reserves is significant at the 10% level. This shows that a 1% increase in foreign exchange reserves would lead to a 0.550411% depreciation of the local currency in the short run.

Finally, in the short run, the variable interest is found to be insignificant in explaining changes in exchange rates in the short run.

Overall, the coefficient of the ECM-1 is statistically significant, signifying that past movements in exchange rate value are corrected during the current period.

Given a long-run relationship exists among variables, the research will mainly concentrate on interpreting the long-run results of the study. Checking the adjusted R^2 shows how well the dependent variable is best explained by a set of explanatory variables in multiple regression. In this case, the value of the adjusted R-squared is 0.7. This means that 70% of exchange rate volatility in Zimbabwe is explained by changes in global oil prices ($lnOP$), inflation rate ($lnINF$), net foreign direct investment ($lnFD$I), foreign exchange reserves ($lnFER$) and interest rates ($lnIR$).

Starting with $lnOP$, holding other variables constant, the positive coefficient of global oil prices would mean that a 1% increase in global oil prices increases the amount of Zimbabwean currency required to purchase a unit of USD by 2.21265%. This implies that when using the direct currency quotation system, the ZWL depreciates by 2.21265%. Conversely, a 1% decrease in global oil prices would lead to a 2.21265% decrease in the amount of ZWL currency required to purchase a unit of USD. This implies an appreciation in the ZWL value against the USD. Theoretically, if oil prices increase, given that Zimbabwe is a net oil importing country, it implies that it will need more forex to acquire the same barrels of oil it used to buy at a lower price. This involves an increased supply of the local currency to the foreign exchange market, thereby leading to currency depreciation. A similar result was also obtained by Fowowe (2014), who conducted research analysing South African exchange rates and concluded that oil price increases lead to a depreciation of the South African Rand (ZAR). The same results were also obtained by Baek et al. (2020), who conducted research in selected Sub-Saharan countries, including Botswana, South Africa, and Zambia, on the influence of oil prices on exchange rates in the selected countries. Muhammad (2012) also obtained the same results in Nigeria in a study that analysed the relationship between exchange rate and oil price in Nigeria. The results indicated that an increase in oil prices leads to the depreciation of the Nigerian Naira against the USD.

The inflation rate is significant in determining the long-run value of the exchange rate in Zimbabwe. The coefficient exchange rate is statistically significant at the 1% level. The coefficient for $lnINF$ is 0.2002643, this implies that a 1% increase in inflation increases the value of the current exchange rate by 0.2002643%. This means that the exchange rate depreciates by 0.2002643% increasing the amount of ZWL required to purchase a unit of USD.

Furthermore, the ARDL results show a coefficient for net foreign direct investment is statistically significant at the 1% level. This implies that a 1% increase in the value past value of net foreign direct investment leads to a 0.633309% decrease in the current ZWL/USD rate, indicating an appreciation of ZWL. Kosteletou (2000) found that an increase in foreign direct investment contributes to domestic currency appreciation. According to Osinubi (2009), an increase in net foreign direct investment leads to an appreciation of the Nigerian naira. Dey et al. (2021) carried out a research in Bangladesh to determine the influence of foreign direct investment on national income and exchange rate stability. Foreign direct investment was found to be significant in explaining both exchange rates and national income. In their case, an increase in foreign direct investment would result in an appreciation of the Bangladeshi Taka (BDT) and an increase in national income at the same time. However, there is a lack of literature on how foreign direct investment influences the exchange rate. Most studies focus on how exchange rates influence foreign direct investment.

Moving on to foreign exchange reserves FER, the log of foreign exchange reserves has a positive coefficient of 1.470579, which is statistically significant at the 1% level of significance. This shows that foreign exchange reserves are significant in determining the exchange rate in Zimbabwe holding other factors constant. The results imply that a 1% change in the foreign exchange reserves in Zimbabwe results in a 1.470579% change in the value of the exchange rate. This shows that lower foreign exchange rate reserves are associated with the lower value of exchange rate, indicating the appreciation of exchange rate in Zimbabwe.

Theoretically, a country's central bank uses its foreign exchange reserves to absorb shocks that might be exerted on the exchange rate. This is achieved by purchasing or selling reserves depending on the desired direction. Reserves operate as a shock absorber against variables that might negatively impact a currency's exchange rate. Given these results, it shows that an increase in foreign exchange reserves is associated with a depreciation of the local currency. This shows that keeping a higher level of foreign exchange reserves is done at the expense of the depreciating local currency which means that there is no action in selling reserves to hedge the local currency from depreciating. Conversely, lower reserves are associated with an appreciation of the local currency. This implies that the exchequers will be using sufficient reserves to hedge the local currency from negative external shocks while maintaining an appreciating exchange rate. This also shows that keeping sufficient reserves in Zimbabwe helps to hedge the local currency. Lastly, among all the variables, interest rate is the only variable that is not significant in explaining variations in exchange rates in Zimbabwe.

4.4 Post estimations

All the diagnostic tests are carried out and presented in Table 5 below to show the validity of the model.

