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Exchange Rates and Inflation Dynamics in Multicurrency Regimes: The Case of Zimbabwe (2014 to 2024)

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Abstract: Exchange rate volatility has emerged to be one of the most critical determinants of price stability for countries operating in multicurrency systems with their own currency in the basket of currencies. This study empirically examined the impact of exchange rates (official and parallel market rates) on inflation in Zimbabwe during the multicurrency system for the period 2014 to 2024, together with comparing the impacts of the official and parallel market exchange rates on inflation. Time series and monthly data were used to examine the short and long run impact of exchange rates on inflation in an ARDL estimation framework. Findings revealed a short run and long run positive relationship between both the official and parallel market exchange rates and inflation, with the parallel market exchange rate being the most significant variable. Other control variables used, such as domestic productivity, have a highly significant negative impact on inflation through the official and parallel exchange rate models in both the short and the long run. Money supply, real interest rate, trade balance, foreign prices, foreign output, stock market prices and foreign currency reserves have varied impacts through either the official or parallel market exchange rate models. Policy recommendations include a contractionary Monetary and expansionary Fiscal policy mix that will result in exchange rate appreciation and stability, productivity growth, trade surplus, growth in reserves, and ultimately low prices. The exchange rate policy recommended in this study is to shelve discard the local currency in the multicurrency system until industrial capacity utilization exceeds 50% to add the local currency to the basket of currencies and 75% for mono-local currency (de-dollarization).

Keywords: exchange rates; inflation; multicurrency; ARDL

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1. Introduction and Background

Price and exchange rate volatility have been key determinants of macroeconomic stability, hence policy interventions earmarked to achieve sustained growth should be centered on these critical macroeconomic variables. In some instances, they can all be used as indicators of macroeconomic stability (African Development Bank, 2024). Together with Gross Domestic Product, inflation is often used to determine macroeconomic stability (Felipa, 2023). The domestic price level and exchange rate have since been considered as critical variables for internal and external balance (African Development Bank, 2024). Full macroeconomic stability is a combination of internal stability and external stability. Internal stability is often directly connected to domestic price stability, while external stability is directly connected to exchange rate stability, in connection with Mundell's principle of effective market classification concepts (Mandel, 2000). However, for an economy operating under the multicurrency regime (with its own currency in the basket of currencies, like

Zimbabwe for the period under study), the exchange rate has emerged to be one of the most critical determinants or indicators of macroeconomic stability. Given the significance of exchange rates in multicurrency systems, the monetary transmission mechanism is likely to be through the exchange rate (mainly the parallel market exchange rate) and price channels. Given this, exchange rate policies should be designed in such a way that they should translate into macroeconomic stability and promote sustainable and inclusive growth (Davoodi et al., 2021). Carefully crafted exchange rate policies may have positive implications on trade and domestic price levels (Felipa, 2023; Davoodi et al., 2021). The rise in foreign exchange and prices of goods and services are among the key factors that cause fluctuations in economic growth and development (Jawo et al., 2023).

The relationship between inflation and exchange rates is also dependent on the exchange rate regime a country is using, and the exchange rate system that results in low inflation may not be effective in all countries, due to country-specific (mainly economic and political) characteristics. Likewise, the exchange rate system also differs with time within a country; the exchange rate system that results in stable prices and economic growth may have long-term negative implications, depending on other macroeconomic and political conditions, which tend to vary from time to time. A multicurrency system can be an independent exchange rate regime without the introduction of local currency and exchange rates discussed will be between foreign currencies, while with a local currency component in the basket of currencies, either fixed, managed floating or flexible exchange rate systems in multicurrency regimes will be put into play. This therefore summarizes the multicurrency regime used from 2009 to 2024. As cited in Davoodi et al. (2021), exchange rate pegs are often associated with lower inflation (Levy Yeyati, 2019), and in the long run, they help monetary policy in anchoring inflation expectations and discipline monetary policy. Flexible exchange rate regimes promote credible inflation-targeting frameworks that play a significant role in anchoring inflation at low levels. Despite the global changes because of the COVID-19 pandemic and the Russia–Ukraine war that disrupted the global supply chains, price instability can be a result of domestic aggregates, including exchange rate misalignment and macroeconomic imbalances in Zimbabwe. For a country operating under a multicurrency regime, exchange rate behavior is important, since it may have direct effects on the prices of basic commodities, and monetary policy may be transmitted to economic growth mainly through the exchange rate channel.

Stabilization policy interventions (Fiscal and Monetary policies) of many developing countries are directed towards inflation, with economies such as Zimbabwe putting more effort into Monetary policy, given that the country operates under a multicurrency regime. The need for monetary policy credibility and discipline rises with the addition of local currency into the basket of foreign currencies traded as legal tender in the local market. The introduction of the local currency component (Bond coins and later Bond notes) sparked a lot of debate in relation to either misalignment or alignment of the exchange rate. With takeaways from the Gresham's law and as highlighted in Matsui (1998) and Mishkin (2019), many economists predicted that bad money (Bond coins and later Bond notes) will drive away good money (United States dollar), while in the Zimbabwean case, good money drives away bad money, resulting in the nation dumping the Bond notes and coins to RTGS, which many economists further dubbed as a typical example of bad money that was later and informally driven away by the United States dollar (although this was denied by businesses) and officially phased out through the introduction of the Gold backed currency (Zimbabwe Gold- ZiG) in 2024. Given the multicurrency system and the role of monetary policy in macroeconomic stability, growth and sustainable development become significant. The significance of exchange rates in inflation can be more visible under multicurrency regimes, unlike in mono-currency economies. This study aims to evaluate,

during the multicurrency system period, the relationship between inflation and exchange rate dynamics using monthly data to capture the high volatility of both exchange rates and inflation, together with other control variables. Given the dynamics in the two variables (exchange rates and inflation), monthly data were found to be more appropriate than annual data because the money market responds instantly to changes in macroeconomic aggregates, hence acute changes take place in short spaces of time. Monthly data were found to be the most appropriate for developing economies like Zimbabwe, where macroeconomic stability is more difficult to achieve than in developed countries whose economies are stable, hence there are insignificant changes over a long period of time. Under normal circumstances, multicurrency regimes are generally adopted as transitional stabilization programs that normally last for short periods of time, such as five 5 years, before nations return to their local (mono-currency) regimes. However, the Zimbabwean case is peculiar in the sense that the multicurrency regime has overstayed (it has been in existence for more than a decade and appears likely to remain longer), hence the need for both short run and long run evaluations, giving rise to the relevance of an estimation technique that simultaneously estimates both the short run and long run relationships such as the ARDL approach, which is also justified by the data characteristics. There has been a series of attempts to bring back the local currency and even attempts to make the local currency the only legal tender, even though these have been received differently by the business community and general populace, which at times have further weakened the external value of the local currency since 2014. This has triggered the need to evaluate the stabilizing/destabilizing effects of exchange rates on inflation. This study also aims to identify the other predictors of inflation dynamics in Zimbabwe.

Literature is becoming more skewed towards the link between exchange rates and economic growth (Morina et al., 2020; Fofanah, 2022; Istrefi & Vangjel, 2022; Niyonsaba, 2023) and stock market prices (Dahir et al., 2018; Kumar et al., 2019; Sheikh et al., 2020; Adeniyi & Kumeka, 2020; Huang et al., 2021; Sakarombe & Makoni-Marimbe, 2020; Luqman & Kouser, 2019). Others have also concentrated on the exchange rate and gold and oil prices relationship (Akbar et al., 2019; Sheikh et al., 2020; Hussain et al., 2017, 2023), while a few have investigated the relationship between exchange rates and trade flows (Asteriou et al., 2016; Bahmani-Oskooee & Aftab, 2017). Another area where literature is growing is on the relationship between money supply and inflation (Sultana et al., 2019; Sunal, 2018; Paul et al., 2023; Dekkiche, 2022). Accordingly, the relationship between price stability and exchange rates is receiving less attention. For some of the studies that specialize in the stock market, their analysis is grounded on the asset models (Portfolio Balance model) of exchange rate determination and therefore emphasizes capital mobility across capital markets (nations) as the main trigger of exchange rate dynamics that result in inflation movements. Such studies are more skewed towards the capital account of the balance of payments account. However, concentrating on the capital account of the balance of payments seems more informative and brings somewhat realistic findings for developed and stable macroeconomies, unlike in fragile and developing unstable economies like Zimbabwe. Likewise, using only stock prices to capture macroeconomic and price stability may give a false picture for commodity-driven small open economies with a thin capital market like Zimbabwe. Compared to other studies that evaluated the impact of exchange rates on gold and oil prices, this might be relevant to natural resource endowed economies like Zimbabwe but given the contribution of natural resources to the Zimbabwean economy, using prices of minerals (gold prices) may also give an incomplete picture about the relationship between exchange rates and inflation in Zimbabwe. Given that, an all-encompassing measure like the general price level will tell a better story about the relationship between exchange rates and inflation in Zimbabwe. As a result, instead of this study being premised on the Capital

account (Asset models of exchange rate determination), the study therefore is grounded on the flow models of exchange rate determination (Purchasing Power Parity theory and the Balassa–Samuelson hypothesis), which are anchored on the current account balance.

Further, for a few studies that included the two (exchange rate in general and inflation), the studies are more biased towards stable and mono-currency economies (Ozcelebi, 2018; Obradović, 2025) with an insignificant parallel market. For small open economies with thriving parallel markets operating in a multicurrency regime, with the impact of both the official and parallel market exchange rates, a study such as this becomes imperative. In addition, comparing the effects of both official and parallel market exchange rates is strongly justified. Other local studies (Mahonye & Zengeni, 2019) considered data for the historical period where prices were fairly stable. However, as highlighted in Mahonye and Zengeni (2019), by observing parallel market movements, the real exchange rate movements can be deduced, thereby revealing the deviations of the local currency from the market forces' determined exchange rate. This therefore justifies the inclusion of the two prevailing exchange rates independently in the analysis to understand whether they have varied impacts on the dependent variable (price level).

Studies in relation to Zimbabwe include those of Sakarombe and Makoni-Marimbe (2020), who investigated the interaction between the stock exchange fungibility market and the parallel exchange rate market in Zimbabwe, and Mahonye and Zengeni (2019), who examined the impact of exchange rates on output and inflation in Zimbabwe. Sakarombe and Makoni-Marimbe (2020) used the Old Mutual Implied Rate (OMIR) to represent the stock exchange fungibility and the parallel market rate to investigate their short and long run relationships together with their causal relationships, while the present study seeks to evaluate the relationships that exist between the official exchange rate and the parallel market rate and their impact on inflation in Zimbabwe.

In addition, Mahonye and Zengeni (2019) used quarterly data for the period 1990 to 2006 and found that real exchange rate fluctuations had significant effects on real output growth in both the short run and long run; also, exchange rate fluctuations were neither inflationary nor deflationary in Zimbabwe in the short run but inflationary in the long run. However, the study by Mahonye and Zengeni (2019) utilized historical quarterly data, hence may not provide specific relationships in the current multicurrency and highly dynamic macroeconomic environment often characterized by embarking on supply-side interventions to boost domestic production until industrial capacity utilization rises significantly, so that even a new local currency will be backed by production. Supply-side interventions may include respecting and issuing property rights to boost both domestic and foreign direct investment, privatization and commercialization, infrastructure development and export promotion and import substitution industrialization. With the significance of the parallel market exchange rate on prices in Zimbabwe, policies should be directed towards making the market less profitable. A lasting stabilization policy mix (Fiscal and Monetary policies) could have been effective if the government shelved the introduction of the local currency until production and capacity utilization significantly increased. The study also utilized data for a fairly stable macroeconomic period where the parallel market implications were not very evident due to stringent foreign exchange controls in Zimbabwe. The current study will therefore provide specific policy implications to the subject area, given various exchange rate policy episodes followed during the multicurrency regime. This study is of greater importance since it utilizes monthly data from 2014 to 2024, which helps in accommodating the macroeconomic dynamics, especially in the highly volatile parallel exchange rate market and inflation together with the official exchange market. The transition from the purely multicurrency regime, dubbed by many as dollarization, the introduction of Bond coins in 2014, according to the Reserve Bank of Zimbabwe (RBZ,

2014), the introduction of Bond notes in 2016 (RBZ, 2016) and the RTGS currency (RBZ, 2019), Gold coins in 2022 (RBZ, 2022) to March 2024, before the introduction of the new Zimbabwe Gold (ZiG) currency, (RBZ, 2024), resulted in various implications for the official exchange rate, the parallel market exchange rate and inflation in Zimbabwe. The study aims to establish the relationship between exchange rates and inflation in Zimbabwe in a multicurrency regime, together with other determinants of price stability.

The study therefore contributes to literature in that it evaluates the impact of exchange rates changes on inflation, taking account of the parallel market rate, which is proving to be a critical macroeconomic phenomenon in many developing countries. Secondly, the study compares the impact of the official versus that of the parallel market on price stability through estimating separate models for the official exchange rate and the parallel market exchange rate. Thirdly, though not least, it provides policy recommendations to the monetary authorities of Zimbabwe and beyond on recommendations for operating multicurrency regimes. Additionally, findings from this study may be of significance to other developing countries that are going through or may go through macroeconomic instability, especially hyperinflation and are considering adopting the Zimbabwean route (a multicurrency system, whether with or without local currency) to decide how and when to reintroduce their own currency, basing on the findings from this study. If other countries are considering the multicurrency system, they may also be informed through this study on how to hedge against the potential implications of the parallel foreign exchange rate market on prices and other macroeconomic variables.

The study is motivated by the fact that there is no consensus on the findings on the nexus between exchange rates and inflation, and most importantly, the relationship between inflation, official exchange rate and parallel market exchange rate in multicurrency regimes with a local currency component. Given, the peculiarity of the Zimbabwean exchange rate regimes, this study will therefore provide country specific evidence on the relationship between exchange rate(s) and inflation. In the Zimbabwean context, no study has attempted to compare the impacts of official versus parallel market exchange rates in the multicurrency regime, with this study concentrating on the period when local currency components (Bond notes and coins to the RTGS) were added to basket of currencies considered as legal tender. The results will go a long way in informing policy as to how and when to introduce local currency in previously dollarized economies or countries that operated in multicurrency regimes with no local currency and move away from a multicurrency regime (or de-dollarize and or re-dollarize) in line with country specific characteristics. Beyond Zimbabwe, findings from this study will help to inform monetary and exchange rate policies that fit well into the macroeconomic characteristics of the economies and suggest what should be prioritized during various exchange rate regimes, depending on the results of various additional and control variables in the model. The next section presents the background and the literature review, followed by the methodology, results and discussion, and lastly, conclusions and policy recommendations.

The null hypothesis of the study is that exchange rates do not influence inflation in Zimbabwe's multicurrency system punctuated with local currency; the alternative hypothesis is that that exchange rate fluctuations influence the general price level in Zimbabwe. Explicitly, the first hypothesis is that the official exchange rate does not affect price stability in Zimbabwe, while the alternative hypothesis is that the official exchange rate affects price stability in Zimbabwe. The second hypothesis is that the parallel market exchange rate does not affect price stability in Zimbabwe; the alternative hypothesis is that the parallel market exchange rate affects price stability in Zimbabwe. The last hypothesis is that the official market exchange rate exerts more influence on price levels in Zimbabwe than the parallel market exchange rate, while the null alternative hypothesis is that the

parallel market exchange rate exerts more influence on price fluctuations in Zimbabwe than the official market exchange rate.

Background to Exchange Rates in Zimbabwe

Following the economic collapse and currency crash/crises of 2007/8, Zimbabwe adopted a system where multiple foreign currencies, mainly the US dollar and the Rand, were used as legal tender (with the ultimate dominance of the US dollar resulting in a scenario as if the economy had self-dollarized). This provided macroeconomic stability and tamed hyperinflation until 2014, when Bond coins were introduced as a way of easing trading (change) and later Bond notes, in 2016, were pegged at par with the US dollar (RBZ, 2016). Bond coins and notes, however acted as local currency, where the value started to depreciate against the US dollar, because they acted as a pseudo local currency. The collapse of the Bond coins and notes in 2019 was punctuated with an introduction of the Real Time Gross Settlement (RTGS). Bigger denominations of the Bond notes were later introduced in 2019 (RBZ, 2019) during the RTGS currency period. With the demand for foreign currency being greater than its supply due to low production levels and balance of payments disequilibrium (deficits), the demand for imports rose, leading to the central bank failing to satisfy local forex demand at the fixed exchange rate, thereby leading to the thriving black/parallel foreign exchange market.

After the officialization of the local currency in 2019 (i.e., the declaration of the RTGS currency (RBZ, 2019)), despite having local currency components from 2014 (Bond coins (RBZ, 2014) and later Bond notes (RBZ, 2016), the Reserve Bank of Zimbabwe (RBZ) introduced the auction system (RBZ, 2019). This was mainly aimed at managing the exchange rate through a controlled or managed floating exchange rate mechanism. The Bond notes and coins have been fixed at par with the US dollar since their introduction, but on the parallel market, they have been trading through the market mechanism, which is when dual exchange rate system has been validated. The introduction of the RTGS also marked the partial liberalization of the foreign exchange market from an official perspective, with full liberalization being witnessed in the parallel market. Further attempts to stabilize the exchange rate were witnessed through the introduction of Gold coins (in 2022), although nothing significant in relation to currency stability and exchange rate certainty was realized and the gap between the parallel and official exchange rates continued to widen. Given that the gap between the official (auction rate) and the parallel market exchange rate continued diverge, this led to the collapse of the RTGS in 2024 and the introduction of the Zimbabwe Gold (ZiG) currency (RBZ, 2024).

Despite this study ending in the period of the RTGS currency, the recent attempts by the Zimbabwean monetary authorities to stabilize the economy through currency stabilization resulted in the dumping (collapse/crash) of the RTGS currency, resulting in the introduction of the Zimbabwe Gold (ZiG) digital currency. This was introduced with attempts to bring the much-needed foreign currency market and macroeconomic stability, hence further studies may consider the ZiG period, when enough data on the exchange rates and inflation are made available. With these currency developments, the currency continues to operate in the doldrums of currency crises. There are two main exchange rates used in the country (the official mainly for the public individuals and entities while the parallel is used by the majority private individuals). This study therefore sought to examine the relationship between inflation and official exchange rate and inflation and parallel exchange rates in Zimbabwe's multicurrency regime with a local currency.

2. Literature Review

2.1. Theoretical Literature

2.1.1. Purchasing Power Parity (PPP) Theory

The main theory that underpinned this study is the Purchasing Power Parity (PPP) theory. It is the main theory that provides a clear-cut route through which the transmission mechanism between exchange rate and inflation can be analyzed, by defining the ratio of price levels in terms of currencies between two countries for a common good. The Purchasing Power Parity (PPP) model is a theory in economics where the exchange rate between two currencies must adjust to reflect the differences in price levels between the two respective countries. Given that, a unit of currency should buy the same amount of goods and services regardless of the location in the world (essentially equalizing purchasing power across nations). This theory is what justifies the inclusion of both domestic and foreign price levels in this study. However, the PPP has its own weaknesses; for instance, it excludes trade barriers and transport costs. The other main weakness is that it focuses on the current account balance (flow model) of the BOP and does not wholly consider the current account balance but only the tradables balance (visible trade balance), hence the exchange rate will be partially determined and movements in exchange rates may be underestimated.

2.1.2. The Balassa and Samuelson Hypothesis

The Balassa–Samuelson hypothesis explains differences in prices and incomes across countries because of differences in productivity. It explains why using exchange rates vs. purchasing power parity to compare prices and incomes across countries will give different results. The implication, therefore, is that the optimal rate of inflation is higher for developing countries as they grow and raise their productivity. The Balassa–Samuelson effect identifies productivity differentials as the main factor that lead to systematic deviations in prices and wages between countries, and between national incomes expressed using exchange rates and Purchasing Power Parity (PPP). Expressed in simple terms, an increase in wages in the tradables in an emerging economy result in higher wages in the non-tradables. The accompanying increase in prices makes inflation rates higher in fast-growing economies than in slow growing (developing economies). This relative price increase in non-tradable goods translates to a real exchange rate appreciation, meaning the country's currency becomes more expensive when compared to the price of domestic goods and services. Given the limitations of the PPP theory, the study also considers the Balassa–Samuelson hypothesis, which consider the whole current account balances (tradables and non-tradables balance), despite also being biased towards the current account balance, only excluding the capital account. The Balassa–Samuelson hypothesis is the rationale for including domestic and foreign productivity variables in the models for this study.