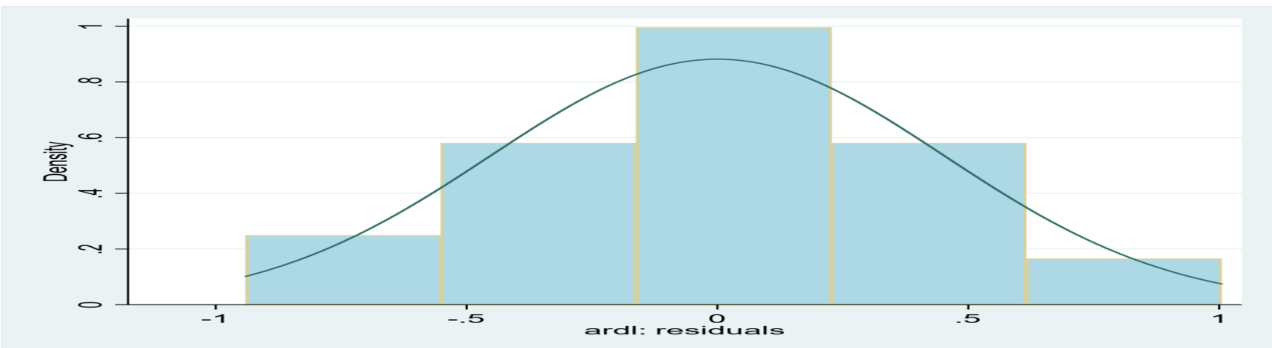
Table 4: Diagnostic tests of the ARDL model

Test	lag	Chi2	Prob>Chi2
LM test for autoregressive conditional heteroscedasticity	1	0.422	0.5161
Breusch-Godfrey LM test for autocorrelation	1	1.385	0.2393
Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	1	0.95	0.3299
Durbin-Watson d-statistic(11, 31) = 2.198193			
Mean VIF= 2.62			
Ramsey RESET test for stability Prob> F = 0.3596			
Jarque-Bera normality test: Chi(2) = 0.9357			

Source: Author's computation from STATA 15.0 on diagnostic tests

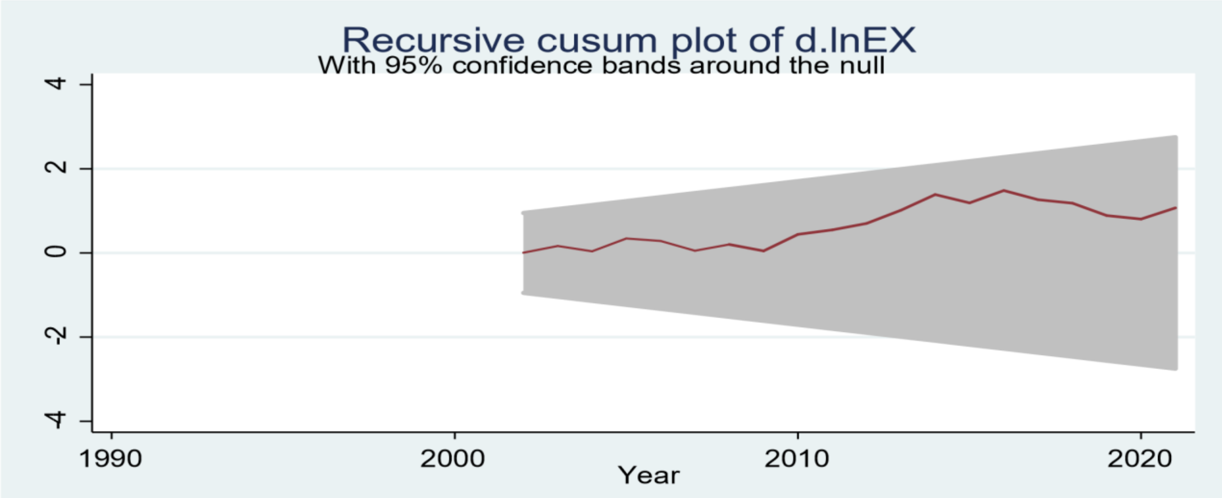
The results of the diagnostic tests reported in Table 4 above show that the model passed the autocorrelation test, heteroscedasticity test, stability test and normality test. This confirms the reliability and consistency of the estimated parameters.

Figure 2: Residual normality test graph



The study used the cumulative sum test for the parameter stability. The cumulative sum (CUSUM) graph is within the 5% significance level bounds, indicating the stability of the model.

Figure 3: Stability test graph



5

5. Conclusion

The study brings insight into how changes in global oil prices affect the exchange rate in Zimbabwe. The key findings are that there is a positive long-run relationship between global oil prices and exchange rates. This implies that increasing global oil prices leads to the depreciation of the local currency. Based on the key findings of the study, several policy implications and recommendations can be discerned to guide the formulation of effective strategies aimed at mitigating the impact of changes in global oil prices on the exchange rate in Zimbabwe. Firstly, policymakers should prioritize the diversification of the nation's energy sources by promoting the adoption of alternative renewable energy systems, such as solar and hydropower. This strategic shift can reduce the nation's reliance on imported oil products and mitigate the adverse effects of oil price fluctuations on the exchange rate. In parallel, efforts to curb inflation and stabilize the price level should be a focal point of macroeconomic policy. The implementation of sound monetary and fiscal policies aimed at containing inflationary pressures can safeguard the value of the local currency and foster exchange rate stability. Similarly, initiatives to attract foreign direct investment and bolster foreign exchange reserves are paramount to fortifying the exchange rate against external shocks, including fluctuations in global oil prices. In conclusion, this research was mainly focused on the impacts of global oil prices on Zimbabwean exchange rates, mainly paying more attention to global oil prices as the major external shock impacting exchange rates in Zimbabwe. Therefore, the research might not be wholly adopted in other countries with different macroeconomic environments. This provides room for other areas for further studies. For example, research can be carried out on how global oil prices impact exchange rates in countries with relatively stable currencies.

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