2.1.3. Monetary Approach to Inflation Model

The other theory that underpinned this study is the monetary approach to inflation model (the Quantity Theory of Money), which is an economic model that primarily attributes inflation to changes in the money supply and is considered as the foundation of the monetary approach to exchange rate determination. The theory essentially argues that inflation is a monetary phenomenon, meaning that rapid increases in the money supply relative to the real output of goods and services directly lead to rising prices, according to the core principles of monetarist theory. If money supply (M) increases faster than real output (Y), then the price level (P) must also rise to maintain the equation's equilibrium. In relation to this study, it is what also guided the inclusion of domestic productivity and domestic price level. Further combining the PPP and the quantity theory of money in the

Monetary approach to exchange rate determination gave rise to the inclusion of foreign output and foreign price levels.

2.2. Empirical Literature Review

Kavila and Le Roux (2017), empirically investigated the impact of macroeconomics shocks on inflation using Vector Error Correction modelling (VECM), Monthly data for the period 2009 to 2012 were utilized. Results show that external shocks such as the exchange rate changes (South African rand versus the US dollar), together with the increase in international food and oil prices are immediately coupled with permanent effects on inflation. Appreciation of the South African rand versus the US dollar and positive international oil price shocks permanently increased inflation. Measures to mitigate the negative impact of external shocks on inflation were prescribed. However, this study covered the period before the introduction of the local currency component in the basket of currencies, hence the need to check on the implications of the exchange rate changes on inflation. The study mainly talked about the US dollar to South African rand official exchange rate, because the parallel market rate was not very divergent to the official rate for the two currencies and was not thriving, hence the implications of the official exchange rate were complete. Also, the study covered the period before the addition of a local currency component, hence the parallel market speculative activities were not yet so destabilizing.

Kavila and Le Roux (2016) examined the dynamics of inflation in the dollarized Zimbabwean economy using monthly data for the period 2009 to 2012 in an ARDL approach. The study used variables like money supply, real output, exchange rate, and foreign prices. Findings revealed that lag of inflation, exchange rate (US dollar/South African rand), international oil prices, and foreign price level (South African inflation rate) are the main determinants of inflation in Zimbabwe. The results revealed a shift in the dynamics of inflation in Zimbabwe from the traditional domestic money supply growth to international determinants. Given that, traditional policies were found to be irrelevant in dollarized economies, compared to economies with their own currencies. Unlike in this study, the study used the US dollar/South African rand exchange rate because the local currency component was only bond coins which were a few months from introduction, hence this study only considers the period from the introduction of the bond coins and included foreign productivity guided by the Balassa and Samuelson hypothesis which considers foreign productivity. Compared to the US dollar/South African rand used in a purely multicurrency without local currency, the parallel market activities were economically insignificant, giving rise to their incorporation in this study, since they thrived after the local currency component was added to the multicurrency regime.

Mahonye and Zengeni (2019) examined the effects of devaluation on inflation and real output in Zimbabwe using quarterly data for the period 1990 to 2006. Their study utilized the Johansen co-integration regression and the vector error correction method (VECM) to examine the short and long run relationships between exchange rate, inflation and real output. They found that fluctuations in the real exchange rate have significant effects on real output growth in both the short run and long run, while exchange rate fluctuations were found to be neither inflationary nor deflationary in the short run but inflationary in the long run. A weakening domestic currency may potentially grow the economy in the short run but be inflationary in the long run. Despite using historical data for a fairly stable period, the current study seeks to evaluate the impact of exchange rate volatility on inflation in a highly volatile multicurrency period, concentrating more on the period after the introduction of local currency component into the basket of currencies, although it was then more of an informally dollarized economy, given the dominance of the United States dollar.

Sakarombe and Makoni-Marimbe (2020) investigated the interaction between the stock exchange fungibility market and the parallel exchange rate market. Short run and long run relationships and speed of adjustments were determined between the variables through co-integration, the Engle–Granger Error Correction Model and the Granger Causality test. From the co-integration results, a perfect long run speed of adjustment towards the steady state equilibrium was established. From the Granger Causality results, stock exchange fungibility was found to Granger cause exchange rate changes. However, the study used the stock market (Capital/Asset market) to determine the inflation rate (Old mutual implied rate), which may be less relevant to a commodity driven economy like Zimbabwe when it comes to the inflation dynamics. This study therefore utilized the month-on-month official inflation rate, which caters for the goods market (Current account balance), thereby utilizing the current account balance which is most suitable for a commodity driven economy like Zimbabwe.

Hoang et al. (2020), examined the exchange rate impact on inflation and economic growth in Vietnam using time series data from 2005 to 2018, utilizing the VAR self-regression vector model. Endogenous variables included the bilateral real exchange rate (Er), money supply (M2), exports (X), imports (IM), GDP (GDPR), the consumer price index (CPI) and two exogenous variables, international price (Pw) and US Federal Reserve interest rate (Ifed). The impact of exchange rates on endogenous variables (inflation and economic growth) was examined. Basing on their findings, they made recommendations for the improvement of Vietnam's macro environment (trade balance, inflation control, and economic growth support, implementing), to ensure macroeconomic stability, thereby improving national competitiveness. Many of the variables used are like those that have been used in this study, except the exclusion of the parallel market exchange rate, which is more equally visible and significant to the Zimbabwean context, given the local currency component on the multicurrency regime.

Jawo et al. (2023) examined the impact of a real effective exchange rate, money supply, and economic growth on inflation in Gambia. Time series data for the period 1985 to 2021 were used in an ARDL approach. Their findings revealed (in relation to real effective exchange rate, money supply, and economic growth) that all the variables used in the model cause inflation, positively and negatively, in the long run and short run, respectively. Real effective exchange rate together with money supply were found to significantly affect inflation in the long run. From the recursive cumulative sum, it was concluded that the relationship was stable, while the square recursive cumulative sum revealed an unstable relationship between inflation and the independent variables, which might have been a result of exogenous shocks on output. The study recommended that the Gambian government should be cautious in increasing public debts. The study used only the official exchange rate, and the current study is peculiar in the sense that the study covered only covered the multicurrency period with local currency only for Zimbabwe.

Roger et al. (2017) investigated the exchange rate and inflation dynamics in Zambia using a structural vector auto-regression using quarterly data for the period 1995 to 2014. Their findings revealed exchange rate pass-through effects on inflation. The price of copper was also found to be a critical driver of exchange rate changes, and it was associated with low though significant pass-through effects on inflation, while monetary shocks were found to trigger exchange rate changes. Food inflation was found to be responsive to genuine exchange rate shocks, although it was more responsive to copper price changes and money supply. As cited in Jawo et al. (2023), inflation is said to be generally dependent on exchange rate, wage rate, interest rate, money supply, potential output, and trade openness and expectations.

Musa (2021) examined the effect of exchange rate volatility on inflation in Nigeria. Annual time series data for the period 1986–2019 were used. The generalized autoregressive conditional heteroskedasticity (GARCH) and vector error correction models (VECM) were used. Consumer price index for inflation was the dependent variable, while nominal exchange rate, imports, exports and money supply were the independent variables in the model. Money supply and nominal exchange rate were found to have a positive and significant relationship with inflation. Given that, it was concluded that inflation in Nigeria is caused by exchange rate fluctuations and growth in money supply.

Kemoe et al. (2024) examined the exchange rate pass-through effects on inflation in sub-Saharan Africa (SSA). Monthly data on the bilateral US dollar exchange rate and the nominal effective exchange rate (NEER) were used. Exchange rate depreciation was found to cause sizable increases in domestic inflation. The exchange rate pass-through effects in SSA were found to be higher than in other regions depending on the exchange rate regime, type of exchange rate (bilateral versus NEER), natural resource endowment, and domestic market competitiveness. In addition, the pass-through effect was found to be disproportionately larger and insistent for large depreciation shocks and for exchange rate changes that are more persistent, and evidence of asymmetry was revealed where the pass-through effect is stronger during depreciations than appreciations. Recommendations included the advice that strengthening monetary policy frameworks and credibility will help to ease the impact of depreciations on inflation.

Olamide et al. (2022) examined the influence of exchange rate instability on the inflation–growth nexus in Southern African Development Community (SADC) countries for the period from 2000 to 2018. Pooled Mean Group (PMG), Generalised Moments (GM) and Dynamic Fixed Effect (DFE) were employed. The Pooled Mean Group estimator of the Panel Autoregressive Distributed Lag was the most ideal, according to Hausman test. In addition, the GARCH (1, 1) was used to generate exchange rate instability. Findings revealed that exchange rate instability and inflation have negative relationships with economic growth of the region. Economic growth was found to be negatively influenced by the consequential effect of exchange rate instability on inflation (the higher the exchange rate instability in the region, the more severe the inflationary growth relationship of the region). This therefore confirms the menu cost theory of price setting (i.e., the higher the rate of inflation, the quicker the exchange rate pass-through effect).

Roger et al. (2019) investigated the relationship between copper prices, the exchange rate and consumer price inflation in Zambia using a structural vector autoregression. Quarterly data for the period 1995 to 2014 were used in conjunction with a combination of sign and zero restrictions to identify relevant global and domestic shocks. Findings revealed that the price of copper is the most important driver of the exchange rate changes and the fluctuations it causes are associated with a low pass-through of about 7% (which is consistent with a period of relatively low inflation). It was also revealed that exchange rate fluctuations emanating from monetary shocks result in 25% pass-through effects and even more for food prices.

Valogo et al. (2023) examined the threshold effect of exchange rate pass-through (ERPT) on inflation and the relevance of the exchange rate threshold using Taylor's rule. They used monthly data from 2002 to 2018, and the threshold autoregressive (TAR) method. Findings from the ERPT model revealed that exchange rate depreciation beyond a monthly threshold of 0.70% has a significant positive pass-through effect on inflation, giving credence to the relevance of threshold level. In addition, results of the monetary policy rule model revealed that, regardless of the threshold level, exchange rate positively and significantly influences monetary policy. They concluded that taking account of the exchange rate in the policy

rule, despite the threshold, may help to prevent depreciation of the exchange rate beyond optimal levels, ultimately resulting in no ERPT on inflation.

Obradović (2025) examined the influence of the exchange rate on inflation for the period 2012–2021. A Nonlinear Autoregressive Distributed Lag (NARDL) was used. A long run relationship was confirmed through the co-integration test between inflation, export, economic growth, money supply, and exchange rate. Exchange rate depreciation was found to be positively related to price increases. An exchange rate depreciation of 10% results in 2.38% price increase in Serbia, while a real exchange rate appreciation leads to a 0.3%9 price increase. From the long run results, inflation more strongly responds to exchange rate currency depreciation than currency appreciation. The study was carried out in a stable mono-currency export oriented Serbian economy where only the official exchange rate matters, hence this study for Zimbabwe covers the multicurrency system with the local currency period where the economy is driven by both the official and parallel market exchange rates.

The studies reviewed indicate that much literature is based on stable economies and mono-currency economies (Hoang et al., 2020; Kemoe et al., 2024; Olamide et al., 2022; Roger et al., 2017; Roger et al., 2019; Musa, 2021; Jawo et al., 2023, among others), where the significance of the parallel market is ambiguous due to very small profit margins from speculative activities; hence this variable is missing in many of the studies performed outside Zimbabwe. Also, for the few studies performed in the Zimbabwean context, many covered the multicurrency period before 2014, where the only relevant exchange rate was only the official exchange rate (Mahonye & Zengeni, 2019; Kavila & Le Roux, 2016; Bonga & Dhoro, 2015). Also, for the period covered by many of the Zimbabwean studies, there was a multicurrency regime without a local currency, which justified a stable and predictable relationship between inflation and exchange rate rates.

This study therefore fills the notable gap covering the multicurrency regime with a local currency component and when the parallel market was visible in influencing the pricing decisions in Zimbabwe. The study specifically covered the period when the Zimbabwean government, through the Reserve Bank of Zimbabwe (RBZ), introduced Bond coins and later Bond notes that characterized price distortions due to exchange (official and parallel) convergences and divergences in the domestic money market, foreign exchange market and the goods market. Given the highlighted gaps from the empirical literature above, the rationale for investigating exchange rates and inflation dynamics in Zimbabwe is premised on the historical experiences of the country, which was characterized by currency volatility and hyperinflation. Past experiences led to macroeconomic (internal and external dis-equilibriums) stagnation and political instability that resulted in the imminent collapse of the local currency towards the first quarter of 2009 (which marked the birth of the multicurrency regime due to self-dollarization pressure). Such instabilities and macroeconomic stagnation complicated planning and decision-making processes of individuals, businesses and economic planning in general, hence the findings from this study will help in informing stabilization policies. The findings of this study will provide evidence for corrective macroeconomic stabilization policies to be implemented or followed before the economy self-regulates to the disadvantage of policymakers (for instance, self-re-dollarization that will lead to loss of monetary policy autonomy). Variables for the estimated models were also selected taking into account adaptive, regressive, extrapolative and rational expectations and justified from the empirical and theoretical literature perspectives on relationships between exchange rate(s) and inflation dynamics. Zimbabwe seems to be following a historical path in which where the local currency component is no longer able to purchase some commodities (such as fuel) and some businesses refuse to accept it as legal and local currency, although with unique and modified macroeconomic characteristics

(where there is a component of local currency in the basket of currencies in circulation) in the multicurrency system for the study period. The unique Zimbabwean macroeconomic characteristics and experiences since 2014 highlighted above motivated the researcher in carrying out this study. Findings from this study will therefore inform monetary and exchange rate policies in Zimbabwe and beyond on the best strategies for macroeconomic (price and exchange rate) stability in multicurrency systems with local currency.

3. Methodology and Model Specification

This section presents the empirical model specification for this study. The study adopted and modified the ARDL model from Jawo et al. (2023). According to Jawo et al. (2023), inflation is said to be generally dependent on exchange rate, wage rate, interest rate, money supply, potential output, and trade openness and expectations. In this study, exchange rates were divided into official and parallel market exchange rates, trade openness replaced by trade balance, output measured by manufacturing value added and composed of domestic and foreign output, taking account of the flow models of exchange rates and prices (Purchasing Power Parity theory and the Balassa and Samuelson hypothesis together with the asset models, that is, the monetary and portfolio balance models of exchange rate determination). The theoretical model is underpinned on the Monetary Approach to exchange rates and balance of payments (trade balance as in Sakarombe & Makoni-Marimbe, 2020 despite it being the current account and also from Hoang et al., 2020 who used exports and imports independently) determination, the Quantity Theory of Money (QTM), Purchasing Power Parity (PPP) theory (foreign and domestic price levels as used in Hoang et al., 2020), the Balassa and Samuelson hypothesis (domestic and foreign productivity variables) and the Portfolio Balance model (interest rate as in Jawo et al., 2023; Roger et al., 2017, and stock prices as in Sakarombe & Makoni-Marimbe, 2020). Taking account of the monetary approach to exchange rate and balance of payments determination, the Purchasing power parity theory and the Balassa and Samuelson hypothesis, foreign output (foreign manufacturing value added) and foreign price levels were also added to the vector of independent variables. Foreign variables used in the model (foreign output and prices) are the South African general price level and output, because South Africa is Zimbabwe's major trading partner. Due to low production levels in Zimbabwe, the country imports even basic commodities (mostly from South Africa), making it a net importer, hence international (South African) prices levels have a significant impact on the general price level as used in Hoang et al. (2020) and Kavila and Le Roux (2016, 2017). Variables were considered and not considered based on availability and unavailability of monthly data respectively. The empirical linear models are presented in Equations (1) and (2).

$$Infln_t = \beta_0 + \beta_1 OExch_t + \beta_2 MS_t + \beta_3 RIR_t + \beta_4 SP_t + \beta_5 DMVA_t + \beta_6 FP_t + \beta_7 TB_t + \beta_8 FR_t + \beta_9 FMVA_t + \mu_t \quad (1)$$

$$Infln_t = \beta_0 + \beta_1 PExch_t + \beta_2 MS_t + \beta_3 RIR_t + \beta_4 SP_t + \beta_5 DMVA_t + \beta_6 FP_t + \beta_7 TB_t + \beta_8 FR_t + \beta_9 FMVA_t + \mu_t \quad (2)$$

3.1. Econometric Model

Parameter estimates were obtained using the ARDL estimation approach developed by Pesaran and Shin (1999) and Pesaran et al. (2001). Co-integration analyses and long run relationship estimations are oriented towards ARDL rather than the traditional vector error correction (VECM) and vector auto-regressive (VAR) methods (Matsvai & Hosu, 2024). ARDL is the most appropriate for variables integrated at different levels (Nkoro & Uko, 2016; Matsvai & Hosu, 2024) and in this study, only I[0] and I[1] variables without I[2].

With ARDL, unit root tests are therefore carried out, mainly to check if no variables are integrated of order 2, which is the only scenario where ARDL does not produce efficient estimates (Suroso et al., 2022). As in the studies of Ghouse et al. (2018), and Suroso et al. (2022), the ARDL approach proved to be the most appropriate for this study since there were no I[2] variables found from the stationarity tests. The appropriateness of the ARDL estimation technique was further justified by the fact that the sample is small, as advocated in Pesaran et al. (2001). ARDL models are considered relatively robust when dealing with small sample sizes and they provide a built-in test for cointegration, allowing the formal testing of whether a long run relationship exists between the variables in the estimated model (Aruga et al., 2020; Zhang et al., 2021). With the multicurrency regime in Zimbabwe having been established for more than 15 years and provisionally in existence until 2030 estimating only the short run dynamics may provide insufficient evidence on the inflation and exchange rate(s) dynamics hence estimating both the short run and long run dynamics became imperative. The ARDL approach was selected because it simultaneously provides both short- and long-term estimates and executes the co-integration test using the bound-testing approach (Kripfganz & Schneider, 2023). Given the interdependence nature of financial variables to their previous/lagged values, the ARDL estimation technique proved to be the most appropriate because of its ability to consider the effects of lags of both dependent (inflation) and independent (exchange rates) variables on the dependent variable. The ARDL approach has the additional advantage of yielding consistent estimates of the long run coefficients (Varona & Gonzales, 2021; Kripfganz & Schneider, 2023). Other studies that used the ARDL approach on exchange rates and inflation dynamics include Jawo et al. (2023), Umar and Umar (2022), Munir (2022), Malec et al. (2024), Rapti (2024), Bala (2018), Kavila and Le Roux (2016) and Jahan (2024), thereby further justifying the applicability of the methodology used. In this study, the lags of the dependent variable (inflation) are important to form part of the vector of independent variables where inflation expectations can easily be captured through the estimation of an ARDL model. The ARDL (p, q) model is therefore formulated as follows:

$$y_t = \sum_{j=1}^{p} \lambda_j y_{t-j} + \sum_{j=0}^{q} \delta_j x_{t-j} + \varepsilon_t \tag{3}$$

where y_t is the endogenous variable, x_t represents a $kx1$ vector of exogenous variables, δ_j is a $kx1$ parameter vector, λ_j is the scalar vector, and ε_t is the stochastic error term. In error correction terms, (3) becomes:

$$\Delta y_t = \phi y_{t-1} + \beta' x_t + \sum_{j=1}^{p-1} \lambda_j^* \Delta y_{t-j} + \sum_{j=0}^{q-1} \delta_j^* x_{t-j} + \varepsilon_t \tag{4}$$

where $= -1\left[1 - \sum_{j=1}^{p} \lambda_j\right]$; $\beta' = \sum_{j=0}^{q} \delta_j$; $\lambda_j^* = \sum_{m=j+1}^{p} \lambda_m, j = 1, 2, \ldots . p-1$; $\delta_j^* = \sum_{m=j+1}^{q} \delta_m, j = 1, 2, \ldots . q-1$.

Simplifying (4) gives:

$$\Delta y_t = \phi(y_{t-1} + \theta' x_t) + \sum_{j=1}^{p-1} \lambda_j^* \Delta y_{t-j} + \sum_{j=0}^{q-1} \delta_j^* x_{t-j} + \varepsilon_t \tag{5}$$

In (5), $\theta = -\left[\frac{\beta}{\phi}\right]$ shows the long run elasticities of x_t on y_t. ϕ is the speed of adjustment or error correction term. From the equation, θ measures the speed with which y_t moves back to long run equilibrium following disturbances in x_t. A significantly negative θ indicates convergence and stability in the long run/steady state equilibrium. Short run

elasticities of the endogenous and exogenous variables are shown by their respective lagged differences, λ_j^* and δ_j^*, respectively. Applying Equation (4), the theoretical models (1) and (2) will then be transformed to (6) and (7) as below in line with the models specified for the official and parallel market exchange rates. The logarithmic transformation and the ARDL model specifications for this study are presented mathematically in Equations (6) and (7). The models were transformed into logarithmic functions to reduce the problems of non-normality in residuals as well as allowing coefficients to be directly interpreted as elasticities (Stock & Watson, 2020). In trying to clearly evaluate the relationship between inflation and exchange rates (official and parallel market exchange rates) in Zimbabwe's multicurrency regime with a local currency component, the researcher specified and estimated two models.

Official Exchange Rate and Inflation Model

$$\begin{aligned} logInfln_t = \; & \phi(\theta_1 logOExch_t + \theta_2 logMS_t + \theta_3 logRIR_t + \theta_4 logSP_t + \theta_5 logDMVA_t \\ & + \theta_6 logFP_t + \theta_7 logTB_t + \theta_8 logFR_t + \theta_9 logFMVA_t) \\ & + \sum_{j=1}^{p-1} \lambda_j \Delta logInfln_{t-j} + \sum_{j=1}^{q-1} \beta_{1j} \Delta logOExch_{t-j} \\ & + \sum_{j=1}^{q-1} \beta_{2j} \Delta logMS_{t-j} + \sum_{j=1}^{q-1} \beta_{3j} \Delta logRIR_{t-j} + \sum_{j=1}^{q-1} \beta_{4j} \Delta logSP_{t-j} \\ & + \sum_{j=1}^{q-1} \beta_{5j} \Delta logDMVA_{t-j} + \sum_{j=1}^{q-1} \beta_{6j} \Delta logFP_{t-j} + \sum_{j=1}^{q-1} \beta_{7j} \Delta logTB_{t-j} \\ & + \sum_{j=1}^{q-1} \beta_{8j} \Delta logFR_{t-j} + \sum_{j=1}^{q-1} \beta_{9j} \Delta logFMVA_{t-j} + \varepsilon_t \end{aligned} \tag{6}$$

Parallel Market Exchange Rate Model

$$\begin{aligned} logInfln_t = \; & \phi(\theta_1 logPExch_t + \theta_2 logMS_t + \theta_3 logRIR_t + \theta_4 logSP_t + \theta_5 logDMVA_t \\ & + \theta_6 logFP_t + \theta_7 logTB_t + \theta_8 logFR_t + \theta_9 logFMVA) \\ & + \sum_{j=1}^{p-1} \lambda_j \Delta logInfln_{t-j} + \sum_{j=1}^{q-1} \beta_{1j} \Delta logPExch_{t-j} \\ & + \sum_{j=1}^{q-1} \beta_{2j} \Delta logMS_{t-j} + \sum_{j=1}^{q-1} \beta_{3j} \Delta logRIR_{t-j} + \sum_{j=1}^{q-1} \beta_{4j} \Delta logSP_{t-j} \\ & + \sum_{j=1}^{q-1} \beta_{5j} \Delta logDMVA_{t-j} + \sum_{j=1}^{q-1} \beta_{6j} \Delta logFP_{t-j} + \sum_{j=1}^{q-1} \beta_{7j} \Delta logTB_{t-j} \\ & + \sum_{j=1}^{q-1} \beta_{8j} \Delta logFR_{t-j} + \sum_{j=1}^{q-1} \beta_{9j} \Delta logFMVA_{t-j} + \varepsilon_t. \end{aligned} \tag{7}$$

3.2. Variables, Expected Signs and Data Sources

The variable descriptions, variable codes and proxies, together with expected signs and data sources are summarized in Table 1 below.

Table 1. Variables expected signs and data sources.

Variable Name	Expected Sign(s)	Description (Monthly Data)	Data Sources
Inflation (INFLN)	Dependent variable	Month on month inflation rate	Zimbabwe National Statistics Agency (ZIMSTAT)/Reserve Bank of Zimbabwe (RBZ)
Official Exchange rate (OExch)	+/−	International price of a domestic currency (as in Mahonye & Zengeni, 2019; Obradović, 2025; Hoang et al., 2020; Bonga & Dhoro, 2015)	Reserve Bank of Zimbabwe/IMF
Parallel Market Rate (PExch)	+/−	Exchange rate determined by market forces in informal markets (as in Mahonye & Zengeni, 2019; Kavila & Le Roux, 2017; Sakarombe & Makoni-Marimbe, 2020)	Reserve Bank of Zimbabwe & Bloomberg Financial Services

Table 1. *Cont.*

Variable Name	Expected Sign(s)	Description (Monthly Data)	Data Sources
Money Supply (MS)	+	Money supply (as in Hoang et al., 2020; Jawo et al., 2023; Obradović, 2025)	Reserve Bank of Zimbabwe
Trade balance (TB)	+/−	Reserve Bank of Zimbabwe and IMF (as in Jawo et al., 2023; Obradović, 2025)	Reserve Bank of Zimbabwe and Zimbabwe National Statistics Agency (ZIMSTAT)
Real Interest rate (RIR)	+/−	Nominal interest rate adjusted for inflation (Jawo et al., 2023; Roger et al., 2017)	Reserve Bank of Zimbabwe
Stock Market Prices (SP)	+/−	ZSE all share price index (as in Sakarombe & Makoni-Marimbe, 2020)	Zimbabwe Stock Exchange
Foreign Currency Reserves (FR)	+/−	Foreign exchange reserves (Obradović, 2025; Jawo et al., 2023)	Reserve Bank of Zimbabwe
Foreign Prices (FP)	+	South Africa's general price level (month on month inflation rate) (as in Hoang et al., 2020; Kavila & Le Roux, 2016, 2017)	Statistics South Africa
Domestic Productivity (DMVA)	−	Manufacturing value added (as in Kavila & Le Roux, 2017; Obradović, 2025; Hoang et al., 2020)	Reserve Bank of Zimbabwe
Foreign Productivity (FMVA)	+	South Africa's manufacturing value added (as in Hoang et al., 2020; Jawo et al., 2023; Obradović, 2025)	South African Reserve Bank (SARB)

4. Data Analysis Techniques

The study employed the ARDL technique to analyze the data in STATA 17 software. In addition, data were also analyzed using descriptive statistics, unit root tests (Dickey–Fuller (ADF) and Phillips–Perron (PP), multicollinearity tests (correlation matrix), co-integration tests (ARDL bounds testing) and the actual ARDL model estimation. Model diagnostics were also undertaken for robust results and detecting model misspecifications Gujarati (2022).

4.1. Descriptive Statistics

Table 2 reports the descriptive statistics for the dependent, independent and control variables employed in the study.

Table 2. Descriptive statistics.

Statistic	INF	OExch	PExch	SP	MS	RIR	TB	FP	DMVA	FMVA
Mean	36.91	302.48	458.72	9952.48	15,599,298	24.38	179,900,000	2.2	15.5%	12.679
Median	33.711	381.21	817.18	18,347.78	22,196,479	93.1	121,373,000	0.85	14.7	12.61
Maximum	74.46	6104.7	11,000	210,833.9	54,708,681.4	165.5	268,000,000	3	21%	12.963
Minimum	31.00	1.00	1.000	10.06005	2,088,448.1	2.02	69,600,000	0.2	12.2%	11.73
Std. Dev.	10.9	1107.7	1657.3	33,666.08	179,715.3	31.62	27,619.4	7.83	11.63	123.94
Skewness	3.06	4.33	4.39	4.396	9.48	2.49	7.28	1.77	2.69	6.15
Kurtosis	19.64	20.65	21.97	22.27	47.79	8.98	22.17	11.39	14.57	37.17
Obs	112	112	112	112	112	112	112	112	112	112

Stata 17 output.

Additionally, the mean for the parallel exchange rate (PExch) indicates that, on average, the month-on-month parallel exchange rate was approximately ZWL 458.72/USD 1. Further, the maximum value for PExch shows that the parallel exchange rate peaked at ZWL 11,000/USD 1, implying the worst depreciation of the domestic currency. In addition,

following the multicurrency regime in 2009, the parallel market exchange rate was stable as it was fixed at ZWL 1/USD 1 up to 2019 and from 2023 onwards, the month-on-month parallel market exchange rate fluctuated, exhibiting an upward trend. Month-on-month real interest rates in Zimbabwe averaged about 24.32%, whilst the month-on-month real interest rate peaked at 165.45% during the same period. In terms of inflation (INF), the mean statistic indicates that the month-on-month inflation measured by CPI averaged about 36.91%.

4.2. Unit Root Tests Results

Prior to the estimations of the ARDL regression model, unit root tests were conducted for all the variables using the ADF and PP tests. In carrying out the unit root tests, the researcher first examined line graphs of the variables to assess whether the series exhibited a trend and/or intercept or not. From this, it was established that all variables except for inflation (INF) contained both an intercept and a trend. The results from the ADF and PP tests for unit root tests are presented in Table 3.

Table 3. Unit root test results.

	Augmented Dickey–Fuller (ADF)			Phillips–Peron (PP)		
Variable	**Level**	**1st Diff**	**Conclusion**	**Level**	**1st Diff**	**Conclusion**
Inflation (INF)	−7.91 **		I(0)	−8.54 **		I(0)
Official Exchange Rate (OEch)	0.05	−9.29 **	I(1)	0.21	−9.17 **	I(1)
Parallel Exchange Rate (PExch)	0.70	−9.52 **	I(1)	0.57	−9.09 **	I(1)
Money Supply (MS)	2.975 *		I(0)	3.053 **		I(0)
Stock Prices (SP)	−0.96	−18.02	I(1)	−0.93	−8.79 **	I(1)
Real Interest Rate (RIR)	1.719	5.34 ***	I(1)	0.827	6.24 ***	I(1)
Forex Reserves (FR)	5.337 ***	–	I(0)	0.577	4.43 ***	I(0)
Trade Balance (TB)	0.493	3.856 **	I(1)	0.378	2.975 *	I(1)
Domestic Productivity (DMVA)	3.856 **	–	I(0)	8.17 ***	–	I(0)
Foreign Prices (FP)	0.493	3.387 **	I(1)	0.827	3.365	I(1)
Foreign Productivity (FMVA)	4.14 ***		I(0)	4.15 ***	–	I(0)

***, **, * denote significance at 1%, 5%, and 10%, respectively. Source: STATA 17 output.

From the ADF and PP test results presented in Table 3 above, inflation (INF), Money Supply (MS), Forex Reserves (FR), and Foreign Productivity (FMVA), and Domestic Productivity (DMVA), were found stationary in level, meaning they were I(0), whilst Official Exchange Rate (OER), Parallel Exchange Rate (PER), Stock Prices (SP), Real Interest Rate (RIR), Trade Balance (TB), and Foreign Prices (FP), and the other independent and control variables ($\ln OEXR_t$, $\ln PEXR_t$ and $\ln RIR_t$) were found to have unit roots and become stationary after first differencing, hence are integrated of order 1 [I(1)]. Results from unit root tests suggest that some variables became stationary after first differencing (that is, they are integrated of order 1), while others are stationary in level (meaning they are integrated of order 0 that is I[0], as shown in Table 3 from the ADF test and confirmed by the Phillips–Perron tests. Given that all the variables used in the models become stationary in level and after first differencing, the highest order of integration is one, meaning there are no I[2] integrated variables; hence, this gives a strong justification for the use of the ARDL estimation approach.

4.3. Multicollinearity Test Results

The Pairwise correlation table shown in Table 4 was estimated to determine the presence of multicollinearity among the independent variables included in the regression model (combined for the two models estimated).

Table 4. Correlation matrix.

	lnOEXR	lnPEXR	lnMS	lnSP	lnRIR	lnFR	lnTB	lnFP	lnDMVA	lnFMVA
lnOExch	1									
lnPExch	0.056	1								
lnMS	0.623	0.571	1							
lnSP	0.311	0.267	0.173	1						
lnRIR	0.058	0.462	0.333	0.259	1					
lnFR	0.327	0.127	0.321	0.514	0.343	1				
lnTB	0.481	0.715	0.632	0.234	0.391	0.618	1			
lnFP	0.409	0.519	0.172	0.593	0.414	0.771	0.145	1		
lnDMVA	0.563	0.191	0.784	0.379	0.638	0.472	0.333	0.179	1	
lnFMVA	0.681	0.275	0.599	0.736	0.145	0.8	0.132	0.594	0.721	1

Source: Stata 17 output.

From the correlation matrix presented in Table 4, correlation coefficients for the paired predictor variables were less than 0.8, implying the models did not suffer from the multicollinearity problems. Correlations of less than 0.8 between two independent variables imply absence of the problem of multicollinearity (Gujarati, 2022). The results indicated that the effects of each exogenous variable on the endogenous variable can be isolated, thereby guaranteeing robust and unbiased regression results.

4.4. Results of the ARDL Regression Model

4.4.1. ARDL Bounds Test for Co-Integration

The bounds' co-integration is sensitive to the number of lags used; hence, the researcher applied the lag selection criterion and found the optimum number of lags through the lag order selection statistics and the system chosen four to be the maximum number of lags to be selected in this study. After applying the lag selection criterion, the bounds test for co-integration was carried out. To examine the number of co-integrating equations between the variables, the calculated F-statistic should be greater than the critical value for the upper bound I(1). The results revealed two cointegrating equations and the null hypothesis of no long-term relationship was rejected. The results of the bounds test for co-integration are presented in Table 5 below.

Table 5. ARDL bounds test for co-integration.

Model	F-Statistic	F-Critical Values			Decision
Official Exchange Rate Model (OExch)	19.453 ***	Lower Bound	5%	2.62	Co-integration
Parallel Market Exchange Rate Model (PExch)	9.115 ***	Lower Bound	1%	3.41	Co-integration

***, **, * denote significance at 1%, 5%, and 10%, respectively.

4.4.2. Inflation and Exchange Rate Dynamics in Zimbabwe

From the long run results presented in Table 6, the error correction terms (ECT) for the two models (official exchange rate model and parallel exchange rate model) were

negative (−0.567 and −0.707 respectively) and all statistically significant at the 1% level. In other words, the speed of adjustment to long run inflation equilibrium following dynamics in the explanatory variables is 57.7% for the official exchange rate model and 70.7% for the parallel exchange rate model. The high speed confirms that the influence of the explanatory variables in inflation determination is considerably high. This endorses the long run association between the explanatory (exchange rates, domestic productivity, foreign productivity, interest rates, money supply, foreign price level, stock prices, trade balance and foreign currency reserves) variables and inflation in the two models. The model variables combined explanatory power was 91.4% and 97.3% (for the official exchange rate and parallel market exchange rate models respectively), which is meaningfully high. The adjusted R squared of 0.863 and 0.932 implies that about 86.3% and 93.2% of the variations in inflation for the official and parallel market exchange rate models, respectively, are explained by the explanatory variables in each model.

Table 6. Long run results.

LONG RUN RESULTS				
	Official Exchange Rate		**Parallel Market Rate**	
	Coefficient	**Std Error**	**Coeff**	**Std Error**
Error Correction Term	−0.567 ***	0.188	−0.707 ***	0.163
Official Exchange Rate (OExch)	0.027 *	0.250		
Parallel Market Rate (PExch)			0.538 ***	0.115
Money Supply	0.214 **	0.362	0.412	0.232
Stock Prices	0.146 ***	0.134	0.086	0.136
Real Interest Rate	0.131 *	0.096	0.164	0.131
Trade Balance	−0.165 **	0.068	0.114 *	0.080
Foreign Currency Reserves	−0.042 ***	0.001	−0.151 **	0.005
Foreign Price level (RSA Inflation Rate)	0.019	0.012	0.108 **	0.003
Domestic Productivity	−0.890 ***	0.146	−0.729 ***	0.118
Foreign Productivity	0.460	0.303	0.117 **	0.057
R2	0.914		0.973	
Adjusted R2	0.863		0.932	
Diagnostics				
Durbin–Watson	2.03		2.425	
LM Arch χ^2	[0.134]		[0.078]	
B Pagan χ^2	[0.178]		[0.254]	
Ramsey Test	[0.303]		[0.355]	
Skewness χ^2	[0.461]		[0.461]	

In parenthesis ( ) are standard errors and ***, **, * denote significance level at 1%, 5%, and 10%, respectively.

From the long run results presented in Table 6, a positive relationship between exchange rates and inflation was exhibited. A percentage depreciation of the official exchange rate results in a 2.7% increase in inflation, while a percentage depreciation of the parallel market exchange rate results in a 53.8% increase in inflation in the long run, at the 10% and 1% levels of significance, respectively. This therefore implies that, as the exchange rate(s) depreciates, prices increase, although prices in this Zimbabwean context are more

responsive to parallel market exchange rate changes in the long run. The findings confirm the long run results from Ozcelebi (2018), Mahonye and Zengeni (2019), Ko and Win (2024) and Jawo et al. (2023). On the other hand, Money supply, Stock prices, and Real interest rate positively influence inflation through the official exchange rate channel at the 5%, 1% and 10% levels of significance, respectively, in the long run and have no impact through the parallel market exchange rate model. Trade balance was found to negatively influence inflation in the long run through both the official and parallel market exchange rate models. A percentage increase in trade balance resulted in 16.5% decrease and 11.4% increase in inflation through the official and parallel market exchange rates, respectively, in long run in Zimbabwe.

Foreign currency reserves were found to be negatively connected to inflation through the two exchange rate models in the long run. A percentage increase in foreign currency reserves resulted in a 4.2% decrease in inflation through the official exchange rate model at the 1% level of significance, while a percentage increase in foreign currency reserves resulted in a 15.1% decrease in the general price level at the 5% level of significance in the long run. This generally implies that foreign currency reserves have more influence on the general price level via the parallel market exchange rate. Foreign price levels were found to positively affect the domestic price level only through the parallel market exchange rate model in the long run. A percentage increase in foreign prices (South African price level) resulted in a 10.8% increase in the domestic price level at the 5% level of significance. This could be because of the production costs in Zimbabwe, which are generally high, to an extent that products imported from South Africa (even basic commodities) tend to be cheaper in the Zimbabwean retail market after transportation costs and at times with trade taxes (either specific or ad valorem tariff if the commodity is officially shipped into the local market and only transport cost if the product is smuggled into the local market). Likewise, foreign productivity was found to positively affect the domestic price level only through the parallel market exchange rate channel in the long run. A percentage increase in South African production levels resulted in 11.7% increase in domestic price levels at 5% level of significance in the long run. Domestic productivity was found to negatively influence domestic prices in the long run through both the official and the parallel market exchange rate models. A percentage increase in domestic production resulted in 89% and 72.9% decreases in in domestic prices through the official and parallel market exchange rate models, respectively, at the 1% level of significance in the long run in Zimbabwe. Excluding the parallel market exchange rate, this was found to be contrary to the findings of Jawo et al. (2023). Long run productivity proved to be such a critical determinant of price stability through both the official and parallel market exchange rates in Zimbabwe.

4.4.3. Diagnostics

To establish the soundness of the estimated models (official and parallel market exchange rate models), several diagnostic tests (the Breusch–Godfrey serial correlation LM test, the Ramsey reset for model specification, ARCH test for heteroskedasticity and Skewness tests) were performed. Diagnostic test results are presented in Table 6 under the long run results. Serial correlation is rejected, as indicated in the Durbin–Watson statistics of 2.03 and 2.43 for the official and parallel exchange rate models, respectively. The Breusch Pagan and ARCH tests for heteroskedasticity for the two models (0.178 and 0.254, and 0.134 and 0.078, respectively) shows that the residuals do not suffer from heteroskedasticity. The Reset test results (0.303 and 0.355) revealed stability of the two models. Lastly, the Skewness test results led to the rejection of the null hypothesis that the estimated residual series are not normally distributed for the two (official and parallel market exchange rate) models.

4.4.4. Short Run ARDL Results

From the short run results presented in Table 7, the lagged values of inflation were found to have a positive and statistically significant relationship with the current inflation levels through both (official and parallel exchange rate) models in the short run. Through the official exchange rate model, a percentage increase in the previous year's inflation will result in a 0.3% increase in the next year's inflation rate, while a percentage increase in the lagged value of inflation results in 8.9% potential increase in inflation in the short run. This means that inflation expectations positively influence the current general price level in the short run in Zimbabwe, thereby confirming the findings of Hoang et al. (2020) and Ozcelebi (2018). In the short run, the lagged values of both the official and parallel market exchange rates significantly affect the current inflation rate. The lagged values of the parallel market exchange rate significantly and positively influence (at the 1%, 5% and 10% levels of significance for the first, second, and third lags, respectively) the current rate of inflation. The lagged values of the official exchange rate weakly (at the 10% level of significance) and positively influence the current level of inflation through the second lag in the short run. This implies the lagged values of the parallel market exchange rate have more influence on the general price level in Zimbabwe than the lagged values of the official exchange rate in the short run. This is consistent with the findings of Roger et al. (2017), Ozcelebi (2018) and Sajid et al. (2024), while contradicting those of Jawo et al. (2023) and Ko and Win (2024) in the short run. The second lag of money supply was found to positively influence inflation in the short run at the 5% level of significance (a percentage increase in money supply would trigger a 1.07% increase in inflation in the short run) via the official exchange rate model channel and a positive impact on inflation via the parallel exchange rate model through the third lag at 10% level of significance. The short run result on exchange rates, money supply, and interest rates contradicts the findings of Jawo et al. (2023) and Ko and Win (2024), who concluded a negative relationship between the above variables and inflation, but consistent with those of Sajid et al. (2024). Real interest rates affect inflation via both the official and parallel market exchange rate models, with more impact via the official exchange rate model through the first and second lags at 1% and 10% levels of significance, respectively, and this was contrary to the findings of Jawo et al. (2023).

Trade balance affects inflation through the official exchange rate model in the second lag at the 10% level of significance. A percentage increase in the trade balance resulted in a 4.9% decrease in inflation. This means that, for an import dependent economy like Zimbabwe, increases in the trade balance are a result of increases in exports where exports also increase because of growth in production, hence the rate of inflation is bound to fall. In the parallel market exchange rate model, trade balance was found to be insignificant in influencing inflation despite positive signs than the theoretical negative signs; the only influence can be through imported inflation, since the major trading partner is South Africa, changes in the South African economy will exert have spill-over effects to economies that rely on it, like Zimbabwe, via trade connections. Foreign currency reserves negatively affect the inflation rate in Zimbabwe. Through the official exchange rate model, a percentage increase in reserves resulted in 5.2% and 2.6% reduction in inflation through the first and second lags of foreign exchange reserves, respectively. Through the parallel market exchange rate model, a percentage increase in foreign currency reserves resulted in a 1.7% decrease in inflation at a 10% level of significance. Given that, foreign currency reserves have a more significant impact on inflation through the official exchange rate channel than through the parallel market exchange rate route. This could be because the Zimbabwean economy is largely informal, hence reserves may not have any significant implications

on inflation through the parallel market rate, compared to through the official exchange rate channel.

Table 7. Short run results.

SHORT RUN RESULTS					
	Lags	**Official Exchange Rate**		**Parallel Market Rate**	
Inflation	D1	0.0300 **	0.171	0.089 ***	0.146
Official Exchange Rate	D1	0.022	0.003		
	LD	0.009 *	0.003		
Parallel Market Rate	D1			0.0089 ***	0.002
	LD			0.002 **	0.013
	L2D			0.157 *	0.017
Money Supply	D1	0.170	0.086	0.134	0.0885
	LD	0.0107 **	0.113	0.322	0.113
	L2D			0.028 *	0.078
Stock Prices	D1	−0.001	0.004	0.081	0.093
Real Interest Rate	D1	0.338 **	0.088	0.105 *	0.109
	LD	0.346 *	0.134	0.214	0.12
	L2D			0.444	0.117
Trade Balance	D1	−0.294	0.215	−0.003	0.007
	LD	−0.0491 *	0.218		
Foreign Currency Reserves	D1	−0.052 *	0.251	−0.017 *	0.068
	LD	−0.026 ***	0.005	0.03	0.159
	L2D	−0.575	0.469		
Foreign Prices (RSA General Price level)	D1	0.162	0.137	0.024	0.215
	LD	0.410	0.241	0.298 **	0.126
Domestic Productivity	D1	−0.539 **	0.118	−0.484 **	0.72
	LD	−0.002 *	0.001	−0.204 ***	0.062
Foreign Productivity	D1	−0.008	0.007	0.094 **	0.051
constant		7.267 ***	1,538	4.765 ***	1.359

In parenthesis ( ) are standard errors and ***, **, * denote significance level at 1%, 5%, and 10%, respectively.

Foreign prices were found to affect the rate of inflation in Zimbabwe only through the parallel market exchange rate channel. A percentage increase in foreign prices predicts a 29.8% increase in inflation in Zimbabwe through the parallel market exchange rate channel in the short run. If prices of basic commodities in south Africa (which constitute the consumer price index) increase, there are greater and significant increases in the price of domestic basic commodities in Zimbabwe. This could be because of very low industrial capacity utilization signaling low levels of production, resulting in domestic demand being significantly satisfied by imports. Therefore, increases in foreign prices (particularly in South Africa) will be directly transmitted to Zimbabwe prices. Zimbabwe is an economically weaker trading partner to South Africa, hence general price increases in the stronger country spill over to economically weaker trading partners. This results in imported inflation, worsened by the fact that Zimbabwe is an import dependent country (with

imports ranging from basic commodities to capital goods), as asserted in Kavila and Le Roux (2016). Therefore, foreign price levels have more effect on the inflation rate for Zimbabwe via the parallel market exchange rate model than the official exchange rate model. The positive relationship between inflation and foreign price levels in general is in agreement with the findings of Kavila and Le Roux (2017) and Tiedemann et al. (2024).

Domestic productivity was found to affect the domestic price level negatively through both the official and parallel market exchange rates in the short run, confirming the findings of Jawo et al. (2023) and Dekkiche (2022). A percentage increase in domestic production will result in a 53.9% and 48.4% decrease in inflation through the official and parallel market exchange rates, respectively, in the first lags all at 5% level of significance in the short run. Also, percentage increases in domestic productivity result in 0.2% and 20.4% decreases in inflation rates though the official and parallel market exchange rates at the 10% and 1% levels of significance, respectively. Given that, domestic rate of inflation is largely dependent on domestic productivity levels in the short run in Zimbabwe.

Foreign productivity was found to influence inflation positively through the parallel market exchange rate model, while there is no impact through the official exchange rate model. A percentage increase in foreign (South African) productivity resulted in a 9.4% increase in domestic price levels in Zimbabwe in the short run at the 5% level of significance through the parallel market exchange rate model (through the first lag), confirming the findings of Kavila and Le Roux (2017). Despite the "Zimbabwe is open for business" mantra by the second Republic, Zimbabwe is expensive for business, hence attracted investors did not complete their investment promises due to the considerable costs of production, resulting in low productivity growth and ending up increasing the demand for imports, including of basic commodities. Increased demand for imports results in increased demand for foreign currency, which the central bank cannot meet with its highly prioritized foreign currency reserves, and therefore the foreign currency demand will be met by the parallel market, where the rate will change frequently in line with the market forces (hence fluctuations) in the parallel market exchange rate. The parallel market exchange rate fluctuations result in price distortions that ultimately result in increased prices, even in the hard currency (the foreign currency component by retailers obliged to charge in local currency). The local currency values are constantly changing with fluctuations in the parallel market exchange rate, which is an unambiguous sign that the parallel market rate affects Zimbabwe macroeconomic fundamentals more than the official exchange rate. Also, in trying to make the local currency relevant, the fiscal and monetary authorities are forcing retailers to charge in local currency; however, some supplies are accessed in foreign currency or imported, whilst reserves are inadequate to sustain/defend local currency. As a result, retailers resort to dual pricing (imposing both a foreign currency price and a local currency price). However, the local currency price fluctuates daily as it is usually anchored on the parallel market exchange rate volatilities, hence it becomes very expensive to buy local in foreign currency, despite buying in local currency depending on the parallel market rate. Given that, the demand for imports increases irrespective of the availability of homogeneous commodities in the local market, thereby further crippling domestic productivity.

Zimbabwe operated under the fixed exchange rate system after adding the local currency component (Bond coins and notes fixed at 1:1 with the United States dollar and later proceeded by the less flexible foreign currency auction system). Fixed exchange rates are generally effective in more productive countries that export more and import less, so that they can accumulate significant amounts of reserves. Less productive countries under fixed exchange rates are more vulnerable to currency crises, as highlighted in the first-generation models of currency crisis. This is mainly because the local currency will be overvalued, hence it creates an artificially high demand for foreign currency compared

to what the monetary authorities can satisfy, ultimately resulting in price distortions and increases (inflation). Experience suggests that, once inflation reaches a high level and becomes volatile, inflation control is difficult and time-consuming in the absence of a strong and independent central bank that otherwise puts emphasis on economic stability in general and price stability in particular (Koch & Noureldin, 2023).

Inflation in Zimbabwe is currently more dependent on the parallel market rate than the official rate, given that the business community together with the public generally consider the official exchange rate as a pseudo exchange rate because it has less significant influence on critical macroeconomic fundamentals, and it is out of reach for the general populace, resulting in less significant influence on inflation dynamics in Zimbabwe. The parallel market exchange rate usually pulls the official exchange rate, resulting in monetary and fiscal authorities always following and fighting the parallel market exchange rate in trying to achieve exchange rate convergence and, ultimately, price stability. Exchange rate stability in a multicurrency system requires domestic productivity to be growing; hence, without domestic productivity growth, introducing a local currency component to the basket of currencies in circulation simply results in local currency depreciation and imminent collapse, because the demand for foreign currency will be high for the importation of goods that are not produced by domestic industries. With the pseudo-official exchange rate, together with the local currency component not being supported by local production, the monetary authorities failed to ensure currency credibility, and this resulted in some traders having the option to choose their preferred trading currency and rejecting the local currency, thereby rendering it useless. Some retailers who are forced to accept the local currency component charge separate prices (a local currency value and a foreign currency value) that should be convertible to each other through the official exchange rate, but they normally convert the price through the parallel exchange rate and its fluctuations and claim that the prices are independent of exchange rates. By charging prices based on the parallel market exchange rate under which the local currency constantly depreciates, price distortions then push the prices up resulting in inflation; hence the inflation rate seems much more responsive to the parallel market exchange rate than the official exchange rate.

5. Conclusions

As summarized in Table 8, the parallel market exchange rate was found to exert more, positive and statistically significant influence on inflation in Zimbabwe, both in the short and long run. However, the official exchange rate was found to positively influence inflation in Zimbabwe, despite having a lesser impact than the parallel market exchange rate in both the short and long run. Domestic productivity emerged to be one of the most critical and influential determinants of inflation dynamics in both the short and long run in Zimbabwe, where a negative relationship was revealed through both the official and parallel market exchange rate models. Given this, stabilization policies should aim to stabilize the exchange rates so that domestic productivity will thereby guarantee the acceptability and stability of local currency in the local market. Other variables that were found to affect inflation in Zimbabwe included stock market prices, real interest rates, trade balance, and foreign currency reserves through the official exchange model in the short run and varied impacts in the long run. However, through the parallel market exchange rate model, money supply, foreign currency reserves, foreign prices, foreign productivity and domestic productivity were found to statistically and significantly influence inflation in the short run in Zimbabwe. In the long run, through the official exchange rate model, money supply, real interest rate, foreign currency reserves, foreign price level, and domestic production were the statistically significant determinants of inflation, while parallel market exchange rate, foreign currency reserves, foreign prices, domestic and foreign productivity

were found to be statistically significant determinants of inflation through the parallel market exchange rate model.

Table 8. Summary of results.

	Short Run		Long Run	
Variable	**OExch Model (1)**	**PExch Model (2)**	**OExch Model (1)**	**PExch Model (2)**
Official Exchange Rate	Significant **	-	Significant *	-
Parallel Market Rate	-	Significant ***	-	Significant ***
Money Supply	Significant **	Significant *	Significant **	insignificant
Stock Market Prices	Significant ***	insignificant	insignificant	insignificant
Real Interest Rate	Significant **	insignificant	Significant *	insignificant
Trade Balance	Significant *	insignificant	insignificant	insignificant
Foreign Currency Reserves	Significant ***	Significant *	Significant ***	Significant **
Foreign Prices	insignificant	Significant **	Significant ***	Significant ***
Domestic Productivity	Negative ***	Negative ***	Negative ***	Negative ***
Foreign Productivity	insignificant	Positive **	insignificant	Positive **

In parenthesis ( ) are standard errors and ***, **, * denote significance level at 1%, 5%, and 10%, respectively.

In Zimbabwe, this phenomenon can be attributed to unstable macroeconomic conditions, mainly low and declining levels of domestic productivity. Failure to meet domestic demand for foreign currency (and excessive exchange rate controls) in Zimbabwe resulted in a thriving parallel or black market for foreign currency, which tends to be distortionary (as a large gap between official and parallel rates lead to inefficient allocation of resources). The parallel market exchange rate in Zimbabwe is a result of strict foreign exchange rate and capital controls that limit access to the official market, essentially creating a "black market" where currencies are traded at a significantly different rates, leading to substantial flows of money (both the local and foreign currency) through unofficial channels. The Zimbabwean government, through the Reserve Bank of Zimbabwe, fixes the official exchange rate at an artificially high level (overvaluing the local currency) compared to the market demand, thereby creating an incentive for individuals to seek for more favorable exchange rates in the parallel/black market, often through informal channels. Fluctuations in the parallel market rate can create significant uncertainty for businesses, hindering investment decisions. The fluctuations in the parallel market exchange rate in Zimbabwe tends to affect the official exchange rate, together with inflation, thereby worsening the macroeconomic situation through capital flight and low investment because the environment will be unconducive for business. The results from this study can be used in other developing countries that are going through macroeconomic challenges such as inflation and considering the adoption of multicurrency systems, providing information that can help them understand what to prioritize during the use of multicurrency (for instance, from this study's findings, domestic productivity growth); they may gain information about the timing of reintroducing their own currencies and the strategies used (gradually re-introducing or using the shock therapy approach—instant and instantly/completely abolishing the multicurrency system). Some countries may also design mechanisms to hedge against the destabilizing effects of the parallel exchange rate market if considering multicurrency systems by learning from the Zimbabwean experiences described in this study.

5.1. Policy Recommendations

In a multicurrency system like that in Zimbabwe, the exchange rate is a critical variable to be closely monitored. For a multicurrency system with no local currency, the official exchange rate is the most critical, while in multicurrency systems with local currency in

the basket of currencies in circulation, both the parallel and official exchange rates become important macroeconomic variables that need to be closely monitored. From the findings of this study, the parallel market exchange rate in Zimbabwe exerts more influence on inflation and hence should be given more attention. Clear and realistic signals for monetary policy direction depend more on the parallel market exchange rate, despite the need to also consider the official exchange rate. Given the significant effects of exchange rate changes on inflation, especially the parallel market exchange rate, the government should find lasting solutions to protect the economy from the destabilizing parallel market activities, in which the government is always on the verge of crafting defensive and reactionary policies in response to the parallel market speculative activities; instead, the parallel market should thrive on government policies (e.g., the monetary exchange rate), created to enable business survival and sustain their rent-seeking activities. Given the destabilizing effects of the parallel foreign exchange market, the government, through the Central Bank, could remove the local currency component of the multicurrency regime (thereby strengthening the multicurrency system). Therefore, it appears that the local currency components (Bond coins, Bond notes and the RTGS) were prematurely introduced, hence their imminent collapse without productivity backing. The main policy recommendation based on the findings from this study includes maintaining the multicurrency regime without the local currency component while targeting domestic productivity growth first, then reintroducing the local currency after realigning the macroeconomic fundamentals. On the re-introduction of the local currency, the government should adopt a mono-currency regime, which can be sustained if productivity grows first. Streamlining both Fiscal and Monetary policies towards boosting domestic production may help in sustaining the currency at re-introduction. An expansionary Fiscal policy (cutting taxes and increasing government expenditure) and contractionary Monetary policy (reasonably increasing interest rates, bank rate and reserve requirement ratios) mix in this regard would help simultaneously increase domestic production and reduce inflation.

In a multicurrency system, it is very important to keep the parallel market premiums very low by valuing the local currency realistically, depending on the currency back-up strategies (domestic productivity growth, import substitution, export promotion, foreign currency reserves accumulation to exchange rate stability), and avoid exchange rate misalignment (in this case, exchange rate (local currency) overvaluation). In addition, to ensure that the parallel market exchange rate activities are less destabilizing, the monetary authorities should target policies that try to achieve exchange rate convergence (of official and parallel exchange rates) so that arbitraging in the foreign currency market under a multicurrency regime becomes less profitable. This can be achieved though ensuring policies that boost domestic productivity faster than foreign productivity through tax incentives and subsidies to companies that produce substitutes for imports and export commodities. Such organizations should be considered as strategic companies to embrace the import substitution and export promotion strategies that will result in growth in trade balance, foreign currency reserves and local currency appreciation to exchange rate stability and certainty. Supply-side interventions will boost domestic production until industrial capacity utilization rises significantly, so that even a new local currency will be backed by production. Supply-side interventions may include respecting and issuing property rights to boost both domestic and foreign direct investment, privatization and commercialization, infrastructure development, and export promotion and import substitution industrialization. With the significance of the parallel market exchange rate on prices in Zimbabwe, policies should be directed towards making the market less profitable. A lasting stabilization policy mix (Fiscal and Monetary policies) could have been effective if

the government had delayed the introduction of the local currency until production and capacity utilization significantly increased.

For a small open economy operating under a multicurrency exchange rate regime, there is need to increase domestic productivity before introducing its own currency. This enables domestic demand to be met by domestic supply, hence there will be no need for imports. As indicated in the results, where domestic productivity was found to have a negative influence on inflation under all the models, both in the short and long run, increasing domestic production will go a long way towards reducing the appetite for imports (including for basic commodities). This can therefore be achieved through subsidizing local producers and giving tax holidays that may reduce the production costs and allow competitive prices to be charged in the global market. Despite the "Zimbabwe is open for business" mantra, Zimbabwe is expensive for business, making the business environment unconducive for productivity growth. For the mantra to realize the investment promises/commitments made by investors, costs of production should be significantly reduced through subsidies and tax incentives (i.e., an expansionary fiscal policy). The actual realization of investment promises will therefore result in increased domestic production that may result in exchange rate appreciation and price stability. Increasing domestic production causes domestic supply to exceed domestic demand. Excess domestic supply results in competitive prices, both in the domestic and global markets, thereby reducing imports and increasing exports. Growth in exports and the reduction in imports result in an increase in foreign currency reserves that causes appreciation of and stability of the local currency component of the multicurrency regime.

As evidenced by the results from this study, exchange rate stability results in price stability under multicurrency systems, and policy recommendations may also include central bank independence, so that exchange rate fluctuations and their possible implications on price and overall macroeconomic stability can be kept under strict surveillance. Experience suggests that, once inflation reaches a high level, control becomes very difficult and time-consuming in the absence of strong, independent central banks that put emphasis on price stability (Koch & Noureldin, 2023). Closely monitoring the exchange rates results in acknowledging and reacting to the macroeconomic and monetary signals (especially the parallel market exchange rate signals) in time, thereby reducing policy lags (both inside and outside lags) and simultaneously improving stabilization policy effectiveness. Delays and denials (such as unjustifiably maintaining the Bond notes and coins in parity with the United States dollar) in recognizing the thriving parallel market signals resulted in the monetary authorities being late react to dis-equilibriums, leading to inadequate/half-baked/ineffective policy responses that often result in the imminent collapse/crash of the local currencies. However, if the government wishes to retain its monetary sovereignty, it could fully liberalize the exchange rate. Fully liberalizing the foreign exchange market will help to arrest the destabilizing activities in the parallel market. This will also gradually bring the official and parallel rates closer to each other, resulting in official and parallel/black market exchange rate convergence.

During the multicurrency period from 2009 to 2014 (before the introduction of the local currency component into the basket of currencies), price stability was enjoyed, but since 2014, price instability has resurfaced. Gradual reintroduction of the local currency has resulted in failure of the local currency (Bond notes and coins to the RTGS) and triggered macroeconomic instability. With pressure to have a local currency for monetary policy sovereignty, the best strategy to reintroduce the local currency into the basket of foreign currencies is to do this in phases. First, domestic productivity growth should be promoted, waiting until industrial capacity utilization rises above 50%, and then waiting for industrial capacity utilization to exceed 75%, before de-dollarizing (returning to a

mono-local currency). Maintaining the multicurrency regime without the local currency component for a period is the best policy option until domestic productivity substantially grows and the realignment of other macroeconomic fundamentals is achieved. With either multicurrency without local currency or full dollarization, the country's macroeconomic environment becomes more credible as the possibility of speculative attacks on the local currency and capital market virtually disappears (Bonga & Dhoro, 2015). Maintaining the multicurrency system without local currency will help in the revival of industries that result in domestic productivity growth (as experienced in the period 2009 to 2014), restoration of confidence, and credibility in the economy. Increases in domestic output will result in domestic supply exceeding domestic demand, translating into growth in exports over imports. This will result in growth in foreign currency reserves that can be used to manage the exchange rate and help in bringing the exchange rate certainty through the reduction of exchange risk. However, if the authorities continue to push for the use of local currency in the basket of currencies, there are already signals that the economy is in the process of informally or self-dollarizing, as indicated by the rate at which the local currency is failing to purchase certain critical commodities and the insurgence of many retail outlets that currently not accepting the local currency, from the period of the RTGS currency to the now ZiG currency.

5.2. Recommendations for Further Studies

Future studies could consider other variables such as fiscal deficits and wage rates, as they are characteristic features of many developing countries, if data are available (as lack of these data limits the inclusion of such variables in this study). Likewise, future studies could compare the impact of exchange rates changes on inflation for the most recent period, after the collapse of the RTGS currency that is the Zimbabwe Gold (ZiG) currency. Further studies could also examine the impact of exchange rate convergence or divergence on inflation and other macroeconomic variables, thereby using the difference between the official and the parallel market exchange rates as the main dependent variable.

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